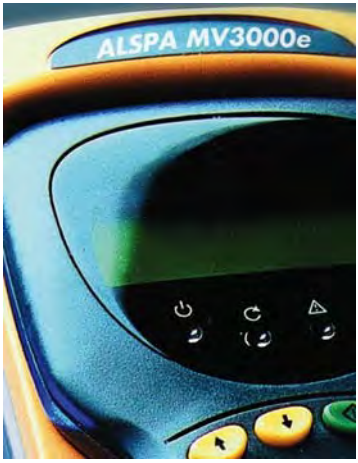


ALSPA MV3000e

Publication No. T1694EN Rev. 0004 (06/06)

PROFIBUS

Fieldbus Coupler MVS3007

CONVERTEAM

THE POWER CONVERSION COMPANY

SAFETY INSTRUCTIONS

Care has been taken with the design of this product to ensure that it is safe. However, in common with all products of this type, misuse can result in injury or death. Therefore, it is very important that the instructions in this manual and on the product are observed during transportation, commissioning, operation, maintenance and disposal.

This technical manual should be regarded as part of the product. It should be stored with the product and passed on to any subsequent owner or user.

Local safety laws and regulations must always be observed.

Persons working on the product must be suitably skilled and should have been trained in that work for these products.

The product is a component designed for incorporation in installations, apparatus and machines.

The product must not be used as a single item safety system. In applications where maloperation of the product could cause danger, additional means must be used to prevent danger to persons.

Product approvals and certifications will be invalidated if the product is transported, used or stored outside its ratings or if the instructions in this manual are not observed.

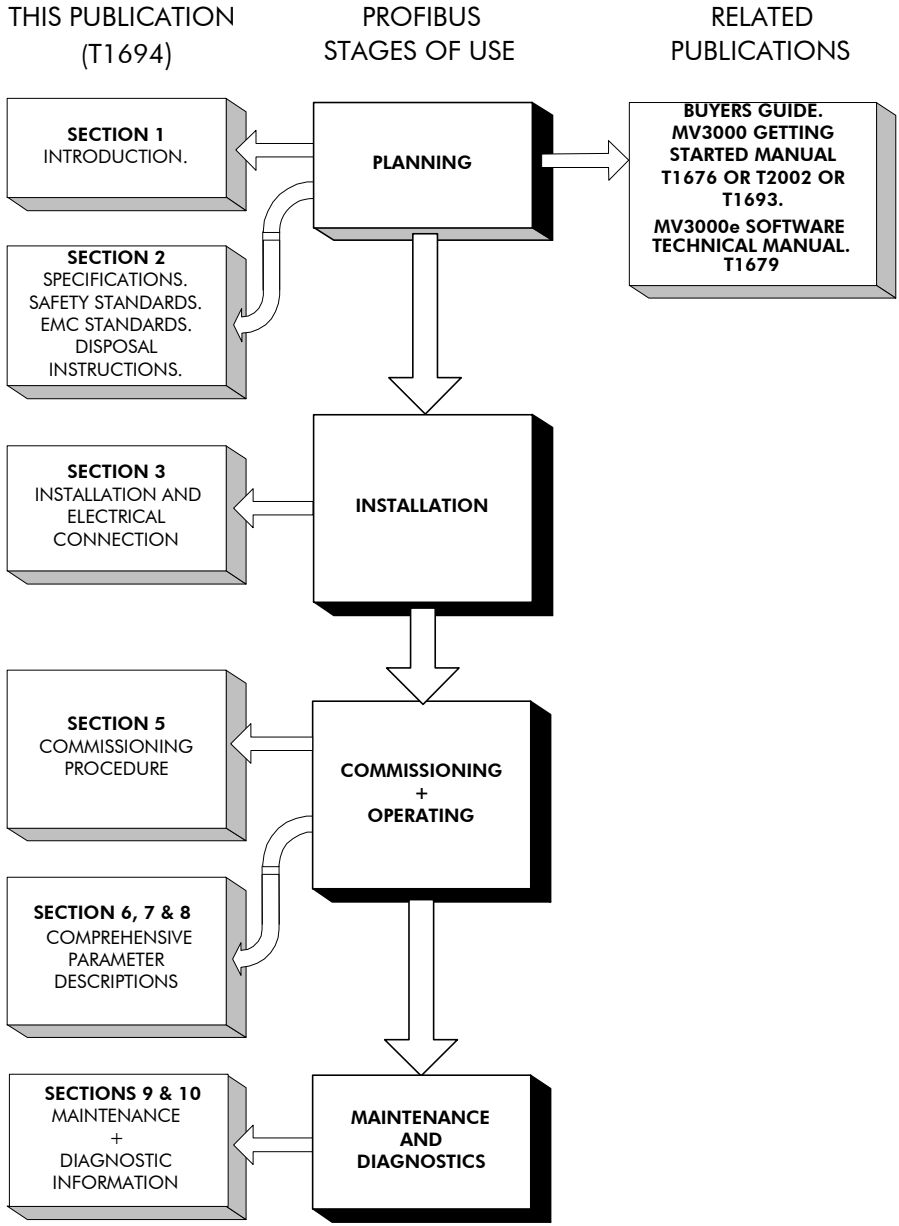
Third party approvals to safety standards UL 508C and CSA C22.2 No 14 are marked on the product.

In the European Union:

- Products within the scope of the Low Voltage Directive, 73/23/EEC as amended are CE marked.
- The product complies with the essential protection requirements of the EMC directive 89/336/EEC as amended, when installed and used as described in this manual. The requirements of the EMC Directive should be established before any installation, apparatus or machine which incorporates the product is taken into service.
- A machine should not be taken into service until the machine has been declared in conformity with the provisions of the Machinery (Safety) Directive, 98/37/EEC.

CHANGES FROM PREVIOUS EDITION

Original edition (02/00).
Two types of PROFIBUS module described and menu 74 added. (03/03)
Minor Modifications (07/03)
Minor Modifications following Product Validation (09/04)


THIS PUBLICATION (T1694)
PROFIBUS STAGES OF USE
RELATED PUBLICATIONS
SECTION 1 INTRODUCTION.
PLANNING
BUYERS GUIDE. MV3000 GETTING STARTED MANUAL T1676 OR T2002 OR T1693.
MV3000e SOFTWARE TECHNICAL MANUAL. T1679
SECTION 2 SPECIFICATIONS. SAFETY STANDARDS. EMC STANDARDS. DISPOSAL INSTRUCTIONS.
SECTION 3 INSTALLATION AND ELECTRICAL CONNECTION
INSTALLATION
SECTION 5 COMMISSIONING PROCEDURE
COMMISSIONING + OPERATING
SECTION 6, 7 & 8 COMPREHENSIVE PARAMETER DESCRIPTIONS
SECTIONS 9 & 10 MAINTENANCE + DIAGNOSTIC INFORMATION
MAINTENANCE AND DIAGNOSTICS

OVERVIEW

Explains how to diagnose faults using on-board LEDs and drive parameters.

Appendix A. Configuration example for first-time users.

Appendix B. Configuration tables.

Appendix C. Fault Return form.

Appendix D. Configuring the Master.

Glossary

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Section **Page**

1. Introduction

1.1 General Description

The ALSPA MV3000e PROFIBUS Fieldbus Coupler may be retrofitted to the whole range of ALSPA MV3000e drives and allows the drive to be connected to a PROFIBUS-DP network.

This manual describes the two types of PROFIBUS Fieldbus Coupler that may be fitted in an ALSPA MV3000e AC drive

- MVS3007-4001 supplied up to December 2002 and
- MVS3007-4002 supplied after December 2002.

1.2 PROFIBUS Configuration

The PROFIBUS board is used as a slave device on a PROFIBUS link.
The board is parameterised and controlled using the same parameter interface as the rest of the drive. The board may also be configured over the drive's serial links, but it is not possible to configure the board over the PROFIBUS link itself.

1.3 GSD File

The GSD file is used to provide a profile of the slave device to the master device on the bus. The files for both ALSPA PROFIBUS Fieldbus Couplers are provided on a diskette supplied with the PROFIBUS board.

1.4 Associated Publications

T1676 – ALSPA MV3000e Getting Started Manual
T1679 – ALSPA MV3000e Software Technical Manual
T1689 – ALSPA MV DELTA (Air Cooled) Technical Manual
T1693 – ALSPA MV DELTA (Liquid Cooled) Technical Manual

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2. Specification

2.1 PROFIBUS Board Specification

2.1.1 Fieldbus

Capable of communication rates from 9600 bit/s to 12Mbit/s (1.5M bits/s for MVS3007-4001 PROFIBUS board).
Automatic Baud rate[1] selection from the following list:

- 9,600 bits/s
- 19,200 bits/s
- 93,750 bits/s
- 187,500 bits/s
- 500K bits/s
- 1.5M bits/s
- 3M bits/s (MVS3007-4002 PROFIBUS board only)
- 6M bits/s (MVS3007-4002 PROFIBUS board only)
- 12M bits/s (MVS3007-4002 PROFIBUS board only)

2.1.2 PROFIBUS Protocol

Implements the PROFIBUS-DP Fieldbus protocol according to DIN 19245.

2.1.3 Data Refresh Rate

Data is exchanged between the PROFIBUS Fieldbus module and the drive's parameters every 10ms.

2.1.4 MVS3007-4001 board Data Volume

Cyclic Channel Receive:

- 1 control word (16 bit), and
- 5 reference demands (16 bit),

or,

- 2 control words (16 bit), and
- 4 reference demands. (16 bit).

[1] If at any time the baud rate is changed in the PROFIBUS-DP master then it is necessary to power cycle the drive for the change to be recognised by this module.

Cyclic Channel Transmit:

- 1 status word (16 bit), and
- 5 monitor values (16 bit).

2.1.5 MVS3007-4002 board Data Volume

Cyclic Channel Receive:

- 1 control word (16 bit), and
- 1, 5 or 9 reference demands (16 bit),

or,

- 2 control words (16 bit), and
- 0, 4 or 8 reference demands. (16 bit).

Cyclic Channel Transmit:

- 1 status word (16 bit), and
- 1, 5 or 9 monitor values (16 bit).

2.1.6 Data Consistency

CAUTION

When using the PROFIBUS interface to transfer values that span more than one 16-bit word (e.g. a 32-bit value) the interface does not guarantee that all members of the data set will be sent at the same time. The user must therefore ensure that the received value is valid.

This is best explained by an example:

The position Feedback is contained in two parameters, P38.02 and P38.03. If the drive is configured to transmit these parameters to the PROFIBUS network and the value is changing, the following sequence of values could be transmitted on consecutive PROFIBUS transmissions:

PROFIBUS Transmission Number	Actual Value	P38.03	P38. 02	Value Received over PROFIBUS
1	00009999	0000	9999	00009999
2	00010000	0001	0000	00000000[2]
3	00010000	0001	0000	00010000

2.1.7 Power Supply

Power is supplied by an internal 5V supply, with a nominal current consumption of 315mA

2.1.8 Physical dimensions

The PROFIBUS PCB measures 160mm by 100mm and weighs approximately 165g

2.1.9 Environment

Storage - Altitude (max.) 3000 m
Temperature range -25°C to +55°C
Relative Humidity 5% to 95% non-condensing

Transport -Altitude (max.) 3000 m
Relative Humidity ≤ 95% non-condensing
Vibration, drop IEC 60721-3-2 Class 2M1
Operating - Altitude (max.) 3000 m
Temperature range 0°C to +50°C
Relative Humidity 5% - 95% non-condensing
Vibration IEC 60721-3-3 Class 3M1 & EN50178

2.2 Safety Standards

pr EN50178 Electronic equipment for use in power installations.

2.3 EMC Standards

EN61800-3 / IEC61800-3.

[2] I.e. the value of P38.03 from transmission 1 and P38.02 from transmission 2.

2.4 Disposal Instructions

This equipment or any part of the equipment should be disposed of in accordance with the laws of the country of use.

3. Installation

3.1 PCB Handling Information

An earthed anti-static wristband must be worn when handling the PROFIBUS *board.*

3.1.1 Receipt of Equipment on Site

Where the PROFIBUS board is shipped separate to the general drive assembly, the equipment should be carefully unpacked and inspected for any signs of damage. Check the complete consignment against the packing slip for any loss in transit. If any damage or loss has occurred, contact your local supplier immediately giving the following details:

- A list of damaged or missing items.
- A description of the damage.
- The order number or packing slip details.

3.1.2 Storage

If the equipment delivered to site is not to be installed immediately:

- Re-pack it in its original packing material.
- Store it in a clean dry atmosphere, preferably at room temperature. See section 2.1.9.

3.2 Configuration Details for Drive Modules

There are two types of PROFIBUS board. The MVS3007-4001 board is identifiable by the daughter board mounted on pillars and the presence of the 8 way Dual in Line (DiL) switch, S3. See Figure 3-1 MVS3007-4001 PROFIBUS Board and Figure 3-2 MVS3007-4001 PROFIBUS Layout. The MVS3007-4002 board has neither the daughter board nor switch S3 fitted.

When fitted in a drive, the MVS3007-4001 and MVS3007-4002 PROFIBUS boards are differentiated by the position of the 9 pin D connector. The connector is in the middle of the MVS3007-4001 board, whereas on the MVS3007-4002 board the connector is close to the LED indicators.

It is important that the switches and links on the PROFIBUS board be set before installation into the drive, as changing these will require removal of the module.

3.3 MVS3007-4001 PROFIBUS Board Configuration

The switch settings and link connections that may be configured are shown in Tables 1 and 2. The default settings and connections are recommended for MV3000e applications and are indicated by asterisks *****.

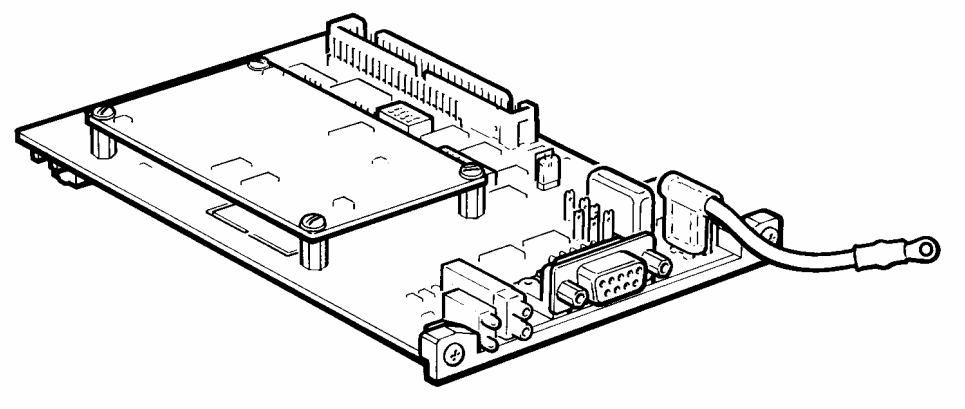


Figure 3-1 MVS3007-4001 PROFIBUS Board

3.3.1 Location of Switches

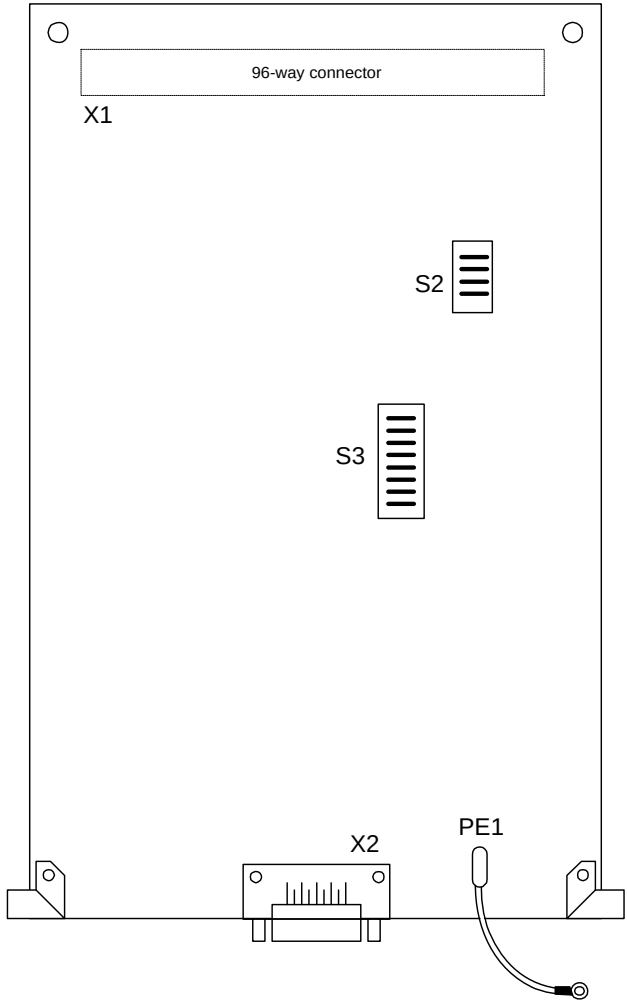


Figure 3-2 MVS3007-4001 PROFIBUS Layout

3.3.2 Switch Settings

The MVS3007-4001 PROFIBUS board has two Dual-in-Line switches, S2 and S3, which must be configured as per Tables 3-1 and 3-2.
The switches are located as shown inside the front cover.

Table 3-1 Switch S2 meanings

S2.1	S2.2	S2.3	S2.4	Dual Port RAM Address	Units
On	On	Off	Off	F000 – F3FF (Hex)	MV3000e *

Table 3-2 Switch S3 meanings

Switch (S) Jumper (X)	State	Meaning	
S3-1	On	Not used	
	Off	PROFIBUS DP mode	*
S3-2	On	MV3000e mode	*
	Off		
S3-3	On	Not used, must be Off	
	Off	Not used, must be Off	*
S3-4	On	Use PPO type 2 (10 words long)	
	Off	Use PPO type 4 (6 words long)	*
S3-5	On	Zero references on loss of Master	
	Off	Freeze references on loss of Master	*
S3-6 to S3-8	On	Not used.	
	Off	Not used.	*
X23	1-2	Watchdog monitors drive activity	*
	2-3	Watchdog monitors PROFIBUS module activity	

* Default settings/connections

3.4 MVS3007-4002 PROFIBUS Board Configuration

The switch settings and link connections that may be configured is shown in Table 3-3. The default settings and connections are recommended for MV3000e applications and are indicated by asterisks *****.

The MVS3007-4002 board is supplied with a terminator PCB that must be removed to gain access to switch S2. Replace the terminator PCB after adjusting switch S2.

3.4.1 Switch Settings

The MVS3007-4002 PROFIBUS board has one Dual-in-Line switch, S2, which must be configured as per Table 3-3.

Table 3-3 Switch S2 meanings

S2.1	S2.2	S2.3	S2.4	Dual Port RAM Address (Hex)	Menu Activated
On*	On*	Off	Off	F000 – F3FF	Menu 75
Off	On	Off	Off	F400 – F7FF	Menu 74

* Default settings/connections

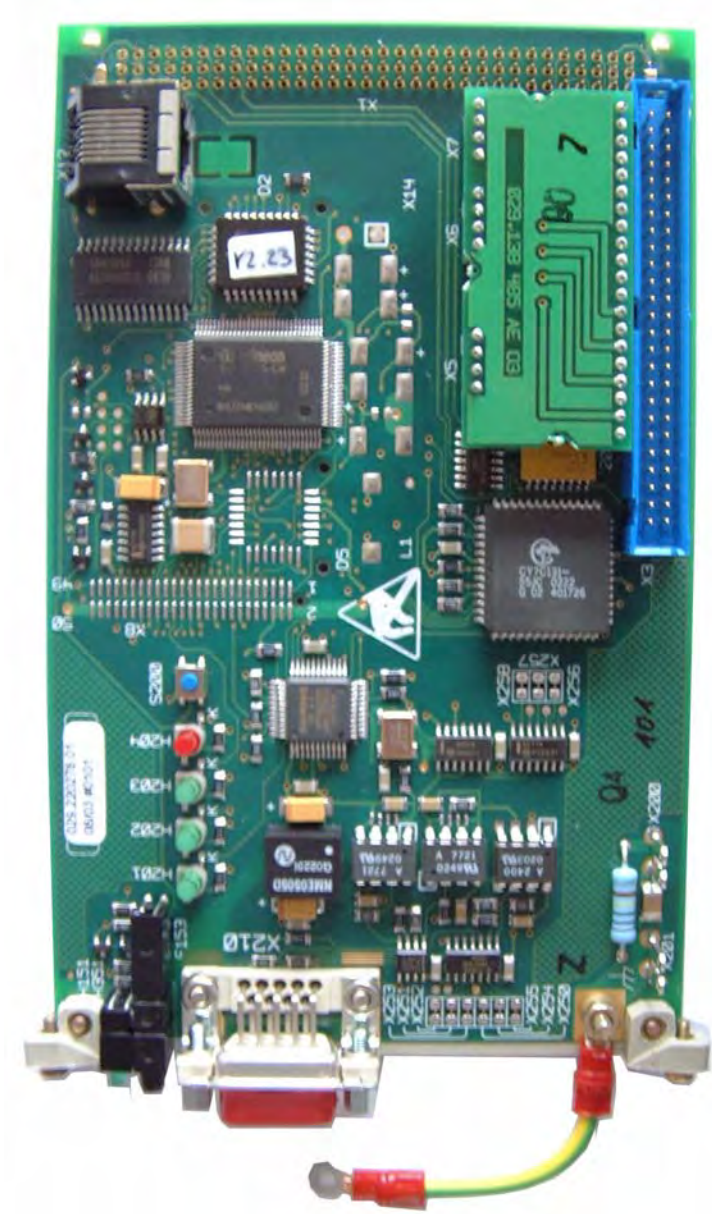


Figure 3-3 MVS3007-4002 PROFIBUS Board

3.4.2 Location of Switch S2

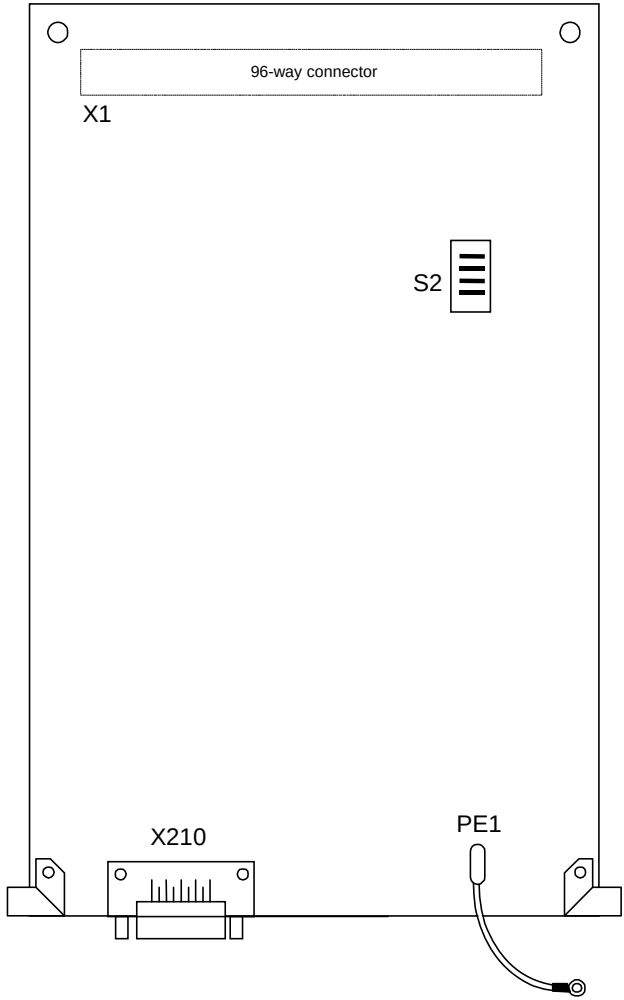


Figure 3-4 MVS3007-4002 PROFIBUS Layout

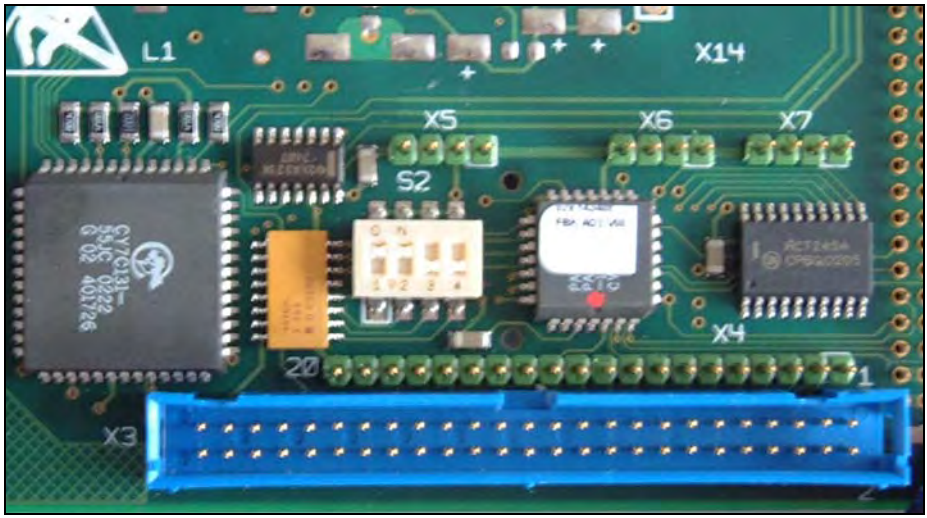


Figure 3-5 Close Up of S2 with terminator removed.

3.5 Installation Procedure for ALSPA MV3000e MicroCubicle™ Drives

1. Switch off the mains supply to the drive and ensure that the drive is fully isolated.

WARNINGS

- **This equipment may be connected to more than one live circuit. Disconnect all supplies before working on the equipment.**
- **Wait at least 5 minutes after isolating supplies and check that voltage between DC+ and DC- has reduced to a safe level before working on this equipment.**

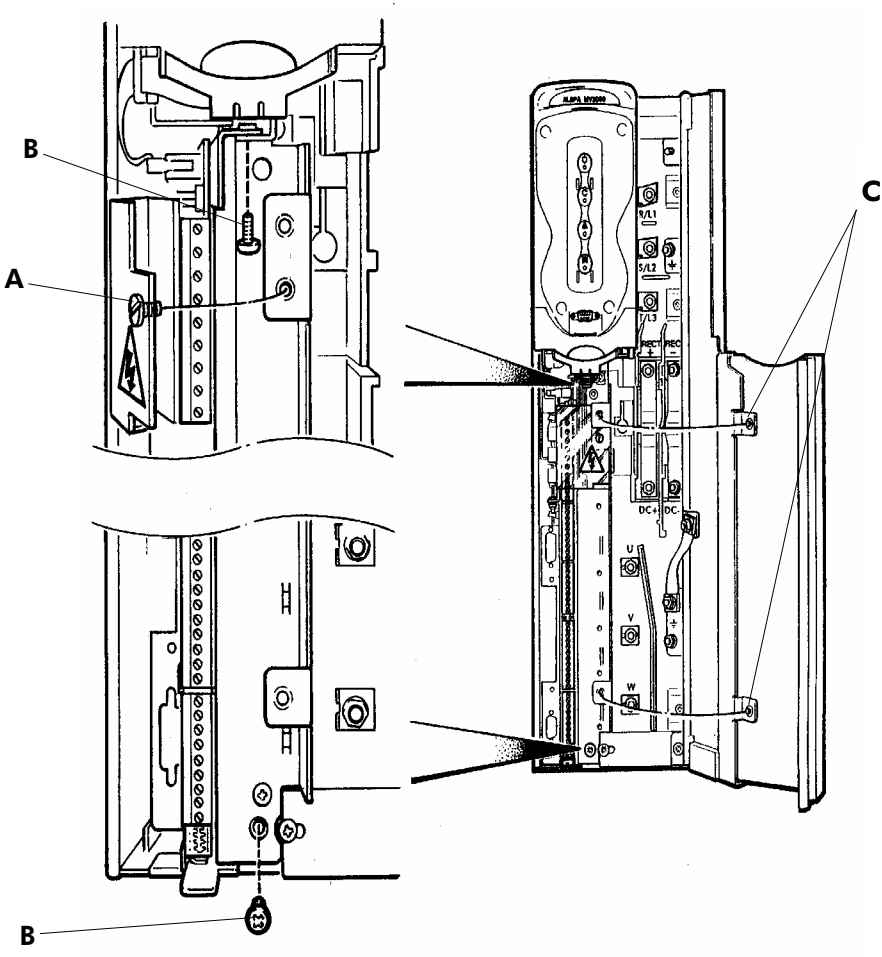
2. Refer to Figure 3-6 and fully open the drive doors as follows:

   i. Open the left hand yellow plastic door beneath the Keypad harbour by carefully pulling the bottom of the door and/or the depression at the top.

   ii. Open the right hand door by releasing the two screws (C).

3. Release the screw (A) securing the plastic terminal shroud. Remove and retain the two screws and washers (B) securing the control module to the drive chassis.

Figure 3-6 Drive module – access and release the control board



4. Slide the control board completely forward out of the drive, disconnecting any ribbon connectors located at the top of the board, (see Figure 3-7), and noting their positions for ease of re-connecting.

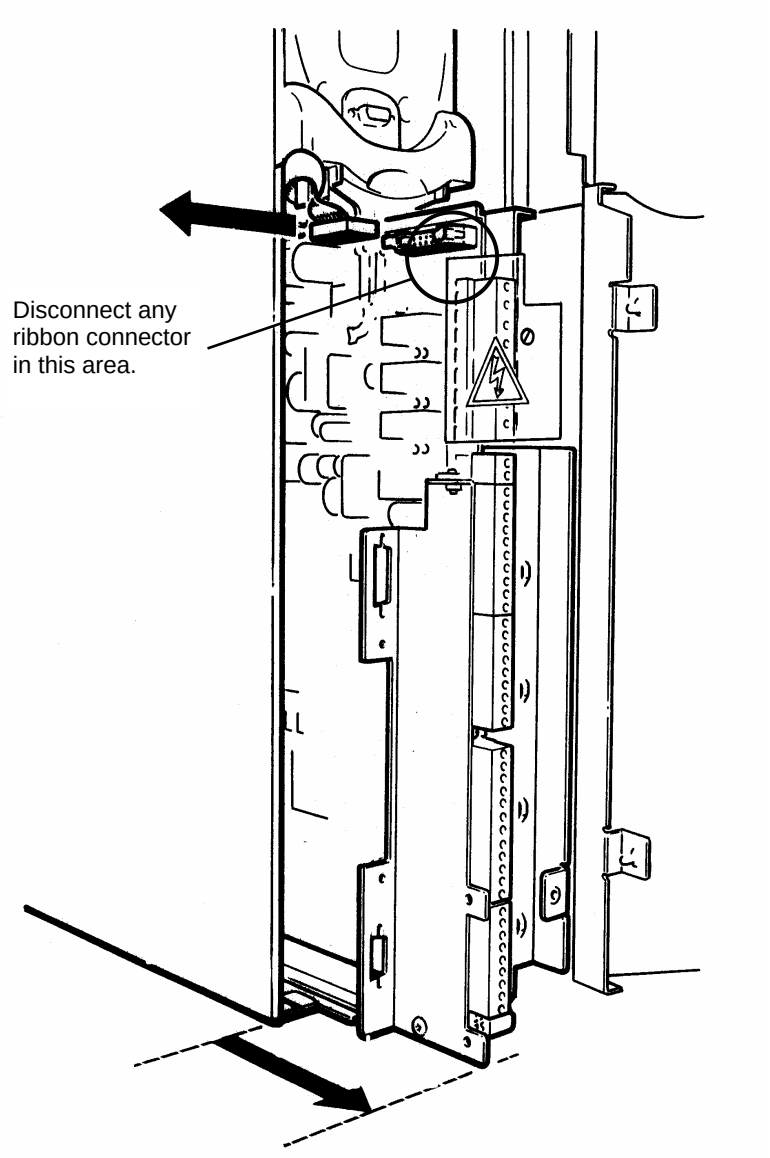


Figure 3-7 Drive module – removing the control board

CAUTION

This equipment contains solid state devices which may be affected by electrostatic discharge. Observe static handling precautions.

5. Fit the PROFIBUS board into the 96-way socket (B) at the back of the control board, as shown in Figure 3-8. Secure it to the steel front plate with the two screws provided, locating the ring crimp of the free yellow/green earth lead (A) under one of the screws.

6. Attach the label (C) if supplied, and fit dust covers (D) to any PROFIBUS connector that will be exposed for a lengthy period, see Figure 3-8.

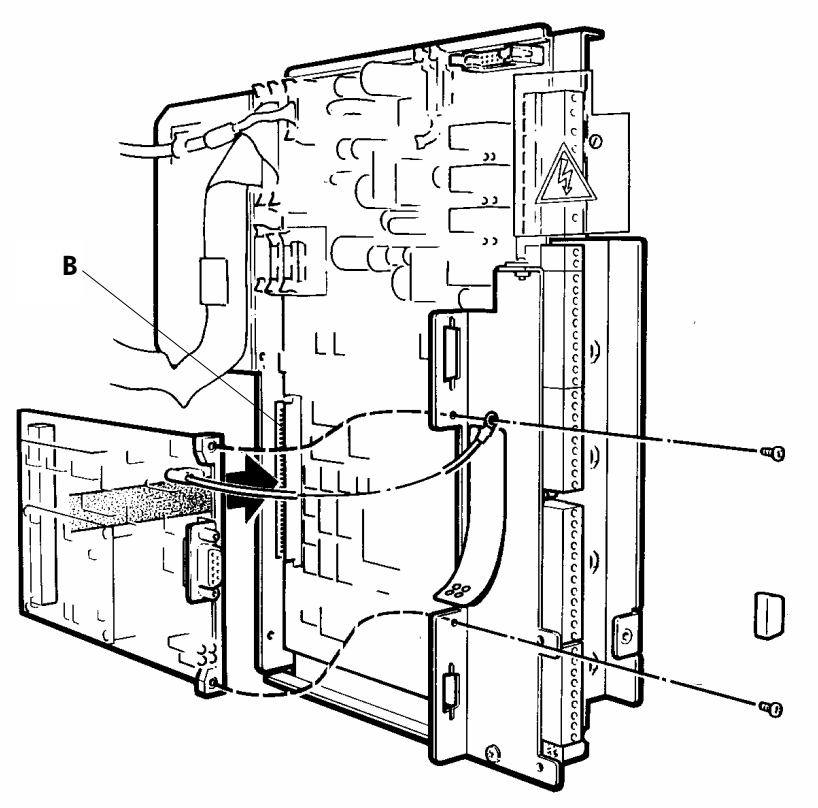


Figure 3-8 Drive module – fitting the PROFIBUS board

7. Slide the control module back into the drive and re-connect the ribbon connectors that were disconnected at step 4.

8. Secure the control drive to the drive chassis using the two screws and washers removed at step 3. Close the plastic terminal shroud and secure with the retained screw, then close and secure the drive doors.

3.6 Installation Procedure for ALSPA MV DELTA & MV-LCD Systems

1. Switch off the mains supply to the drive and ensure that the drive is fully isolated.

WARNINGS

- **This equipment may be connected to more than one live circuit. Disconnect all supplies before working on the equipment.**
- **Wait at least 5 minutes after isolating supplies and check that voltage between DC+ and DC- has reduced to a safe level before working on this equipment.**

2. Referring to Figure 3-9, remove the five M4 screws (E), and the M5 nut and washers (D) (next to the M5 earth stud), which secure the steel cover plate (G) covering the control board.

Note: If this is difficult due to restricted access, remove the MV3000e controller as described in T1689 (air cooled) or T1693 (liquid cooled).

3. Remove the two M4 screws securing the steel front panel (C) to the chassis.

CAUTION

This equipment contains solid-state devices that may be affected by electrostatic discharge. Observe static handling precautions.

4. Fit the PROFIBUS board to the front panel with the two screws provided, locating the ring crimp of the free yellow/green earth lead (H) under the nearest of the screws.

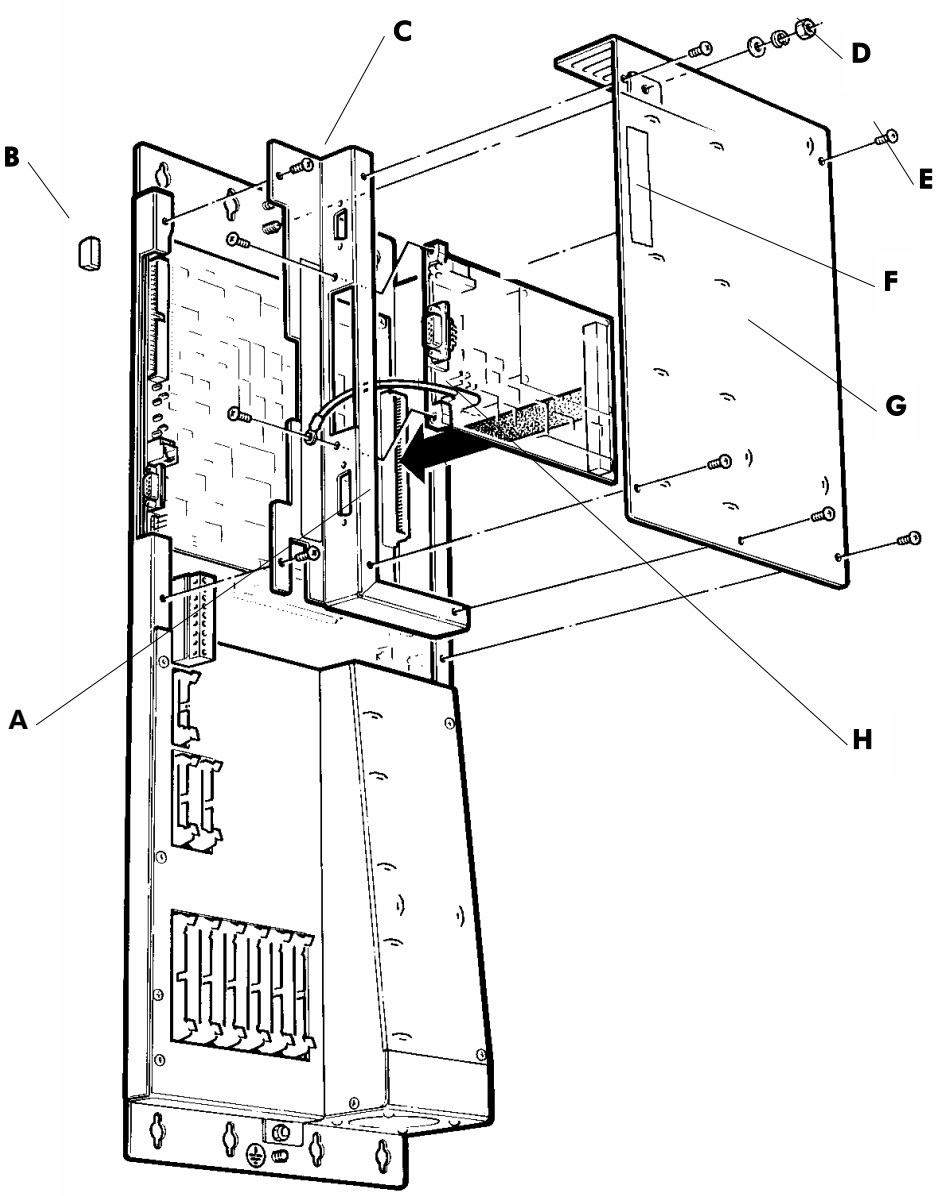


Figure 3-9 DELTA system – fitting the PROFIBUS board

5. Locate the 96-way connector on the PROFIBUS board into the socket (A) at the back of the control board, as shown in Figure 3-9. Secure the front panel to the chassis using the two M4 screws removed at step 3.
6. Attach the label (F) if supplied, and fit dust covers (B) to any PROFIBUS connector that will be exposed for a lengthy period, see Figure 3-9.
7. Re-fit the cover plate over the control board, using the five screws and the M5 nut and washers removed at step 2.

3.7 Connections

CAUTION

This equipment contains solid-state devices that may be affected by electrostatic discharge. Observe static handling precautions.

Connections to the PROFIBUS board must use 9 way D-type PROFIBUS connectors fitted with 440UNC screwjacks.

3.7.1 External Wiring

It is important to strain relieve the PROFIBUS cable before it is connected to the drive. Strain relief helps to prevent damage to the PROFIBUS connection or the cable being unexpectedly unplugged.

Electrical noise and electromagnetic interference can be introduced into a microelectronics system via the cables and wires connected to it. To avoid this, wiring which could carry noise, that is 'dirty' cables, should be kept away from cables that are to be kept free from electrical noise or 'clean'. Wiring that falls into the same group can be run together, while wiring from different groups should be kept apart, though paths may cross at right angles. All connections to the PROFIBUS board are considered to be clean.

3.7.2 PROFIBUS Connectors

The PROFIBUS board contains 1 external connection, a 9 way D-type female connector that is used to connect to the PROFIBUS network cable.

Connectors conforming to the PROFIBUS standard are recommended, e.g. DIN 41652.

Note that the making of a 'T' in the PROFIBUS network is not allowed, the cable must always be daisy-chained, as shown in Figure 3-10 below.

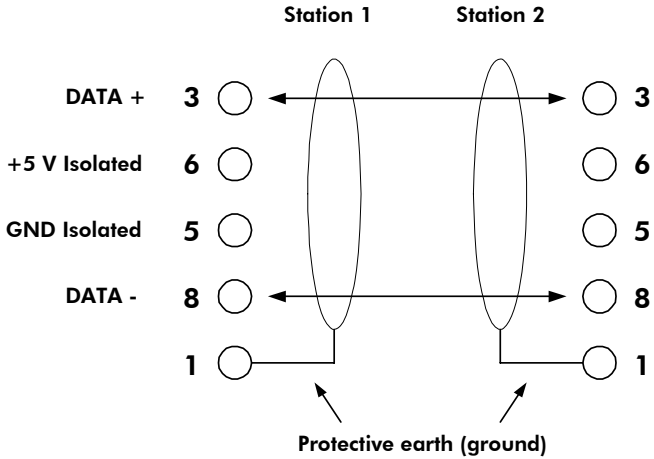
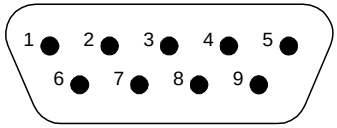


Figure 3-10 Interconnecting two PROFIBUS stations

3.7.3 9 Way DIN Connections



View looking into the mating face of the connector.

Figure 3-11 Pin-out of the PROFIBUS 9 pin D-type connector

The PROFIBUS connections are as follows:

Pin 1 = Protective earth (PE) or screen.
Pin 3 = DATA+
Pin 5 = GND (isolated)
Pin 6 = +5V (isolated)

Pin 8 = DATA–

3.7.4 PROFIBUS Cable

Twisted pair shielded cable equivalent to Belden 8227 is recommended.

- Two core cable, screened and twisted.
- Resistance 100 to 120 ohm at f > 100 kHz.
- Capacitance < 60 pF per meter.
- Minimum cross section of 0.22 mm^2 (24 AWG).

3.7.5 PROFIBUS Earthing

To ensure an EMC compliant installation, the network cable screens must be continuous.

On the PROFIBUS board, the protective earth (PE) is connected through the flat connector PE2 to the cable shield. The MV3000e enclosure must be connected to PE with the largest practicable cable cross-section.

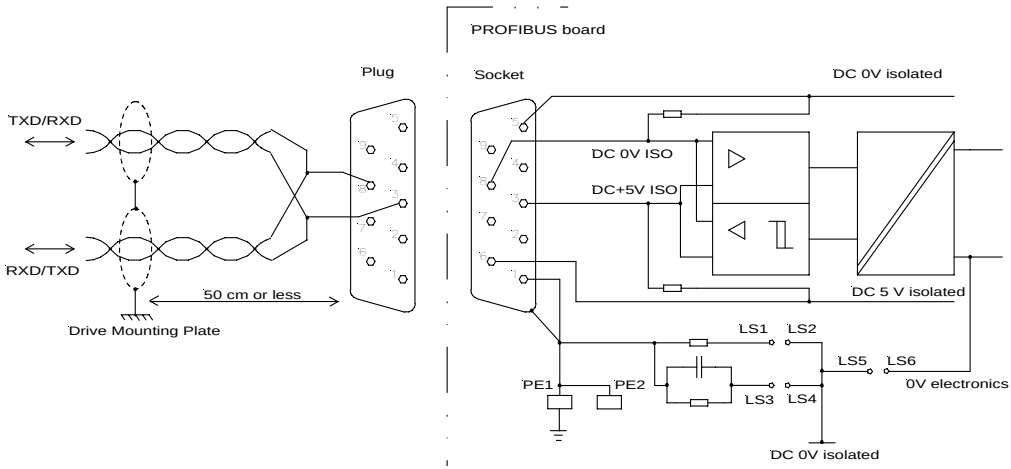


Figure 3-12 Protective earth arrangement

Note: Use a metal P-clip to bond the braid to the Drive mounting plate. The clip should be no more than 50 cm from the connector.

3.7.6 Bus cable termination

It is necessary to terminate both ends of the network, typically as shown in Figure 3-13. Power must be applied to both terminations to ensure correct operation.

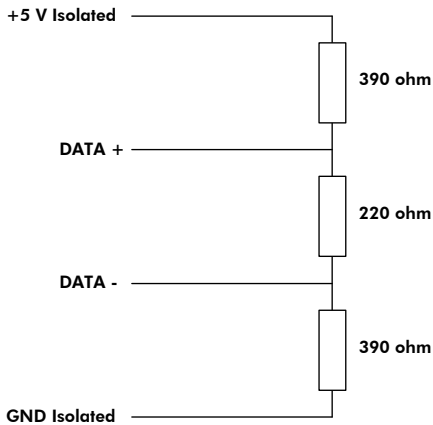


Figure 3-13 PROFIBUS link termination

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4. Commissioning

4.1 Mechanical Checks

Check that:

- The PROFIBUS board has been installed into the drive in accordance with the instructions given in Section 3.
- Refer to the Getting Started Manual T1676 for relevant checks of the Drive equipment.

4.2 PROFIBUS Configuration

The ALSPA MV3000e drives are configured, controlled and monitored by reading and writing drive parameter values. This principle extends to the PROFIBUS board when it is fitted. Drive parameters are accessed either:

- Using Serial Link communications, (not including the PROFIBUS Fieldbus).
- Using the Drive Data Manager™ (Keypad) or the PC programming package ALSPA Drive Coach.

Use of the Keypad and serial links for the drive is explained in the MV3000e Technical Manuals.

Sections 7 and 8 describe how to configure and control the PROFIBUS board, using the drive parameters. To aid configuration of the PROFIBUS board, a worked example is provided in Appendix A.

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5. PROFIBUS-DP Protocol

5.1 Introduction

This section gives a brief overview of the PROFIBUS protocol when applied to Variable Speed Drives.

5.2 PROFIBUS Protocol

The PROFIBUS board implements the PROFIBUS-DP protocol.

5.2.1 Process Data and PROFIDRIVE

CAUTION

When using the PROFIBUS interface to transfer values that span more than one 16-bit word (e.g. a 32-bit value) the interface does not guarantee that all members of the data set will be sent at the same time. The user must therefore ensure that the received value is valid.

Process data is transferred using the PROFIBUS process data object (PPOs) packets. The PROFIBUS Profile for Variable Speed Drives (PROFIDRIVE) contains the drive specific definition of these PPOs. Depending on the direction of the data transfer, the PPOs contain either control words and set points or status words and actual values. The PPOs are sent on a regular cyclic basis at a rate determined by the Baud rate and number of PROFIBUS devices on the network.

Refer to the example in 2.1.6.

5.2.2 Parameter process data object types

Within PROFIDRIVE, there are five different types of PPO. Each type of PPO is defined to contain all or some of the PPO fields.

The MVS3007-4001 PROFIBUS Fieldbus coupler only supports either the PPO type 2 or the PPO type 4 packet, selected by DIP switch S3-4, (see Section 3.3.2). The PPO type 4 packet is the shorter of the two and only contains the last 12 octets of the type 4 PPO. These are shown in Figure 5-1.

The fields are defined as 16 bit words. Two octets form one word.

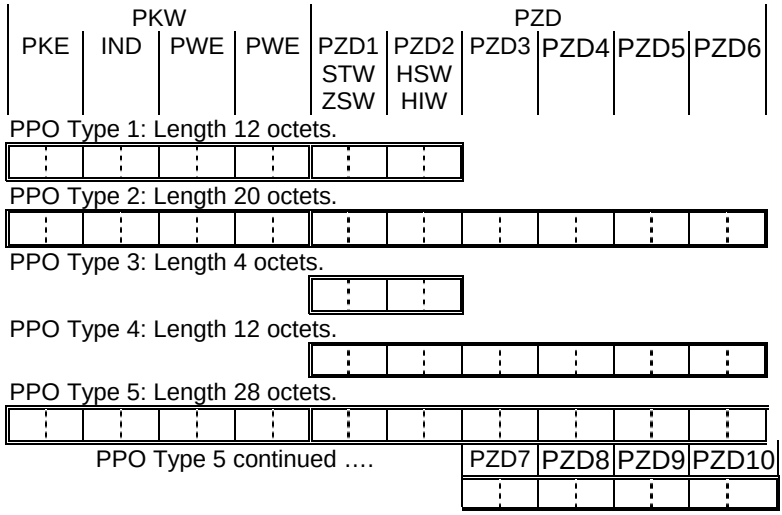

Figure 5-1 - Parameter process data objects

The abbreviations derive from the PROFIBUS definition of each and are kept the same to correspond to the PROFIDRIVE terminology:

PKW = Parameter ID/value
PKE = Parameter ID
IND = Sub-index
PWE = Parameter value

PZD = Process Data, cyclically transferred
STW = Control word
HSW = Main set point
ZSW = Status word
HIW = Main actual value

The MVS3007-4002 PROFIBUS card can be configured to any of PPO types 1 to 5 to provide 2, 6 or 10 reference and monitor words respectively.[3]

It is recommended that PPO types 1 and 2 are not used as their use will only consume PROFIBUS communication bandwidth

[3] If at any time the PPO type is changed then it is necessary to power cycle the drive for the change to take effect.

The type 1 PPO contains 4 words of PKW and 2 words of PZD data, the type 3 PPO only contains 2 words of PZD data. For applications that only require up to 2 references and/or monitor words, less PROFIBUS network communication bandwidth will be used. This may be an important consideration on a slow Baud rate network with a large number of nodes.

The type 2 PPO contains 4 words of PKW and 6 words of PZD data, the type 4 PPO only contains 6 words of PZD data. It is the PZD block that is used to transfer the references and monitored values.

The type 5 PPO will allow up to 10 references and/or monitor words. This setting will consume the most PROFIBUS network bandwidth and will additionally impose a slight increase in drive workload.

It is recommended that the smallest PPO size be selected to meet the needs of the application.

5.3 Configuring a PROFIBUS-DP Master

The PROFIBUS board is a slave device on the PROFIBUS network. The board is supplied with a disk containing a GSD file that contains details of the PROFIBUS board and the services it provides. The GSD file is required when configuring the master to talk to the module.

Use the correct GSD file for the PROFIBUS board used!

For MVS3007-4001 use Mv3_2002.gsd
For MVS3007-4002 use Alst2002.gsd

Appendix D provides some examples of configuring ALSPA C80-35 and its PROFIBUS-DP master.

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6. Menu Parameters

6.1 Introduction

This section describes the use of parameters. The next two chapters describe the Fieldbus Coupler menu parameters in detail.

6.2 Parameter Attributes

Each parameter has a number of attributes, which define the security classification, how the value is used and how the drive acts when a value is changed. The attributes for each parameter are given in the parameter list at the end of the relevant section.

The parameter attributes are as follows:

R = Read Only, these are either set during manufacture or are parameters that are used to monitor the state of various functions of the drive while it is running.

E = Engineer Accessible, these are drive configuration parameters which are set as part of the system design or during commissioning, and which should not be changed during normal operation. Refer to the drive manual for information on access control.

O = Operator Accessible, these are parameters which are used to control the drive within normal operating limits, and may need to be changed during normal operation. Refer to the drive manual for information on access control.

L = List Parameter, when stepping through the parameter values using the keypad up and down arrow buttons, the values are chosen from a pre-set list, and no intermediate values are available.

N = Enter Parameter, some parameters may cause undesirable results if intermediate values are passed to the drive immediately while stepping through the values. To activate a changed parameter value with an N attribute press the keypad ENTER button after selecting the correct value.

S = Stop To Edit, the drive must be stopped before this parameter can be updated.

6.3 Access Authority

Updating any of the user parameters is only allowed if the communications device attempting to read or write to the parameter has 'access' authority. The PROFIBUS Fieldbus has an ‘engineer’ status with regard to updating/accessing drive parameters.

The PROFIBUS Fieldbus has, generally, the same access authority as the RS232 and RS485 serial links detailed in the drive manual. The major exception to this rule is that the PROFIBUS network is not able to update its own configuration parameters.

6.4 List Parameters

When trying to access list parameters (see Section 6.2) it is important to note that the value required is not necessarily the value indicated by the keypad. The first element in a list parameter has a value of 1, the second parameter has a value of 2, and so on. The value displayed by the keypad may be different to this value. For example when configuring the RS232 serial link Baud rate, P32.10, the keypad options are 9.6, 19.2 and 38.4 K Baud, which correspond to values of 1, 2 and 3 when configured via a PROFIBUS network.

7. Menu 74 Parameters

7.1 Introduction

This section describes the method of controlling the PROFIBUS board, using the drive parameters available in Menu 74.

The section gives a list of those parameters necessary to get the PROFIBUS link operational, and then details the functions of the remaining parameters. The section ends with a list of all the parameters associated with the PROFIBUS board.

7.2 PROFIBUS Menu 74

The configuration of the PROFIBUS board is implemented via Menu 74, which will be visible if the CDC recognises the presence of an appropriately configured Fieldbus Coupler (see sections 3.3.2 and 3.4.1). Menu 74 is fully described in Section 7.4.

7.3 Basic Settings Explanation

The basic settings are those required to get the PROFIBUS board operating and to define the basic operating modes of the board. A block diagram is provided at the end of the manual to help with configuration of the PROFIBUS board.

The stages in configuring a MVS3007-4001 or MVS3007-4002 PROFIBUS board are as follows:

1. Set up the PROFIBUS network node address in Parameter 74.02
2. Select and set up the PPO type in Parameter 74.03[4]
3. Configure the PROFIBUS references and PROFIBUS control words in Menu 74.
4. Set P74.05 to 1 to configure the link.

[4] If at any time the PPO type is changed then it is necessary to power cycle the drive for the change to take effect.

7.4 Menu 74 Description

7.4.1 Expansion bus device P74.00

The hardware identifier is a read only value that indicates the type of Expansion board bus fitted to the system. Valid values are :

3 Fieldbus Coupler.

7.4.2 Protocol P74.01

Only one option is allowed for this parameter:
3 PROFIBUS-DP

Other values are reserved for future Fieldbus protocol standards.

7.4.3 Node Address P74.02

Each node attached to a PROFIBUS network needs to have a defined unique node address.

Important: No PROFIBUS board may have the same node address as another device connected to the same network.

When requested, the PROFIBUS board indicates its presence to the bus master. If multiple boards are configured with the same node address they will all try to respond at the same time.

For the PROFIBUS board the node address is defined by P74.02. The node address may be any number between 2 and 126 inclusive. It is usual for the PROFIBUS master to take node address 1, and for node address 127 to be reserved for multi-cast messages.

7.4.4 PPO Type P74.03

Set this to 0 (DiL switch) if an MVS3007-4001 PROFIBUS board is being used.

Otherwise set the value to the desired PPO type (see section 5.2.2). This parameter must be set BEFORE a 'configure' command is instructed.

The drive software also uses the setting of this parameter to decide if the board is an MVS3007-4001 or an MVS3007-4002 type. Therefore, it is important that this parameter be correctly configured.

7.4.5 Auto Configure P74.04

WARNING

The user should be aware that allowing the PROFIBUS link to automatically configure and run on power up could represent a possible safety hazard as the data from the network will be acted on by the Drive.

Many users may require the PROFIBUS link to be automatically configured and run as the drive powers up. This option is available by setting P74.04 to a 1. This would normally be the last step during commissioning of the link.

For safety reasons the value of P74.04 is set to a default value of zero.

7.4.6 Configure Link P74.05

Once the node address and PPO type have been entered, it is necessary to instruct the firmware to update the PROFIBUS board's configuration. To do this set P74.05 to a 1. The firmware automatically rewrites this value to a zero when configuration is complete. Only after this occurs will any changes to the board's configuration take effect.

The PROFIBUS node address can only be reconfigured once per power up. If the node address needs changing, the new node address must be programmed and then the drive power cycled.

If P74.04 was set to a 1 prior to a power-up, setting P74.05 to a 1 will not change the node address until the power is cycled.

If pointer and scale parameters are changed, a 'configure' link operation is required before the new values are utilised. In this case there is no requirement to power-cycle the drive.

7.4.7 Use FBC Data P74.06

The default value of this parameter is 1 (Enable). If it is set to 0 (Disable), the 'receive network data' is scaled and can be viewed by the spy viewer, but the data will not be copied to the destination parameters specified by the receive pointers.

7.4.8 Source Loss Action P74.07

A loss of reference may be declared if the PROFIBUS link detects a loss of communications with the master.

When a loss of reference is declared, one of three things can happen depending on the setting. Valid values:

0 Ignore loss of reference errors and carry on running.
1 On a loss of reference set a warning and carry on running.
2 On a loss of reference trip the drive.

The warning code for loss of communications is 106, and the trip code is 204.

Status flag 97 indicates whether Fieldbus communications are healthy or not. Status flag 97 can be viewed using parameter P11.35.

7.4.9 Freeze/Fallback Action P74.08

On an MVS3007-4001 PROFIBUS card, switch S3-5 (see Section 3.3) must always be set to OFF.

This parameter determines the action taken by the drive if the link to the PROFIBUS master fails. It affects what values are copied into the Fieldbus reference parameters defined in Section 7.4.12. If freeze is selected the parameter value freezes to the last good received data. If fallback is selected, the associated fallback value (refer to Table 7-5, parameters 74.20 to 74.43) is copied into the appropriate references.

7.4.10 Communications Status P74.09

This parameter displays one of the values shown in Table 7-1 depending upon the state of the PROFIBUS board interface.

Table 7-1 Communications status

Value	State	Meaning
0	On-line	The PROFIBUS board is communicating correctly.
1	Not configured	**The PROFIBUS board has not yet been configured with a valid node address.**
2	Network not found	The PROFIBUS board has been configured, but no network messages have been detected.
3	Not communicating	The PROFIBUS board has been configured, the network Baud rate deduced from the presence of traffic, but either this slave address is not being polled from the master, or the PROFIBUS board does not support the type of data packet the master is configured for.

7.4.11 Data Errors P74.10 to P74.13

When transferring data between the PROFIBUS link and the Drive parameters, several possible errors could occur. If an error does occur then it is logged in P74.10 or P74.12. Parameters P74.10 and P74.12 log the errors that occurred transferring the data and P74.11 and P74.13 log the total number of errors. The error format is as follows:

Bit 0 Reserved
Bit 1 Parameter write access denied, parameter has ‘R’ attribute set
Bit 2 Data clamped to lower limit before being written
Bit 3 Data clamped to upper limit before being written
Bit 4 Data below bit parameter range and not written
Bit 5 Data above bit parameter range and not written
Bit 6 Reserved

Bit 7 Attempt to write to a stop to edit parameter when running, data ignored.
Bit 8 Attempt to read from a non-existent parameter
Bit 9 Parameter read access denied.
Bit 10 Reserved
:
:
Bit 15 Reserved

For each transfer all the data errors are flagged, and a counter is incremented for each transfer error. Note that the error counter is allowed to rollover and is reset when the PROFIBUS board is configured. When writing data outside the normal range of a parameter, the data is clamped to the maximum or minimum value. Bit parameter values outside the normal range are ignored.

For example if the following information was viewed:
P74.44 = 0300H (= 0000 0011 0000 0000 binary)
P74.45 = 21

This indicates that one of the monitor parameters configured attempted to read from a non-existent parameter, and another parameter attempted to read a parameter that did not have Fieldbus read access. The error counter indicates that a total of 21 errors had occurred since the last PROFIBUS configuration.

Note that entering a zero as a monitor parameter to be read or written will not produce an error.

7.4.12 Reference holders P74.20 to P74.38

The PROFIBUS module can provide up to 10 references for use within the drive. These references can be used to control such values as the speed (if pointed to by one of the speed reference pointers). The PROFIBUS reference module needs to be used in conjunction with Menu 42 (the Pointer Menu), which is described in Section 6 of the Software Technical Manual T1679.

WARNING*:*

Ensure that no two Fieldbus parameters are mapped to the same Drive parameter as this will lead to unpredictable results.

If a loss of PROFIBUS reference is declared, (see Section 7.4.8) the reference value will no longer be updated by the PROFIBUS link. In this situation the user has the choice of using the last value obtained from the PROFIBUS link or using the fallback value.

Each reference has an associated fallback value that will be copied into the reference value as soon as a loss of PROFIBUS event occurs. Fallback copying only occurs if the freeze/fallback parameter is set to fallback.

The fallback value will be valid until the PROFIBUS network recovers, at which time the PROFIBUS data will be used.

Be aware that the fallback mechanism only applies to values in the even numbered parameters between P74.20 to P74.42. Received data transferred directly to Drive parameters will not have the fallback option but will freeze on loss of the network – refer to the block diagram at the end of this manual.

Note also that all fallback parameters will be copied to their partner parameter whether or not the parameter is in use.

Table 7-2 illustrates the relationship between the received PPO word and the parameter pointers and reference "holders" (destination parameters) – refer also to the block diagram.

Table 7-2 Received PPO data mapping example for PPO type 4

PPO Reference	Parameter Pointer	Holder (Destination Parameter)	
PZD1 (STW)	P74.50	=	74.40
PZD2 (HSW)	P74.52	=	74.20
PZD3	P74.54	=	74.22
PZD4	P74.56	=	74.24
PZD5	P74.58	=	74.26
PZD6	P74.60	=	74.28 or 74.42

Entering a value of 0 in a pointer parameter will mean that any data associated with that parameter is ignored, as P0.00 is not a valid parameter.

7.4.13 Control Words P74.40 & P74.42

The PROFIBUS board can provide a source for two control word parameters. Control flags are explained in the Getting Started Manual T1676, but basically allow control of such functions as starting and stopping via a single bit in a 16-bit parameter. The two control word parameters are capable of controlling 32 control flags.

Normally, only one word of 16 control flags would be sufficient to control the drive. If more than 16 control flags are needed, P74.42 can be used to hold a further 16 control flags. While any of the received words can be mapped to this parameter, it is recommended that the last word be used for the second control word.

Control flags in the FBC control words are selected by specifying a control flag source (CFSRC) value in the range 5.000 to 5.031 which correspond to FBC bits 0 to 31 respectively.

The description of how to map control flag parameters to the drive's control flags in Menus 33 and 34 is given in manual T1676, and in more detail in the Software Technical Manual T1679. The control flag parameters also have an option of a fallback value if a loss of Fieldbus reference is declared.

7.4.14 Received Data Parameters P74.50 to P74.69

In order to use the data received in the PPO, it must be placed somewhere for the drive to use. These Parameters allow the relevant PPO word to be placed in a destination parameter. While some parameters can be directly written to, others, such as references, cannot. For this reason a group of reference parameters are available to hold the received reference. Menu 42 then points to these references for inclusion into the relevant reference selector.

Each receive parameter pointer has an associated scale parameter. This is to allow network units to be converted to drive units.

Internally, the drive represents 100.00% with a value of 10000. The PROFIDRIVE profile can represent 100.00% with a value of 16384. In order to scale received set point references to the drive's internal representation for 100.00% the parameters in menu 60 (see 7.5) allow the user to specify what numerical value is being used by the

PROFIBUS network to represent 100%. The default scale is set to unity.

7.4.15 Transmitted Data, P74.70 to P74.89

To put data into the transmit PPO, it must be taken from somewhere within the drive. Parameters P74.70 to P74.89 allow the relevant PPO word to be allocated. See Table 7-3.

Table 7-3 Transmitted PPO data mapping example for PPO type 4

Parameter	Value	Meaning
Example		
P74.72	P9.01	= PPO PZD2 (Speed feedback)
P74.73	1	= Speed (%) scaler
P74.70	P(0-99.99)	= PPO PZD1
P74.71	0 to 15	= Scaler (0 = unity)
P74.72	P(0-99.99)	= PPO PZD2
P74.73	0 to 15	= Scaler (0 = unity)
P74.74	P(0-99.99)	= PPO PZD3
P74.75	0 to 15	= Scaler (0 = unity)
P74.76	P(0-99.99)	= PPO PZD4
P74.77	0 to 15	= Scaler (0 = unity)
P74.78	P(0-99.99)	= PPO PZD5
P74.78	0 to 15	= Scaler (0 = unity)
P74.80	P(0-99.99)	= PPO PZD6
P74.81	0 to 15	= Scaler (0 = unity)

The PROFIDRIVE standard specifies that PZD1 (ZSW) contain a status word following the definition in Table 7-4. The Programmable Status Word in P41.32 or P41.33 is a collection of status bits specified by parameters P41.00 to P41.15, or P41.16 to P41.31. These can be used to set up the status word required by PROFIDRIVE, and then point P74.30 to P41.32 or P41.33.

Table 7-4 Allocation of the status word bits (Speed control mode)

Bit	Meaning
0	Ready for switch-on / not ready for switch-on
1	Ready for operation / not ready for operation
2	Operation enabled / operation inhibited
3	Fault / no fault
4	No OFF 2 / OFF 2
5	No OFF 3 / OFF 3
6	Switch-on inhibit / no switch-on inhibit
7	Warning / no warning
8	Set point/actual value within tolerance range / Set point/actual value not within tolerance range
9	Control requested / operation on site
10	speed reached/ speed under range
11	Device-related
12	Device-related
13	Device-related
14	Device-related
15	Device-related

Each location in the PPO sent back to the PROFIBUS master is specified according to Table 7-3.

For example, it is decided to monitor 4 parameters, Speed feedback (P9.01), Current feedback (P9.05), Motor volts (P9.07) and Motor power (P9.08).

To configure the first parameter source, set P74.72 = 9.01
To configure the first parameter scale, set P74.73 = 1 (speed(%))
To configure the second parameter source, set P74.74 = 9.05
To configure the first parameter scale, set P74.75 = 7 (Current)
To configure the third parameter source, set P74.76 = 9.07
To configure the first parameter scale, set P74.77 = 10 (Volts)
To configure the final parameter source, set P74.78 = 9.08
To configure the first parameter scale, set P74.79 = 6 (Percent)

Note*:* When entering parameters via the Keypad, it is important that any leading zeros are entered after the decimal point. Entering 9.1 will result in P9.10 being used, not P9.01.

Entering a value of 0 in a source pointer parameter will mean that a corresponding value of 0 is written to the PROFIBUS network.

7.4.16 FBC 1 Config Menu 74

Table 7-5 FBC 1 Config Menu 74

Par No	Name	Default	Range	Attrib.	Comment
P74	FBC 1 Config Menu				
P74.00	Expansionn Bus Device	Monitor	3=Fieldbus Coupler	R	
P74.01	FBC1 Protocol	3	3=PROFIBUS-DP Slave	E.L.N.S	
P74.02	FBC1 Node Address	0	0 .. 127	E	1..127 for PROFIBUS
P74.03	FBC1 PPO Type	4	0=DiL switch 1=PPO Type 1 2=PPO Type 2 3=PPO Type 3 4= PPO Type 4 5= PPO Type 5	E.L	Option 0 for MVS3007-4001 boards only.
P74.04	Auto Config. FBC1	0	0=Disable 1=Enable	E.L.N	
P74.05	Configure FBC1	0	0=Disable 1=Enable	E.L.N	
P74.06	Use FBC1 Data.	1	0=Disable 1=Enable	E.L	
P74.07	Ref. Loss Action	1	0=Ignore 1=Set Warning Bit 2=Trip Drive	E.L	
P74.08	FBC1 Fallback Action	1	0= Freeze 1= Fallback	E.L.S	
P74.09	FBC1 Comms. Status	Monitor	0=On-line 1=Not configured 2=Network not found 3=Not communicating 4=Unknown Protocol 5=Promptness Error 6=Freshness Error 7=Synchronize Error 8=Config. Fault 9=Internal FBK Error 10=Sched. Build Error 11=FBK Scaling Fault 12=Drive Fault	R	
P74.10	FBC1 Tx Error Word	Monitor	0000 to FFFFhex	R.	
P74.11	FBC1 Tx Error Count	Monitor	0-65535	R	
P74.12	FBC1 Rx Error Word	Monitor	0000 to FFFFhex	R.	
P74.13	FBC1 Rx Error Count	Monitor	0-65535	R	
P74.20	FBC1 Reference 1	0	±200.00 %	E	
P74.21	FBC1 Ref. 1 Fallback	0	±200.00 %	E	
P74.22	FBC1 Reference 2	0	±200.00 %	E	
P74.23	FBC1 Ref. 2 Fallback	0	±200.00 %	E	
P74.24	FBC1 Reference 3	0	±200.00 %	E	
P74.25	FBC1 Ref. 3 Fallback	0	±200.00 %	E	
P74.26	FBC1 Reference 4	0	±200.00 %	E	
P74.27	FBC1 Ref. 4 Fallback	0	±200.00 %	E	
P74.28	FBC1 Reference 5	0	±200.00 %	E	

Par No	Name	Default	Range	Attrib.	Comment
P74.29	FBC1 Ref. 5 Fallback	0	±200.00 %	E	
P74.30	FBC1 Reference 6	0	±200.00 %	E	
P74.31	FBC1 Ref. 6 Fallback	0	±200.00 %	E	
P74.32	FBC1 Reference 7	0	±200.00 %	E	
P74.33	FBC1 Ref. 7 Fallback	0	±200.00 %	E	
P74.34	FBC1 Reference 8	0	±200.00 %	E	
P74.35	FBC1 Ref. 8 Fallback	0	±200.00 %	E	
P74.36	FBC1 Reference 9	0	±200.00 %	E	
P74.37	FBC1 Ref. 9 Fallback	0	±200.00 %	E	
P74.38	FBC1 Reference 10	0	±200.00 %	E	
P74.39	FBC1 Ref. 10 Fallback	0	±200.00 %	E	
P74.40	FBC1 Control Word 1	0	0-FFFF	E	
P74.41	Control1 Fallback 1.	0	0-FFFF	E	
P74.42	FBC1 Control Word 2	0	0-FFFF	E	
P74.43	Control1 Fallback 2.	0	0-FFFF	E	
P74.50	FBC1 Rx Word 1 Ptr.	00.00	0-99.99	E.N *	
P74.51	FBC1 Rx Word 1 Scale	0	0=Unity 1=Speed (%) 2=Speed (RPM) 3=Torque(%) 4=Torque(Nm) 5=Frequency 6= Percent 7=Speed Ramp Rate 8=Torque Slew Rate 9=Current 10=Volts 11=Resistance 12=Inductance 13=Scaler 1 14=Scaler 2 15=Scaler 3	E.L.*	
P74.52	FBC1 Rx Word 2 Ptr.	00.00	0-99.99	E.N *	
P74.53	FBC1 Rx Word 2 Scale	0	0-15	E.L.*	
P74.54	FBC1 Rx Word 3 Ptr.	00.00	0-99.99	E.N *	
P74.55	FBC1 Rx Word 3 Scale	0	0-15	E.L *	
P74.56	FBC1 Rx Word 4 Ptr.	00.00	0-99.99	E.N *	
P74.57	FBC1 Rx Word 4 Scale	0	0-15	E.L *	
P74.58	FBC1 Rx Word 5 Ptr.	00.00	0-99.99	E.N *	
P74.59	FBC1 Rx Word 5 Scale	0	0-15	E.L *	
P74.60	FBC1 Rx Word 6 Ptr.	00.00	0-99.99	E.N *	
P74.61	FBC1 Rx Word 6 Scale	0	0-15	E.L *	
P74.62	FBC1 Rx Word 7 Ptr.	00.00	0-99.99	E.N *	
P74.63	FBC1 Rx Word 7 Scale	0	0-15	E.L *	
P74.64	FBC1 Rx Word 8 Ptr.	00.00	0-99.99	E.N *	
P74.65	FBC1 Rx Word 8 Scale	0	0-15	E.L *	
P74.66	FBC1 Rx Word 9 Ptr.	00.00	0-99.99	E.N *	
P74.67	FBC1 Rx Word 9 Scale	0	0-15	E.L *	
P74.68	FBC1 Rx Word 10 Ptr.	00.00	0-99.99	E.N *	
P74.69	FBC1 Rx Word 10 Scale	0	0-15	E.L *	
P74.70	FBC1 Tx Word 1 Ptr.	00.00	0-99.99	E.N *	
P74.71	FBC1 Tx Word 1 Scale	0	0-15	E.L *	

Par No	Name	Default	Range	Attrib.	Comment
P74.72	FBC1 Tx Word 2 Ptr.	00.00	0-99.99	E.N *	
P74.73	FBC1 Tx Word 2 Scale	0	0-15	E.L *	
P74.74	FBC1 Tx Word 3 Ptr.	00.00	0-99.99	E.N *	
P74.75	FBC1 Tx Word 3 Scale	0	0-15	E.L *	
P74.76	FBC1 Tx Word 4 Ptr.	00.00	0-99.99	E.N *	
P74.77	FBC1 Tx Word 4 Scale	0	0-15	E.L *	
P74.78	FBC1 Tx Word 5 Ptr.	00.00	0-99.99	E.N *	
P74.79	FBC1 Tx Word 5 Scale	0	0-15	E.L *	
P74.80	FBC1 Tx Word 6 Ptr.	00.00	0-99.99	E.N *	
P74.81	FBC1 Tx Word 6 Scale	0	0-15	E.L *	
P74.82	FBC1 Tx Word 7 Ptr.	00.00	0-99.99	E.N *	
P74.83	FBC1 Tx Word 7 Scale	0	0-15	E.L *	
P74.84	FBC1 Tx Word 8 Ptr.	00.00	0-99.99	E.N *	
P74.85	FBC1 Tx Word 8 Scale	0	0-15	E.L *	
P74.86	FBC1 Tx Word 9 Ptr.	00.00	0-99.99	E.N *	
P74.87	FBC1 Tx Word 9 Scale	0	0-15	E.L *	
P74.88	FBC1 Tx Word 10 Ptr.	00.00	0-99.99	E.N *	
P74.89	FBC1 Tx Word10 Scale	0	0-15	E.L.*	

Setting P74.03 to its default will signify the use of the old type of PROFIBUS FBC. Any other value will imply the use of the new type.

Where for Attributes:

N - ENTER has to be pressed to update
O - Operator Accessible
E - Engineer Accessible
L - List Parameter
S - Stop Drive To Edit
R - Read Only

* This parameter requires a PROFIBUS reconfiguration (P74.05 = 1) before changes will take effect.

7.5 Scale Menu 60 Description

This menu allows the scaling between drive and Fieldbus to be specified for various different data types.
A pair of parameters specifies each scale. The first parameter specifies the drive value equivalent to the external Fieldbus value contained in the second parameter of the pair. For example, if the drive represents a value of 100% by the value 10000 and the Fieldbus represent 100% by the value 16383, the first parameter will contain 10000 and the second parameter will contain 16383. When a parameter is to be output to the Fieldbus using the scale detailed in the above example the formula is:

$$Output = ParameterValue \times \frac{ExternalEquivalentValue}{DriveEquivalentValue}$$

When receiving a parameter from the Fieldbus the formula is:

$$ParameterValue = Input \times \frac{DriveEquivalentValue}{ExternalEquivalentValue}$$

Table 7-6 lists the data types that have been provided.

Table 7-6 Data Types

Data Type	Parameter
Speed(%)	P60.00 and P60.01
Speed(rpm)	P60.02 and P60.03
Torque(%)	P60.04 and P60.05
Torque(Nm)	P60.06 and P60.07
Frequency	P60.08 and P60.09
Percent	P60.10 and P60.11
Speed Ramp Rate	P60.12 and P60.13
Torque Slew Rate	P60.14 and P60.15
Current	P60.16 and P60.17
Volts	P60.18 and P60.19
Resistance	P60.20 and P60.21
Inductance	P60.22 and P60.23
User scaler 1	P60.24 and P60.25
User scaler 2	P60.26 and P60.27
User scaler 3	P60.28 and P60.29

Note: Table 7-7 includes a full list of Menu 60 parameters

7.5.1 Scaling Parameter Menu 60

Table 7-7 Scaling Parameter Menu 60

Par No	Name	Default	Range	Attrib.	Comment
P60.00	Drive Speed (%)	10000	±32,767 pu %	E.N	
P60.01	Extern Speed (%)	10000	±32,767 pu %	E.N	
P60.02	Drive Speed (rpm)	1000	±32,767 pu rpm	E.N	
P60.03	Extern Speed (rpm)	1000	±32,767 pu rpm	E.N	
P60.04	Drive Torque (%)	10000	±32,767 pu %	E.N	
P60.05	Extern Torque (%)	10000	±32,767 pu %	E.N	
P60.06	Drive Torque (Nm)	10000	±32,767 pu Nm	E.N	
P60.07	Extern Torque (Nm)	10000	±32,767 pu Nm	E.N	
P60.08	Drive Frequency	100	±32,767 pu Hz	E.N	
P60.09	Extern Frequency	1	±32,767 pu Hz	E.N	
P60.10	Drive Percent	10000	±32,767 pu %	E.N	
P60.11	Extern Percent	10000	±32,767 pu %	E.N	
P60.12	Drive Ramp Rate	10000	±32,767 pu/s	E.N	
P60.13	Extern Ramp Rate	10000	±32,767 pu/s	E.N	
P60.14	Drive Torque Rate	10000	±32,767 pu/s	E.N	
P60.15	Extern Torque rate	10000	±32,767 pu/s	E.N	
P60.16	Drive Current	10	±32,767 pu A	E.N	
P60.17	Extern Current	1	±32,767 pu A	E.N	
P60.18	Drive Volts	1	±32,767 pu V	E.N	
P60.19	Extern Volts	1	±32,767 pu V	E.N	
P60.20	Drive Resistance	1	±32,767 pu Ω	E.N	
P60.21	Extern Resistance	1	±32,767 pu Ω	E.N	
P60.22	Drive Inductance	1	±32,767 pu H	E.N	
P60.23	Extern Inductance	1	±32,767 pu H	E.N	
P60.24	Drive Scalar 1	1	±32,767 pu	E.N	
P60.25	Extern Scalar 1	1	±32,767 pu	E.N	
P60.26	Drive Scalar 2	1	±32,767 pu	E.N	
P60.27	Extern Scalar 2	1	±32,767 pu	E.N	
P60.28	Drive Scalar 3	1	±32,767 pu	E.N	
P60.29	Extern Scalar 3	1	±32,767 pu	E.N	

7.6 Data Spy Parameters P89.00 to P89.10

The Data Spy parameters can be used to help debug and commission the PROFIBUS network as well as monitoring data transactions during normal operation. Using the spy area of Menu 89 it is possible to monitor data received by the module, in its unmodified form. The data is available in parameters P89.01 to P89.10 and corresponds to the PZD of the PPO of interest.

The values are displayed in decimal with no scaling and should be exactly what is appearing on the PROFIBUS network.

To select a PPO to be spied upon, enter the parameter number as listed in Table 7-8.

Table 7-8 Data Spy Menu 89

PPO	Active Menu	P89.00 Value	Meaning
Fbus RX PPO	Menu 75	75.00 to 75.29	Spy Receive PPO
Fbus TX PPO	Menu 75	75.30 to 75.46	Spy Transmit PPO
FBC1 RX PPO	Menu 74	74.50 to 74.69	Spy Receive PPO
FBC1 TX PPO	Menu 74	74.70 to 74.89	Spy Transmit PPO

8. Menu 75 Parameters

8.1 Introduction

This section describes the method of controlling the PROFIBUS board, using the original drive parameters available in Menu 75. The section begins with a brief outline of the PROFIBUS protocol when applied to Variable Speed Drives, followed by a list of the drive menus used by the PROFIBUS board.

The section gives a list of those parameters necessary to get the PROFIBUS link working, and then details the functions of the remaining parameters. The section ends with a list of all the parameters associated with the PROFIBUS board.

8.2 PROFIBUS Menu

The configuration of the PROFIBUS board is implemented via Menu 75, which will be visible if the CDC recognises the presence of a Fieldbus Coupler. Menu 75 is fully described in Section 8.5.

8.3 Data Update Rate

The CDC control board transfers information to and from the PROFIBUS board every 10 ms. During transfers the software will interrogate the PROFIBUS board for any errors.

8.4 Basic Settings Explanation

The basic settings are those required to get the PROFIBUS board operating and to define the basic operating modes of the board. A block diagram is provided at the end of the manual to help with configuration of the PROFIBUS board.

The stages in configuring an MVS3007-4001 or MVS3007-4002 PROFIBUS board are as follows:

1. Set up the PROFIBUS network node address in Parameter 75.02
2. Configure the PROFIBUS references and PROFIBUS control words in Menu 75.
3. Set P75.05 to 1 to configure the link.

Appendix A gives a worked example.

8.5 Menu 75 Description

8.5.1 Expansion bus device P75.00

The hardware identifier is a read only value that indicates the type of Expansion board bus fitted to the system. Valid values are:

4 Fieldbus Coupler.

This parameter is also viewable at P35.11.

8.5.2 Node Address P75.02

Each node attached to a PROFIBUS network needs to have a defined unique node address.

Important: No PROFIBUS board may have the same node address as another device connected to the same network.

When requested, the PROFIBUS board indicates its presence to the bus master. If multiple boards are configured with the same node address they will all try to respond at the same time.

For the PROFIBUS board the node address is defined by P75.02. The node address may be any number between 2 and 126 inclusive. It is usual for the PROFIBUS master to take node address 1, and for node address 127 to be reserved for multi-cast messages.

The PROFIBUS node address can only be reconfigured once per power up. If the node address needs changing, the new node address must be programmed and then the drive power cycled.

8.5.3 Protocol P75.03

Only the PROFIBUS-DP standard is supported, so this parameter must be set to 3, other options are reserved for other Fieldbus protocol standards.

8.5.4 Run On Power Up P75.04

WARNING

The user should be aware that allowing the PROFIBUS link to automatically configure and run on power up could represent a possible safety hazard, as the data from the network will be acted on by the Drive.

Many users may require the PROFIBUS link to be automatically configured and run as the drive powers up. This option is available by setting P75.04 to a 1. This would normally be the last step during commissioning of the link.

For safety reasons the value of P75.04 is set to a default value of zero.

8.5.5 Configure Link P75.05

Once the node address has been entered, it is necessary to instruct the firmware to update the PROFIBUS board's configuration. Setting P75.05 to a 1 does this. The firmware automatically rewrites this value to a zero when configuration is complete. Only after this occurs will any changes to the board's configuration take effect.

The PROFIBUS node address can only be reconfigured once per power up. If the node address needs changing, the new node address must be programmed and then the drive power cycled.

If P75.04 was set to a 1 prior to a power-up, setting P75.05 to a 1 will not change the node address until the power is cycled.

8.5.6 Source Loss Action P75.06

A loss of reference may be declared if the PROFIBUS link detects a loss of communications with the master.

When a loss of reference is declared, one of three things can happen depending upon the state of P75.06. Valid values of P75.06 are:

0 Ignore loss of reference errors and carry on running.

1 On a loss of reference set a warning and carry on running.
2 On a loss of reference trip the drive.

The warning code for loss of communications is 116, and the trip code is 63.

Status flag 56 indicates whether Fieldbus communications are healthy or not.

8.5.7 Freeze/Fallback Action P75.07

Switch S3-5 (see Section 3.3) must always be set to OFF. In this condition, P75.07 determines the action taken by the drive if the link to the PROFIBUS master fails. It affects what values are copied into the Fieldbus reference parameters defined in Section 7.4.12. If freeze is selected the parameter value freezes to the last good received data. If fallback is selected, the associated fallback value (refer to Table 8-7, parameters 75.07 to 75.21) is copied into the appropriate references.

8.5.8 Control Words P75.08 & P75.10

The PROFIBUS board can provide a source for two control word parameters. Control flags are explained in the Getting Started Manual T1676, but basically allow control of such functions as starting and stopping via a single bit in a 16-bit parameter. The two control word parameters are capable of controlling 32 control flags.

Normally, only one word of 16 control flags would be sufficient, leaving five words of set-point references. If more than 16 control flags are needed, P75.10 can be used to hold a further 16 control flags. While any of the received words can be mapped to this parameter, it is recommended that the last word be used.

The description of how to map control flag parameters to the drive's control flags in Menus 33 and 34 is given in manual T1676, and in more detail in the Software Technical Manual T1679. The control flag parameters also have an option of a fallback value if a loss of Fieldbus reference is declared.

8.5.9 Received Data Parameters P75.22 to P75.27

In order to use the data received in the PPO, it must be placed somewhere for the drive to use. Parameters P75.22 to P75.27 allow the relevant PPO word to be placed in a destination parameter. While some parameters can be directly written to, others, such as references, cannot. For this reason a group of reference parameters are available to hold the received reference. Menu 42 then points to these references for inclusion into the relevant reference selector.

8.5.10 References P75.12 to P75.21

The PROFIBUS module can provide up to 5 references for use within the drive. These references can be used to control such values as the speed (if pointed to by one of the speed reference pointers). The PROFIBUS reference module needs to be used in conjunction with Menu 42 (the Pointer Menu), which is described in Section 6 of the Software Technical Manual T1679.

To send data from Ref. 1 parameter 1 to PZD1 (P75.12), for example:

- Set Ref. 1 parameter 1 to point at the reference parameter, ie. P75.23 = 75.12

The data received at this position will then be copied to P75.12.

WARNING:

Ensure that no two Fieldbus parameters are mapped to the same Drive parameter as this will lead to unpredictable results.

If a loss of PROFIBUS reference is declared, (see Section 7.4.8) the reference value will no longer be updated by the PROFIBUS link. In this situation the user has the choice of using the last value obtained from the PROFIBUS link or using the fallback value.

In the above example, the fallback value for reference 1 can be set to 0 by setting P75.13 = 0. To use the fallback value instead of the last value received over the PROFIBUS link set P75.07 = 1. If this reference value were linked to the speed reference for example,

then upon loss of the PROFIBUS link the speed would automatically be clamped to zero.

Be aware that the fallback mechanism only applies to values in the even numbered parameters between P75.08 to P75.20. Received data transferred directly to Drive parameters will not have the fallback option but will freeze on loss of the network – refer to the block diagram at the end of this manual.

Table 7-2 details the relationship between the received PPO word and the parameter pointers and reference "holders" (destination parameters) – refer also to the block diagram.

Table 8-1 Received PPO data mapping for PPO type 4

PPO Reference	Parameter Pointer	Holder (Destination Parameter)
PZD1 (STW)	P75.22	= 75.08
PZD2 (HSW)	P75.23	= 75.12
PZD3	P75.24	= 75.14
PZD4	P75.25	= 75.16
PZD5	P75.26	= 75.18
PZD6	P75.27	= 75.10/75.20

Entering a value of 0 in a pointer parameter will mean that any data associated with that parameter is ignored, as P0.00 is not a valid parameter.

8.5.11 Transmitted Data, P75.30 to P75.35

To put data into the transmit PPO, it must be taken from somewhere in the drive. Parameters P75.30 to P75.35 allow the relevant PPO word to be allocated. See Table 7-3.

Table 8-2 Transmitted PPO data mapping for PPO type 4

Parameter	Value	Meaning
Example		
P75.31	P9.01	= PPO PZD2 (Speed feedback)
P75.30	P(0-99.99)	= PPO PZD1
P75.31	P(0-99.99)	= PPO PZD2
P75.32	P(0-99.99)	= PPO PZD3
P75.33	P(0-99.99)	= PPO PZD4
P75.34	P(0-99.99)	= PPO PZD5
P75.35	P(0-99.99)	= PPO PZD6

The PROFIDRIVE standard specifies that PZD1 (ZSW) contains a status word following the definition in Table 7-4. The Programmable Status Word in P41.32 or P41.33 is a collection of status bits specified by parameters P41.00 to P41.15, or P41.16 to P41.31. These can be used to set up the status word required by PROFIDRIVE, and then point P75.30 to P41.32 or P41.33.

Table 8-3 Allocation of the status word bits (Speed control mode)

Bit	Meaning
0	Ready for switch-on / not ready for switch-on
1	Ready for operation / not ready for operation
2	Operation enabled / operation inhibited
3	Fault / no fault
4	No OFF 2 / OFF 2
5	No OFF 3 / OFF 3
6	Switch-on inhibit / no switch-on inhibit
7	Warning / no warning
8	Set point/actual value within tolerance range / Set point/actual value not within tolerance range
9	Control requested / operation on site
10	speed reached/ speed under range
11	Device-related
12	Device-related
13	Device-related
14	Device-related
15	Device-related

Each location in the PPO sent back to the PROFIBUS master is specified according to Table 8-4.

Table 8-4 Transmitted PPO data mapping

PPO Reference	Parameter
PZD1 (ZSW)	P75.30
PZD2 (HIW)	P75.31
PZD3	P75.32
PZD4	P75.33
PZD5	P75.34
PZD6	P75.35

For example, it is decided to monitor 4 parameters, Speed feedback (P9.01), Current feedback (P9.05), Motor volts (P9.07) and Motor power (P9.08).

To configure the first parameter source, set P75.31 = 9.01
To configure the second parameter source, set P75.32 = 9.05
To configure the third parameter source, set P75.33 = 9.07
To configure the final parameter source, set P75.34 = 9.08

Note: When entering parameters via the Keypad, it is important that any leading zeros are entered after the decimal point. Entering 9.1 will result in P9.10 being used, not P9.01.

Entering a value of 0 in a source pointer parameter will mean that a corresponding value of 0 is written to the PROFIBUS network.

8.5.12 Reference Scaling and Masking, P75.28 to P75.29

Internally, the drive represents 100.00% with a value of 10000. The PROFIDRIVE profile can represent 100.00% with a value of 16384. In order to scale received set point references to the drive's internal representation for 100.00% the parameter P75.28 is available that allows the user to specify the numerical value being used by the PROFIBUS network to represent 100%. At default the value is set to 10,000.
As not all references may require scaling, a Scale Reference Mask, P75.29, is provided to enable scaling on selected references. By default the first and last received words are not scaled as these are normally used for control flags. The lowest 6 bits in the mask are used for the scale mask, the remaining bits are ignored.

Table 8-5 Scale reference mask

Bit								Apply scale to PPO PZD word:	Default
7	6	5	4	3	2	1	0		
							└	— 1	0
						└	—	— 2	1
					└	—	—	— 3	1
				└	—	—	—	— 4	1
			└	—	—	—	—	— 5	1
		└	—	—	—	—	—	— 6	0
	└	—	—	—	—	—	—	— not used	0
└	—	—	—	—	—	—	—	— not used	0

8.5.13 Data Spy Parameters P75.36 to P75.41[5]

The Data Spy parameters can be used to help debug and commission the PROFIBUS board as well as monitoring data transactions during normal operation. Using the spy area of Menu 75 it is possible to monitor data received by the module, in its unmodified form. The data is available in parameters P75.36 to P75.41 and corresponds to the six 16 bit words of data received by the module from the PROFIBUS interface.

The values are displayed in decimal with no scaling and should be exactly what the PROFIBUS-DP Master is transmitting.

8.5.14 Data Errors P75.42 to P75.45

When transferring data between the PROFIBUS link and the Drive parameters, several possible errors could occur. If an error does occur then it is logged in P75.42 or P75.44. Parameters P75.42 and P75.44 log the errors that occurred transferring the data and P75.43 and P75.45 log the total number of errors. The error format is as follows:

Bit 0	Reserved
Bit 1	Parameter write access denied, parameter has 'R' attribute set
Bit 2	Data clamped to lower limit before being written
Bit 3	Data clamped to upper limit before being written
Bit 4	Data below bit parameter range and not written
Bit 5	Data above bit parameter range and not written
Bit 6	Reserved
Bit 7	Attempt to write to a stop to edit parameter when running, data ignored.
Bit 8	Attempt to read from a non-existent parameter
Bit 9	Parameter read access denied.
Bit 10 - 15	Reserved

For each transfer all the data errors are flagged, and a counter is incremented for each transfer error. Note that the error counter is allowed to rollover and is reset when the PROFIBUS board is configured. When writing data outside the normal range of a

[5] The above is correct for software Version 8.00 or earlier.
For software Version 9.00 or later P75.36 to P75.41 are not available.
To view received data set P89.00=P75.00 and view data in P89.01 onward.
For transmitted data set P89.00=P75.30

parameter, the data is clamped to the maximum or minimum value. Bit parameter values outside the normal range are ignored.

For example if the following information was viewed:
P75.44 = 0300H (= 0000 0011 0000 0000 binary)
P75.45 = 21

This indicates that one of the monitor parameters configured attempted to read from a non-existent parameter, and another parameter attempted to read a parameter that did not have Fieldbus read access. The error counter indicates that a total of 21 errors had occurred since the last PROFIBUS configuration.

Note: Entering a zero as a monitor parameter to be read or written will not produce an error.

8.5.15 Communications Status P75.46

This parameter displays one of the values shown in Table 7-1,depending upon the state of the PROFIBUS board interface.

Table 8-6 Communications status

Value	State	Meaning
0	On-line	The PROFIBUS board is communicating correctly.
1	Not configured	**The PROFIBUS board has not yet been configured with a valid node address.**
2	Network not found	The PROFIBUS board has been configured, but no network messages have been detected.
3	Not communicating	The PROFIBUS board has been configured, the network Baud rate deduced from the presence of traffic, but either this slave address is not being polled from the master, or the PROFIBUS board does not support the type of data packet the master is configured for.

8.6 Fieldbus Configuration Menu

Table 8-7 Menu 75

Par No	Description	Default	Range	Attr.	Comment
75.00	Expansion bus device	Set by hard-ware	3 = Fieldbus Coupler	R	See page 8-2
75.01	Protocol ID	0	Reserved for future use	R	Not used
75.02	Node Address [6]	255	0 to 127 (4002: 0 to 255)	E	See page 8-2
75.03	Protocol	3	4002= 2 or 3 4001 FIXED= 3	E.L	See page 8-2
75.04	Automatic configuration at power up	0	0= Prevent, 1 = Allow	E.L	See page 7-3
75.05	Configure Link	0	1 to configure. Automatically reset to 0 by a configuration attempt.	E.L	See page 8-3
75.06	Action on loss of PROFIBUS control source.	1	0 = Ignore 1 = Warning 2 = Trip	E.L	See page 8-3
75.07	Freeze / Fallback	1	0 = Freeze 1 = Fallback	E.S.L	See page 8-4
75.08	Control Word 1	0	0 – FFFF	R	See page 8-4
75.09	Control Fallback 1	0	0 – FFFF	E	See page 8-4
75.10	Control Word 2	0	0 – FFFF	R	See page 8-4
75.11	Control Fallback 2	0	0 – FFFF	E	See page 8-4
75.12	Reference 1	0	±100.00	E	See page 8-5
75.13	Fallback 1	0	±100.00	E	See page 8-5
75.14	Reference 2	0	±100.00	E	See page 8-5
75.15	Fallback 2	0	±100.00	E	See page 8-5
75.16	Reference 3	0	±100.00	E	See page 8-5
75.17	Fallback 3	0	±100.00	E	See page 8-5
75.18	Reference 4	0	±100.00	E	See page 8-5
75.19	Fallback 4	0	±100.00	E	See page 8-5
75.20	Reference 5	0	±100.00	E	See page 8-5
75.21	Fallback 5	0	±100.00	E	See page 8-5
75.22	CW 1 Pointer	0	0 - 99.99	E.S.N	See page 8-5
75.23	Ref. 1 Pointer	0	0 - 99.99	E.S.N	See page 8-5
75.24	Ref. 2 Pointer	0	0 - 99.99	E.S.N	See page 8-5
75.25	Ref. 3 Pointer	0	0 - 99.99	E.S.N	See page 8-5
75.26	Ref. 4 Pointer	0	0 - 99.99	E.S.N	See page 8-5
75.27	CW 2/Ref. 5 Pointer	0	0 - 99.99	E.S.N	See page 8-5
75.28	Value for 100% Ref.	10000	0 ±32767	E	See page 8-8
75.29	Scale Reference Mask	001Eh	0-FFFFh	E.S	See page 8-8
75.30	Status word Source	0	0 - 99.99	E.S.N	See page 8-6
75.31	Value 1 Source	0	0 - 99.99	E.S.N	See page 8-6
75.32	Value 2 Source	0	0 - 99.99	E.S.N	See page 8-6

[6] This parameter requires a PROFIBUS reconfiguration before changes can take effect.

Par No	Description	Default	Range	Attr.	Comment
75.33	Value 3 Source	0	0 - 99.99	E.S.N	See page 8-6
75.34	Value 4 Source	0	0 - 99.99	E.S.N	See page 8-6
75.35	Value 5 Source	0	0 - 99.99	E.S.N	See page 8-6
75.36	Raw data 1 [7]	0	±32767 [8]	R	See page 8-9
75.37	Raw data 2 [4]	0	±32767 [5]	R	See page 8-9
75.38	Raw data 3 [4]	0	±32767 [5]	R	See page 8-9
75.39	Raw data 4 [4]	0	±32767 [5]	R	See page 8-9
75.40	Raw data 5 [4]	0	±32767 [5]	R	See page 8-9
75.41	Raw data 6 [4]	0	±32767 [5]	R	See page 8-9
75.42	Rx Error Word			R	See page 8-9
75.43	Rx Error Count			R	See page 8-9
75.44	Tx Error Word			R	See page 8-9
75.45	Tx Error Count			R	See page 8-9
75.46	Fbus Comms. state		0 - 3	R	See page 8-10

Where for Attributes :

N - ENTER has to be pressed to update
O - Operator Accessible
E - Engineer Accessible
L - List Parameter
S - Stop Drive To Edit
R - Read Only

[7] For software Version 8.00 or earlier P75.36 to P75.41 are visible.
For software Version 9.00 or later P75.36 to P75.41 are not available, the SPY facility should be used as follows:
Received data- Set P89.00=75.00 and view received data in P8900 onwards.
Transmitted data-Set P89.00=75.30 and view data for transmission in P89.01 onwards.

[8] Raw data may be received having a value of –32768. This will display as “uncollated” on the keypad but will nevertheless be transferred correctly.

9. Maintenance

When the PROFIBUS board is installed in a drive, its maintenance requirements are included with maintenance of the drive, described in the relevant drive manual. This maintenance consists generally of checking for the ingress of dust and moisture, and checking for security of electrical connections.

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10. Diagnostics

10.1 Menu 74 Diagnostics

10.1.1 Faults

If a previously working link has stopped working, one of the two error codes may be displayed depending upon the setting of P74.07. Status Flag 97 (Fieldbus OK) can also be examined in parameter P11.35 to confirm the unhealthy state.

10.1.2 PROFIBUS Warning Fault Code

Table 10-1 shows the warning fault code displayed in the drive warnings tables, if the PROFIBUS link is not healthy, and P74.07; action on loss of PROFIBUS control source has been set to "warning".

Table 10-1 Warning fault code

Fault Code	Name	Description
106	FBC1 Loss	PROFIBUS board is not communicating with the master

10.1.3 PROFIBUS Trip Fault Code

Table 10-2 shows the trip fault code displayed in the drive trip tables, if the PROFIBUS link is not healthy, and P74.07; action on loss of PROFIBUS control source has been set to "trip".

Table 10-2 Trip fault code

Fault Code	Name	Class	Description
204	FBC1 Loss	R	PROFIBUS board is not communicating with the master

A= Auto resettable trip
R = Manually resettable trip
S = System trip
N = Non resettable trip

10.2 Menu 75 Diagnostics

10.2.1 Faults

If a previously working link has stopped working, one of the two error codes may be displayed depending upon the setting of P75.06. Status Flag 56 (Fieldbus OK) can also be examined in parameter P11.33 to confirm the unhealthy state.

10.2.2 PROFIBUS Warning Fault Code

Table 10-1 shows the warning fault code displayed in the drive warnings tables, if the PROFIBUS link is not healthy, and P75.06; action on loss of PROFIBUS control source has been set to "warning".

Table 10-3 Warning fault code

Fault Code	Name	Description
116	Fieldbus Loss	PROFIBUS board is not communicating with the master

10.2.3 PROFIBUS Trip Fault Code

Table 10-2 shows the trip fault code displayed in the drive trip tables, if the PROFIBUS link is not healthy, and P75.06; action on loss of PROFIBUS control source has been set to "trip".

Table 10-4 Trip fault code

Fault Code	Name	Class	Description
63	Fieldbus Loss	A, R	PROFIBUS board is not communicating with the master

A= Auto resettable trip
R = Manually resettable trip
S = System trip
N = Non resettable trip

10.3 MVS3007-4001 and MVS3007-4002 Fieldbus Coupler Indicator LEDs

The MVS3007-4001 and MVS3007-4002 PROFIBUS Fieldbus Couplers provide two LED indicators for diagnostic purposes. These are not visible from the outside of the drive, but are visible on the edge of the board when the Drive control door is open. They are viewed end-on as shown in Figure 10-1) and have meanings as shown in Table 10-5.

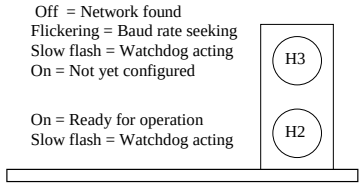

Figure 10-1 Diagnostic LEDs on the PROFIBUS board

Table 10-5 LED indication meaning

LED H2	LED H3	Description
On	On	Node address not yet configured
On	Flickering	**Searching for any network traffic.**
On	Off	Network traffic found.
Pulsing	Pulsing	Watchdog time-out.

Depending on the setting of Switch S2 parameter P75.46 or parameter P74.09 will display the state of the communications without opening the drive to view the LEDs, see Section 7.4.10.

10.4 Spares and Re-order Information

The interface does not contain any user replaceable parts and must be returned to the manufacturer for repair. Whole units should be kept for spares.

Please contact customer support, or your local agent for details.

The MVS3007-4001 PROFIBUS board is no longer available.

The order number for the replacement PROFIBUS board is:

MVS3007-4002

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Appendix A. Configuration Example

Consider a drive on a PROFIBUS network that requires a Run/Stop command, speed reference and minimum speed set via the PROFIBUS network. The drive produces its speed feedback and torque demand onto the PROFIBUS network. This drive is to have a PROFIBUS node address of 10.

Realistically Run/Stop and speed reference would probably be a 'global' requirement for other drives on the network, whereas minimum speed may only be required individually.

The drive first needs to be commissioned to run the motor, so carry out the commissioning procedure in the MV3000e technical manuals. Assuming the drive and PROFIBUS board are correctly installed, the PROFIBUS now needs to be configured.
Refer to the block diagram at the rear of this manual to visualise the parameters and their uses.

A.1 Check the PROFIBUS Hardware

P75.00 indicates which type of Fieldbus Coupler board is fitted. This should display a 3, corresponding to a Fieldbus Coupler board. If P75.00 is not visible, check P35.11 it will display the type of expansion board fitted. If it displays 0 corresponding to no expansion board, verify that the PROFIBUS board is fitted correctly. If it displays some other type of expansion board, check that the correct board is fitted.

If the correct board is fitted and LED H2 and H3 are lit according to Table 10-5 LED indication meaning in Section 10.3 MVS3007-4001 and MVS3007-4002 Fieldbus Coupler Indicator LEDs, both LEDs should be illuminated to indicate an un-configured, healthy PROFIBUS board.

A.2 Decide what information needs to be transferred.

For a more complex set of data to be transferred, the tables contained in Appendix B Configuration Tables may help in the allocation of the parameters. In this example, the requirements are simple, so we will move directly to the next stage.

A.3 Configure the PROFIBUS Link

To configure this information into the drive, the following parameters need to be set:

Table A-1 Basic set-up

Parameter	Value	Meaning
P75.02	10	Set the node address to 10

P75.06 is set to warn until the link has been fully commissioned, at which time it can be set to the desired state.

To configure the drive set P75.05 to a 1. This will be rewritten to a zero when configuration has been completed. With the PROFIBUS link disconnected, or if the PROFIBUS master has not yet been configured to communicate with slave 10, LED H3 will change from steady to either flashing (no traffic detected on the network), or off (traffic detected on the network). At the same time the warning LED on the keypad will illuminate. When the PROFIBUS-DP Master has been correctly configured for slave 10, with the correct packet length, the warning LED will extinguish.

Note: Setting P75.04 to a 1 allows the PROFIBUS board to be automatically configured as the drive powers up.

Baud rate: There is no Baud rate selection as the Slave automatically Baud selects to the rate of the Master, however the valid values are shown in Section 2.1.1.

A.4 Adding Drive Parameters

Having configured the PROFIBUS link it is then necessary to configure where the information to be transmitted over the link comes from and received information goes to. There are three basic types of data parameters: simple parameters, references and control/status bits.

A.5 Simple Parameters

Simple parameters are parameters that the PROFIBUS board can write to or read from directly. In this example the minimum speed, speed feedback and torque demand are examples of simple parameters.
To transmit simple parameters out onto the link, enter the parameter number into the appropriate Transmit parameter. The set-up for monitored values would be as in Table A-2 below.

Example for transmitted/monitored data

Table A-2 Simple monitor parameter set-up.

Parameter	Value	Meaning
P75.31	9.01	PPO PZD2 – P9.01 Speed feedback
P75.32	9.04	PPO PZD3 – P9.04 Torque demand
P75.33	0	PPO PZD4 – not required
P75.34	0	PPO PZD5 – not required
P75.35	0	PPO PZD6 – not required

Speed Feedback and Torque Demand will be transmitted from the drive onto the PROFIBUS link.

Received Data

This example also has a simple reference parameter, P5.17 minimum speed. P75.24 is configured below in Table A-3.

Note that the minimum speed parameter P5.17 and its units are in rpm, not percentage. The drive is connected to a 1500 r/min motor.

To write to parameters within the drive, enter the parameter number into the appropriate Receive parameter.

Table A-3 Simple reference parameter set-up.

Parameter	Value	Meaning
P75.24	5.17	PPO PZD3 - P5.17 minimum speed

This will allow the PROFIBUS link to write directly to the minimum speed parameter.

A.6 Reference Parameters

References are parameters within the drive that cannot be written to directly, speed reference is one such example. In order to have PROFIBUS data as the speed reference it is necessary to write the PROFIBUS data to a PROFIBUS reference and then select this reference to be the speed reference.

The first stage to setting up a reference parameter is to produce a PROFIBUS reference. PROFIBUS references are held in P75.12 to P75.21. Even numbers contain the reference, odd numbers contain the fallback for the reference. In this example we will use

PROFIBUS reference 1, see Table A-4. The received data is transferred using the Reference Pointers in P75.23 to P75.27.

In this example we will use Reference Pointer 1 to transfer the Speed Reference, Reference Pointer 2 retains its configuration from the above "simple example".

Table A-4 Reference parameter set-up

Parameter	Value	Meaning
P75.23	75.12	Ref. 1 = P75.12 = PPO PZD2 word
P75.24	5.17	PPO PZD3 - P5.17 minimum speed
P75.25	0	PPO PZD4 word not used
P75.26	0	PPO PZD5 word not used
P75.27	0	PPO PZD6 word not used

Having configured the P75.23 pointer to transfer data to a Fieldbus reference "holder", the user has the option of declaring a 'fallback' value for that reference. This will be dealt with later.

Reference Scaling and Masking

The 'holder' for the received reference can only have a value of ±100.00%, which internally is represented as ±10000. It is necessary to enter a value of 10,000 into P75.28 to make the drive scale a received value of 10,000 into 10000. As the scaling will apply only to the first reference, the second and third bits in the Scale Reference Mask, P75.29, need to be a '1' and a '0' respectively. The default setting, where the second, third, fourth and fifth bits are '1', so P75.29 must be changed to read 0000000000000010 binary which is 0002H. It is necessary to know the hexadecimal value as the parameter requires the value to be entered as hexadecimal.

Once the PROFIBUS reference has been configured it is necessary to configure the speed reference to come from the Fieldbus Reference 1. Each of the drive references has a parameter or parameters that set-up where the source of that reference is. For the speed references these parameter are P5.01 to P5.05. These parameters need to be configured to source the reference from the 'Pointer menu', Menu 42. Each of the pointers in Menu 42 is dedicated to one of the drive references. The speed reference has pointers 1 and 2 dedicated to it. We will use pointer 1, see Table A-5.

Table A-5 Speed reference set-up

Parameter	Value	Meaning
P5.01	21	Speed reference source 1 - use pointer 1
P5.02	0	Speed reference source 2 - not required
P5.03	0	Speed reference source 3 - not required
P5.04	0	Speed reference source 4 - not required
P5.05	0	Speed backup source – not required

Having configured the speed reference source to be menu 42 pointer 1, the final stage is to configure pointer 1 to use PZD1, set up previously. Pointer 1 is configured in P42.00 and P42.01 as shown in Table A-6 below.

Table A-6 Speed reference pointer 1 set-up

Parameter	Value	Meaning
P42.00	75.12	Pointer 1 source – P75.12 Fieldbus reference 1
P42.01	100.00	Pointer 1 scale - 100.00%

The data transferred in the Fieldbus Reference 1 word (from PPO PZD2) will now be used as the speed reference. Note that menu 42 allows the use of a scaling function to scale the incoming data before it is written to the relevant reference. *This scale will also apply to the fallback value if it used.*

A.7 Control Bits

Control bits are bits in the drive that cannot be written to directly, but may be accessed indirectly in a similar manner to a reference. Control bits perform such tasks as starting and stopping the drive. This example requires access to 2 control bits, the start flag and the stop flag. The first stage to setting up a control bit is to produce a Fieldbus control word, which is similar to a Fieldbus reference. Fieldbus control words are held in P75.08 and P75.10. Control word 1 (from PPO PZD1) is used in this example and control word 2 (from PZD6) may also be used. Here we will use control word 1 only, the set-up being shown in Table A-7. The start and stop bits are transferred using control word 1.

Table A-7 Control word set-up

Parameter	Value	Meaning
P75.22	75.08	Control word 1 = P75.08 = PPO PZD1.
P75.27	0	PPO PZD6 word not used.

Having configured the parameters to transfer data to a Fieldbus control reference the user has the option of declaring a 'fallback' value for that control reference. This will be dealt with later.

Once the Fieldbus control reference has been configured it is necessary to configure the start and stop control bits source to come from Fieldbus control reference 1. Each of the drive control bits has a parameter that sets up where the source of that control bit is. Referring to Table A-8, for the start bit this parameter is P33.01 for the stop bit this parameter is P33.00. These parameters need to be configured to source their values from the Fieldbus control reference. Fieldbus control reference 1 contains values 5.100 to 5.115 which are Fieldbus control reference 1 bits 0 to 15, values 5.200 to 5.215 are Fieldbus control reference 2 bits 0 to 15.

Table A-8 Control flag source set-up

Parameter	Value	Meaning
P33.00	5.100	Stop control flag source - 5.100 Fieldbus control word 1, bit 0
P33.01	5.101	Start control flag source - 5.101 Fieldbus control word 1, bit 1
P34.16	1	Pass Start/Stop control to the control flags

A.8 Status Word

Any drive status word can be sent to the Fieldbus, either a pre-defined one from Menu 11 or a user-configured one from Menu 41. This example, shown in Table A-9, will send the first 16 Status Flags in P11.30, (as TX STS WRD 1 SOURCE).

Table A-9 Transmit status word

Parameter	Value	Meaning

P75.30	11.30	Transmitted status word 1 source

The Fieldbus parameters now contain a basic configuration.

A.9 Data for Master Device Configuration

The PROFIBUS-DP master device producing the data for this drive should now be configured. The data required to get the drive running is shown in Table A-10.

Table A-10 PROFIBUS-DP Master's data allocation

Word	Value	Meaning
0	XXXXH	Contains the run/stop bits
1	5000	Set the speed reference to 50%
2	150	Set the drive minimum speed to 150 rpm
3	0	Not used
4	0	Not used
5	0	Not used

The data produced by the drive is listed in Table A-11 below:

Table A-11 PROFIBUS-DP Master's received data

Word	Units	Meaning
0	Binary flags	Contains the drive status bits
1	0.01%	Speed feedback.
2	0.01%	Torque demand.
3	0	Not used
4	0	Not used
5	0	Not used

A.10 Using PROFIBUS Data Spy

Having parameterised a basic configuration, the user may wish to know what data is actually being transferred over the PROFIBUS network. This can be done using the PROFIBUS spy module. The PROFIBUS spy module uses P75.36 to P75.41 to display each of the 6 PZD words associated with the received PPO.

Note that the data will be displayed un-scaled and in decimal. The drive may limit data before writing it into a parameter if it exceeds that parameter's limits, see Section 7.4.11.

A.11 Check For Data Errors

Once the drive has been configured the user should check that no data errors are occurring. Data errors can occur when the PROFIBUS module attempts to write the data from the PPO into drive parameters. This may be because the parameter is not able to accept data in this manner, or because the data itself is outside accepted limits. Data errors are given in P75.42 to P75.45. For the receive and transmit PPO packets there is an error code of the last error that occurred and the number that have occurred since the last PROFIBUS configuration attempt. The list of data error codes and their meaning is given in Section 7.4.11. An example for the source data is given in Table A-12 below.

Table A-12 Data error example

Parameter	Value	Meaning
P75.44	200H	Read access from a parameter was denied
P75.45	20	20 errors have occurred since the last PROFIBUS link configuration.

In this example read access to a parameter was denied, possibly because that parameter does not exist. This implies that one of the parameters set for source is incorrect and does not actually exist.

A.12 Fallback Values

The example declares a PROFIBUS reference and a PROFIBUS control word, both of which have the option of a fallback value. A fallback value is a value that will be used instead of the PROFIBUS value if the PROFIBUS link becomes unhealthy. As a simple example, if the PROFIBUS link is lost then the user may want to force the speed reference to zero. To use this feature the PROFIBUS link first needs to be configured to select fallback value

on a loss of the PROFIBUS link. Setting parameter P75.07 to a 1 does this.

If this value is set to 0 then on a PROFIBUS loss the reference value will be frozen. This means that the last valid value received over the link will be used.

Note: ALL PROFIBUS reference/control values are affected by the freeze/fallback simultaneously.

The fallback values can now be entered for the relevant PROFIBUS reference, for the speed reference we will use a fallback value of 0. If communication is lost then we would like the drive to stop, this means that the start control flag should be set to 0, and the stop bit should be set to 0. This means the fallback value should be 0000H.

These settings are summarised in Table A-13.

Table A-13 Fallback value example

Param	Value	Meaning
P75.07	1	On PROFIBUS loss use the fallback not the freeze value
P75.13	0	PROFIBUS reference 1 (speed reference) fallback value
P75.09	0000H	PROFIBUS control word 1 (start/stop flags) fallback value. Bit 0 - Not set, stop flag active Bit 1 - Not set, start flag inactive Bits 2 - 15 – not required

A.13 Warning on Loss of PROFIBUS Link

This function is carried out by P75.06 (described in Section 7.4.8). During the commissioning process P75.06 is set to 1 by default, and the drive generates a Warning. When commissioning has been successfully completed, P75.06 may be set to either :

0 = Ignore loss
1 = Warn of loss
2 = Trip the drive

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Appendix B. Configuration Tables

Table B-1 PROFIBUS control words

No.	Param.	Mapped From	Fallback Value	Description
Example				
1	P74.40	74.50	0	
1	P74.40			
2	P74.42			

Table B-2 Control Word 1, P74.40

Bit	Control Flag Number	Fallback Value	Description
Example			
0	5.000	0	Bit 0 mapped to Stop flag
0	5.000		
1	5.001		
2	5.002		
3	5.003		
4	5.004		
5	5.005		
6	5.006		
7	5.007		
8	5.008		
9	5.009		
10	5.010		
11	5.011		
12	5.012		
13	5.013		
14	5.014		
15	5.015		

Table B-4 Control Word 2, P74.40

Bit	Control Flag Number	Fallback Value	Description
Example			
0	5.016	0	Bit 0 mapped to Stop flag
0	5.016		
1	5.017		
2	5.018		
3	5.019		
4	5.020		
5	5.021		
6	5.022		
7	5.023		
8	5.024		
9	5.025		
10	5.026		
11	5.027		
12	5.028		
13	5.029		
14	5.030		
15	5.031		

Table B-3 PROFIBUS References

No.	Param.	Destination Parameter	Scale	Fallback Value	Description
Example					
1	P74.50	74.20	0	0	Speed Reference
1	P74.50				
2	P74.52				
3	P74.54				
4	P74.56				
5	P74.58				
6	P74.60				
7	P74.62				
8	P74.64				
9	P74.66				
10	P74.68				

Table B-5 PROFIBUS monitors

No.	Param.	From Parameter	Scale	Fallback Value	Description
Example					
1	P74.70	41.32	0	0	Prog status word 0
2	P74.72	9.01	0	0	Speed Feedback
1	P74.70				
2	P74.72				
3	P74.74				
4	P74.76				
5	P74.78				
6	P74.80				
7	P74.82				
8	P74.84				
9	P74.86				
10	P74.88				

Table B-6 Programmable Status Word 0

Bit	Param. No.	Control Flag No.	Description
Example			
0	P41.00	2.001	Bit 0 mapped to Stopped flag
0	P41.00		
1	P41.01		
2	P41.02		
3	P41.03		
4	P41.04		
5	P41.05		
6	P41.06		
7	P41.07		
8	P41.08		
9	P41.09		
10	P41.10		
11	P41.11		
12	P41.12		
13	P41.13		
14	P41.14		
15	P41.15		

Table B-7 Programmable Status Word 1

Bit	Param. No.	Control Flag No.	Description
Example			
0	P41.16	2.001	Bit 0 mapped to Stopped flag
0	P41.16		
1	P41.17		
2	P41.18		
3	P41.19		
4	P41.20		
5	P41.21		
6	P41.22		
7	P41.23		
8	P41.24		
9	P41.25		
10	P41.26		
11	P41.27		
12	P41.28		
13	P41.29		
14	P41.30		
15	P41.31		

Table B-8 Menu 42 - Reference Pointers

No.	Param.	Points To Param.	Scale	Function
Example				
1	P42.00	74.12	10000	Speed Reference
1	P42.00			Speed Reference
2	P42.02			Speed Reference
3	P42.04			Reference Sequencer
4	P42.06			PID Set-point
5	P42.08			PID Feedback
6	P42.10			Trim Reference
7	P42.12			Speed Trim Reference
8	P42.14			Torque Reference
9	P42.16			Torque Limits
10	P42.18			Torque Limits
11	P42.20			Temperature Compensation Scale
12	P42.22			Flux Limit
13	P42.24			Current Limit
14	P42.26			Torque/Magnet. Current
15	P42.28			Torque/Magnet. Current
16	P42.30			Position Reference
17	P42.32			Position Reference

18	P42.34			Tacho Feedback

Table B-1 PROFIBUS control words

No.	Param.	Mapped From	Fallback Value	Description
Example				
1	P75.08	75.22	0	
1	P75.08			
2	P75.00			

Table B-2 Control Word 1, P75.08

Bit	Control Flag Number	Fallback Value	Description
Example			
0	5.100	0	Bit 0 mapped to Stop flag
0	5.100		
1	5.101		
2	5.102		
3	5.103		
4	5.104		
5	5.105		
6	5.106		
7	5.107		
8	5.108		
9	5.109		
10	5.110		
11	5.111		
12	5.112		
13	5.113		
14	5.114		
15	5.115		

Table B-3 PROFIBUS References

No.	Param.	Destination Parameter	Fallback Value	Description
Example				
1	P75.23	75.12	0	Speed Reference
1	P75.23			
2	P75.24			
3	P75.25			
4	P75.26			
5	P75.27			

Table B-4 Control Word 2, P75.10

Bit	Control Flag Number	Fallback Value	Description
Example			
0	5.200	0	Bit 0 mapped to Stop flag
0	5.200		
1	5.201		
2	5.202		
3	5.203		
4	5.204		
5	5.205		
6	5.206		
7	5.207		
8	5.208		
9	5.209		
10	5.210		
11	5.211		
12	5.212		
13	5.213		
14	5.214		
15	5.215		

Table B-5 PROFIBUS monitors

No.	Param.	From Param.	Description
Example			
1	P75.30	41.32	Prog status word 0
1	P75.30		
2	P75.31		
3	P75.32		
4	P75.33		
5	P75.34		
6	P75.35		

Table B-6 Programmable Status Word 0

Bit	Param. No.	Control Flag No.	Description
Example			
0	P41.00	2.001	Bit 0 mapped to Stopped flag
0	P41.00		
1	P41.01		
2	P41.02		
3	P41.03		
4	P41.04		
5	P41.05		
6	P41.06		
7	P41.07		
8	P41.08		
9	P41.09		
10	P41.10		
11	P41.11		
12	P41.12		
13	P41.13		
14	P41.14		
15	P41.15		

Table B-7 Programmable Status Word 1

Bit	Param. No.	Control Flag No.	Description
Example			
0	P41.16	2.001	Bit 0 mapped to Stopped flag
0	P41.16		
1	P41.17		
2	P41.18		
3	P41.19		
4	P41.20		
5	P41.21		
6	P41.22		
7	P41.23		
8	P41.24		
9	P41.25		
10	P41.26		
11	P41.27		
12	P41.28		
13	P41.29		

14	P41.30		
15	P41.31		

Table B-8 Menu 42 - Reference Pointers

No.	Param.	Points To Param.	Scale	Function
Example				
1	P42.00	75.12	10000	Speed Reference
1	P42.00			Speed Reference
2	P42.02			Speed Reference
3	P42.04			Reference Sequencer
4	P42.06			PID Set-point
5	P42.08			PID Feedback
6	P42.10			Trim Reference
7	P42.12			Speed Trim Reference
8	P42.14			Torque Reference
9	P42.16			Torque Limits
10	P42.18			Torque Limits
11	P42.20			Temperature Compensation Scale
12	P42.22			Flux Limit
13	P42.24			Current Limit
14	P42.26			Torque/Magnet. Current
15	P42.28			Torque/Magnet. Current
16	P42.30			Position Reference
17	P42.32			Position Reference
18	P42.34			Tacho Feedback

Appendix C. Fault Return Form

Product Failure Notification

Customer:

Address:

Fax No:

Tel No:

Date:

Ship to Address (if different to above):

End User Details

Name:

Address:

Fax No:

Tel No:

Application Detail

Description of Item

PCB/Unit Type:

Serial No:

Description:

System Type:

Fault occurs when (please tick)

Hot □ Cold □ Ambient □

Type of Fault (please tick)

Hard □ Intermittent □

Time between failures

_____ hours/minutes

Fault Code displayed

_____

Distributor Engineer's Fault Report

Fault Description:

Fault Finding Procedure Followed:

Engineer's Diagnoses & Conclusions:

Goods Returned/Requested (please tick)

Warranty ☐
Sales Order No. supplied on

_____

Non Warranty ☐
Please give Order Number
_____

Service Contract ☐
Please give Order Number
_____

For Credit ☐
Credit returns must have approval before return

Note: All non-warranty items must be accompanied by a valid customer order number.

Converteam USE ONLY
Copy to Development

Credit Note Authorisation: Date
_____
Approved by:

Name:
_____
_____

Signature: _____

Date _____

Engineer's Name:
(Print)

Engineer's Signature:

Date Repair Completed:

Customer Satisfaction Report: For Warranty Items

I, name
_____
_____

Signature _____
Date _____
Acknowledge that the product failure repair referred to on this report has been satisfactorily completed.

PRODUCT RETURN NUMBER

Please contact Special Products Dept. for Product Return No. Tel: (01782) 781128. Returned goods will not be accepted without a valid Product Return No. & copy of this form.

K5017.7

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Appendix D. Configuring the Master

This section contains information specific to certain packages used to configure a PROFIBUS master.

D.1 ALSPA C80-35 PLC using ALSPA P80

D.1.1 Type 2 PPO packets

These packets are 10 words (20 bytes) long and should be configured as three consecutive modules of type input/output with a length type of Word and a consistency over the whole length. Each module should have its own module number, i.e. 1, 2 or 3. The first two modules should be 4 words in length and the last module should be two words long. The reference and monitor values will be in the (output or input respectively) memory locations for the second and third modules.

D.1.2 Type 4 PPO packets

These packets are 6 words (12 bytes) long and should be configured as one module of type input/output with a length type of Word and a consistency over the whole length. The modules should be 6 words long.

D.2 Example Disk

A pocket is provided in the manual to store an Example disk that is supplied with the product.

The disk supplied with this manual gives an example ALSPA P80 configuration for the ALSPA C80-35 module available from **Converteam**. The example configuration matches that of the example in Appendix A.

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Glossary

The following terms and acronyms are used within the text of this manual:

BDM	Basic Drive Module, the control board that integrates the functions of the CDC and the PIB. It is used on smaller range of MV3000e drives.
CDC	Common Drive Controller, the control board for the MV3000e range of drives.
CW	Control word.
H	Used in this manual to indicate a number is hexadecimal.
PE	Protective earth.
PIB	Power Interface Board, the control board which interfaces the CDC to the output switching devices.
PROFIBUS	Process Fieldbus.
PROFIBUS-DP	PROFIBUS Decentralised Periphery protocol.
PROFIBUS-FMS	PROFIBUS Field Message Specification protocol.
PROFIDRIVE	PROFIBUS Profile for Variable Speed Drives .
PPO	Parameter process data object, the data telegram defined by PROFIDRIVE to transfer data between PROFIBUS-DP master and slaves.
PZD	Process Data, a data element within the PPO.
VSD	Variable Speed Drive.

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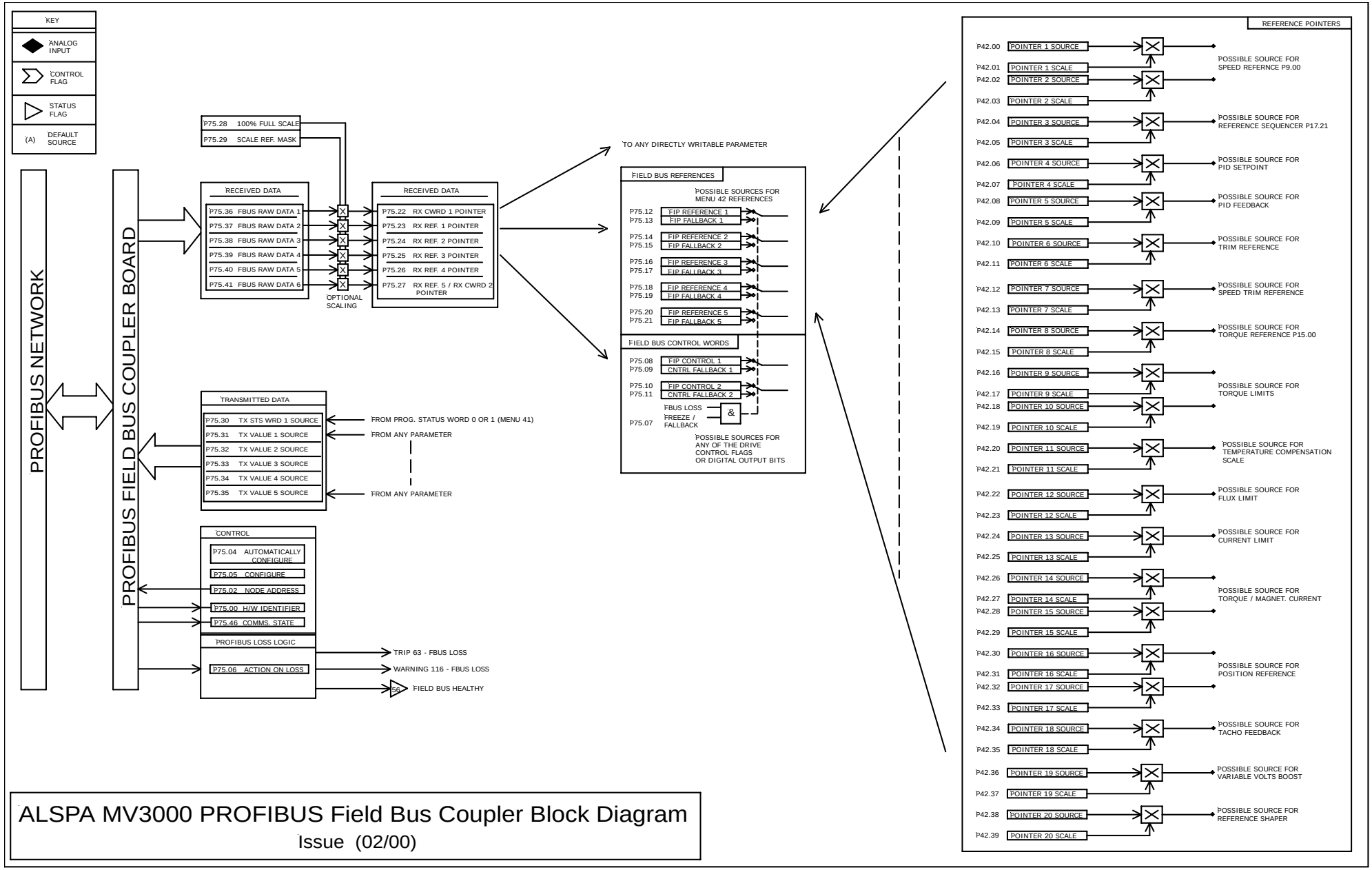
Index

This index applies to the English Edition of the T1694 Technical Manual for the ALSPA PROFIBUS Fieldbus Coupler for MVS3000-4001 and MVS3007-4002 Drives.

The indexes are prepared with word by word alphabetisation and are presented with page numbers for subject location. Page numbers for appendices are prefixed with the appendix letter e.g. A1 in the index is Appendix 1 page 1.



ALSPA MV3000 PROFIBUS Field Bus Coupler Block Diagram

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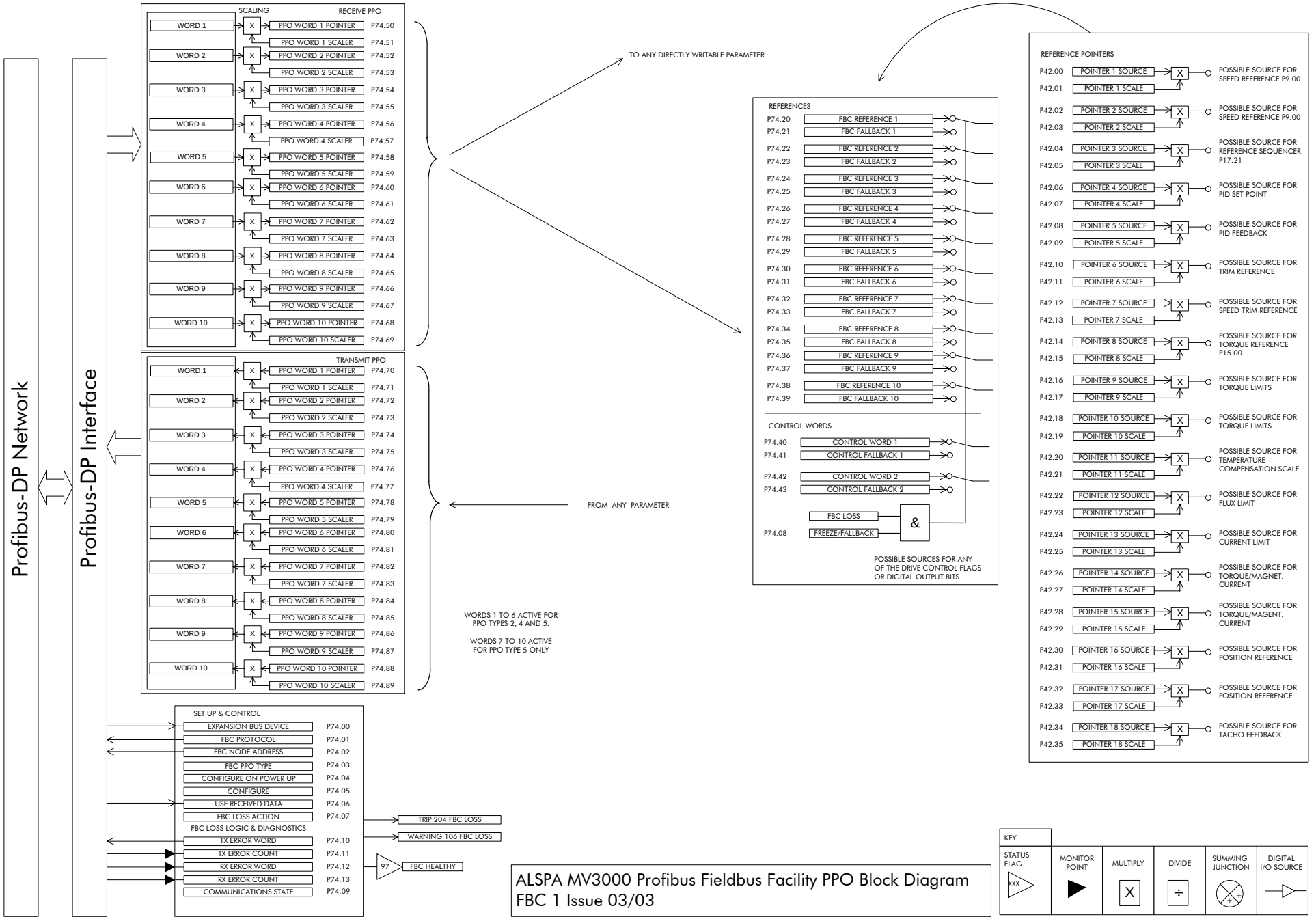

ALSPA MV3000 Profibus Fieldbus Facility PPO Block Diagram
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