

User Guide

Profibus-DP

Option Module
For Unidrive

Part Number: 0460-0075
Issue Number: 3



SAFETY INFORMATION

Persons supervising and performing the electrical installation or maintenance of a Drive and/or an external Option Unit must be suitably qualified and competent in these duties. They should be given the opportunity to study and if necessary to discuss this User Guide before work is started.

The voltages present in the Drive and external Option Units are capable of inflicting a severe electric shock and may be lethal. The Stop function of the Drive does not remove dangerous voltages from the terminals of the Drive and external Option Unit. Mains supplies should be removed before any servicing work is performed.

The installation instructions should be adhered to. Any questions or doubt should be referred to the supplier of the equipment. It is the responsibility of the owner or user to ensure that the installation of the Drive and external Option Unit, and the way in which they are operated and maintained complies with the requirements of the Health and Safety at Work Act in the United Kingdom and applicable legislation and regulations and codes of practice in the UK or elsewhere.

The Drive software may incorporate an optional Auto-start facility. In order to prevent the risk of injury to personnel working on or near the motor or its driven equipment and to prevent potential damage to equipment, users and operators, all necessary precautions must be taken if operating the Drive in this mode.

The Stop and Start inputs of the Drive should not be relied upon to ensure safety of personnel. If a safety hazard could exist from unexpected starting of the Drive, an interlock should be installed to prevent the motor being inadvertently started.

GENERAL INFORMATION

The manufacturer accepts no liability for any consequences resulting from inappropriate, negligent or incorrect installation or adjustment of the optional operating parameters of the equipment or from mismatching the Drive with the motor.

The contents of this User Guide are believed to be correct at the time of printing. In the interests of a commitment to a policy of continuous development and improvement, the manufacturer reserves the right to change the specification of the product or its performance, or the contents of the User Guide, without notice.

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1 Introduction

NOTE

Unidrive parameters are denoted in this manual by “#MM.PP”, where MM refers to the menu number, and PP refers to the parameter number within that menu. Please refer to the Unidrive Advanced User Guide for a full list of parameter definitions.

1.1 Profibus-DP Interface for Unidrive

The Unidrive Profibus-DP interface is supplied as an option module, with the Profibus-DP using a UD70 as the host. The UD70 does not lose any functionality when the Profibus-DP interface is fitted. The fastest data rate currently supported is 1.5 Mbits/sec.

The Unidrive supplies all power requirements for the Unidrive Profibus-DP interface. There is no provision for a back-up +24V power supply.

1.2 Product Conformance Certification

The Unidrive Profibus-DP interface (with V2.05.00 firmware, V2.08.00 system file and V5.0 GSD file) was submitted to the PROFIBUS Nutzerorganisation for conformance testing. All tests were successful, and the PROFIBUS Nutzerorganisation awarded full Profibus Conformance Certification. (Profibus Certificate No. Z00600)

NOTE

Unidrive Profibus-DP interfaces fitted with V2.04.00 firmware or earlier do NOT have Product Conformance Certification.

1.3 Overview Specification

- Auto slave configuration of data format and data consistency during Profibus-DP network initialisation.
- Supported data rates (bits/sec): 1.5M, 500k, 187.5k, 93.75k, 19.2k, 9.6k
- Three 16 bit input/output words, all can be mapped to or from Unidrive parameters
- CT Single Word Format non-cyclic data channel

2 Mechanical Installation



Warning

The Unidrive must be disconnected from the mains supply before installing or removing an option module.

2.1 Unidrive

1. Slide the option module into the Unidrive.



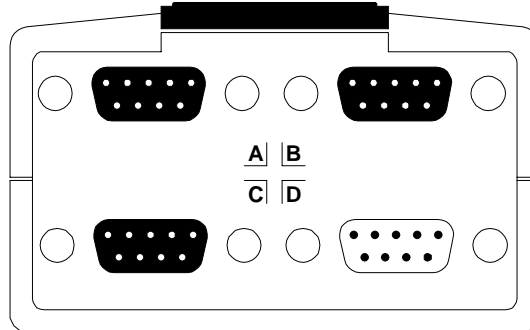
2. Push the option module into the Unidrive until it clicks into place.



3 Electrical Installation

3.1 Profibus-DP Connectors

The Unidrive Profibus-DP interface has two 9-way D-type sockets (A and B) to connect to the Profibus-DP network. Connectors C and D are the RS232 programming port (C) and RS485 general-purpose communications port (D) of the UD70.



The Profibus-DP connectors are parallel connectors, so either connector can be used. The pin-out connections are identical, and are given in the table below.

Terminal	Function	Description
8	A	Negative data Line
3	B	Positive data Line
5	0V ISO	0V Isolated
6	V _{DC}	+5V line for termination resistors
Shell	Screen	Cable braided screen connection

3.2 Profibus-DP Data Connections

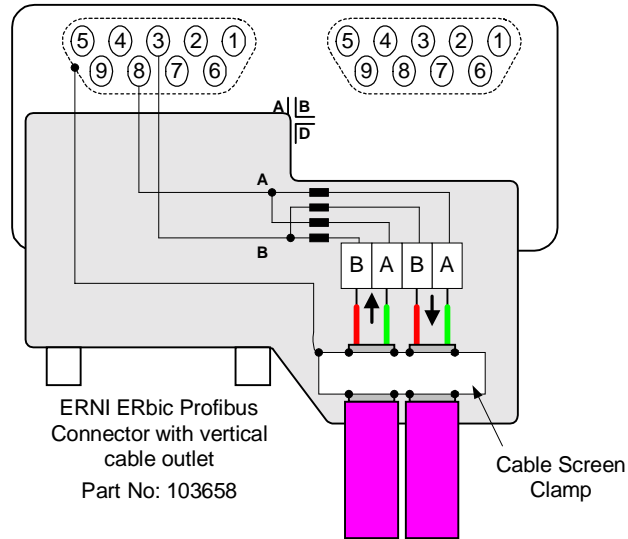
Specifically designed connectors are available for use on Profibus-DP networks that accept 2 Profibus-DP cables into colour-coded screw terminals, and plug directly into a 9-way Profibus-DP D-type connector. A screen clamp is also included to ensure good screen continuity and provide the best possible immunity to noise. Control Techniques recommends that a suitable connector should be used to connect the Unidrive Profibus-DP interface to a Profibus-DP network.

Details of manufacturers of connectors approved for use with Profibus-DP can be found on the Profibus web site at "www.profibus.com".

3.2.1 ERNI Connector

The ERbic® range of fieldbus connectors from ERNI includes a Profibus-DP connector with a vertical cable outlet (Part No. 103658) that is suitable for use with the Unidrive Profibus-DP interface. This connector allows 2 cables to be connected to the same connector, and does not break the network if disconnected from the Unidrive Profibus-DP interface. Further details are available from the ERNI web site at "www.erni.com".

The ERNI connector can only be fitted to D-type connector A on the Unidrive Profibus-DP interface, as shown in the diagram below.

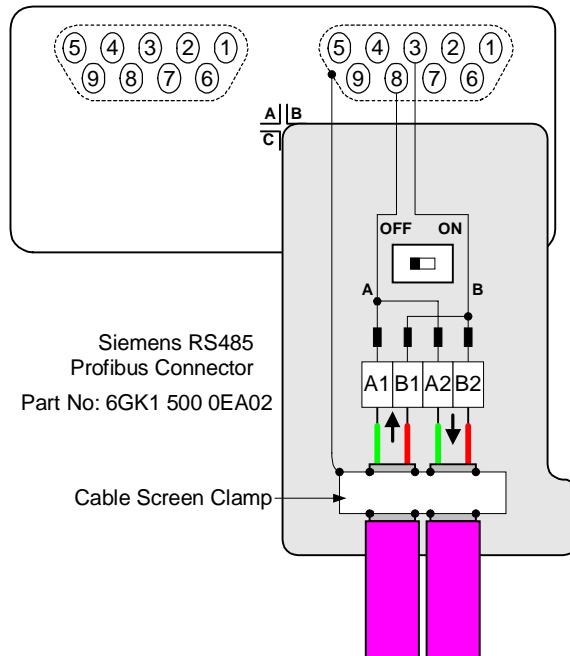


A termination connector is also available with the appropriate termination resistors fitted inside the connector. Refer to section 3.5 for further details.

3.2.2 Siemens Connector

Another suitable Profibus-DP connector for use with Unidrive is available from Siemens. (Part No. 6GK1 500 0EA02.) This connector has a switch that can enable or disable the internal termination resistor network. When termination is enabled, the outgoing bus is isolated. This connector allows 2 cables to be connected to the same connector, and does not break the network if disconnected from the Unidrive Profibus-DP interface. Further details are available from the Siemens web site at "www.siemens.de".

The Siemens connector can be fitted to either Profibus-DP D-type connector (A or B) on the Unidrive Profibus-DP interface.



3.3 Profibus-DP Cable

Profibus-DP cable has a single twisted pair plus overall screening. The data wires are usually red and green, and should be connected as shown in the table below.

Cable	Data Signal	Terminal	Description
Green	A	8	Negative data line Connect to pins 1 or 4 on a Commander SE Profibus-DP interface connector
Red	B	3	Positive data line Connect to pins 2 or 5 on a Commander SE Profibus-DP interface connector
Braided Shield	Screen	Shell	Cable screen Connect to pin 3 on a Commander SE Profibus-DP interface connector

Profibus-DP networks (like most fieldbus systems) run at high data rates, and consequently require cable specifically designed to carry high frequency signals. Low quality cable will attenuate the signals, and may render the signal unreadable for the other nodes on the network.

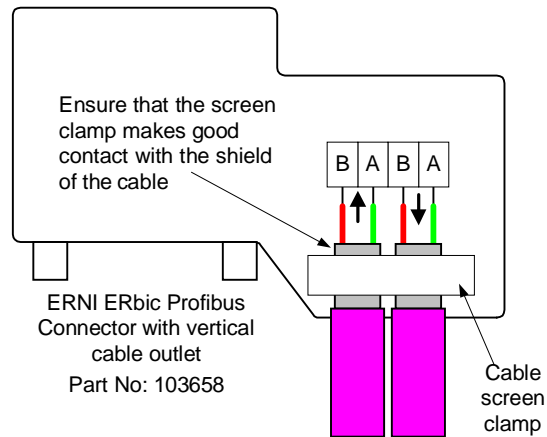
Cable specifications and a complete list of approved manufacturers of equipment for use on Profibus-DP networks is available on the Profibus web site at "www.profibus.com".

NOTE

Control Techniques can only guarantee correct and reliable operation of its Profibus-DP interfaces if the network cable installed has been fully approved by the PROFIBUS Nutzerorganisation.

3.4 Profibus-DP Cable Screen Connections

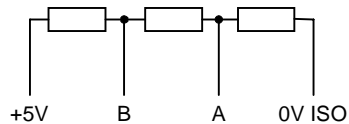
To ensure the best screen arrangement, strip the outer plastic shield off the Profibus-DP cable, and clamp the bare screen under the screen clamp. This will ensure that a good connection is made between the screens of both network cables, and help prevent noise currents from flowing into the Profibus-DP interface itself.



3.5 Profibus-DP Network Termination

The termination resistor network is not fitted internally on the Unidrive Profibus-DP interface. It is the installer's responsibility to ensure that both ends of each section of network cable are correctly terminated.

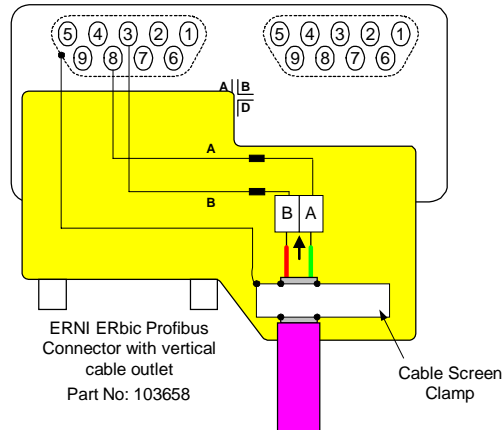
The termination resistor network required is shown in the diagram below.



It is very important in high-speed communications networks that the network communications cable is correctly terminated. Failure to terminate the network properly may mean that the network operates with substantially reduced noise immunity, or in the worst case, the network doesn't work at all.

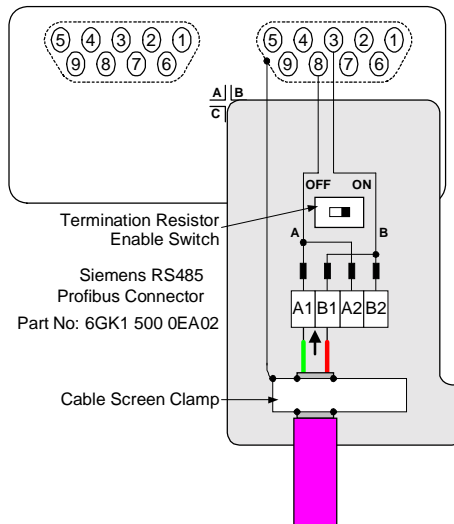
3.5.1 ERNI Termination Connector

ERNI supply a separate Profibus-DP connector that has the appropriate resistor network fitted internally. The termination connector is yellow to distinguish it from the non-terminated Profibus-DP connector.



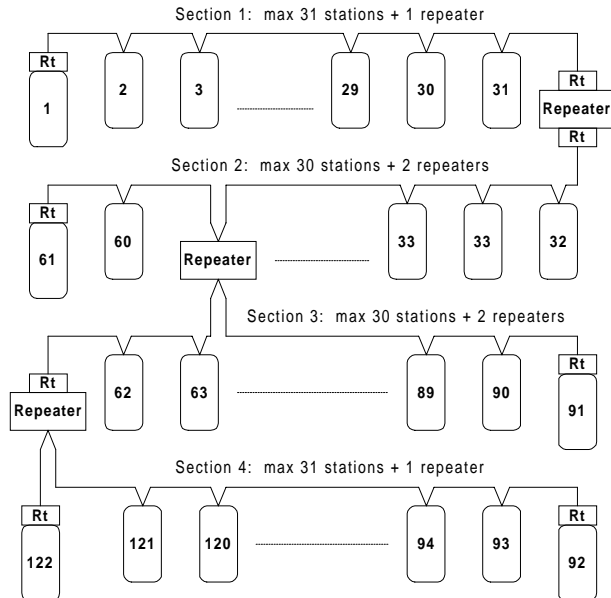
3.5.2 Siemens Connector

The termination resistor network is fitted in the Siemens connector. The resistors can be switched in or out of the circuit as required using the Termination Resistor Enable Switch.



3.6 Maximum Network Length

The maximum number of nodes that can be connected to a single Profibus-DP network segment is 32 nodes. Up to 3 line repeaters may be used to extend the network to 4 segments, allowing a maximum of 122 nodes on the network.



NOTE

Terminating resistors (Rt) MUST be installed at BOTH ends of each network segment.

The maximum length of cable for each segment is determined by the data rate at which the network must operate. The table below gives a summary of the maximum segment length for each data rate.

Data Rate (bits/sec)	Maximum Segment Length (m)	Maximum Total Network Length (m)
9.6K to 93.75K	1200	4800
187.5K	1000	4000
500K	400	1600
1.5M	200	800

4 Getting Started

The Quick Start section shows the basic parameter configurations required for the Profibus-DP interfaces to establish communications. Cyclic and non-cyclic data explanations are given in chapters 5 and 6.

NOTE

Parameters #20.01 to #20.20 and #20.50 are reserved for configuring the Profibus-DP interface, and should not be used in DPL programs.

4.1 Basic Communications Quick Start

Profibus-DP communications can be established with the Unidrive Profibus-DP interface simply by configuring the node address.

- Plug the Profibus-DP module into the Unidrive.
- Power up the Unidrive.
- Set the node address (#20.05) as required .
- Set #17.19 to 1 to store #20.05 and reset the UD70.

The Profibus-DP interface will re-initialise, and configure itself with the new node address. The data format and consistency are automatically detected when the master controller initialises the network.

Function	Unidrive	Recommended Setting
Node Address	#20.05	1 to 125
Data Rate	Not displayed	The data rate is automatically detected on Profibus-DP networks
Network Loss Trip	#20.11	48

4.2 Profibus-DP Node Address

Unidrive: #20.05

Every node must be given a unique network address. If a node is assigned an address, and that address already exists on the Profibus-DP network, the node may prevent the network from operating. The valid range of addresses is from 1 and 125.

If an invalid node address is set in #20.05, the Profibus-DP interface will reject the configured address, default to 125, and update #20.05 with the address that is actually being used.

NOTE

Changes to #20.PP parameters do not take effect in the Profibus-DP interface until the UD70 has been reset. See section 4.7.

4.3 Profibus-DP Data Rate

The Unidrive Profibus-DP interface will automatically detect the data rate of the network, and synchronise to the master controller. Data rates above 1.5 Mbits/sec are not supported. The Unidrive Profibus-DP interface does not display the actual network data rate.

bits/sec	bits/sec
1.5M	93.75K
500K	19.2K
187.5K	9.6K

4.4 Data Format

The Unidrive Profibus-DP interface automatically detects the required data format when the master controller initialises the network. Data consistency is optional, and is also detected during network initialisation.

3 Cyclic Words with Mode 1 Non-Cyclic data (with or without consistency) is the same data format as used on Mentor II and Commander SE. Each cyclic data word is mapped to a Unidrive parameter with default mappings as shown in the table below.

Cyclic Channel	Default Mapping Status
IN Word 0	Non-cyclic data word
IN Word 1	Status word
IN Word 2	Post-ramp speed reference
IN Word 3	Motor active current
OUT Word 0	Non-cyclic data word
OUT Word 1	Control word
OUT Word 2	Digital speed reference 1
OUT Word 3	Torque reference

4.5 Network Status

Unidrive: #20.50

The status of the Profibus-DP network is displayed in #20.50, and can be viewed on the display on the Unidrive.

#20.50	Status	Description
>0	Network healthy	Indicates the number of network cycles per second, and the slave is exchanging data with the master controller.
0	Network is not running	Indicates that the network is not currently running.

4.6 Network Loss Trip

Unidrive: #17.14

If the Profibus-DP network stops operating, the interface will trip the Unidrive on "tr60". The default time delay between network loss and Unidrive trip is 48ms, so the actual delay to trip will be between 48ms and 96ms. (See section 9.1 for more details.) The master controller will automatically detect that the slave node has gone missing from the network, and will update relevant status registers.

NOTE

Changes to #17.PP parameters in the Unidrive do not take effect until the UD70 has been reset. See section 4.7.

4.7 Initialising Set-up Changes

UD70 (#17.PP) and Profibus-DP (#20.PP) configuration parameters are only read during the initialisation sequence of the UD70. This prevents corruption of the configuration while parameters are being edited. When parameters have been configured, the UD70 must be reset to implement any changes made to the configuration parameters.

To reset from the UD70, set #MM.00 to 1070, and press the red RESET button on the Unidrive. Any changes made to the Profibus-DP configuration will now take effect.

NOTE

Resetting the UD70 does not store the #20.PP configuration parameters, so these changes will be lost when the Unidrive is powered down. See section 5.6.2 for details on storing UD70 parameters.

5 Cyclic Data

NOTE

“OUT data” and “IN data” describe the direction of data transfer as seen by the PLC scanner.

5.1 What is Cyclic Data?

Cyclic data is a method data transfer that must be set-up during network configuration, but is transmitted automatically once configuration is complete. The high-speed data transfer is achieved by transmitting only a 16-bit data value for each cyclic channel over the Profibus-DP network, and relying on local mapping information within the Unidrive to ensure the correct data is sent to the correct locations. This method relies on the PLC program writing and reading data values to and from the registers allocated to the node during network configuration, and the source and destination of IN and OUT data being set-up correctly in the Unidrive itself.

The flexibility of the Unidrive Profibus-DP interface means that each cyclic data OUT channel can be directed to any read-write Unidrive parameter. Similarly, each cyclic data IN channel can use any Unidrive parameter as a source of data.

NOTE

The mapping configuration cannot be changed dynamically, as the UD70 must be reset before changes to the mapping become active.

5.2 What is Data Consistency

If a data format is selected that requires full data consistency, this guarantees that the data on the Profibus is not updated with the new data values until ALL data words have been written into the Profibus buffer memory.

Consistent data may be important when using the 4-word non-cyclic data format. Without consistency, it is possible for 2 of the 4 words to go on one network cycle, with the data value updated on the next cycle. If the command was a write command, this could result in the previous data value being written to the new parameter, and could have disastrous consequences.

Using data consistency can often put restrictions on data manipulation within the master controller, and may require the use of special functions within the master controller, and these can take longer to execute. (Consult the supplier of the master controller for further information.)

5.3 Profibus-DP Data Formats

The Unidrive Profibus-DP interface will auto-detect the data format required during network initialisation. Consistency can be selected when the master controller is configured.

Non-cyclic mode	Cyclic words	Consistency	Comments
1	3	Full	These modes are supported by Mentor II and Commander SE
1	3	None	
1	3	Full	8 bytes with full consistency, available for backwards compatibility with older modules

5.4 Mapping Parameters on Unidrive

The mapping for the cyclic data channels on the Unidrive Profibus-DP interface can be set from the Unidrive keypad using #20.PP parameters.

The mapping method is similar to the method used for mapping analogue inputs and outputs. The value entered in the mapping parameter takes the form MMPP, where MM = menu number of the target parameter and PP = parameter number of the target parameter.

NOTE

#20.01 to #20.20, and #20.50 are all reserved for Profibus-DP set-up and configuration, and should not be used in DPL programs.

The default mapping values are shown in the table below.

Cyclic Channel	Mapping Parameter	Default Mapping Status
IN Word 0	----	Reserved for the non-cyclic data
IN Word 1	#20.07	#90.11, fieldbus status word
IN Word 2	#20.03	#2.01, post-ramp speed reference
IN Word 3	#20.04	#4.02, torque-producing current
OUT Word 0	----	Reserved for the non-cyclic data
OUT Word 1	#20.06	#90.11, fieldbus control word
OUT Word 2	#20.01	#1.21, digital speed reference 1
OUT Word 3	#20.02	#4.08, torque reference

NOTE

If a mapping parameter is set to an invalid value, e.g. destination parameter is read only, or parameter does not exist, the Unidrive will reset the mapping parameter (#20.PP) to its default value.

If a cyclic channel is not required, setting the mapping value to -1 will disable it. The data word will still be transmitted over the network, but the data value will not be written to any Unidrive parameter.

NOTE

The cyclic data channels do not use decimal points. For example, the digital speed reference 1 (#1.21) has units of Hertz, accurate to 1 decimal place. To write a value of 24.6Hz to #1.21, the value must be transmitted as 246.

5.5 Internal 32-Bit Parameters on UD70

The Unidrive Profibus-DP Interface has a set of internal 32-bit registers in the UD70. These are addressed as `_Pxx%`, `_Qxx%`, `_Rxx%` or `_Sxx%` from the DPL program, and the `_Qxx%` registers are used with the internal position controller in the UD70.

A 32-bit cyclic channel can be created for IN data, OUT data or both, by combining cyclic channels 2 and 3. This allows full 32-bit values to be directly transferred between the UD70 and the controlling PC or PLC. (See the "User's Guide" for the UD70 for more information.)

The 32-bit cyclic channel is configured by mapping IN or OUT cyclic data channel 2 (#20.01 or #20.03) to a 32 bit register, and setting the mapping for IN or OUT cyclic data channel 3 (#20.02 or #20.04) to -2. Channel 3 will contain the data high word (upper 16 bits of the 32-bit register) and channel 2 contains the data low word (lower 16 bits of the 32-bit register.)

The 32-bit registers are addressed as parameters in menu 70 to menu 73. (See table below.) To map a cyclic channel to one of these registers, the parameter reference must be entered in the appropriate mapping parameter.

Registers	Parameter Reference
<code>_P00%</code> - <code>_P99%</code>	#70.00 to #70.99
<code>_Q00%</code> - <code>_Q99%</code>	#71.00 to #71.99
<code>_R00%</code> - <code>_R99%</code>	#72.00 to #72.99
<code>_S00%</code> - <code>_S99%</code>	#73.00 to #73.99

NOTE

If the mapping for both cyclic channel 2 and cyclic channel 3 are directed to 32 bit registers, only the low 16 bits of each register will be written to or read from.

5.6 Storing Parameters

Although any changes to the mapping will take effect after a UD70 reset sequence, the new values must be stored in non-volatile memory if they are to be restored automatically when the Interface is next powered up.

5.6.1 Saving Unidrive Parameters (Menu 1 to 19)

To initiate the Unidrive parameter save sequence, set #MM.00 to 1000 and press the red RESET button on the keypad.

All parameters in these menus are saved in the EEPROM in the Unidrive. If the Unidrive Profibus-DP interface is replaced, the Unidrive

will retain all values in menu 1 through menu 19 when the Unidrive is next powered up.

5.6.2 Saving UD70 Parameters (Menu 20 and Internal)

To initiate the non-volatile save sequence for these parameters, set #17.19 to 1. The UD70 will then store menu 20 and the internal 32-bit parameters, clear #17.19 back to zero and completely reset itself.

All menu 20 parameters and internal 32-bit parameters (_Pxx% and _Qxx%) are stored in the FLASH memory of the UD70. If the Unidrive Profibus-DP interface is replaced, the menu 20 parameters may need to be re-configured. If the replacement module has been used before, the stored values may be different from the normal default settings.

The UD70 can also be configured to store these parameters automatically when the Unidrive powers down. The store routine is triggered when an under-voltage (UU) trip occurs. Set #17.20 to 1, store the Unidrive parameters and reset the UD70 to enable this feature.

5.7 Mapping Conflicts

When the mapping parameters for the Profibus-DP cyclic channels are set, care must be taken to ensure that there are no clashes with the mapping of the analogue and digital inputs within the Unidrive. The Unidrive Profibus-DP interface will not indicate any conflict of mapping parameters. This only applies to analogue and digital inputs, and OUT data on the Profibus-DP network.

If a numerical parameter is written to from two different sources, the value of this parameter will depend entirely upon the scale times for the analogue or digital input and the Profibus-DP network. Further confusion may be caused due to the update rate of the display. A parameter may appear to be steady at a particular value, but occasionally glitch in the value will be seen. In reality, this value may be changing continuously, leading to erratic behaviour.

Function	Mapping Parameter	Function	Mapping Parameter
Analogue I/P 1	#7.10	Logic O/P 2	#9.20
Analogue I/P 2	#7.14	Motorised Pot O/P	#9.25
Analogue I/P 3	#7.18	Binary Summer	#9.33
Digital I/P 1	#8.10	Comparator 1 O/P	#12.07
Digital I/P 2	#8.13	Comparator 2 O/P	#12.17
Digital I/P 3	#8.16	Reference Input	#13.06
Digital I/P 4	#8.19	PID O/P	#14.16
Digital I/P 5	#8.21	Cyclic OUT Word 1	#20.06
Digital I/P 6	#8.23	Cyclic OUT Word 2	#20.01
Logic O/P 1	#9.10	Cyclic OUT Word 3	#20.02

Ensure that each Unidrive parameter in the table above has a different value programmed. A value of 0 will disable analogue and digital inputs, and -1 will disable the cyclic data channels.

5.7.1 Control Word Mapping Conflicts

The control word provides a method of writing to multiple bit parameters using one data word. If one of the cyclic data channels is writing to the control word, the following bit parameters for each Unidrive must not be controlled by any digital inputs.

Function	Param	Function	Param
Enable	#6.15	Preset ref select bit 1	#1.46
Run Forwards	#6.30	Application bit	#18.31
Jog	#6.31	Application bit	#18.32
Run Reverse	#6.32	Application bit	#18.33
Preset ref select bit 0	#1.45		

5.8 Fieldbus Control Word for Unidrive

NOTE

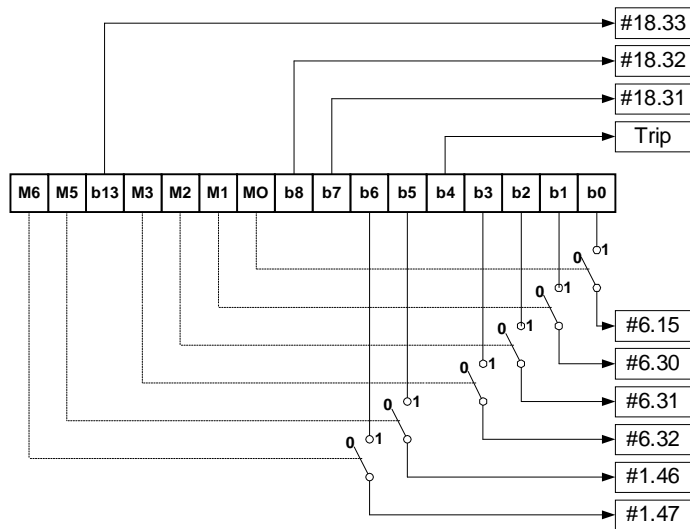
This section assumes that the Unidrive is configured to use the default Wire Proof PLC sequencing mode (#6.04 = 4). If PLC mode is selected (#6.04 = 3), the control word mapping is slightly different. Refer to section 9.2 for details.

The Control Word is an efficient way of remotely controlling the motion of a Unidrive. Each bit in the control word has a particular function, and provides a method of controlling the function of the Unidrive (RUN, JOG, etc.) with a single data word. The control word is addressed in the UD70 by writing to #90.11.

b15	b14	b13	B12	b11	b10	b9	b8
M6	M5	#18.33	M3	M2	M1	M0	#18.32

b7	b6	b5	b4	b3	b2	b1	b0
#18.31	#1.46	#1.45	TRIP	RUN REV	JOG	RUN FWD	ENABLE

The bits shown as "Mx" are individual mask bits that allow the corresponding "bx" to be masked, i.e. the MASK bits determine whether or not the data bit is written through to the corresponding parameter.



If mask bits M0 and M1 are set to 1, ENABLE and RUN FWD are updated with the values of b0 and b1 (either 0 or 1) every time the control word value is received. JOG and RUN REV will not be updated, even if the values of b2 and b3 change, because their mask bits (M2 and M3) are not set to 1. If M0 and M1 are reset to 0, the values in b0 and b1 will NOT be written to ENABLE and RUN FWD, and these parameters will remain set to their current state.

The TRIP bit (b4) will cause a “tr52” trip when set to 1, but the trip cannot be cleared until the TRIP bit (b4) has been reset to 0. Parameters #18.31 to #18.33 are general user parameters and do not have mask bits.

Bit	Function	Description
0	ENABLE	Set to 1 to put the Unidrive in READY mode. (The hardware ENABLE must also be present.) The RUN FWD, JOG and RUN REV bits will have no effect unless the ENABLE bit is set to 1. The Unidrive outputs are disabled immediately when the ENABLE bit is reset to 0, and the motor will coast to stop
1	RUN FWD	Set to 1 to run the motor in the forwards direction. Reset to 0 to decelerate the motor to a controlled stop before the Unidrive output stage is disabled
2	JOG	Set to 1 with RUN FWD or RUN REV bit also set to jog the motor in the appropriate direction. The Unidrive will ramp the motor to the normal speed or stop when the JOG bit is reset to 0, depending on the status of the RUN FWD and RUN REV bits.

3	RUN REV	Set to 1 to run the motor in the reverse direction. When reset to 0, the Unidrive will decelerate the motor to stop before the outputs are disabled
4	TRIP	Set to 1 to trip the Unidrive on "tr52". The TRIP bit must be reset to 0 before the Unidrive can be reset.
5	#1.45	Preset Reference Select. These bits are used to select the digital speed references used. Refer to the Unidrive User Guide for more information.
6	#1.46	
7	#18.31	User application bit
8	#18.32	User application bit
9	M0	ENABLE mask bit
10	M1	RUN FWD mask bit
11	M2	JOG mask bit
12	M3	RUN REV mask bit
13	#18.33	User application bit
14	M5	Mask bits for the Preset Reference Select bits
15	M6	

Some example control words for Wire-Proof PLC mode are given in the table below.

b15-b12	b11-b8	b7-b4	b3-b0	Value	Action
0000	0010	0000	0000	0x0200	Drive disable
0001	1110	0000	0001	0x1E01	Enabled + stopped
0001	1110	0000	0011	0x1E03	Enabled + run fwd
0001	1110	0000	1001	0x1E09	Enabled + run rev
0001	1110	0000	1101	0x1E0C	Enabled + jog rev

5.9 Fieldbus Status Word for Unidrive

The status word is an efficient way of remotely monitoring and diagnosing the status of the Unidrive. Each bit in the status word indicates the status of a function of the Unidrive, e.g. At Speed, Drive Healthy, etc. The status word is addressed in the UD70 by writing to #90.11.

b15	b14	b13	b12	b11	b10	b9	b8
X	#10.15	#10.14	#10.13	#10.12	#10.11	#10.10	#10.09

b7	b6	b5	b4	b3	b2	b1	b0
#10.08	#10.07	#10.06	#10.05	#10.04	#10.03	#10.02	#10.01

The table below shows the particular status of the Unidrive indicated by each bit when set to 1.

Bit	Parameter	Description
0	#10.01	Drive healthy
1	#10.02	Drive running
2	#10.03	Zero speed
3	#10.04	Running at or below min speed
4	#10.05	Below set speed
5	#10.06	At speed
6	#10.07	Above set speed
7	#10.08	Load reached
8	#10.09	In current limit
9	#10.10	Regenerating
10	#10.11	Dynamic brake active
11	#10.12	Dynamic brake alarm
12	#10.13	Direction commanded
13	#10.14	Direction running
14	#10.15	Mains Loss
15		Not used

5.10 Disabling Cyclic Data Channels

Set the appropriate channel mapping parameter to -1, and reset the Unidrive Profibus-DP Interface.

If an application only requires 2 cyclic data channels, the remaining channel can be disabled. This means that the data received from that channel will not be written to any Unidrive parameter. It does not actually remove the channel from the Profibus-DP network.

6 Non Cyclic Data

The non-cyclic data channel provides a method for the master controller to read from or write to any parameter within the Drive. This channel can be used for single infrequent data transfers, or uploading and downloading parameter sets to or from a particular node.

Non-cyclic data access to Unidrive parameters is controlled entirely by the master controller program, and is not configured in any way when the Profibus-DP network map is defined.

The Unidrive Profibus-DP interface currently provides the CT Single Word Format of non-cyclic data. This mode is also available in the Mentor II and Commander SE Profibus-DP interfaces.

NOTE

The non-cyclic data channel does not use decimal points. For example, the digital speed reference 1 (#1.21) has units of Hertz, accurate to 1 decimal place. To write a value of 24.6Hz to #1.21, the value must be transmitted as 246.

6.1 CT Single Word Format

The CT Single Word Format of non-cyclic data uses one word for non-cyclic data. The non-cyclic sub-protocol requires a specific sequence of 4 words or "telegrams" to implement the parameter access. Each non-cyclic word or telegram is split into 2 bytes to implement the sub-protocol, with the high byte containing the control codes for each telegram, and the low byte containing the data for each telegram.

b15	b14	b13	b12	b11	b10	b9	b8
R/W	Error	X	X	Stamp number			

b7	b6	b5	b4	b3	b2	b1	b0
Data byte							

NOTE

If "little endian" data format has been selected, the bytes that form the non-cyclic data word MUST be swapped BEFORE the non-cyclic data word is transferred to the Profibus. See section 9.5.

Bit	Function	Values	Description
0 to 7	Data	0 to 255	Depending on the stamp number of the telegram, this byte contains the menu or parameter number, or data high or low byte.
8 to 11	Stamp number	0 to 4	Indicates the stamp number of the word. This shows which part of the message is currently in progress. Setting the stamp number to 0 resets the internal non-cyclic state machine
12, 13	Not Used		These should be set to 0.
14	ERR	0 = Data OK 1 = Error	Indicates the success or failure of the message. Failure could occur if the parameter does not exist, or is a read-only or write-only parameter.
15	R/W	0 = Write 1 = Read	Defines whether the data word is part of a READ or WRITE cycle is in progress.

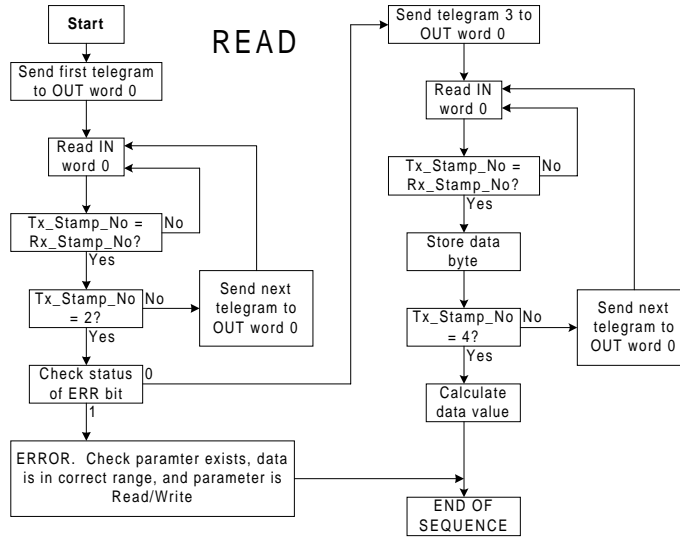
NOTE

X = don't care. Generally, these bits should be set to 0. If a message is aborted part way through, the non-cyclic OUT word should be reset to 0. This will reset the non-cyclic state machine, and allow the message sequence to be restarted.

6.1.1 Reading parameters using Mode 1

To read parameters using the non-cyclic channel, the following "telegrams" must be transmitted to construct the final message.

- Telegram 1 Define menu number.
- Telegram 2 Define parameter number.
- Telegram 3 Request high data byte.
- Telegram 4 Request low data byte.



The following example telegrams show how to read the data value from #3.02 in the Unidrive.

TELEGRAM 1

The first telegram from the master indicates a READ cycle, and the stamp number is 1. The data byte would contain the menu number for the parameter that is to be read.

Bit	b15-b12	b11-b8	b7-b4	b3-b0
Value	1XXX	0001	0000	0011

Data word = 0x8103 Stamp number = 1 Menu = 3

When the first telegram has been received and processed in the slave node, it is mirrored in the non-cyclic IN word back to the PLC. This is the signal to the master controller program that the first telegram of the message has been received and understood, and the second telegram can be transmitted.

TELEGRAM 2

The second telegram from the master also indicates a READ cycle, but the stamp number is now 2. The data byte would contain the parameter number for the parameter that is to read.

Bit	b15-b12	b11-b8	b7-b4	b3-b0
Value	1XXX	0010	0000	0010

Data word = 0x8202 Stamp number = 2 Parameter = 2

When the second telegram has been received and processed in the slave node, it is mirrored in the non-cyclic IN word. This is the signal to the master controller program that the second telegram of the message has been received and understood, and the third telegram can be transmitted.

TELEGRAM 3

The third telegram from the master acts as the indication to the slave node to send the data high byte from the requested parameter. The data byte is not used in this telegram, and should be set to 0.

Bit	b15-b12	b11-b8	b7-b4	b3-b0
Value	1XXX	0011	XXXX	XXXX

Data word = 0x8300 Stamp number = 3 Data high byte = XX

When the third telegram has been received and processed in the slave node, the node will mirror the stamp number in the non-cyclic IN word, and load the high byte of the parameter value into the data byte.

Bit	b15-b12	b11-b8	b7-b4	b3-b0
Value	10XX	0011	0000	0101

Data word = 0x8305 Stamp number = 3 Data high byte = 0x05

If an invalid parameter was specified in telegrams 1 and 2, e.g. parameter is write only, or does not exist, the Profibus-DP interface will set the ERROR bit to 1 (b14 = 1). The data bits will have no significance.

Bit	b15-b12	b11-b8	b7-b4	b3-b0
Value	11XX	0010	XXXX	XXXX

Data word = 0xC200 Stamp number = 2

If an error is reported, it is recommended that the non-cyclic data word is set to 0 to ensure that the non-cyclic state machine is completely reset, and ready for the next non-cyclic READ or WRITE sequence.

TELEGRAM 4

The fourth telegram from the master acts as the indication to the slave node to send the data high byte from the requested parameter. The data byte is not used in this telegram and should be set to 0.

Bit	b15-b12	b11-b8	b7-b4	b3-b0
Value	1XXX	0100	XXXX	XXXX

Data word = 0x8400 Stamp number = 4

When the fourth telegram has been received and processed in the slave node, the node will mirror the stamp number in the non-cyclic IN word, and load the low byte of the parameter value into the data byte.

Bit	b15-b12	b11-b8	b7-b4	b3-b0
Value	1XXX	0100	1101	1100

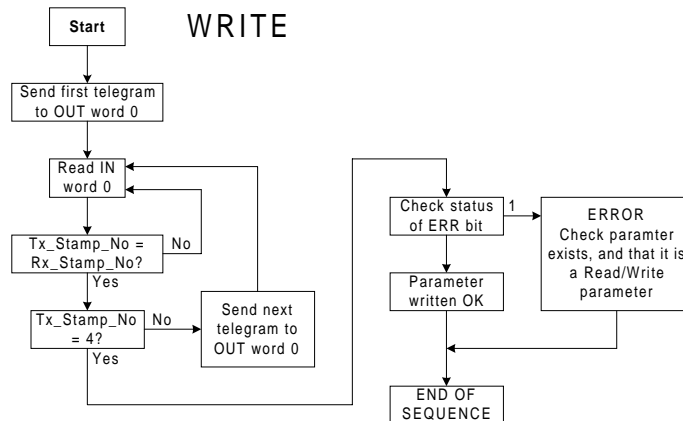
Data word = 0x84DC Stamp number = 4 Data low byte = 0xDC

Speed feedback = (high data byte * 256) + low data byte
 = (0x05 * 0x100) + 0xDC
 = 0x05DC
 = 1500 rpm

6.1.2 Writing parameters using Mode 1

To write to parameters using the non-cyclic channel, the following telegrams must be sent on each network cycle to construct the final message.

- Telegram 1 Define menu number.
- Telegram 2 Define parameter number.
- Telegram 3 Set data high byte.
- Telegram 4 Set data low byte.



The following example telegrams show how to write a value of 120.0 Hz (0x04B0) to #1.21 in the Unidrive.

TELEGRAM 1

The first telegram from the master indicates a WRITE cycle by setting the R/W bit to 0. The stamp number is set to 1. The data byte contains the menu number for the parameter that is to be written to.

Bit	b15-b12	b11-b8	b7-b4	b3-b0
Value	0XXX	0001	0000	0001

Data word = 0x0101 Stamp number = 1 Menu = 1

When the first telegram has been received and processed in the slave node, it is mirrored in the non-cyclic IN word. This is the signal to the master controller program that the first telegram of the message has been received and understood, and the second telegram can be transmitted.

TELEGRAM 2

The second telegram from the master also indicates a WRITE cycle, but the stamp number is now set to 2. The data byte contains the parameter number for the parameter that is to be written to.

Bit	b15-b12	b11-b8	b7-b4	b3-b0
Value	0XXX	0010	0001	0101

Data word = 0x0215 Stamp number = 2 Parameter = 21

When the second telegram has been received and processed in the slave node, it is mirrored in the non-cyclic IN word. This is the signal to the master controller program that the second telegram of the message has been received and understood, and the third telegram can be transmitted.

TELEGRAM 3

The third telegram from the master has the stamp number set to 3. The data bits contain the data high byte for the parameter being written to.

Bit	b15-b12	b11-b8	b7-b4	b3-b0
Value	0XXX	0011	0000	0100

Data word = 0x0304 Stamp number = 3 High data byte = 0x04

When the third telegram has been received and processed in the slave node, it is mirrored in the non-cyclic IN word. This is the signal to the master controller program that the third telegram of the message has been received and understood, and the fourth telegram can be transmitted.

TELEGRAM 4

The fourth telegram from the master has the stamp number set to 4. The data bits contain the data low byte for the parameter that is being written to.

Bit	b15-b12	b11-b8	b7-b4	b3-b0
Value	0XXX	0100	1011	0000

Data word = 0x04B0 Stamp number = 4 Low data byte = 0xB0

When the fourth telegram has been received and processed in the slave node, it will write the data (#1.21 = 1200) as transmitted, ignoring the decimal point. If the operation is successful, the ERR bit is reset to 0 and the telegram is reflected in the non-cyclic IN word.

Bit	b15-b12	b11-b8	b7-b4	b3-b0
Value	00XX	0100	1011	0000

Data word = 0x04B0 Stamp number = 4 Low data byte = 0xB0

If there was a problem with writing the data to the defined parameter, e.g. parameter is read only, does not exist, or data is out of range, the ERR bit is set to 1.

Bit	b15-b12	b11-b8	b7-b4	b3-b0
Value	01XX	0100	XXXX	XXXX

Data word = 0x4400 Stamp number = 4

6.2 Profibus-DP Set-up using Non-Cyclic Data

The Unidrive Profibus-DP interface can also be configured via the non-cyclic data channel. Menu 20 in the Unidrive contains the parameter values currently being used, and these can be modified as required. Cyclic data mapping parameters can be edited via the non-cyclic data, but changes made to the data mapping will not take effect until the UD70 has been reset.

Setting #17.19 to 1 will store the mapping changes in the Profibus-DP interface, and reset the Profibus-DP interface. The Profibus-DP master controller may detect a brief error while the Unidrive Profibus-DP interface resets and re-configures itself.

The parameters listed below are the parameters that can be written to configure the Profibus-DP interface.

Param	Default	Description
#20.07	#90.11	Not used
#20.03	#2.01	IN Channel 2 Mapping
#20.04	#4.02	IN Channel 3 Mapping
#20.06	#90.11	OUT Channel 2 Mapping
#20.01	#1.21	OUT Channel 3 Mapping
#20.02	#4.08	Load Option Defaults

#20.11	200	Trip Delay Time (ms) Specifies the time-out period for the Profibus-DP network. If no network messages are received in this time period, the network loss trip is invoked. (See section 9.1)
#20.13	0	Endian Format Select See section 9.5
#17.14	0	Network Loss Trip Enable
#17.19	0	UD70 Store and Reset

The parameters listed in the table below return information about the Profibus-DP interface. Writing to these parameters will not affect the operation of the node.

Param	Description
#20.14	Option ID Code Indicates the fieldbus type, flavour and hardware version. (See section 8.1)
#20.15	Software Version Vxx.yy Indicates the firmware version fitted to the Profibus-DP interface. (See section 8.2)
#20.50	Fieldbus Diagnostic Indicates the number of message being processed by the Unidrive Profibus-DP. (See section 8.6)
#17.02	System File Version (See section 8.3)

All parameters from #20.01 to #20.20 are reserved for use to configure new features that may be added in future updates of the Unidrive Profibus-DP interface. Unpredictable behaviour of the Profibus-DP interface may result if these parameters are used for other purposes.

7 GSD Files

7.1 What are GSD Files?

GSD files are text files that are used with the Profibus-DP network configuration software. They contain information about the device capabilities, such as supported data rates, delay timings, supported data formats, etc.

GSD files are not actually downloaded to the PLC or scanner. The information they contain is used when the network configuration file is generated, but they are necessary and are only used during network configuration. They must usually be installed into the network configuration software, or copied to a specific directory. Refer to the software documentation for instructions about installing GSD files. Control Techniques cannot offer specific technical support on any of the software packages available for configuring Profibus-DP networks.

NOTE

A device cannot be included in the configuration for a Profibus-DP network without an associated GSD file.

7.2 Unidrive GSD File

A GSD file is available for the Unidrive Profibus-DP interface, and can be obtained from your local Control Techniques Drive Centre, or the Profibus web site at "www.profibus.com". This file contains a full description of the performance capabilities of the Unidrive Profibus-DP interface.

Most configuration tools for Profibus-DP will group slaves together, depending on what type of device they are. The Unidrive can be found under heading "**ADDITIONAL FIELD DEVICES**", sub-heading "**DRIVES**".

Drive	Filename	Version
Unidrive	CTU_3345.GSD	V5.0
Commander SE	CTSE04FA.GSD	V1.2

7.3 Data Consistency

Data consistency provides a method of ensuring that all data is updated at the same time, thus preventing any form of data skew.

Using data consistency can often put restrictions on data manipulation within the master controller, and require data bytes or words to be written in a certain order. Using data consistency can increase the master controller cycle time, so it should only be used if really necessary. (See section 5.2).

7.4 Profibus-DP Data Formats

All data formats can be set to have full data consistency or no data consistency. The first cyclic data word is always the control word.

Non-cyclic mode	Cyclic words	Consistency	Comments
1	3	Full	These modes are supported by Mentor II and Commander SE
1	3	None	
1	3	Full	8 bytes with full consistency, available for backwards compatibility with older modules

When the master initialises the network, it will transmit the configuration byte to each slave. If the configuration byte matches one of the three modes above, the slave will automatically configure itself for this type of data.

If the telegram does not match any of the above data formats, the node will not be initialised and the master will indicate that there is an error on the network.

8 Diagnostics

NOTE

The information from the parameters described below should always be noted before contacting Control Techniques for technical support.

8.1 Fieldbus Code

Unidrive: #20.14

The fieldbus code identifies the hardware level in the Profibus-DP interface. This information is vital when trying to determine what upgrades can be performed on older modules.

The identification of the high-speed communications option module can be read from #20.14 on the Unidrive display. This number is shown in the form XYZ, where X is the fieldbus type, Y is the fieldbus flavour, and Z is the hardware revision level.

#20.14	Fieldbus Type	Fieldbus Flavour	Hardware Revision
100	1 (Profibus)	0 (DP)	0 (UD73A Issue 1 and UD73B Issue 1)

8.2 Firmware Version

Unidrive: #20.15

The version of firmware fitted to the Profibus-DP interface can be read from #20.15. The Hardware Revision column shows the hardware levels that can accept each version of firmware.

#20.15	Firmware Version	Hardware Revision
202	V2.02.00	0
204	V2.04.00	0
205	V2.05.00	0

8.3 System File Version

Unidrive: #17.02

The system file installed in the UD70 must be the correct file for the communications option installed. The system file for the Unidrive Profibus-DP interface is "IBSPROFI.SYS".

The system file that must be installed can depend on the level of hardware and firmware in the module. In general, new system files are backward compatible with older versions of firmware and hardware, but there may be some limitations when upgrading older modules. (See sections 8.1 and 8.2.)

The system file version can be read from parameter #17.02 on the Unidrive.

Firmware	Hardware Revision	System File	Comments
V2.02.00	0	V2.07.03	
V2.04.00	0	or later	
V2.05.00	0	V2.08.00	Certified by the PROFIBUS Nutzerorganisation (PNO)

NOTE

System files can be downloaded using the WINFLASHER utility, which can be obtained from you local Drive Centre.

8.4 Node Address

Unidrive: #20.05

Every Profibus-DP node must be assigned a unique node address. If two or more nodes have the same address, this will cause a conflict when the master attempts to initialise the network.

Ideally, the node address should be configured on each node BEFORE any attempt is made to connect it to the network.

8.5 Network Data Rate

Unidrive: N/A

The Unidrive Profibus-DP interface will automatically detect the data rate of the network, and synchronise to the master controller. Hardware Revision 0 supports a maximum data rate of 1.5 Mbits/sec. The Unidrive Profibus-DP interface does not display the network data rate.

8.6 Network Status

Unidrive: #20.50

#20.50 on Unidrive indicates the number of valid messages per second being received by the node. The Profibus-DP network master controller addresses every node on the network once per network cycle, and exchanges the configured amount of information. If a network has been correctly wired, screened and terminated, there will be very few errors occurring, and the number of messages per second displayed on each node should be the same. #20.50 is only updated once per second.

8.7 No Data Transfer

If data is not being transferred from the master controller to the Unidrive, make the following checks:

- The mapping parameters have been programmed correctly. If an invalid mapping was entered, it will have been reset to 0.
- Check that there are no mapping parameter conflicts, i.e. an analogue input is not trying to control the same parameter as a cyclic OUT channels.

8.8 Unidrive Trip Codes

The trip codes listed below may be caused by the Profibus-DP interface. Other trips may occur if a DPL program is loaded. For a full list of UD70 trips, refer to the UD70 User Guide

Trip Code	Error
tr52	This code indicates that the trip originated from the setting of bit 4 in the control Word
tr56	The UD70 does not contain the correct operating system for the detected hardware. Download the system file "IBSPROFI.SYS". If the trip persists, ensure that the UD73A and UD70 boards inside the module are properly clipped together. (This should only be attempted by suitably qualified personnel!!)
tr57	An illegal operating system call has been made, e.g. WRNET. CTNet commands cannot be used with Profibus-DP
tr60	This trip indicates that loss of the Profibus-DP network has been detected. This can be caused by disconnecting the node from the network, a bad cable connection, or by resetting or stopping the network master controller

See section 9.3 for details on how to reset the Unidrive using the Profibus-DP network.

9 Advanced Features

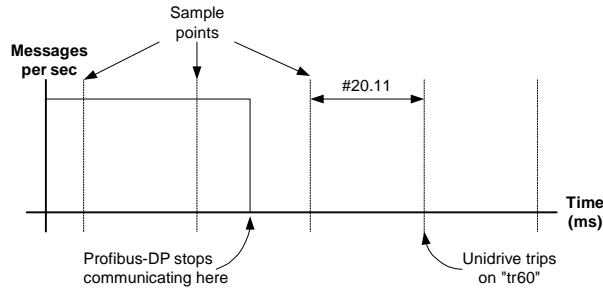
9.1 Network Loss Trip

Unidrive: #20.11

0 = trip disabled

16 to 992 = trip delay time (in ms)

The Profibus-DP interface counts the number of valid network cycles received in a time period specified by #20.11. The trip is triggered if no messages are received in a given sample period, and messages were received in the previous sample period. The default setting for #20.11 is 48ms. The UD70 Global Run-Time Trips also have to be enabled by setting #17.14 to 1.



As can be seen from the diagram, the actual time from network loss to Unidrive trip will range from #20.11 ms to $2 * \#20.11$ ms. If the trip time is set too low, spurious network loss trips may be seen.

The actual network loss trip time depends entirely on the number of messages per second being received under normal operation. As a rough guide, the network loss trip time (#20.11) should be set such that a minimum of 5 messages will be received in any given sample period under normal operating conditions.

NOTE

The network loss trip delay is specified in ms, but the time set will be rounded up to the nearest multiple of 16ms. Hence, if the time delay is set to 100ms, this will be rounded up to 112ms.

9.2 Unidrive Sequencing Mode 3

The default sequencing mode for Unidrive is the Wire-Proof PLC Mode. If PLC Mode is selected (#6.04 = 3), the sequencing bits (#6.30 - #6.32) have slightly different functions.

Control Word	Parameter	Sequencing Bit	PLC Mode (#6.04 = 3)
b0	#6.15	Enable	Enable
b1	#6.30	0	Run
b2	#6.31	1	Jog
b3	#6.32	2	Reverse

ENABLE the display will show "Inh" when set at 0, and depends on #6.30 and #6.32 when set to 1. Setting #6.15 to 0 overrides #6.30 and #6.32, and immediately disables the Unidrive. The motor will coast to rest if it is running when the Unidrive is disabled.

JOG the jog bit must be set, along with the appropriate run and direction signals.

To reset the Unidrive using the Profibus-DP network, use the non-cyclic channel to set #10.38 to 100. The Unidrive will clear #10.38 back to 0 and reset. (See Unidrive manual for more information.)

Some example control word values for the Unidrive are given in the tables below.

b15-b12	b11-b8	b7-b4	b3-b0	Value	Action (PLC mode)
0000	0010	0000	0000	0x0200	Drive disable
0001	1110	0000	0001	0x1E01	Enabled + stopped
0001	1110	0000	0011	0x1E03	Enabled + run fwd
0001	1110	0000	1011	0x1E0B	Enabled + run rev
0001	1110	0000	1111	0x1E07	Enabled + jog rev

9.3 Drive Reset Using The Profibus-DP Network

The Unidrive control word does not provide a RESET bit to clear a trip condition in the Unidrive. There are three methods of resetting the Unidrive from the master controller via the Profibus-DP network.

9.3.1 Reset Without DPL Code

To implement a RESET function without using DPL code, one of the application bits in the control word (see section 5.8) must be used. The application bits directly control #18.31, #18.32 and #18.33, so one of these parameters must be used to control the RESET function (#10.33) of the Unidrive. A 0-1 transition of the application bit will reset the Unidrive.

Assuming #18.31 is to be used as the RESET bit, one of the programmable logic functions in menu 9 can be used to link #18.31 to #10.33, and control resetting of the Unidrive. The table below shows the Unidrive parameter settings required. An alternative configuration using logic function 2 can be implemented by using the parameters in brackets instead.

Parameter	Value	Parameter	Value
#9.04 (#9.14)	18.31	#9.08 (#9.18)	0
#9.05 (#9.15)	0	#9.09 (#9.19)	0.0
#9.06 (#9.16)	0.00	#9.10 (#9.20)	10.33

By default, #10.33 is directly controlled by digital input 2. This must be disabled by setting the mapping parameter for digital input 2 (#8.13) to another value.

If the terminal reset function is required in addition to a fieldbus reset function, logic function 1 or 2 can be configured as an OR function of the fieldbus and terminal reset signals. The parameter settings for menu 9 to implement this are shown below.

Parameter	Value	Parameter	Value
#8.13	<> 10.33	#9.07 (#9.17)	1
#9.04 (#9.14)	18.31	#9.08 (#9.18)	1
#9.05 (#9.15)	1	#9.09 (#9.19)	0.0
#9.06 (#9.16)	8.02	#9.10 (#9.20)	10.33

NOTE

The Unidrive may need to be reset several times if multiple trips have occurred. As the reset will only occur on a 0 -1 transition of #10.33, the master controller should toggle the RESET bit until Drive Healthy (bit 0 of the status word) goes to 1.

9.3.2 Reset Using CT Mode Non-Cyclic Communications

If CT Mode non-cyclic communication has been implemented in the master controller, the Unidrive can be reset the Unidrive by writing a value of 100 to #10.38. The Unidrive may require several reset attempts if multiple trips have occurred. Use bit 0 of the status word (Drive Healthy) to check that the Unidrive has been successfully reset.

9.3.3 Reset Using DPL Code

If both of the menu 9 logic functions within the Unidrive are being used, some DPL code can be used to monitor the control word, and reset the Unidrive. The code should be placed in the SPEED, ENCODER or CLOCK task to ensure frequent scanning of the RESET bit.

```
ENCODER {
reset% = #18.31      ; new state of RESET signal

; check for 0 to 1 transition of RESET bit
IF reset% = 1 AND old_reset% = 0 THEN

    ; set #10.38 to 100 until Drive Healthy bit is set
    DO
        #10.38 = 100
    LOOP WHILE #10.01 = 0
ENDIF

old_reset% = reset% ; store current state of RESET signal
}
```

If another trip condition occurs while the Unidrive is tripped, the Unidrive must be reset twice before all trips are cleared. This is achieved by using the DO...WHILE loop until the Drive Healthy bit (#10.01) is set. The DPL program will also be reset, and the INITIAL task will run when the reset sequence is complete.

NOTE

If a run-time (program) error occurs in the UD70, the DPL program will stop, and the master controller will not be able to reset the Unidrive using the Profibus-DP network. In this case, the Unidrive node can only be reset using non-cyclic data to access #10.38.

9.4 Non-Cyclic Parameter Store

Unidrive: #17.19

0 = no action

1 = store Profibus-DP configuration

Setting #17.19 to 1 will store all #20.PP parameters, and all internal 32-bit _Pxx% and _Qxx% registers. The Profibus-DP interface will also be reset, and may cause the Profibus-DP master to indicate a network error. Any changes made to the configuration via the non-cyclic communications channel will take effect when the reset sequence has been completed.

NOTE

The Unidrive Profibus-DP interface will take approximately 700ms to complete the reset sequence, after which the network can be restarted.

9.5 Endian Format

Unidrive: #20.13

0 = big endian 1 = little endian

The Unidrive uses word (16-bit) format, but the master controller must split each word into 2 bytes (high byte and low byte) for transmission over the Profibus. The "endian format" defines whether the high byte or low byte is transmitted first. Provided that the master controller and slave device are using the same endian format, the data word value will be reconstructed correctly.

The Unidrive Profibus-DP interface uses big endian format by default, where the high byte is transmitted first, followed by the low byte.

However, some master controllers use little endian format. This results in "byte swapping" when the data value is reconstructed at the other end of the network. For example, a value of 0x0102 (258 decimal) may be reconstructed as 0x0201 or 513 decimal.

If #20.13 is set to 1, the Unidrive Profibus-DP interface will treat all data received as "little endian", and use the first byte received as the low byte of the data word.

NOTE

With firmware V2.05.00 and earlier, the bytes for the non-cyclic data word are NOT swapped. To use non-cyclic data in "little endian" data mode, the bytes for each non-cyclic telegram must be swapped BEFORE they are transferred to the Profibus.

9.6 EVENT Task Trigger on UD70

The EVENT task is a high priority task in the UD70 that can be triggered either by the timer/counter unit, or by the Profibus-DP network.

When the fieldbus network is selected as the trigger source, the EVENT task is triggered in every Profibus-DP network cycle.

#17.23	EVENT Task Trigger Source	Comments
0	Timer/Counter	Refer to UD70 Manual for more information.
1	Profibus-DP	The EVENT task is triggered every time new data arrives from the Profibus-DP network, and is passed to the UD70.

Care must be taken not to put too much code in the EVENT task. It has a higher priority than all other UD70 tasks except the INITIAL task, so an extended EVENT task could easily prevent the SPEED task from running, and cause the UD70 to trip on "tr54".

NOTE

This feature is only available with system file V2.07.06 or later.

9.7 Multi-Master Networks

Profibus-DP networks can operate with more than one master device connected to the same lines. Commander SE, Unidrive and Mentor II Profibus-DP interfaces can all operate on multi-master networks, but each device can only be assigned to one of the master devices.

Consult the supplier of your master controller for more details about implementing multi-master Profibus-DP networks.

10 Quick Reference

10.1 Complete Parameter Reference

Parameter	Default	Description
#20.01	121	OUT Channel 2 Mapping
#20.02	408	OUT Channel 3 Mapping
#20.03	201	IN Channel 2 Mapping
#20.04	402	IN Channel 3 Mapping
#20.05	0	Node Address
#20.06	9011	OUT Channel 1 Mapping
#20.07	9011	IN Channel 1 Mapping
#20.11	48	Trip Delay Time (ms)
#20.13	0	Data Endian Format
#20.14	----	Option ID Code (Read only)
#20.15	----	Firmware Version XXYY, where the firmware version is VXX.YY.ZZ (Read only)
#20.50	----	Fieldbus Diagnostic (Read only)
#17.02	----	System File Version (Read only)
#17.14	0	Network Loss Trip Enable
#17.19	0	UD70 Store and Reset
#20.08	0	Reserved
#20.09	0	Reserved
#20.10	0	Reserved
#20.12	0	Reserved
#20.16	0	Reserved
#20.17	0	Reserved
#20.18	0	Reserved
#20.19	0	Reserved
#20.20	0	Reserved

10.2 Profibus-DP Data Formats

Non-cyclic mode	Cyclic words	Consistency	Comments
1	3	Full	These modes are supported by Mentor II and Commander SE
1	3	None	
1	3	Full	8 bytes with full consistency, available for backwards compatibility with older modules

10.3 Fieldbus Control Word

b15	b14	b13	B12	b11	b10	b9	b8
M6	M5	#18.33	M3	M2	M1	M0	#18.32

b7	b6	b5	b4	b3	b2	b1	b0
#18.31	#1.46	#1.45	TRIP	RUN REV	JOG	RUN FWD	ENABLE

Bit	Function	Description
0	ENABLE	Set to 1 to put the Unidrive in READY mode. (The hardware ENABLE must also be present.) The RUN FWD, JOG and RUN REV bits will have no effect unless the ENABLE bit is set to 1. The Unidrive outputs are disabled immediately when the ENABLE bit is reset to 0, and the motor will coast to stop
1	RUN FWD	Set to 1 to run the motor in the forwards direction. Reset to 0 to decelerate the motor to a controlled stop before the Unidrive output stage is disabled
2	JOG	Set to 1 with RUN FWD or RUN REV bit also set to jog the motor in the appropriate direction. The Unidrive will ramp the motor to the normal speed or stop when the JOG bit is reset to 0, depending on the status of the RUN FWD and RUN REV bits.
3	RUN REV	Set to 1 to run the motor in the reverse direction. When reset to 0, the Unidrive will decelerate the motor to stop before the outputs are disabled
4	TRIP	Set to 1 to trip the Unidrive on "tr52". The TRIP bit must be reset to 0 before the Unidrive can be reset.
5	#1.45	Preset Reference Select. These bits are used to select the digital speed references used. Refer to the Unidrive User Guide for more information.
6	#1.46	
7	#18.31	User application bit
8	#18.32	User application bit
9	M0	ENABLE mask bit
10	M1	RUN FWD mask bit
11	M2	JOG mask bit
12	M3	RUN REV mask bit
13	#18.33	User application bit
14	M5	Mask bits for the Preset Reference Select bits
15	M6	

10.4 Fieldbus Status Word

b15	b14	b13	b12	b11	b10	b9	b8
X	#10.15	#10.14	#10.13	#10.12	#10.11	#10.10	#10.09

b7	b6	b5	b4	b3	b2	b1	b0
#10.08	#10.07	#10.06	#10.05	#10.04	#10.03	#10.02	#10.01

Bit	Parameter	Description
0	#10.01	Drive healthy
1	#10.02	Drive running
2	#10.03	Zero speed
3	#10.04	Running at or below min speed
4	#10.05	Below set speed
5	#10.06	At speed
6	#10.07	Above set speed
7	#10.08	Load reached
8	#10.09	In current limit
9	#10.10	Regenerating
10	#10.11	Dynamic brake active
11	#10.12	Dynamic brake alarm
12	#10.13	Direction commanded
13	#10.14	Direction running
14	#10.15	Mains Loss
15	X	Not used

10.5 Unidrive Trip Codes

The trip codes listed below may be caused by the Profibus-DP interface. Other trips may occur if a DPL program is loaded. For a full list of UD70 trips, refer to the UD70 User Guide

Trip Code	Error
tr52	This code indicates that the trip originated from the setting of bit 4 in the control Word
tr56	The UD70 does not contain the correct operating system for the detected hardware. Download the system file "IBSPROFI.SYS". If the trip persists, ensure that the UD73A and UD70 boards inside the module are properly clipped together. (This should only be attempted by suitably qualified personnel!!)
tr57	An illegal operating system call has been made, e.g. WRNET. CTNet commands cannot be used with Profibus-DP
tr60	This trip indicates that loss of the Profibus-DP network has been detected. This can be caused by disconnecting the node from the network, a bad cable connection, or by resetting or stopping the network master controller