T630
Process controller

Profibus
User guide

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PROFIBUS USER GUIDE

1. INTRODUCTION

PROFIBUS DP is an industry standard open network used to interconnect instrumentation and control devices in, for example, a manufacturing or processing plant. It is often used to allow a central Programmable Logic Controller (PLC) or PC based control system to use external 'slave' devices for input/output (I/O) or specialised functions, thus reducing the processing load on the controlling unit so that its other functions can be carried out more efficiently using less memory.

The PROFIBUS network uses a high speed version of the RS485 standard, and permits transmission rates of up to 12MBaud between the host and up to 32 PROFIBUS 'Stations' otherwise called 'nodes' within a single section of network. The use of RS485 repeaters (each counted as a node) allows the maximum of 127 nodes (addresses 0 to 126) to be supported.

It is not within the scope of this document to describe the PROFIBUS standard in detail, nor does it discuss the Process Controller itself. More detailed information on the PROFIBUS can be found by reference to 'http//www.profibus.com', and details of the Process Controller are to be found in the Reference Manual/User guide (Part 1 of this manual).

1.1 GSD Files

Figure 1.1 shows that for each instrument on the communications link, a Device Database File is constructed and loaded into the profibus configuration terminal. These files (called Gerätestammdaten or GSD files) contain information, relating to the instrument's parameters, which the PROFIBUS master (a PLC in the figure) needs in order to communicate with the device.

A number of 'default' GSD files, and editing software are included on the support disk, supplied with this manual. More details are to be found in Appendix A below.

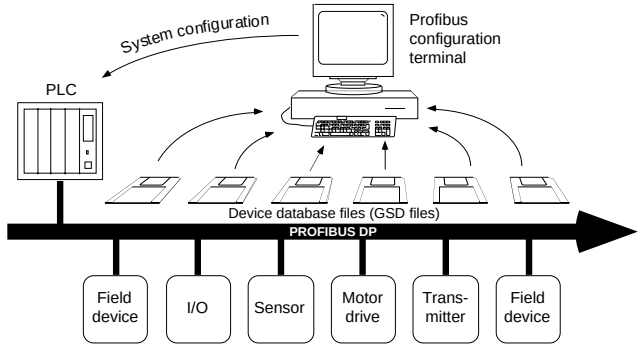


Figure 1.1 Typical PROFIBUS link using a PLC as master (from section 3.3 of http://www.profibus.com)

2. INSTALLATION

PROFIBUS DP is provided by means of an option configuration board which can be fitted to instruments with firmware levels V2 or higher. No special software configuration is required.

2.1 Wiring

The wiring to the PROFIBUS option board is terminated at slot 2, which is the left-most slot when the instrument is viewed from the rear. Figure 2.1a shows the pinout, and figure 2.1b the termination, biassing and shielding arrangement.

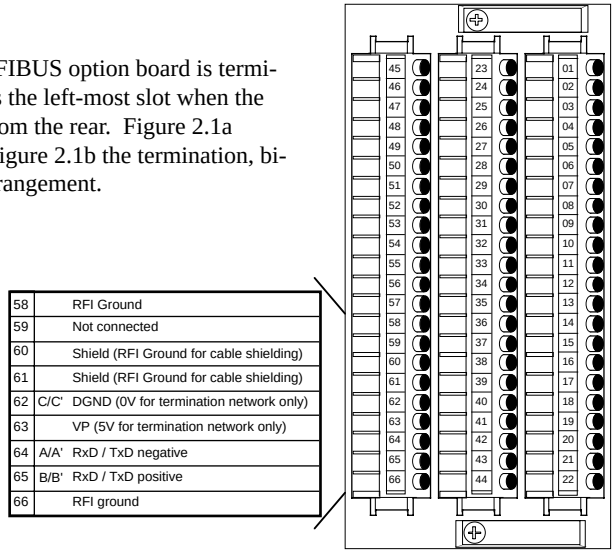


Figure 2.1a Communications Pinout

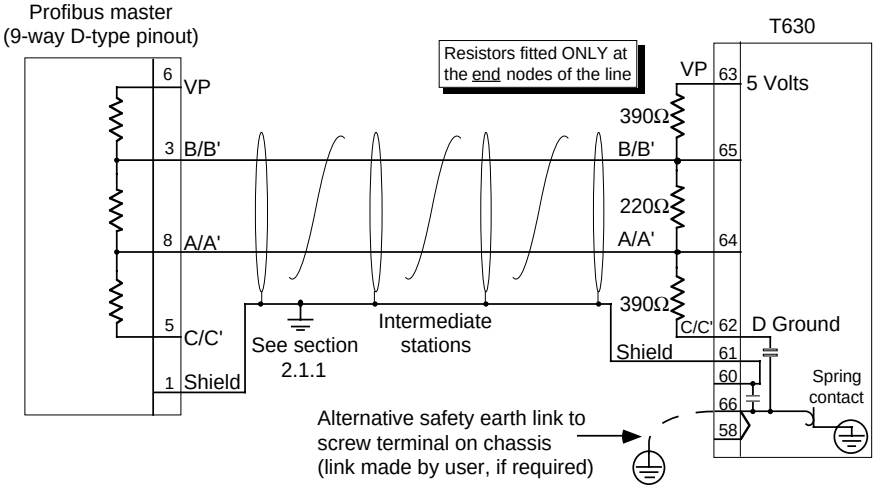


Figure 2.1b Communications wiring and termination

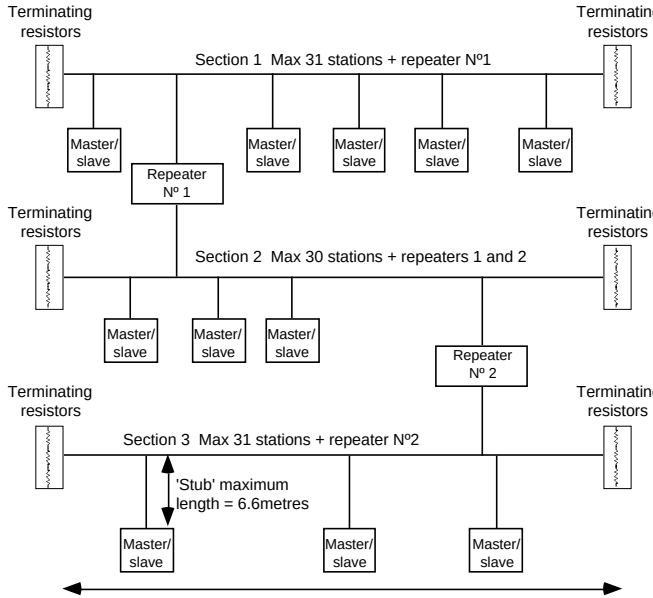
2.1 WIRING (Cont.)

2.1.1 Earthing the shield

The PROFIBUS standard suggests that both ends of the transmission line be connected to safety earth. If such a course is followed, care must be taken to ensure that differences in local earth potential do not allow circulating currents to flow, as these can not only induce large common mode signals in the data lines, resulting in communications failure, but can also produce potentially dangerous heating in the cable. Where doubt exists, it is recommended that the shield be earthed at only one point in each section of the network.

2.1.2 Network wiring.

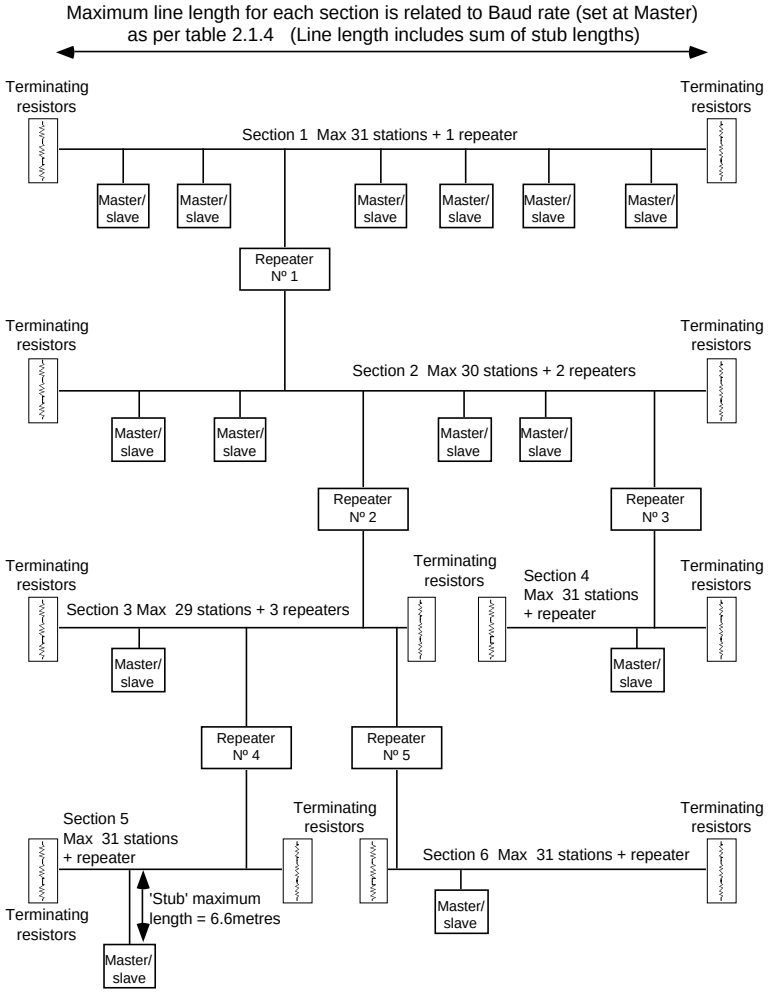
There are two distinct ways of wiring a network, known as 'Linear topology' and 'Tree topology'. In a linear network (figure 2.2.1a), the maximum number of repeaters is three, giving a total number of stations of 122. In theory the tree set-up (figure 2.2.1b) can have more stations, but the PROFIBUS protocol limits the number of stations (including repeaters) to 127 (addresses 0 to 126). It is up to the user to determine which is the most cost effective way of organising the layout.



Typical **linear** bus layout, with two repeaters and up to 92 nodes.
A maximum of three repeaters is allowed, bringing the maximum number of nodes to 122.

Figure 2.1.2a Typical linear bus layout

2.1.2 NETWORK WIRING (Cont.)



Typical **tree** bus layout, with five repeaters and up to 183 station locations.
(Note: The maximum number of stations allowed by Profibus DP is 127)

Figure 2.1.2b Typical tree bus layout

2.1.3 Cable type

Table 2.1.3 below gives the specification for a suitable cable such as Beldon B3079A.

Impedance	135 to 165 ohms at 3 to 20 MHz
Resistance	<110 Ohms/km
Cable capacitance	<30 pF/metre
Core diameter	0.34mm2 max. (22 awg)
Cable type	Twisted pair, 1x1, 2x2 or 4x1 lines
Signal attenuation	9dB max. over total length of line section
Shielding	Cu shielding braid, or shielding braid and shielding foil

Table 2.1.3 Cable specification

2.1.4 Maximum Baud rate compared with line length

The maximum transmission speed depends on the length of the cable run including 'stub' (distance from the bus to a station) lengths. Guaranteed minimum values are given below.

Line length/segment (metres)	100	200	400	1000	1200
Max Baud rate (kbit/sec) (kB)	12,000	1,500	500	187.5	93.75

Table 2.1.4 Maximum baud rate versus line length

2.2 Node Address

Each node must be given a unique address, and this is done in instrument configuration, by accessing parameter list 4, parameter 'AD'. Once the address has been set up, the unit should be powered off, then on again.

The unit has an address of 254 set at the factory. This is outside the address range of the PROFIBUS protocol (0 to 126), so if the unit is inadvertantly inserted into the network without a new address having been set, the bus will not be affected.

Figure 2.2 shows how to access the parameter lists, assuming that the user knows the password. For fuller details of parameter access, see Chapter three of Part 1 of this manual.

Note: To access the comms. status word 'CS' (sections 2.3.1 and 2.4.1) operate the up arrow key twice from the password ('P''O') display.

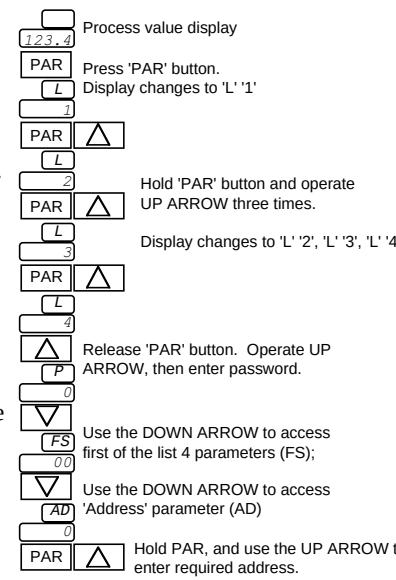


Figure 2.2 Accessing 'AD'

2.3 Adding the unit to the network

Once the unit has been physically wired, and has had an address allocated, a GSD file must be imported into the network configuration software. A number of GSD files are provided on the PROFIBUS support disc, along with a software program called 'PROFCONF' which allows the user to edit these GSD files and/or to create new ones. See Appendix A for details.

The unit can now be added to the network, using the network configuration software, and I/O data areas can be assigned in the master unit, to represent it.

Once the network is defined, the configuration is written to the master, as described in the network configuration software documentation, and the network can be started. If all is well, the communications. status word 'CS' in list 4 will be displayed as '0003'*. Values can now be assigned to PROFIBUS outputs and PROFIBUS inputs can be read as required.

To view CS, use the up arrow key after P0 (ref figure 2.2).

Note:
CS = 0000 means that there is no PROFIBUS card installed or, the card has not been recognised.
CS = 0002 means that the card is installed but it has not been configured by a PROFIBUS Master.

2.4 Trouble-shooting

WARNING

Fault finding may affect the network and control system. Ensure that no damage to personnel or equipment can be caused by any fault finding activity.

2.4.1 No communications

1. Check wiring, verifying the continuity of A and B connections to the master, and ensure that the correct terminals have been used. Figure 2.1a above, shows the terminations for this unit.
2. Check the node address, as described in section 2.2 above. Ensure the address is unique.
3. Verify that a PROFIBUS comms. module is fitted. This can be done by inspecting the underside of the circuit board for the legend 'PROFIBUS comms'.
4. Check the communications status word (CS) as described in section 2.2.
   CS = 0000 means either that no card is installed, or that it has not been recognised
   CS = 0002 means that a PROFIBUS card is installed but it has not been configured by aPROFIBUS master
   CS = 0003 means that a PROFIBUS card has been installed and it has been configured by a PROFIBUS Master.

2.4.1 No communications (Cont.)

5. Ensure that the network has been correctly configured and that the configuration has been correctly downloaded to the master.
6. Verify that the GSD file being used is correct, by loading it into the GSD file configurator to check the format..
7. Ensure that the maximum line length of transmission line has not been exceeded for the Baud rate in use (Table 2.1.4 above).
8. Ensure that the final node on the transmission line (no matter what type of instrument it is) is terminated correctly using three resistors as shown in figure 2.1b above, and that only the first and final nodes are so terminated. Note that some equipment has built-in pull up and pull down resistors which in some cases can be switched in and out of circuit. Such resistors must be removed or switched out of circuit for all but the instruments at each end of the line.
9. Replace any faulty item(s) and re-test.

2.4.2 Intermittent failure to communicate

This fault is shown by the diagnostic status changing, withoutalarms being generated in the instrument. Section 2.5 below, shows the diagnostics information.

1. Check wiring as in 2.4.1 above. Pay particular attention to the integrity of the screening and termination
2. Check the number of words in the data exchange against the maximum number the master can support.
3. Ensure that the maximum line length of transmission line has not been exceeded for the Baud rate in use (Table 2.1.4 above).
4. Ensure that the final node on the transmission line (no matter what type of instrument it is) is terminated correctly using three resistors as shown in figure 2.1b above, and that only the first and final nodes are so terminated. Note that some equipment has built-in pull up and pull down resistors which in some cases can be switched in and out of circuit. Such resistors must be removed or switched out of circuit for all but the instruments at each end of the line.
5. Replace any faulty item(s) and re-test.

2.4.3 Parameter ‘jammed’ at one value and cannot be altered from the front panel

PROFIBUS DP writes all output data continuously, so that if Output power, Setpoint, or Auto/Manual status etc. are included in the output data, their settings are stored in the master data registers will override any setting entered from the front panel. To avoid this happening, use ‘Demand data’ to write parameter values, ONLY when changes are required.

2.4.4 Data format or parameter data seems incorrect

Verify that the GSD file is correct for the given application by loading it into the GSD file configurator program.

2.5 Diagnostic information

PROFIBUS DP provides a message giving diagnostic information for each slave unit. The process controller uses the ExtDiagData area of this message (bytes 7 and 8) to send a word containing 16 bits of information relating to the alarm status of the controller as shown in table 2.5 below. A 'new diagnostics' event occurs whenever any of the monitored events changes state.

Bit	Description
0	High absolute (loop 1)
1	Low absolute (loop 1)
2	High deviation (loop 1)
3	Low deviation (loop 1)
4	Unacknowledged high absolute (loop 1)
5	Unacknowledged low absolute (loop 1)
6	Unacknowledged high deviation (loop 1)
7	Unacknowledged low deviation (loop 1)
8	High absolute (loop 2)
9	Low absolute (loop 2)
10	High deviation (loop 2)
11	Low deviation (loop 2)
12	Unacknowledged high absolute (loop 2)
13	Unacknowledged low absolute (loop 2)
14	Unacknowledged high deviation (loop 2)
15	Unacknowledged low deviation (loop 2)

Table 2.5 Controller alarm status

2.6 Global commands

Freeze and Sync from a PROFIBUS master have no effect

3. OPERATION

PROFIBUS DP performs a cyclical scan of the network devices, during which input and output data for each node is exchanged.

Values from each node (input data) are read by the controller, which then runs its control program, and generates a set of values (output data) to be transmitted to the nodes. This process is called an 'I/O data exchange'. This process is repeated continuously, to give a cyclical I/O data exchange.

Examples of input data are

a. A set of digital readings for a digital input
b. The measured temperature and alarm status from a PID controller.

Examples of output data are:

a. A setpoint to be sent to a PID controller

The I/O data exchange can be repeated continuously, can be synchronised at given times, or can be repeated at a pre-defined interval, which is asynchronous with the controller. Each node is normally assigned a group of PLC I/O registers, or a single function block, so that the controlling program can deal with each node's data as though the node is an internal device, without having to be concerned about timing problems. This mapping of node to register or function block is carried out during network configuration, which is usually carried out using a PC based program.

3.1 I/O data transfer limits.

The PROFIBUS DP standard allows up to 234 bytes of data to be transferred in each direction, during each I/O data exchange. Many PLC masters, however, are unable to support more than 32 bytes, and this has become a typical value. Input and output data lengths for a given node are variable, and it is possible to define nodes as read only, write only or read/write.

The I/O data mixture used by a given slave device is defined by what is called a 'GSD' file, which can be edited to change the mapping of node parameters to PROFIBUS inputs and outputs. This file is imported into the network configuration before the network is created.

3.2. Data format

Data is transmitted in both directions as a single 16-bit integer value (also called a 'register'). The value is returned as a scaled integer such that 999.9 is returned as 9999, and 1.234 is returned as 1234. The control program in the PROFIBUS master must convert these integers into floating point numbers if required.

4. SPECIFICATION

This information is additional to, or replaces the relevant parts of the specification given in Part 1 of this manual. For cable specification and Baud rate versus cable length, see section 2.1

Safety isolation

Isolation	(BS EN61010 dc to 65 Hz)	Installation category II, Pollution degree 2†
	Any terminal to safety earth:	50V dc or RMS (double isolation)

Vp and C/C' limitations*

Maximum current source/sink	30mA (5 Volts)

† Installation category II: The rated impulse voltage for equipment on nominal 230Volts is 2500 V.

Pollution category 2: Normally, only non-conductive pollution occurs. Occasionally, however, a temporary conductivity caused by condensation shall be expected.

* Vp and C/C' may be used ONLY as pull up/down facilities for terminating networks as shown in section 2.1 above

Appendix A GSD FILES

A1 THE GSD FILE CONFIGURATOR

A1.1 Introduction

The GSD file configuration software (PROFCONF) is supplied on the PROFIBUS support disc, and provides a simple means of setting up PROFIBUS input and output data frames. It is a 16-bit Windows application which will run on Windows 3.1, Windows 95 and Windows NT.

A1.2 Installation

Place the PROFIBUS support disc in the disc drive, and run A:\SETUP.EXE from Program Manager or Windows Explorer. Follow the on-screen prompts. Several sample GSD files supplied on the same disc are loaded into the 'installation' directory. These files are described in section A2 below.

A1.3 Operation

The screen layout is as depicted in figure A1.3 below. Initially, if the mouse cursor is moved to an area and left there, a 'hint' box appears to explain what that area of screen does. (Hints can be disabled from the 'Help' menu when they are no longer needed.)

Put simply, the operation of the window is as follows:

1. Select instrument type from the icons at the left edge of the screen.
2. Add device parameters to the PROFIBUS Inputs or PROFIBUS Outputs area.
3. Use 'Save' in order to edit an existing GSD file or 'Save As' to create a new file.

A1.3 OPERATION (Cont.)

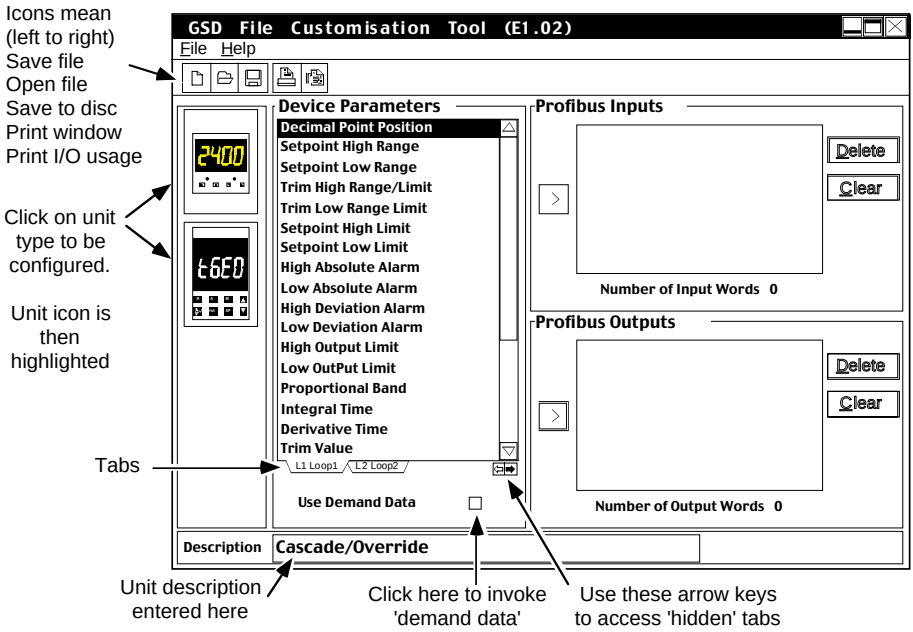


Figure A 1.3 typical GSD File window

A1.3.1 Editing the I/O areas

This can be done in two ways:

a. Display the required parameter in the Device Parameter area, using the 'Tabs' at the bottom of the area if necessary, then click-and-drag the required parameter to the PROFIBUS inputs or PROFIBUS Outputs areas as appropriate.

b. Display the required parameter in the Device Parameter area, using the 'Tabs' at the bottom of the area if necessary, then double-click on the parameter to move it to whichever of the Inputs or Outputs area is active. (Selected by clicking on the associated arrow key.

A parameter can be moved within the list, by click-dragging it within the area.

A parameter can be removed from the Inputs/Outputs list by

a. Clicking on the parameter to highlight it, then clicking the 'Delete' key to the right of the relevant area.

b. Pressing the right mouse button whilst the cursor is over the parameter name. Confirmation of the removal is requested by a pop-up box.

The entire list can be removed using the 'Clear' key.

A1.3.1 EDITING THE I/O AREAS (Cont.)

A maximum of 117 words (input and/or output) including the requirements for demand data (Appendix B) is imposed by the configurator. When this limit is reached, parameters must be removed from lists before any further ones can be added. Because many PLCs cannot support more than 32 words of data at a time, it is recommended that 32 be treated as the limit.

The 'View I/O map' item in the File menu displays a summary of the I/O memory map for the current GSD file. This may be pasted to the clipboard for later use, and can be printed from the File menu.

A1.3.2 Using the file

Before saving the file, it is recommended that a meaningful description in entered in the area at the bottom of the page. Finally, support for demand data can be enabled by clicking in the 'Use Demand Data' box. Demand data is discussed in Appendix B to this manual.

Once the Input/Output lists are as required, the file should be saved to disc. The file can now be imported into the PROFIBUS network configuration tool, and used as an application program.

Note: Several different GSD files can be created for the same instrument, thus allowing the user to create a library of different applications.

A1.4 Example

This example shows how to set up a GSD file to allow gain scheduling using PID settings stored in a PLC.

Input data	Process variable
Output data	Proportional band
	Integral time
	Derivative time
	Cutback high
	Cutback low

In such an application, the PLC monitors the 'Process Variable (e.g. temperature), and when its value passes into a particular pre-set band, the PLC sets the control parameters from previously determined settings.

A2 SAMPLE GSD FILES

This section contains input and output data details for the sample GSD files supplied on the support disc. These files could be used unchanged, but will normally be edited by the user to suit the application.

The PROFIBUS tag number and mnemonic can be found in tables C3.1 and C3.2 in Appendix C below.

A2.1 Basic GSD file EURO6300.GSD

EURO6300.GSD (Manual station) L1 (loop 1) parameters

Input data				Output data			
Word number	Description	Tag number	Mnemonic	Word number	Description	Tag number	Mnemonic
0	Process variable (L1)	1	PV	0	Local Setpoint (L1)	2	SL
1	Resolved Setpoint (L1)	5	SP				

Input data length (words): 2
Output data length (words): 1

A2.2 Single loop controller GSD file: EURO630S.GSD

EURO630S.GSD (Single loop controller) L1 (loop 1) parameters

Input data				Output data			
Word number	Description	Tag number	Mnemonic	Word number		Tag number	Mnemonic
0	Decimal Point Pos (L1)	0	DP	0	Local Setpoint (L1)	2	SL
1	Process variable (L1)	1	PV	1	Control Output (L1)	3	OP
2	Control Output (L1)	3	OP	2	Mode Request (L1)	8	MS
3	Alarm Status Word (L1)	4	AL				
4	Resolved setpoint (L1)	5	SP				
5	Resolved Mode (L1)	9	MN				

Input data length (words): 6
Output data length (words): 3

A2.3 Cascade controller GSD file: EURO630C.GSD

EURO630**C**.GSD (Cascade/Override controller) L1 & 2 (loops 1 & 2) parameters

Input data

Word number	Description	Tag number	Mnemonic
0	Decimal Point Pos (L1)	0	DP
1	Process variable (L1)	1	PV
2	Control Output (L1)	3	OP
3	Alarm Status Word (L1)	4	AL
4	Resolved setpoint (L1)	5	SP
5	Resolved Mode (L1)	9	MN
6	Decimal Point Pos (L2)	48	DP
7	Process variable (L2)	49	PV
8	Control Output (L2)	51	OP
9	Alarm Status Word (L2)	52	AL
10	Resolved Mode (L2)	53	SP

Output data

Word number		Tag number	Mnemonic
0	Local Setpoint (L1)	2	SL
1	Control Output (L1)	3	OP
2	Mode Request (L1)	8	MS
3	Local Setpoint (L2)	50	SL
4	Control Output (L2)	51	OP
5	Mode Request (L2)	56	MS

Input data length (words): 11
Output data length (words): 6

A2.4 Ratio controller GSD file: EURO630R.GSD

EURO630**R**.GSD (Ratio controller) L1 & 2 (loops 1 & 2) parameters

Input data

Word number	Description	Tag number	Mnemonic
0	Decimal Point Pos (L1)	0	DP
1	Process variable (L1)	1	PV
2	Control Output (L1)	3	OP
3	Alarm Status Word (L1)	4	AL
4	Resolved setpoint (L1)	5	SP
5	Resolved Mode (L1)	9	MN
6	PV2 Decimal Point (Ratio)	96	DP
7	PV2 Value (Ratio)	97	PV
8	Ratio Decimal Point (Ratio)	104	DP_R
9	Measured ratio (Ratio)	100	MR

Output data

Word number		Tag number	Mnemonic
0	Local Setpoint (L1)	2	SL
1	Control Output (L1)	3	OP
2	Mode Request (L1)	8	MS
3	Ratio setpoint (Ratio)	101	RS

Input data length (words): 10
Output data length (words): 4

A2.5 Manual station GSD file: EURO630M.GSD

EURO630**M**.GSD (Manual station) L1 (loop 1) parameters

Input data

Word number	Description	Tag number	Mne-monic
0	Decimal Point Pos (L1)	0	DP
1	Process variable (L1)	1	PV
2	Control Output (L1)	3	OP
3	Alarm Status Word (L1)	4	AL
4	Resolved Mode (L1)	9	MN

Output data

Word number	Description	Tag number	Mne-monic
0	Control Output (L1)	3	OP
1	Mode Request (L1)	8	MS

Input data length (words): 5
Output data length (words): 2

Appendix B DEMAND DATA

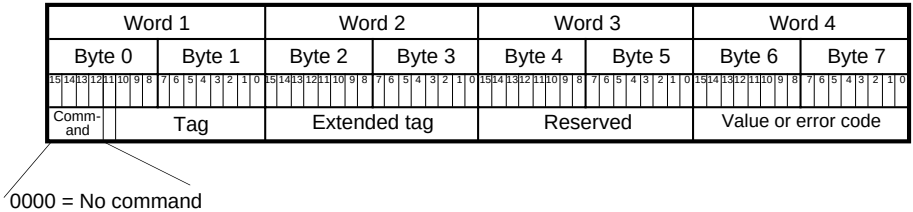
B1 OVERVIEW

The Demand data sub-protocol is supported via standard software in many PLCs. It can also be implemented in ladder logic. The protocol uses the first eight bytes in the request and response messages of the cyclic I/O data exchange described in section 3 of this manual, and is enabled by setting the first byte of the module configuration data to hex 73. Once enabled, it allows random read/write access to any parameter within the instrument.

Setting the value to hex 73 can be done by clicking the 'Use demand data' box in the GSD file configuration program (also supplied on the disc).

Demand data identifies parameters by 'tags', which are unique 16-bit numbers. For example, CONTROL OUTPUT is identified as Tag 3. The tag for any particular parameter can be determined by using the right mouse button when the cursor is over the relevant parameter in the 'Device Parameters' area of the configurator program, or by reference to the tables in Appendix C.

The first four words of the Output data are used to encode a 'request message'. The control program is responsible for writing values to this area to make requests.



0000 = No command
0001 = Read request (Bit 12 set = 4096)
0010 = Write request (Bit 13 set = 8192)

As can be seen from the figure above, Word 1 contains the 'Tag' of the required parameter (see Appendix C for a full list) and a read or write request command. If a read request is made, bit 12 is set, adding 4096 to the tag value. Thus to read tag 71, word 1 would have to have the value 4096 + 71 = 4167. If a write request is made on parameter 71, word 1 would have the value 8192 + 71 = 8263.

Notes:
1 Bit 11 is always 0
2 The 'Extended Tag' word is used for those instruments whose tag numbers can exceed 2047

B1 OVERVIEW (Cont.)

The first four words of Input data are used by the instrument as a ‘response message’ to return values and indicate the success or failure of the requested operation. In this case, the command field will be either 1 (bit 12 set) (read/write successful) or 7 (bits 12,13,14 set) (read/write unsuccessful). The Value field will contain the read/written value (if successful) or an error code (if unsuccessful). The command field has the value 0 when acknowledging ‘No Command’.

Error codes are:
0 Invalid tag number.
1 Attempt to write to a read-only parameter.
2 Value is out of range.

B2 Example

B2.1 Starting an Autotune

An Autotune is a good example of an operation that might be performed using the demand data sub-protocol, since it is a relatively infrequent operation and it would be wasteful to dedicate PROFIBUS I/O for such a purpose. From the tag list in Appendix C below, it can be seen that the Autotune for loop 1 is triggered by setting bit 12 of Mode Status word (SM - tag 23) high (true).

B2.1.1 Clear any previous demand data requests

This is done by setting tag and command data to 0 (zero), and waiting for the (identical) response message.

Word 1		Word 2		Word 3		Word 4	
Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
0	0	Anything		Anything		Anything	

B2.1.2 Read the value of SM

This is done by setting the value of word 1 to 4096 + 23 = 4119 (section B1 above)

Wait for the response message. If successful, the command area will have the value ‘1’ (bit 12 set = 4096), so a value of anything other than ‘4119’ in word 1 indicates an error.

Word 1		Word 2		Word 3		Word 4	
Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
00010000	00010111	Anything		Anything		Anything	

4119

B2.1.3 Set Bit 12 of SM

This is done by setting the value of word 1 to 8192 + 23 = 8215 for the write request, and ORing 4096 with the value of SM to set bit 12.

Word 1		Word 2		Word 3		Word 4	
Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
00100000	00010111	Anything		Anything		Mode status word OR 00010000 00000000	

8215

B2.1.3 SET BIT 12 OF SM (Cont.)

The response will be either the following, if successful...

Word 1		Word 2		Word 3		Word 4	
Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
00010000	00010111	Anything		Anything		Anything	

4119

or the following, if an error has occurred. Note that bits 12, 13 and 14 of the command field are set if an error has occurred.

Word 1		Word 2		Word 3		Word 4	
Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
01110000	00010111	Anything		Anything		Error code	

28695

B2.1.4 Re-read SM

A read request on the parameter SM should now be carried out and the value monitored until bit 12 clears, indicating that the self tune has been successfully completed, or until bit 13 becomes set indicating that the self tune has failed.

Appendix C PARAMETER TABLES

C.1 INTRODUCTION

This Appendix is intended as a reference section to help the user identify the parameter(s) required, and their associated tag numbers for use with the demand data facility described in Appendix B.

The section consists of a number of tables as follows:

1. Parameters in alphabetical order
2. List 1 (loop 1) parameters
3. List 2 (loop 2) parameters, including ratio parameters
4. Instrument (list 3) parameters
5. Communications (list 4) parameters
6. Main board I/O configuration (list 5) parameters
7. Expansion board I/O configuration (list 6) parameters
8. I/O calibration parameters (list 7) parameters
9. Incremental control parameters (list 8 and list 1)
10. Diagnostic (list 9) parameters

C2 LIST OF PARAMETERS AND PROFIBUS TAGS

Tag numbers can be found from table C2 below

Parameter and menmonic	List and tag numbers		
Absolute alarm - high.....HA	List 1; tag 10	List 2; tag 58	
Absolute alarm - Low..... LA	List 1; tag 11	List 2; tag 59	
Alarm status word..... AL	List 1; tag 4	List 2; tag 52	
Analogue input break protection.....AB	List 6; tag 156		
Analogue input connections.....AC	List 6; tag 157		
Analogue input filter time constabt.....AF	List 6; tag 164		
Analogue input range.....AR	List 6; tag 155		
Analogue output connections.....OC	List 6; tag 159		
Analogue output range..... OR	List 6; tag 158		
Backlash compensation..... BL	List 8; tag 236		
Baud Rate.....BD	List 4; tag 128		
Calibration channel.....CC	List 7; tag 192		
Calibration range..... CR	List 7; tag 193		
Calibration step..... ST	List 7; tag 194		
Calibration value.....CV	List 7; tag 195		
Configuration status word..... SC	List 1; tag 21	List 2; tag 69	
Control output..... OP	List 1; tag 3	List 2; tag 51	
Controller type..... CC	List 3; tag 124		
Decimal point position.....DP	List 1; tag 0	List 2; tag 48	List 3; tag 96
Derivative time..... TD	List 1; tag 20	List 2; tag 68	
Deviation Alarm - High.....HD	List 1; tag 12	List 2; tag 60	
Deviation Alarm - Low.....LD	List 1; tag 13	List 2; tag 61	
Digital feedback verify failures.....R3	List 9; tag 202		
Digital I/O connection mask.....DC	List 6; tag 162		
Digital I/O inversion mask.....DI	List 6; tag 161		
Digital I/O pull-up type..... DU	List 6; tag 163		
Digital I/O values.....DV	List 6; tag 160		
Error logs (newest to oldest)..... E0 to EF	List 9; tags 204 to 219		
Expansion I/O enable.....B1	List 3; tag 133		
Fast status byte.....FS	List 4; tag 120		
High absolute alarm.....HA	List 1; tag 10	List 2; tag 58	
High deviation alarm.....HD	List 1; tag 12	List 2; tag 60	
High output limit.....HO	List 1; tag 16		
Inertia compensation..... IN	List 8; tag 235		
Instrument address.....AD	List 6; tag 157		
Instrument identity.....II	List 3; tag 122		
Instrument verstion.....IV	List 2; tag 123		
Integral time.....TI	List 1; tag 19	List 2; tag 67	
I/O bad readings..... R2	List 9; tag 201		
I/O missed readings..... R1	List 9; tag 200		
I/O status word..... SI	List 9; tag 199		
Local setpoint.....SL	List 1; tag 2	List 2; tag 50	
Low absolute alarm.....LA	List 1; tag 11	List 2; tag 59	
Low deviation alarm..... LD	List 1; tag 13	List 2; tag 61	
Low output limit.....LO	List 1; tag 17		
Measured ratio..... MR	List 2; tag 100		

Table C2 Alphabetical list of parameters (sheet 1)

Note: List 1 to List 9 parameters are defined in tables C3.1 to C3.9 respectively, below

C2 LIST OF PARAMETERS (Cont.)

Parameter and menmonic	List and tag numbers		
Minimum pulse time..... PT	List 1; tag 31		
Mode status word..... SM	List 1; tag 23	List 2; tag 71	List 2; tag 105
Motor travel time..... TT	List 8; tag 230		
Output limit - high..... HO	List 1; tag 16		
Output limit - low..... LO	List 1; tag 17		
Parity..... PY	List 4; tag 129		
Pass code 0..... P0	List 3; tag 126		
Pass code 1..... P1	List 3; tag 127		
Process input break protection..... IB	List 2; tag 145	List 6; tag 151	
Process input connections..... IC	List 6; tag 153		
Process input filter time constant..... IF	List 2; tag 148	List 6; tag 154	
Process input linearisation..... IL	List 2; tag 146	List 6; tag 152	
Process input range..... IR	List 2; tag 144	List 6; tag 150	
Process output range..... OR	List 4; tag 149		
Process variable..... PV	List 1; tag 1	List 2; tag 49	
Proportional band..... XP	List 1; tag 18	List 2; tag 66	
Push button mask..... BM	List 1; tag 22	List 2; tag 70	
Ratio setpoint..... RS	List 2; tag 101		
Ratio setpoint high limit..... HS	List 2; tag 102		
Ratio setpoint low limit..... LS	List 2; tag 103		
Remote setpoint..... RM	List 1; tag 25	List 2; tag 73	
Requested mode..... MS	List 1; tag 8	List 2; tag 56	
Resultant mode..... MN	List 1; tag 9	List 2; tag 57	
Resultant setpoint..... SP	List 1; tag 5	List 2; tag 53	
Setpoint high limit..... HS	List 1; tag 14	List 2; tag 62	
Setpoint high range..... HR	List 1; tag 6	List 2; tag 54	
Setpoint low limit..... LS	List 1; tag 15	List 2; tag 63	
Setpoint low range..... LR	List 1; tag 7	List 2; tag 55	
Setpoint - local..... SL	List 1; tag 2	List 2; tag 50	
Setpoint - remote..... RM	List 1; tag 25	List 2; tag 73	
Setpoint - resultant..... SP	List 1; tag 5	List 2; tag 53	
Strategy cycle time..... ST	List 9; tag 220		
Tasks uncompleted..... R4	List 9; tag 203		
Temperature units..... TU	List 3; tag 132		
Time base..... TB	List 1; tag 30	List 2; tag 78	
Track value..... TK	List 1; tag 27		
Trim high/range/limit..... HT	List 1; tag 28	List 2; tag 76	
Trim low range/limit..... LT	List 1; tag 29	List 2; tag 77	
Trim value..... TM	List 1; tag 26	List 2; tag 74	
Uncontrolled PV..... PV	List 2; tag 97		
Uncontrolled PV high range..... HR	List 2; tag 98		
Uncontrolled PV low range..... LR	List 2; tag 99		
Velocity output demand..... VO	List 8; tag 232		

Table C2 (concluded) Alphabetical list of parameters (sheet 2)

Note: List 1 to List 9 parameters are defined in tables C3.1 to C3.9 respectively, below

C3 PARAMETER LISTS

C3.1 List 1 parameters

Tag	Mne-monic	List 1 parameters	Enable (w.r.t. to host)
0	DP	Decimal point position for loop 1 parameters (enter 0 to 4)	Read/Write
1	PV	Process variable	Read only
2	SL	Local setpoint	Read/Write
3	OP	Control output (0.00 to 100.00%)	Read/Wtite
4	AL	Alarm status word	N/A
		Bit 0 High absolute (true = active)	Read only
		Bit 1 Low absolute (true = active)	Read only
		Bit 2 High deviation (true = active)	Read only
		Bit 3 Low absolute (true = active)	Read only
		Bit 4 High absolute (true = unacknowledged)	Read/Write
		Bit 5 Low absolute (true = unacknowledged)	Read/Write
		Bit 6 High deviation (true = unacknowledged)	Read/Write
		Bit 7 Low absolute (true = unacknowledged)	Read/Write
		Bit 8 Alarm acknowledge (true = resets bits 4 to 7)	Write only
		Bit 9 Alarm relay status (true = relay in alarm status)	Read only
		Bit 10 Not used	
		Bit 11 Not used	
		Bit 12 Auto ack. (true = alarm auto acknowlede enabled; false = needs manual acknowledge)	Read/Write
		Bit 13 Relay disable (true = disable relay)	Read/Write
		Bit 14 Relay only on absolute alarms. (true = relay operates only for absolute alarms; false = relay operates for deviation alarms as well)	Read/Write
		Bit 15 Relay action. (true = active only for unacknowledged alarms; false = active for any valid alarm.)	Read/Write
5	SP	Resultant setpoint	Read only
6	HR	Setpoint high range	Read/Write
7	LR	Setpoint low range	Read/Write
8	MS	Requested Mode 0 = 'M' button operated 1 = 'A' button operated 2 = 'R' button operated	Read/Write
9	MN	Resultant mode 0 = Hold 4 = Ratio 1 = Track 5 = Remote Auto 2 = Manual 6 = Forced manual 3 = Local auto 7 = Forced auto	
10	HA	High absolute alarm level	Read/Write
11	LA	Low absolute alarm level	Read/Write
12	HD	High deviation alarm level	Read/Write
13	LD	Low deviation alarm level	Read/Write
14	HS	Setpoint high limit	Read/Write
15	LS	Setpoint low limit	Read/Write
16	HO	High output limit (0.00 to 100.00 %)	Read/Write
17	LO	Low output limit (0.00 to 100.00 %)	Read/Write
18	XP	Proportional band (0.0 to 1999.9)	Read/Write
19	TI	Integral time (0.00 to 199.99 mins/secs)	Read/Write
20	TD	Derivative time (0.00 to 199.99 mins/secs)	Read/Write

Table C3.1 List 1 (Loop 1) parameters - sheet 1: tags 0 to 20

C3.1 LIST 1 PARAMETERS (Cont.)

Tag	Mne-monic	List 1 parameters (Cont.)	Enable (w.r.t. to host)
21	SC	Configuration status word Bit 0 POWER UP true: power up in 'Manual with fail-safe o/p false: power up in last mode and last output Bit 1 FAIL-SAFE OUTPUT true: low output false: last output Bit 2 INVERT O/P true: invert electrical output false: no inversion Bit 3 INVERT PID true: ΔPV and ΔOP in the same sense false: ΔPV and ΔOP in opposite senses Bit 4 PV FAIL MODE true: maintain existing mode on PV failure false: adopt Forced Manual Mode with fail-safe o/p on PV failure Bit 5 INVERSE RATIO true: Loop 1 remote setpoint = PV2 x ratio setpoint false: Loop 1 remote setpoint = PV2 ÷ ratio setpoint Bit 6 RATIO TRACK true: Ratio setpoint tracks measured setpoint (when loop 1 not in remote) false: Ratio setpoint does not track measured setpoint. Bit 7 NOT USED Bit 8 INCREMENTAL CONTROL true: use incremental control false: use continuous control Bit 9 ON/OFF CONTROL true: use on/off control false: use PID control Bit 10 NOT USED Bit 11 SL BALANCE (SL = local setpoint) true: De-bump on writing to SL (SE bit 5 set) false: Do not de-bump when writing to SL Bit 12 SL TRACK (SL = local setpoint) true: SL tracks PV if the mode is not 'Auto' false: SL remains constant Bit 13 CALIBRATION ENABLE true: Enable I/O calibration false: Normal operation Bit 14 PAR TIMOUT ENABLE true: parameter display remains until 'R', 'A' or 'M' mode key is operated false: display returns to the operator display if no key operations have taken place for approximately 5 minutes Bit 15 RAISE/LOWER SPEED true: high speed change of parameter values false: normal speed with aceleration feature.	Read/Write

Table C3.1 List 1 (Loop 1) parameters - sheet 2: - Tag 21

C3.1 LIST 1 PARAMETERS (Cont.)

Tag	Mne-monic	List 1 parameters (concluded)	Enable (w.r.t. to host)
22	BM	Pushbutton Mask - disables 'R", 'A', 'M' pushbuttons	Read/Write
23	SM	Mode status word	
		Bit 0 Hold select	Read/Write
		Bit 1 Track select	Read/Write
		Bit 2 Remote enable	Read/Write
		Bit 3 Comms disable	Read/Write
		Bit 4 NOT (Hold OR Manual)	Read only
		Bit 5 NOT (Remote Auto)	Read only
		Bit 6 Raise output Read/Write	
		Bit 7 Lower output Read/Write	
		Bit 8 Sensor break (true = broken)	Read only
		Bit 9 Sumcheck error	Read/Write
		Bit 10 Calibration sumcheck error	Reaf/Write
		Bit 11 Hardware conflict (true = h/w configuration mismatch)	Read/Write
		Bit 12 Autotune (true starts one-shot tune)	Read/Write
		Bit 13 Tune fail (true = tuning failure)	Read only
		Bit 14 Drooptune (true causes manual reset)	Read/Write
		Bit 15 Cold started (true on cold start; false on warm start)	Read only
24	SE(1)	Control status word for loop 1	Read only
25	RM	Remote setpoint value	Read/Write
26	TM	Trim value	Read/Write
27	TK	Track value (0.00 tro 100.00%)	Read/Write
28	HT	Trim high range and high limit	Read/Write
29	LT	Trim low range and low limit	Read/Write
30	TB	Timebase (0 = seconds; 1 = minutes)	Read/Write
31	PT	Minimum pulse time (0.1 to 60 seconds)	Read/Write

Table C3.1 List 1 (Loop 1) parameters - sheet 3: - Tags 22 to 31

C3.2 List 2 parameters

Tag	Mne-monic	List 2 parameters	Enable (w.r.t. to host)
48	DP	Decimal point position for loop 2 parameters (enter 0 to 4)	Read/Write
49	PV	Process variable	Read only
50	SL	Local setpoint	Read/Write
51	OP	Control output (0.00 to 100.00%)	Read/Wtite
52	AL	Alarm status word	N/A
		Bit 0 High absolute (true = active)	Read only
		Bit 1 Low absolute (true = active)	Read only
		Bit 2 High deviation (true = active)	Read only
		Bit 3 Low absolute (true = active)	Read only
		Bit 4 High absolute (true = unacknowledged)	Read/Write
		Bit 5 Low absolute (true = unacknowledged)	Read/Write
		Bit 6 High deviation (true = unacknowledged)	Read/Write
		Bit 7 Low absolute (true = unacknowledged)	Read/Write
		Bit 8 Alarm acknowledge (true = resets bits 4 to 7)	Write only
		Bit 9 Alarm relay status (true = relay in alarm status)	Read only
		Bit 10 Not used	
		Bit 11 Not used	
		Bit 12 Auto ack. (true = alarm auto acknowlede enabled; false = needs manual acknowledge)	Read/Write
		Bit 13 Relay disable (true = disable relay)	Read/Write
		Bit 14 Relay only on absolute alarms. (true = relay operates only for absolute alarms; false = relay operates for deviation alarms as well)	Read/Write
		Bit 15 Relay action. (true = active only for unacknowledged alarms; false = active for any valid alarm.)	Read/Write
53	SP	Resultant setpoint	Read only
54	HR	Setpoint high range	Read/Write
55	LR	Setpoint low range	Read/Write
56	MS	Requested Mode 0 = 'M' button operated 1 = 'A' button operated 2 = 'R' button operated	Read/Write
57	MN	Resultant mode 0 = Hold, 1 = Track, 2 = Manual, 3 = Local auto, 4 = Ratio, 5 = Remote Auto, 6 = Forced manual, 7 = Forced auto	
58	HA	High absolute alarm level	Read/Write
59	LA	Low absolute alarm level	Read/Write
60	HD	High deviation alarm level	Read/Write
61	LD	Low deviation alarm level	Read/Write
62	HS	Setpoint high limit	Read/Write
63	LS	Setpoint low limit	Read/Write
64	m1041	Dummy parameter	Read/Write
65	m1042	Dummy parameter	Read/Write
66	XP	Proportional band, On/off control, hysteresis (0.0 to 1999.9)	Read/Write
67	TI	Integral time (0.00 to 199.99 mins/secs) (0 disables integral term)	Read/Write
68	TD	Derivative time (0.00 to 199.99 mins/secs) (0 disables derivative term)	Read/Write

Table C3.2 List 2 (Loop 2) parameters - sheet 1: - Tags 48 to 68

C3.2 LIST 2 PARAMETERS (Cont.)

Tag	Mne-monic	List 2 parameters (Cont.)	Enable (w.r.t. to host)
69	SC	Configuration status word	Read/Write
		Bit0 Power up: true = power up in 'Manual' with fail-safe o/p false = power up in last mode and last output	
		Bit 1 Not used	
		Bit 2 Not used	
		Bit 3 Invert PID true = ΔPV and ΔOP in same sense false = ΔPV and ΔOP in opposite sense	
		Bit 4 Not used	
		Bit 5 Not used	
		Bit 6 Not used	
		Bit 7 Not used	
		Bit 8 Not used	
		Bit 9 On/Off control true = use on/off control false = use PID control	
		Bit 10 not used	
		Bit 11 SL balance (SL = local setpoint) true = De-bump on writing to SL (SE bit 5 set) false = No de-bump on SL writes	
		Bit 12 SL track (SL = local setpoint) true = SL tracks PV if mode is not 'Auto'. false = SL remains constant	
		Bit 13 Not used	
		Bit 14 Not used	
		Bit 15 Not used	
70	BM	Pushbutton Mask - disables 'R", 'A', 'M' pushbuttons	Read/Write
71	SM	Mode status word	
		Bit 0 Hold select	Read/Write
		Bit 1 Track select	Read/Write
		Bit 2 Remote enable	Read/Write
		Bit 3 Not used	Read/Write
		Bit 4 NOT (Hold OR Manual)	Read only
		Bit 5 NOT (Remote Auto)	Read only
		Bit 6 Not used	Read/Write
		Bit 7 Not used	Read/Write
		Bit 8 Sensor break (true = broken)	Read only
		Bit 9 Not used	Read/Write
		Bit 10 Not used	Reaf/Write
		Bit 11 Not used	Read/Write
		Bit 12 Autotune (true starts one-shot tune)	Read/Write
		Bit 13 Tune fail (true = tuning failure)	Read only
		Bit 14 Drooptune (true causes manual reset)	Read/Write
		Bit 15 Not used	Read only
72	SE(2)	Control status word for loop 1	Read only
73	RM	Remote setpoint value	Read/Write
74	TM	Trim value	Read/Write
75	m1052	Dummy parameter	Read/Write
76	HT	Trim high range and high limit	Read/Write
77	LT	Trim low range and low limit	Read/Write
78	TB	Timebase (0 = seconds; 1 = minutes)	Read/Write

Table C3.2 List 2 (Loop 2) parameters - sheet 2: Tags 69 to 78

C3.2 LIST 2 PARAMETERS (Cont.)

Tag	Mne-monic	List 2 parameters for ratio stations	Enable (w.r.t. to host)
96	DP	Decimal point position for loop 2 ratio parameters (enter 0 to 4)	Read/Write
97	PV	Uncontrolled process variable	Read only
98	HR	Uncontrolled PV high range	Read/Write
99	LR	Uncontrolled PV low range	Read/Write
100	MR	Measured ratio	Read only
101	RS	Ratio setpoint	Read/Write
102	HS	Ratio setpoint high limit	Read/Write
103	LS	Ratio setpoint low limit	Read/Write
104	DP_R	Ratio decimal point position for MR, RS, HS, LS (For Normal ratio action, DP_R = DP list 2 - DP list 1; for inverse ratio action, DP_R = DP list 1 - DP list 2)	Read only
105	SM	Mode status word	
		Bit 0 Hold select	Read/Write
		Bit 1 Track select	Read/Write
		Bit 2 Remote enable	Read/Write
		Bit 3 Not used	Read/Write
		Bit 4 NOT (Hold OR Manual)	Read only
		Bit 5 NOT (Remote Auto)	Read only
		Bit 6 Not used	Read/Write
		Bit 7 Not used	Read/Write
		Bit 8 Sensor break (true = broken)	Read only
		Bit 9 Not used	Read/Write
		Bit 10 Not used	Reaf/Write
		Bit 11 Not used	Read/Write
		Bit 12 Autotune (true starts one-shot tune)	Read/Write
		Bit 13 Tune fail (true = tuning failure)	Read only
		Bit 14 Drooptune (true causes manual reset)	Read/Write
		Bit 15 Not used	Read only

Table C3.2

List 2 (Loop 2) parameters - sheet 3 (for Ratio Stations): Tags 96 to 105

C3.3 List 3 parameters

Tag	Mnemonic	List 3 parameters	Enable (w.r.t. to host)
121	m121	Dummy parameter	
122	II	nstrument identity (630)	Read only
123	IV	Instrument version	Read only
124	CC	Controller type 0 = Manual station 3 = Single loop controller with ratio station 1 = Single loop controller 4 = Override controller 2 = Cascade 2-loop controller	Read/Write
125	m125	Dummy parameter	
126	P0	Password Nº0 (Access to lists 1 and 2) (0 to 9999)	Read/Write
127	P1	Password Nº1 (Access to all lists) (0 to 9999)	Read/Write
132	TU	Temperature Units (0 = °C; 1 = °F; 2 = Kelvins)	Read/Write
133	B1	Expansion I/O enable (0 = disable; 1 = enable)	Read/Write

Table C3.3 List 3 (Instrument) parameters - Tags 124 to 127, 132 and 133

C3.4 List 4 parameters

Tag	Mnemonic	List 4 parameters	Enable (w.r.t. to host)
120	FS	Fast status byte	
128	BD	Baud rate (not used)	N/A
129	PY	Parity (nNot used)	N/A
130	CommsRes	Communications resolution (always 0)	Read only
131	AD	Instrument address (Valid Profibus range: 0 to 126)	Read/Write

Table C3.4 List 4 (Communications) parameters - Tags 120, 128, 129, 131

C3.5 List 5 parameters

Tag	Mnemonic	List 5 parameters	Enable (w.r.t. to host)
144	IR	Process input range 0 = 4 to 20 mA 3 = 0 to 10 V 1 = 0 to 20 mA 4 = Thermocouple 2 = 1 to 5 V 5 = RTD	ReadWrite
145	IB	Process input break protection (1 = Upscale, 2 = Downscale)	Read/Write
146	IL	Input linearisation 0 = none 4 = Type T t/c 7 = Type B t/c 1 = Square root 5 = Type S t/c 8 = Type N t/c 2 = Type J t/c 6 = Type R t/c 9 = Pt100 RTD 3 = Type K t/c 't/c' = thermocouple	
147	procln_cl	Dummy parameter	
148	IF	Process input filter time-constant (0 to 1999.9)	Read/Write
149	OR	Process output range (0 = 4 to 20 mA; 1 = 0 to 20 mA)	Read/Write

Table C3.5 List 5 (Main I/O) parameters - Tags 144 to 149

C3.6 Expansion I/O (List 6) parameters

Tag	Mne-monic	List 6 parameters	Enable (w.r.t. to host)
150	IR	Process input range 0 = 4 to 20 mA 3 = 0 to 10 V 1 = 0 to 20 mA 4 = Thermocouple 2 = 1 to 5 V 5 = RTD	ReadWrite
151	IB	Process input break protection (1 = Upscale, 2 = Downscale)	Read/Write
152	IL	Input linearisation 0 = none 4 = Type T t/c 7 = Type B t/c 1 = Square root 5 = Type S t/c 8 = Type N t/c 2 = Type J t/c 6 = Type R t/c 9 = Pt_{100} RTD 3 = Type K t/c 't/c' = thermocouple	
153	IC	Process input connection assignment 0 = Not connected 3 = Loop 1 remote setpoint (RM) 1 = Loop 1 track input (TK) 4 = Loop 1 setpoint trim (TM) 2 = Not used	Read/Write
154	IF	Process input filter time-constant (0 to 1999.9)	Read/Write
155	AR	Analogue input range (0, 1 not used; 2 = 1 to 5V; 3 = 1 to 10 V)	Read/Write
156	AB	Analogue input break protection 0 = Freeze input 1 = Upscale 2 = Downscale	Read/Write
157	AC	Analogue input connection assignment 0 = Open circuit 4 = Loop 1 setpoint trim (TM) 1 = Loop 1 track input (TK) 5 = Not used 2 = Not used 6 = Loop 2 remote setpoint (RM) 3 = Loop 1 remote setpoint (RM)* 7 = Loop 2 setpoint trim (TM) * not available with ratio or cascade controllers	Read/Write
158	OR	Analogue output range (0, 1 not used; 2 = 1 to 5 V; 3 = 1 to 10V)	Read/Write
159	OC	Analogue output connection assignment 0 = Loop 1 normalised process variable (PV) % 1 = Loop 1 normalised setpoint (SP) % 2 = Loop 1 Control output (OP) % 3 = Loop 2 normalised process variable (PV) % 4 = Loop 2 normalised setpoint (SP) % (only cascade controllers)	Read/Write
160	DV	Digital I/O values at user terminal	Read/Write
161	DI	Digital I/O inversion mask	Read/Write
162	DC	Digital I/O connection mask	Read/Write
163	DU	Digital I/O pullup type Bit state: 0 = low i/p, high i/p; 1 = high i/p, high o/p DV bits 0 to 3: disconnect*, connect DV bits 4 to 7: disconnect†, connect DI: copy bit, invert bit * DV pulled low by hardware † DV holds last value	Read/Write
164	AF	Analogue input filter time-constant (0 to 1999.9 secs.)	Read/Write

Table C3.6 List 6 (Expansion I/O) parameters - Tags 150 to 164

C3.7 I/O Calibration (List 7) parameters

Tag	Mne-monic	List 7 parameters	Enable (w.r.t. to host)
192	CC	Calibration channel 0 = Main board process input (terminals 13 to 15) 1 = Main board process output (terminals 16 and 17) 2 = Expansion I/O process input (terminals 35 to 37) 3 = Expansion I/O analogue input (terminals 38 and 39) 4 = Expansion I/O analogue output (terminals 40 and 41)	Read/Write
193	CR	Calibration range 0 = 4 to 20 mA process inputs and outputs 1 = 0 to 20 mA process inputs and outputs 2 = 1 to 5 Volt inputs and outputs 3 = 0 to 10 V inputs and outputs 4 = Thermocouple process inputs 5 = PRT process inputs	Read/Write
194	ST	Calibration step (0 to 101)	*
195	CV	Calibration value	Read/Write
196	CalDP	Calibration decimal point position (for calibration via comms.)	Read only
* Writable only when previous step complete			

Table C3.7 List 7 (I/O calibration) parameters - Tags 192 to 196

C3.8 Incremental control parameters

Tag	Mnemonic	Incremental control parameters (Lists 1 and 8)	Enable (w.r.t. to host)
230	TT	Motor travel time (0.5 to 1999.9 secs)	Read/Write
232	VO	Velocity output demand (-100 to + 100 %)	Read/Write
235	IN	Inertia compensation time (0.0 to 20.0 seconds)	Read/Write
236	BL	Backlash compensation time (0.0 to 20.0 seconds)	Read/Write
237	Manual_action	IManual control of incremental outputs	Write only

Table C3.8 Incremental control parameters (Lists 1 and 8)
Tags 230, 232 and 235 to 237

C3.9 Diagnostics (list 9) parameters

Tag	Mne-monic	List 9 Diagnostic parameters	Enable (w.r.t. to host)
197	LightAll	Light all fascia LEDs (1 = LEDs lit for approx 6 secs. then bit resets)	Read/Write
198	Pow_PB	Pushbutton states	Read Only
199	SI	I/O status word Bit 0 Missed filter Bit 1 Extra filter Bit 2 Nominal calibration data sumcheck failure Bits 3 to 15 unused	Read Only
200	R1	Count of I/O missed readings	Read Only
201	R2	Count of I/O bad readings	Read Only
202	R3	Count of digital feedback verification failures	Read Only
203	R4	Count of tasks unable to complete in allotted time	Read Only
204	E0	Error logs stack (youngest error)	Read Only
205	E1	Error logs stack	Read Only
206	E2	Error logs stack	Read Only
207	E3	Error logs stack	Read Only
208	E4	Error logs stack	Read Only
209	E5	Error logs stack	Read Only
210	E6	Error logs stack	Read Only
211	E7	Error logs stack	Read Only
212	E8	Error logs stack	Read Only
213	E9	Error logs stack	Read Only
214	EA	Error logs stack	Read Only
215	EB	Error logs stack	Read Only
216	EC	Error logs stack	Read Only
217	ED	Error logs stack	Read Only
218	EE	Error logs stack	Read Only
219	EF	Error logs stack (oldest error)	Read Only
220	ST	Strategy cycle time	Read Only

See table below for error messages

Bit number	Decimal value if bit set	Push Button
0	1	Down arrow
1	2	Up Arrow
2	4	SP
3	8	M
4	16	PAR
5	32	A
6	64	Alm ack
7	128	R

Table C3.9a List 9 (diagnostics) parameters - Tags 199 to 220

Error Nº (Hex)	Error definition	Fatal ? (causes reset)	Non-volatile memory saved?
01	Main board DFC failed to communicate at start-up	yes	no
02	Main board DFC failed to communicate whilst strategy is running	yes	yes
03	Expansion I/O DFC failedto communicate at start-up	no	no
04	Expansion I/O DFC failed to communicate whilst strategy is running	yes	yes
05	Unrecognised expansion I/O card at start-up	no	no
06	Unrecognised expansion I/O card whilst strategy running	yes	yes
30	Internal error	no	no
31	Internal error	yes	yes
32	Internal error	no	no
33	Internal error	no	no
38	I/O task unable to complete in the allotted time	yes	yes
39	User interface task unable to complete in allotted time	no	no
3A	Control task unable to complete in allotted time	no	no

Consult factory

Table C3.9b Error messages for tags 204 to 219

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Appendix D:
IMPORTING GSD FILES INTO COMMERCIAL PROFIBUS CONFIGURATION SOFTWARE

D1 OVERVIEW

In order to configure PROFIBUS networks, GSD files (<name>.GSD) must be imported into the network configuration tool provided by the vendor of the PROFIBUS Master device. It is also often possible to include a supplementary bitmap file which provide an icon of the unit being configured for use on a graphical representation of the network.

Section D3 below, includes details of how to import GSD files into a number of different Vendors' Master software. These examples should give an indication of how GSD files can be imported into other suppliers' configuration tools.

D2 FINDING FILES ON DISK

D2.1 GSD files and bitmaps

It is assumed that a GSD file has been created using the GSD file editor described in Appendix A above and that its location on hard or floppy disc drive is known.

Notes:

1. A set of standard GSD files and bitmaps are included on the PROFIBUS support disk supplied with this manual. These files are copied into the directory in which the program is installed, usually C:\EUROPROF. Unless action is taken to save GSD files elsewhere, all files created by the GSD File Editor will also be saved to this directory.

2. A GSD file contains a list of required parameters for a particular type of instrument - it does not contain the node address of any individual instrument. The node address is a part of each instruments own configuration (see section 2.2 above) and in the Master Configuration, that particular node address is associated with a particular GSD file. This means that, for example, all temperature controllers can use one GSD file containing parameters suited to temperature controllers, whilst all pressure controllers use a different GSD file with a set of parameters related to pressure control.

D2.2 MASTER CONFIGURATION SOFTWARE

In most cases, it will be necessary for the user to determine the location on the hard disk into which the Master Configuration Software has been installed. In the examples below, it is assumed that the default location defined by the installation program of the Master Software has been used. If it has been installed into a different directory or drive the user must modify the procedure accordingly.

D2.2.1 Copying files

It is usually necessary to copy files from one location on the hard disk drive to another, as a part of the process of importing GSD files. This can be done using Windows Explorer, File Manager or MSDOS copy programs. It may be easier to configure Windows 95 explorer to display file name extensions in order to locate the required files more easily (>GSD for GSD files, >BMP for bitmaps).

D3 CONFIGURATION TOOL EXAMPLES

D3.1 Siemens: SINEC SETUP V1.02/COMLDP V1.01

This is a simple network configuration tool provided with Siemens PC master cards such as the CP5412A2. There is no graphical representation of the network, so no bitmap copying is required.

D3.1.1 Importing a GSD file

1. Select `'DP Configuration'` from the `'Edit'` menu of Sinec Setup. This runs the DP configuration program (COML DP).
2. Select `'New'` from the `'File'` menu, then, from the `'Extras'` menu, select `'Update Catalogue (GSD)...'` This causes a list of all the DP device names (Slave names) in the catalogue to be displayed.
3. Use the `'Import GSD'` button.
4. Locate the required GSD file in the file dialogue box, and then to click `'OK'` to import the selected GSD file. Once complete, click `'OK'` again to finish.
5. Select the device and add it to the network using `'Catalogue Slave'` from the `'Insert'` menu. To remove a slave, use the `'Delete Entry'` button.
6. Assign a node address by clicking on the node address field on the left hand side of the `'Slave List'` and typing a new number in.

Note: The program does not automatically load any changes made to the GSD file after it has been imported. If a GSD file is edited (e.g. to add or remove parameters) then the old file must be deleted using 'Update catalogue' and the new file imported.

D3.2 Siemens COM PROFIBUS V 3.1

The GSD files used by this program must be located in the GSD subdirectory of the installation directory C:\COMPB31. (This is the default directory which is an abbreviation of COM PROFIBUS version 3.1)

Files can be copied to this directory from the GSD Editor installation directory (default = C:\EUROPROF), or can be created there using the 'Save as' option of the editor and selecting the \COMPPB31\GSD sub-directory using the dialogue box. The GSD editor remembers that this is the last sub-directory used, and subsequent files will be loaded from and saved to it directly, unless told otherwise.

In addition to the GSD files, all bitmap (.bmp) files should be copied from the file editor or from the support disk to directory COMPB31\BITMAPS . These will provide a graphical representation of the instrument after configuration. This needs to be carried out only once.

When all the required files are in their correct directories, use of the `'Scan GSD files'` option on the `'File'` menu loads the files.

Note: The `'Load GSD file'` verifies that a GSD file is present and valid, but does not import it.

To create the network, use `'File'`, `'New'` and add the devices as described in the program documentation. Devices are added by pressing the 'CONTROL' button, and their node addresses are assigned at this point.

Note: The program does not automatically load any changes made to the GSD file after it has been imported. If a GSD file is edited (e.g. to add or remove parameters) then the old file must be deleted using 'Update catalogue' and the new file imported.

D3.3 Hilscher (Synergetic) SYCON Configurator V1 (16 Bit)

The GSD files used by this program must be located in the GSD subdirectory of the installation directory C:\PROFIBUS\SYCOMDP. (This is the default directory.)

Files can be copied to this directory from the GSD Editor installation directory (default = C:\EUROPROF), or can be created there using the 'Save as' option of the editor and selecting the \PROFIBUS\SYCOMDP sub-directory using the dialogue box. The GSD editor remembers that this is the last sub-directory used, and subsequent files will be loaded from and saved to it directly, unless told otherwise.

Bitmaps are not supported so there is no need to import them

Use the 'Add device option on the 'Device data base' menu to locate and import the GSD file. If you wish to use a number of different GSD files for the same device type, the program requires that you give a unique name to each device in the 'Description' field of the GSD file editor, so that it can differentiate between the devices on the database.

Note: The program does not automatically load any changes made to the GSD file after it has been imported. If a GSD file is edited (e.g. to add or remove parameters) then the old file must be deleted as follows:

a use the '`Display`' option on the '`Device data base`' menu to display the device database, which is a list of the currently loaded GSD file types.
b Click on the required device name, and remove it by using the delete button.

The replacement file is loaded using the '`Add device`' option on the '`Device data base`' menu.

D3.4 Hilscher (Synergetic) SYCON Configurator V2.4 (32 Bit - Windows 95 and NT only)

The GSD files used by this program must be located in the FieldBus\PROFIBUS\GSD subdirectory of the installation directory C:\Program Files\Hilscher GmbH\SyCon. (This is the default directory.)

Files can be copied to this directory from the GSD Editor installation directory (default = C:\EUROPROF), or can be created there using the 'Save as' option of the editor and selecting the sub-directory using the dialogue box. It should be noted that some elements are abbreviated because the editor is a 16-bit application:

\PROGRA~1\HILSCH~1\GMBH\SYCON\FIELDBUS\GSD

The GSD editor remembers that this is the last sub-directory used, and subsequent files will be loaded from and saved to it directly, unless told otherwise.

In addition to the GSD files, all bitmap (.bmp) files should be copied from the file editor or from the support disk to the FieldBus\PROFIBUS\BMP sub-directory of the SyCon installation directory. These will provide a graphical representation of the instrument after configuration. This needs to be carried out only once.

SyCon scans (imports) all GSD files when it starts up, so you need only to add the devices to the network and assign node addresses as described in the SyCon documentation

Because the program imports all GSD files at start up, it is necessary only to shut the program down and then re-start it to import any newly edited files.

D3.5 SST (S&S Technologies) PROFIBUS Configurator V0.14 Beta (32 Bit - Windows 95 and NT only)

The GSD files used by this program must be located in the PBX subdirectory of the installation directory C:\DLINK32\5136-PFB (this is the default directory.)

Files can be copied to this directory from the GSD Editor installation directory (default = C:\EUROPROF), or can be created there using the 'Save as' option of the editor and selecting the DLINK32\5136-PFB\PBX sub-directory using the dialogue box. The GSD editor remembers that this is the last sub-directory used, and subsequent files will be loaded from and saved to it directly, unless told otherwise.

Bitmaps are not supported so there is no need to import them

The program scans (imports) all GSD files when it starts up, you need only to add the devices to the network and assign node addresses as described in the SyCon documentation

Because the program imports all GSD files at start up, it is necessary only to shut the program down and then re-start it to import any newly edited files.

D3.6 Softing/Integrated Control Technology PROFIBUS DP Configurator (ProfiConf)

The importing of GSD files into this program is carried out as follows:

1. Use the '`Edit DDB path`' option in the 'Options' menu.
2. Use the '`Add`' button.
3. Use the dialogue box which is displayed to locate the directory containing your GSD files (C:\EUROPROF is the default name).
4. Exit the program and re-start it. (Once this has been done, any changes to GSD files are automatically imported when PROFIBUS starts up.)
5. Add the device to the network by clicking on its name in the '`Model Name`' window, and assigning a node address to it.

Bitmaps are not supported by this program.