ProSoft
T E C H N O L O G Y

Where Automation Connects.

ProLinx®

PDPM

ProLinx Gateway
PROFIBUS DP Master

June 24, 2013

PROTOCOL MANUAL

Your Feedback Please

We always want you to feel that you made the right decision to use our products. If you have suggestions, comments, compliments or complaints about our products, documentation, or support, please write or call us.

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Important Installation Instructions

Power, Input, and Output (I/O) wiring must be in accordance with Class I, Division 2 wiring methods, Article 501-4 (b) of the National Electrical Code, NFPA 70 for installation in the U.S., or as specified in Section 18-1J2 of the Canadian Electrical Code for installations in Canada, and in accordance with the authority having jurisdiction. The following warnings must be heeded:

WARNING - EXPLOSION HAZARD - SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS I, DIV. 2;
WARNING - EXPLOSION HAZARD - WHEN IN HAZARDOUS LOCATIONS, TURN OFF POWER BEFORE REPLACING OR WIRING MODULES
WARNING - EXPLOSION HAZARD - DO NOT DISCONNECT EQUIPMENT UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOWN TO BE NON-HAZARDOUS.
THIS DEVICE SHALL BE POWERED BY CLASS 2 OUTPUTS ONLY.

ProLinx® Products Warnings

WARNING – EXPLOSION HAZARD – DO NOT DISCONNECT EQUIPMENT UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOWN TO BE NON-HAZARDOUS.
AVERTISSEMENT – RISQUE D'EXPLOSION – AVANT DE DÉCONNECTER L'EQUIPMENT, COUPER LE COURANT OU S'ASSURER QUE L'EMPLACEMENT EST DÉSIGNÉ NON DANGEREUX.

ProLinx Gateways with Ethernet Ports

Series C ProLinx™ Gateways with Ethernet ports do **NOT** include the HTML Web Server. The HTML Web Server must be ordered as an option. This option requires a factory-installed hardware addition. The HTML Web Server now supports:

- 8 MB file storage for HTML files and associated graphics files (previously limited to 384K)
- 32K maximum HTML page size (previously limited to 16K)

1.1.1 To upgrade a previously purchased Series C model

Contact your ProSoft Technology distributor to order the upgrade and obtain a Returned Merchandise Authorization (RMA) to return the unit to ProSoft Technology.

1.1.2 To order a ProLinx Plus gateway with the -WEB option

Add **-WEB** to the standard ProLinx part number. For example, **5201-MNET-MCM-WEB**.

Markings

Label Markings
<cULus>
E183151
Class I Div 2
Groups A,B,C,D T6
-30°C <= Ta <= 60°C
<Ex>
II 3 G
Ex nA IIC T4
-20°C <= Ta <= 50°C
II – Equipment intended for above ground use (not for use in mines).

3 – Category 3 equipment, investigated for normal operation only.

G – Equipment protected against explosive gasses.

Contents

2   Functional Overview

The PROFIBUS Master protocol driver exists as a single port implementation. The driver can be configured as a Class 1 PROFIBUS Master to interface with other PROFIBUS slave devices. The unit is also used for configuration of the nodes on the PROFIBUS network. It provides access to both standard as well as extended diagnostic information and freeze/sync capability. The PROFIBUS master port can be used to continuously interface with PROFIBUS slave devices over a serial communication interface (RS-485).

2.1   About the PROFIBUS Protocol

PROFIBUS (Process Field Bus) is a widely-used, open-standards protocol created by a consortium of European factory automation suppliers in 1989.

PROFIBUS is a master/slave protocol. The master establishes a connection to the remote slave. When the connection is established, the master sends the PROFIBUS commands to the slave. The PDPM module works as a master only.

The module uses an internal database to pass data and commands between the processor and the client and server devices on the PROFIBUS network.

PROFIBUS supports a variety of network types. The network type supported by the PDPM module is PROFIBUS DP (Device Bus), which is designed for remote I/O systems, motor control centers, and variable speed drives.

2.2   PROFIBUS DP Architecture

The PROFIBUS DP Master network supports multiple Master systems with several slaves.

The following table shows the most important features of PROFIBUS DP Master:

Standard	EIN 501 70 DIN 19245
Transmission equipment (Physical)	EIA RS-485 IEC 1158-2 (through link or coupler) Fiber Optic Cable (not available)
Transfer procedure	Half-duplex
Bus topology	Linear bus with active bus termination
Bus cable type	Shielded twisted pair conductors
Connector	9-pin D-Sub
Number of nodes on the bus	Max: 32 with no repeaters Max: 125 with 3 repeaters in 4 segments

2.2.1 Bus Access

Two different bus access procedures handle the various communication requirements for the PROFIBUS DP Master topology:

- Token Passing
- Polling

2.2.2 Token Passing

Token passing ring is the basis for communication between the more complex, active stations. All stations have the same rights in that a token is passed from station to station in a logical ring. The token is passed to each station with a maximum, definable token cycle time. A station is given transmission rights for the duration of time that it has the token.

2.2.3 Master/Slave Polling

Master/slave polling guarantees a cyclic, real-time based data exchange between the station with transmission rights, the active station, and its subordinates, the passive stations. In this case, the Master is able to pass data to the slave and/or receive data. The services in layer 2 (field-bus data link in ISO-OSI reference model) organize this communication.

2.3   Communication Types

In addition to point-to-point data transfer, the PROFIBUS protocol can also handle the following types of communication.

- Broadcast communication: An active node sends an unacknowledged message to all other nodes (Master and slaves)
- Multicast communication (control instructions): An active node sends an unacknowledged message to a group of nodes (Master and slaves)

2.4   Master/Slave Communication Phases

The communication between the Master and the slaves takes place in the following phases:

- Parameterization and configuration phase
- Usable data transfer phase

Before a DP slave can be integrated into the usable data transfer phase, the parameterization and configuration phase runs a device identification test that verifies that the planned configuration matches the actual device configuration for each slave in the PROFIBUS network. The test verifies that:

- The device is actually there
- It is the right type of device
- The station address set on the device matches the station address in the bus configuration
- The formats, telegram length information, and bus parameters are correct

    and

- The number of configured inputs and outputs is correct

2.5   Module Internal Database

The internal database is central to the functionality of the module. This database is shared between all the ports on the module and is used as a conduit to pass information from one device on one network to one or more devices on another network. This permits data from devices on one communication port/network to be viewed and controlled by devices on another port/network. In addition to data from the master port, status and error information generated by the module can also be mapped into the internal database.
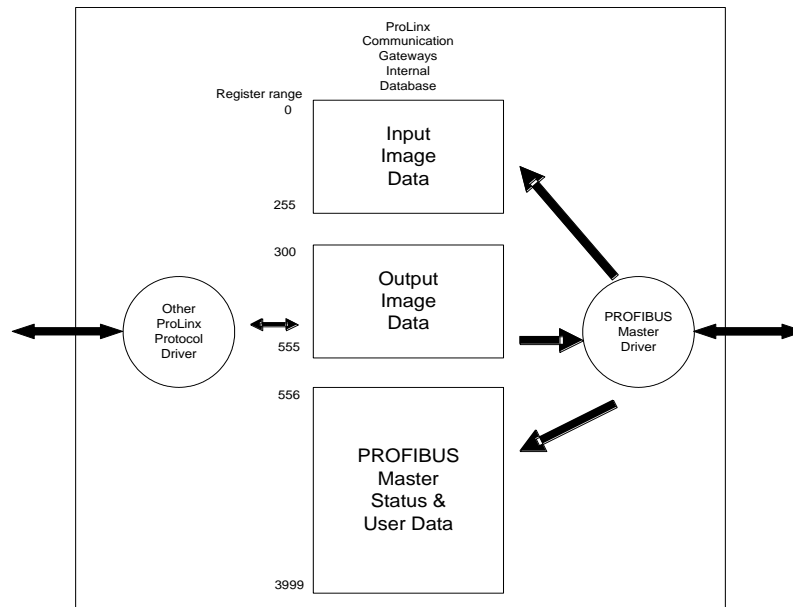
2.5.1 PROFIBUS Master Port Specifications

Type	Specifications
General Parameters	
Internal Database	Up to 4000 registers (words) available.
Communication parameters	Baud Rate: 9.6 kbps to 12 Mbps
PROFIBUS Master	
Command List	Read Diag Global Cmd Read Cntrs Reset Cntrs
Status Data	Error codes available on an individual command basis. In addition, a slave status list is maintained per active PROFIBUS Master port.
PROFIBUS Master	
Node address	0 to 125 (software selectable)
Status Data	Error codes, counters and port status available per configured slave on the network.

2.5.2 PROFIBUS Master Port Access to Database
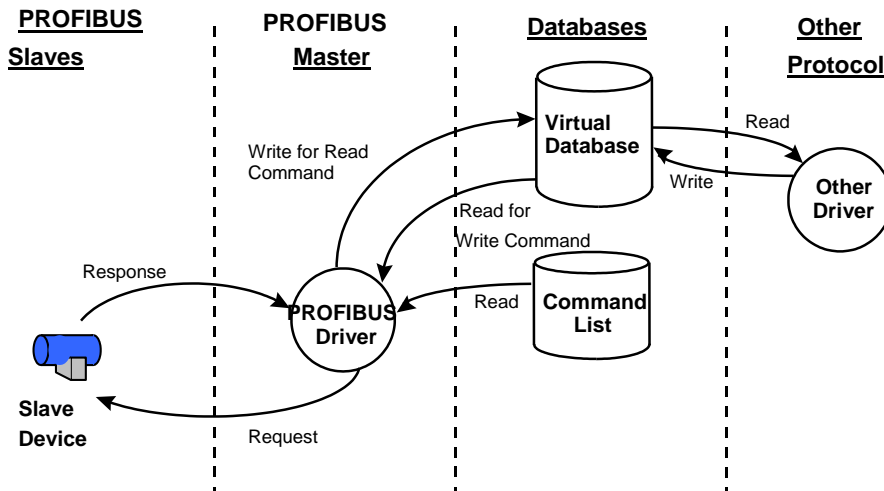
The Master driver uses the database in two ways:

1 A read command issued to a slave device by the master driver will return the slave data into the internal database.

2 A write command issued to a slave device by the master driver uses the data in the internal database to write to the slave device.

In addition to data from the master port, status and error information generated by the module can also be mapped into the internal database.

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Before a DP slave can be integrated into the usable data transfer phase, the parameterization and configuration phase runs a device identification test that verifies that the planned configuration matches the actual device configuration for each slave in the PROFIBUS network. The test verifies that:

- The device is actually there
- It is the right type of device
- The station address set on the device matches the station address in the bus configuration
- The formats, telegram length information, and bus parameters are correct and
- The number of configured inputs and outputs is correct

2.7   Port Physical and Protocol Specifications

The ProLinx module supports the PROFIBUS Master protocol as a Master on either a Mono-Master or Multi-Master network.
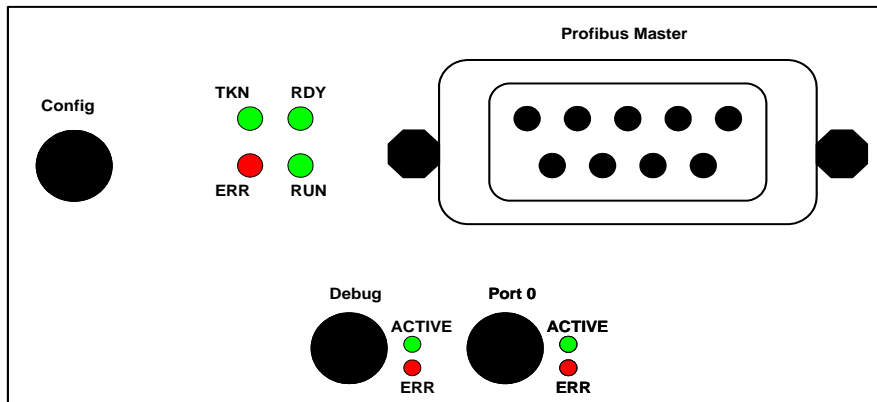
The relationship between the port labeling on the front of the ProLinx module and the application is as follows:

Port Label	Function
Debug	Debug/Configuration
Port 0	Communication Port 0
Config	PROFIBUS Master Configuration Port
PROFIBUS Master	PROFIBUS Master Port

2.7.1 Serial Port Specifications
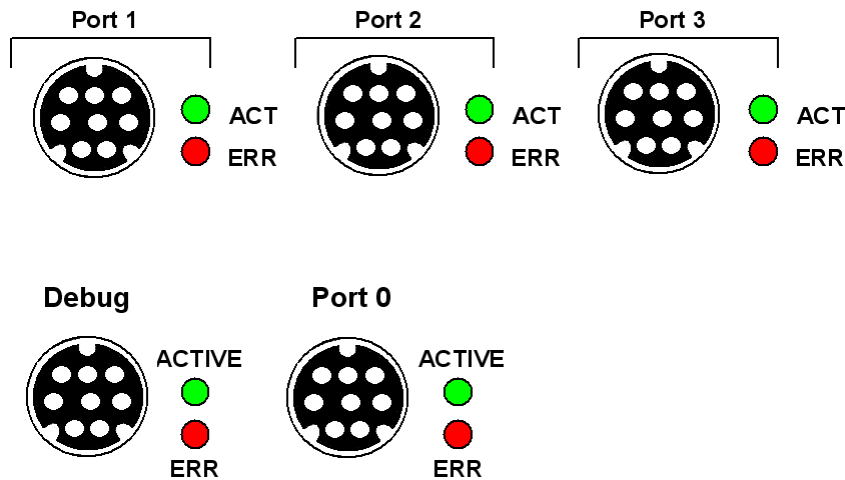
Type	Specifications
Serial Ports	
Serial Port Adapter Cables	One Mini DIN to DB-9M adapter cable included for each configurable serial port
Config Port Connector/ Pinout	DB-9F connector / DTE pinout
Serial Port Isolation	2500V RMS port-to-port isolation per UL 1577. 3000V DC min. port to ground and port to logic power isolation.
Serial Port Protection	RS-485/422 port interface lines TVS diode protected at +/- 27V standoff voltage. RS-232 port interface lines fault protected to +/- 36V power on, +/- 40V power off.

Note: On all ProLinx modules, data from the application port on the main board, serial Port 0, is not buffered. Packets go directly to and from the serial chipset to the processor. This has the potential to cause the serial communications to become erratic at baud rates above 38,400 baud.
ProLinx modules with 4 serial ports have a separate serial interface board for serial Ports 1, 2, and 3. These serial ports are buffered and can handle communications up to 115,200 baud.

3   Configuration

In This Chapter

3.1   Using the ProLinx SyCon PROFIBUS Configurator

The ProLinx SyCon PROFIBUS is a PROFIBUS-DP configurator that provides an automatic means of configuring a PROFIBUS Master Module. All devices are configured using a single tool which checks dependencies between devices and thereby only allows configurations that make sense.

In addition, ProLinx SyCon documents the fieldbus system. Detailed configuration documentation may be printed out that includes details between the bus topology and the utmost detail of a single device. ProLinx SyCon supports standardized files that contain information about all features and limitations of the slave device and uses these files for configuration.

Lastly, the ProLinx SyCon is equipped with a diagnostic mode that allows viewing of fieldbus status information.

3.1.1   Install ProLinx Sycon Configurator

PROLINX SyCon requires:

- A DVDdrive
- 486 or better CPU
- 20Mb of free hard disk space
- Minimum 16 Mb RAM
- Serial (RS232) Communication Port (COM1, COM2, COM3 or COM4)
- A screen and graphics card capable of 800x600 resolution
- Windows 95, Windows 98, Win NT4 with Service Pack 3 or higher
- For Windows 95, minimum Service Pack 1
- For Windows NT 4.0, minimum Service Pack 3

3.1.2   Installation

Close all active applications before starting the installation program and perform the following:

1   Start the installation by running \ProLinx\Utilities\Sycon\SyCon\Setup.exe from the installation DVD.
2   As the setup program runs, the program prompts you to make selections as to what components to install.
3   Select the appropriate components based on the following example.

Note: ProLinx SyCon does not use the OPC server and a license number must be entered in order to complete the installation.
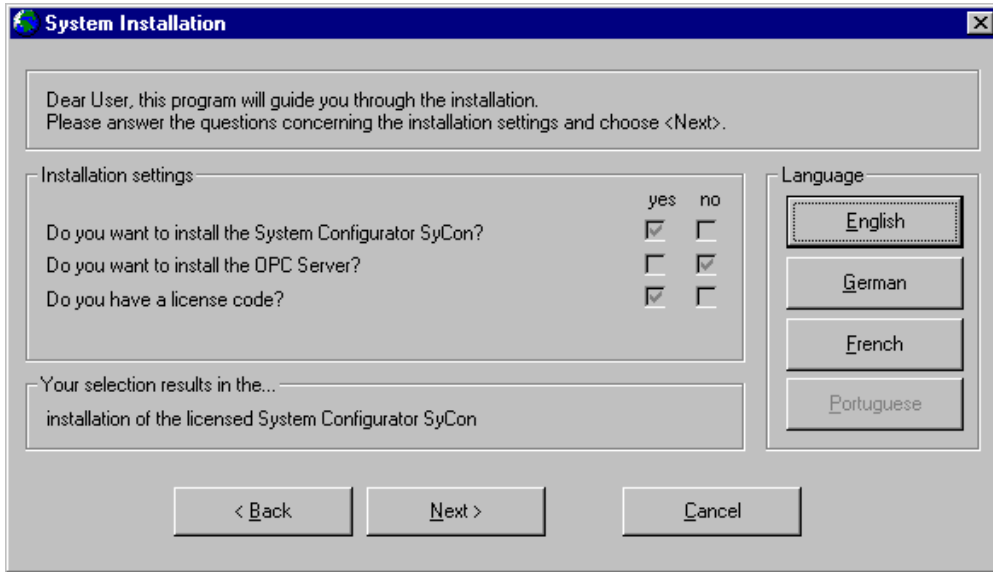
4   Enter the license code and company information when prompted. You will find the license code in E:\ProLinx\Utilities\Sycon\SyCon\LIC_044.TXT (double-click the filename to open in Notepad.exe)
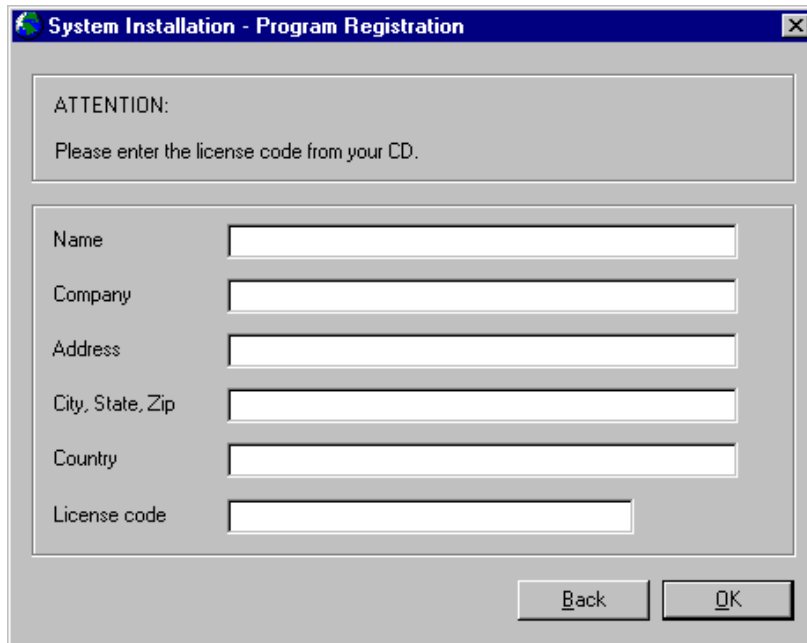
The System Installation program automatically launches the PROLINX SyCon installation program. When prompted for components to install, choose Configurator and CIF Device Driver.

GSD Files

Each PROFIBUS-DP manufacturer uses standard device description files to define the PROFIBUS-DP device functionalities on the network. These definitions are called GSD files. The set of device description files (GSD files) build the device database.

PROLINX Devices

The GSD files for PROLINX devices are located on the ProLinx Solutions DVD in the \ProLinx\Utilities\PDPS_GSD folder.

Refer to E:\ProLinx\Utilities\PDPS_GSD\ProLinx_PDPS\readme.pdf to determine the correct GSD files to use.

To import the ProLinx GSD files:

1   In SyCon, open the File menu, and choose Copy GSD.
2   In the Copy GSD dialog box, navigate to your DVD drive, and select the path \ProLinx\Utilities\PDPS_GSD.
3   Press [Ctrl][A] to select all the GSD files in that folder, and then click Open.
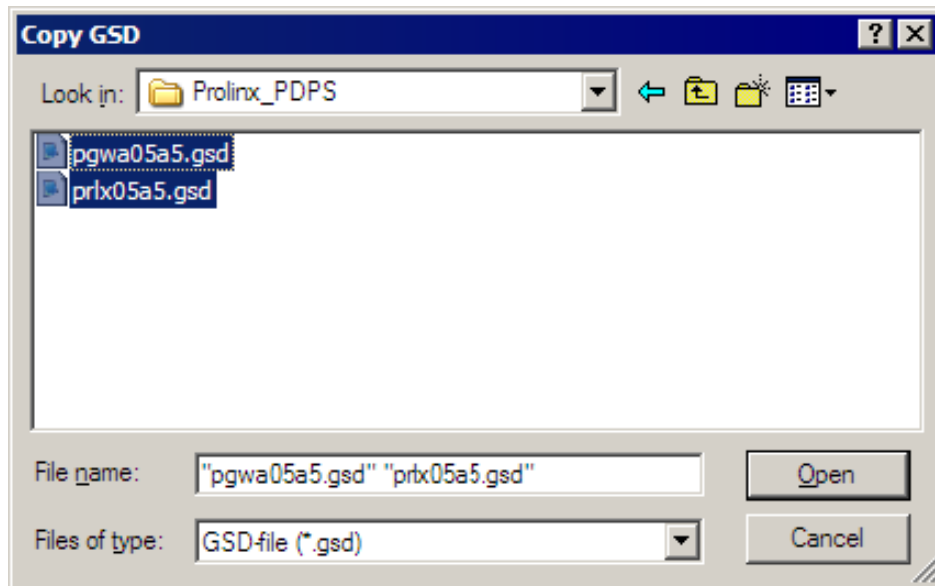
4   You will be prompted to import the BMP files that accompany the GSD files. Click Open to import each of the selected BMP files.

Other Devices

For other devices, these files should be provided and updated by the device manufacturer.

You can also get the GSD files from the homepage of the PROFIBUS user association:

http://www.PROFIBUS.com (http://www.profibus.com)

For all available configurations, GSD files must be contained in the directory GSD. During installation of the program PROLINX SyCon, the available files will be included. If you need another GSD file during PROLINX SyCon runtime you have to copy this file with the menu item **File - Copy GSD**.

The GSD directory path is changeable. To modify it from the default to another path use the menu **Settings - Path**.

All GSD files have to be present in this directory. The default path for ProLinx SyCon GSD files is

```
C:\Program Files\HMS\SyCon\Fieldbus\PROFIBUS\GSD
```

At program startup, PROLINX SyCon automatically reads in all GSD files that are present in the **GSD** directory. Because of this, device names are placed in an internal list. The device-specific data is taken online directly from the GSD file during the configuration phase.

If you must use a GSD file that is not included in the selection list during the configuration phase, you have to copy the file to the GSD using the **File - Copy GSD** command. If you use this option or manually copy a file to the directory using Windows Explorer, you must activate the Reread command using the menu **Settings - Path** and **OK** acknowledgement.

In the menu **Tools - GSD Viewer** all GSD files of the directory are shown.
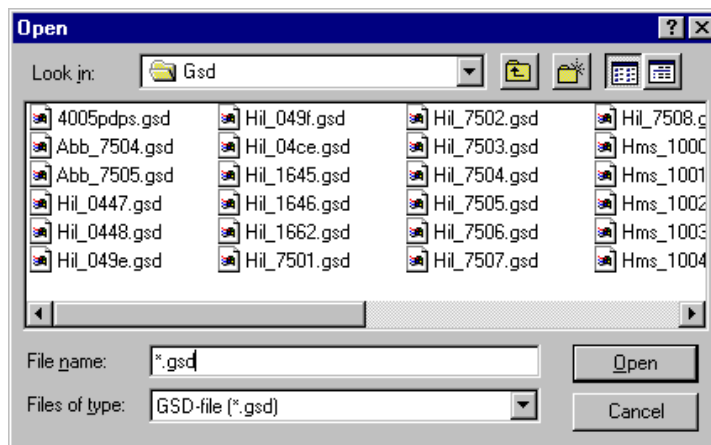
3.1.3 Configuring a PROFIBUS Using PROLINX SyCon

Basic Configuration

ProLinx SyCon configures the PROFIBUS system quickly and easily.

Perform the following procedure to configure the PROFIBUS system.

1 Select File - New from the menu.
2 ProLinx SyCon will start the configuration mode and open the window with the bus line.

3   Insert the master you are defining on the bus.
4   Insert DP slaves and assign them to the master.
5   Configure these DP slaves with the actual I/O modules, parameter data, and so on. Ensure that the right addressing mode has been selected.
6   If using a multi-master network, look at the dependencies/connections between the devices by selecting one master after the other as actual master to check your configuration.
7   Select the baud rate and bus parameters.
8   Set up the device assignment that defines how ProLinx SyCon is to communicate with the devices.
9   Save the configuration.
10   Select the port to be configured and perform the download process to all devices.
11   Connect the PROFIBUS cable to the device.
12   Start the debug mode to check the communication.
13   Print out the documentation produced by the PROFIBUS system. If PROFIBUS is running, start with the installation of the application.

3.1.4   Inserting a Master

To insert a master in the configuration, select the **Insert - Master** menu to open the selection dialog box or click the following button:

The mouse cursor changes automatically to the insert master cursor. Click on the position where you want to insert the new master. A dialog box appears where you can select one or more masters. You can select different master types (depending on the vendor brand).

If you chose the ProLinx PROFIBUS Master, the Vendor information is displayed exactly as shown in the following example:
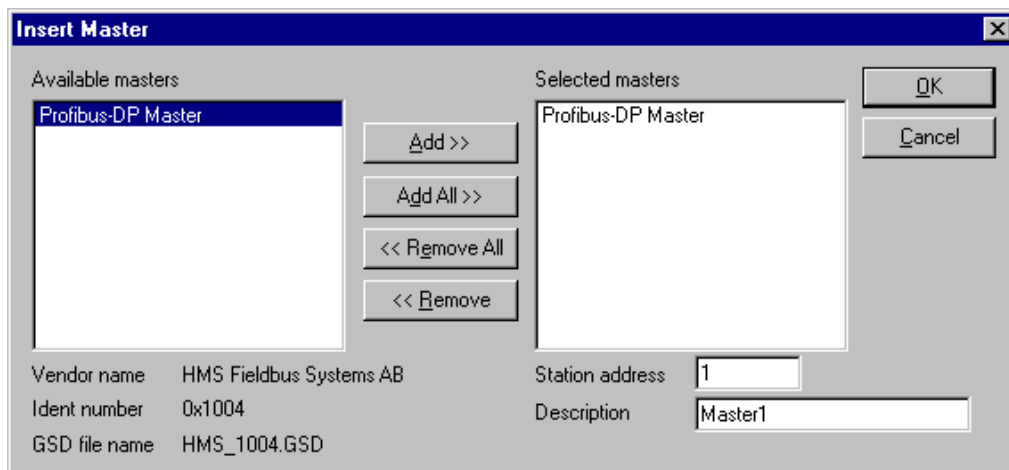
In this example, a PROFIBUS-DP Master will be added with Station Address **1** and the Description **Master 1.**

3.1.5 Master Configuration

Double-click the master to configure it. The following dialog box appears.
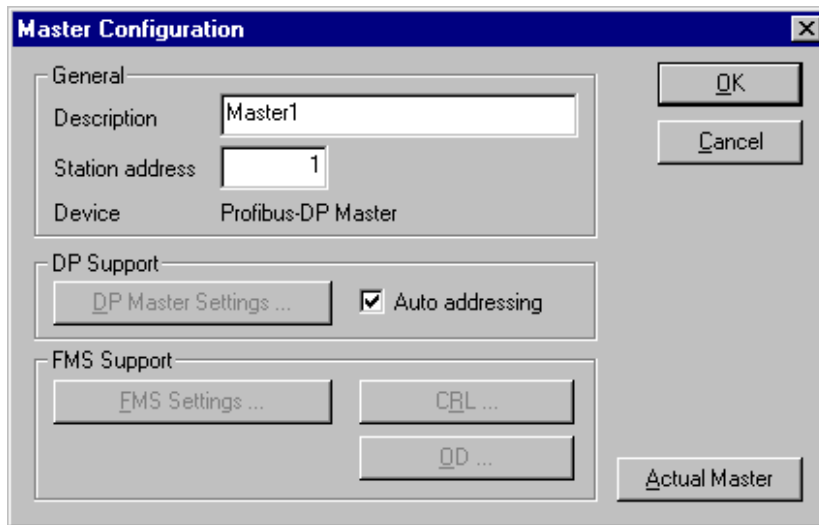
This configuration window allows you to:

- Specify the station address of the master
- Specify a (symbolic) description for this master
- Set this master as the actual master (to do a download for example)
- Activate or deactivate the auto addressing

3.1.6 Inserting a Slave Device

To insert new PROFIBUS-DP slaves in the configuration, select the **Insert - Slave** menu to open the selection window or click the following button:

The mouse cursor changes automatically to the insert slave cursor. Click on the position where you want to insert the new slave. A dialog box appears where you have to select one or more slaves.
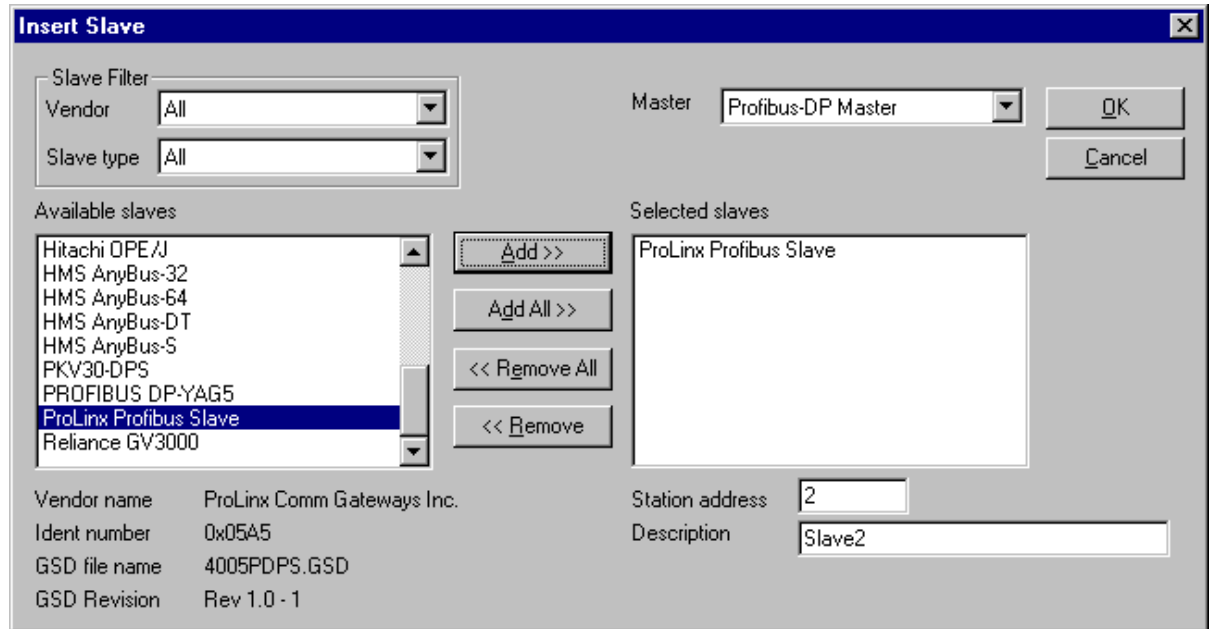
The Available slaves list-box displays all slave devices present in the GSD directory. A filtering feature is available is you want to view by a special slave family. If a slave is selected, information about that slave appears below the Available slaves list box..

With a double click or with the button **Add**, the slave appears in the right list box. All devices in this box will be connected to the active master displayed in the Master window. You must select each slave one-by-one. You can also give each a device a name or a short description in the Description Field.

The Station address field increments with each addition of a new slave. However, this address may be overwritten.

Note: It is possible to choose one slave several times but each device must have its own station address to distinguish them on the network.

Configuring a Slave

Slave-specific configuration is accomplished using the Slave Configuration dialog box. Here, modules and associated data are assigned to the address of the process data image in the master device. These addresses correspond to the application in the PLC.

Select the menu **Settings - DP Slave Configuration** or double-click on a slave to open Slave Configuration dialog box.

There are two types of DP-slaves; simple and modular. A **simple slave** has a fixed data length. A modular slave's data length is configurable. This type of slave can be understood as an assembly of one or more simple slaves with one bus address.
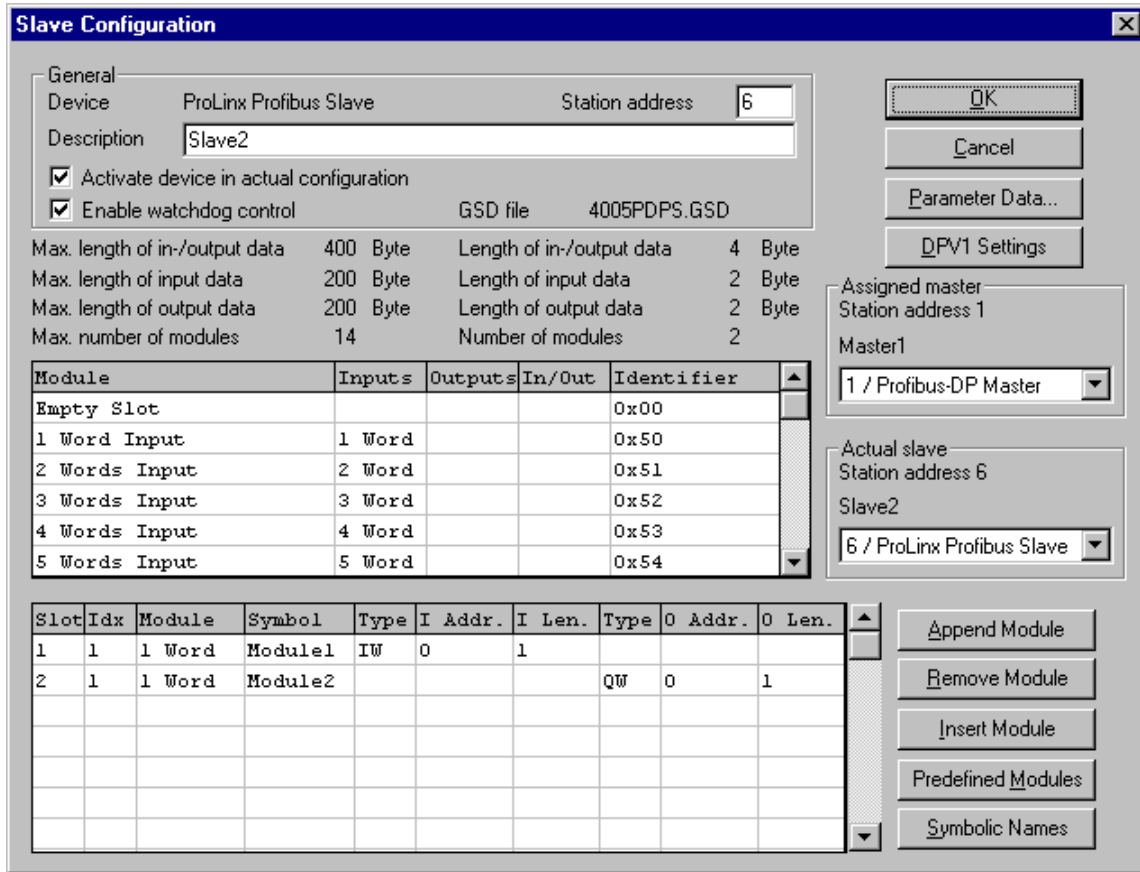
The upper table contains all available modules of the slave. In the case of a simple slave, there is only one module that is automatically copied into the lower table by ProLinx SyCon. A modular slave must be copied by the user by double-clicking on the module or selected module in combination with the **Append Module** button.

If a module has several inputs or outputs (sub modules), more lines appear in the configuration table. These additional lines will be signed with a higher index in the column **Idx**. The column **Slot** counts the modules.

Perform the following steps to configure the modules of the slave:

1 If not already present, select all modules from the upper table and insert them in the lower table to be configurable.

2 The sequence of the modules in the lower list is important and must correspond to the real physical slave configuration.

3 Assign the addresses of the module data in the process image for each module in the lower table. This is done in the columns **Type** and **Address** for input and output separately.

4 The I/O address can be entered by the user or set automatically by ProLinx SyCon. Therefore the flag **Auto Addressing** must be set in the window **Master Settings**. If active, ProLinx SyCon will place all I/O data offsets in physical order. This is done during the download procedure and the assigned addresses can be checked in the **Address Table**. If the addresses are entered manually the default address 0 in the field **I Address** respectively **O Address** must be overwritten.

Note: Offset addresses are entered as a word (16-bit) address.

With the flag **Watchdog Control activated** it is fixed how the slave will react to the interruption of the communication with the belonging master. Is this flag activated and the slave recognized the interrupted communication over the control interval, the slave will set all outputs to 0 and will set itself into the main mode.

Caution: If Watchdog Control is switched off, possible set outputs will not be reset by the slave, although the communication is broken.

Set_Param (SAP61)

ProSoft PROFIBUS Slave (PDPS) devices have a configurable parameter for SPC3 User Prm Byte. The following illustration shows the value of this parameter in Sycon, the configuration tool for ProLinx PROFIBUS Master devices.
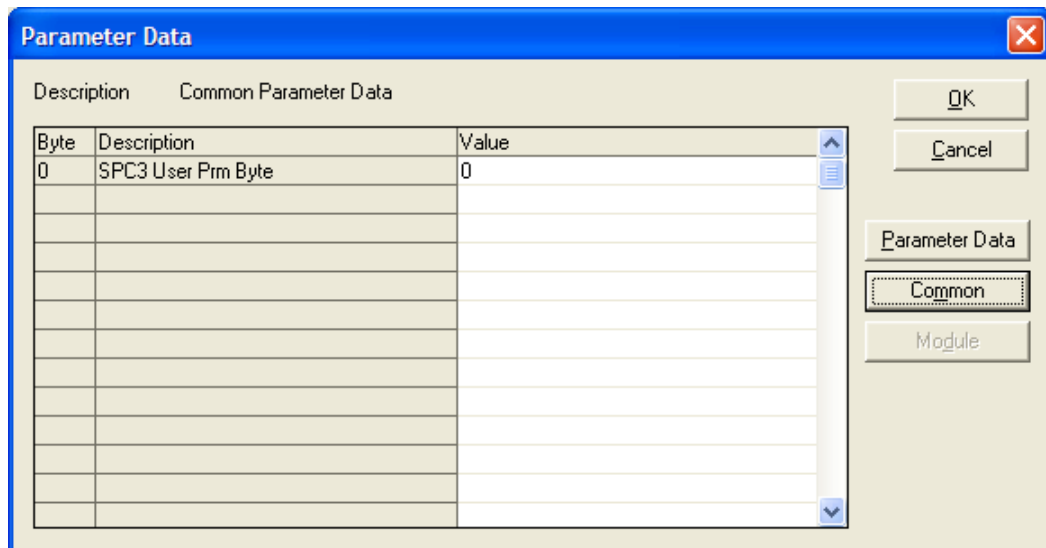
Parameter Data Structure

SPC3 evaluates the first seven data bytes (without user prm data), or the first eight data bytes (with user prm data). The first seven bytes are specified according to the standard. The eighth byte is used for SPC3-specific communications. The additional bytes are available to the application.

Byte	Bit Position								Designation
	7	6	5	4	3	2	1	0	
0	Lock Reg	Unio Req	Sync Req	Free Req	WD on	Res	Res	Res	Station status
1									WD_Fact_1
2									WD_Fact_2
3									MinTSDR
4									Ident_Number_High
5									Ident_Number_Low
6									Group_Ident
7									Spec_User_Prm_Byte
8 to 243									User_Prm_Data

Byte 7	Spec_User_Prm_Byte		
Bit	**Name**	**Significance**	**Default State**
0	Dis_Startbit	The start bit monitoring in the receiver is switched off with this bit	Dis_Startbit = 1, That is, start bit monitoring is switched off.
1	Dis_Stopbit	Stop bit monitoring in the receiver is switched off with this bit	Dis_Stopbit = 0 That is, stop bit monitoring is not switched off.
2	WD_Base	This bit specifies the time base used to clock the watchdog. WD_Base = 0: time base 10 ms WD_Base = 1: time base 1 ms	WD_Base = 0 That is, the time base is 10 ms.
3 to 4	Res	To be parameterized with 0	0
5	Publisher_Enable	DXB-publisher-functionality of the SPC3 is activated with this bit	Publisher_Enable = 0, DXB-request-telegrams are ignored; Publisher_Enable = 1, DXB-request-telegramme are processed
6 to 7	Res	To be parameterized with 0	0

3.1.7 Settings

Device Assignment

PROLINX SyCon is able to configure different devices in a PROFIBUS network. To run the online functions of such a device, it must be defined how PROLINX SyCon can communicate with it. This is done in the menu item **Device Assignment**.
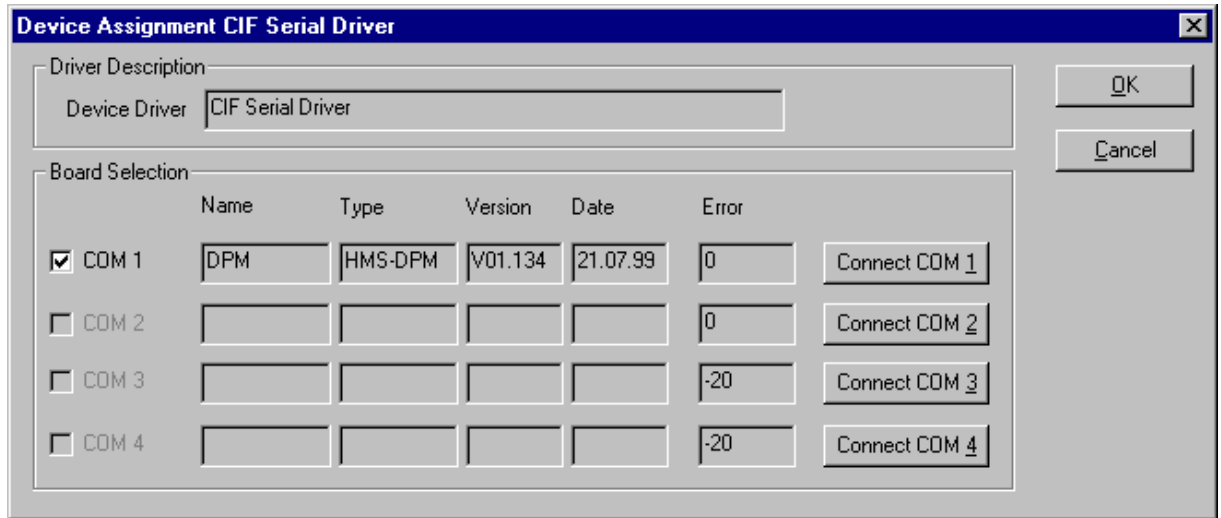
The external connection can be checked with the buttons **Connect COM 1** to **Connect COM 4**. PROLINX SyCon sends a request on that COM port and asks for the firmware. If there is a Master device connected, the firmware is displayed otherwise there will be a timeout error.

Bus Parameter

For a PROFIBUS DP system with one master, the only parameter that must be selected is the baud rate.
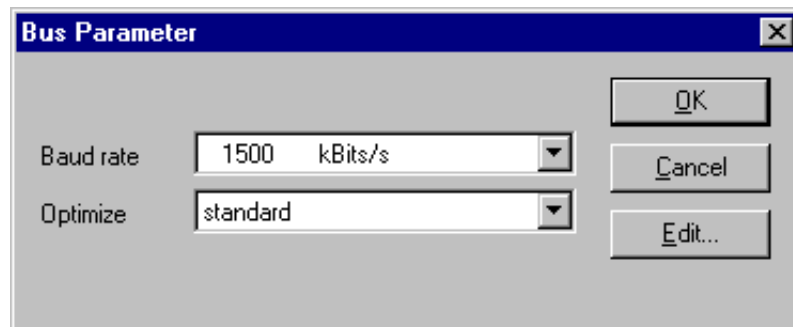
The baud rate of the PROFIBUS is common for all bus devices. Changing the baud rate has the consequence that all other parameters will be re-calculated. The System Configurator checks if the baud rate is supported by all configured devices **on basis of the entries in the GSD file**.

If the System Configurator finds at least one device in the configuration that does not support the selected baud rate, an error message appears. Some parameters can be changed individually by opening the Edit Bus Parameter dialog box. Use the Edit button to look at the actual parameters.

Note that if any changes are made in the bus parameters, the parameter for the field **Optimize** must be changed from **standard** to **by user**.
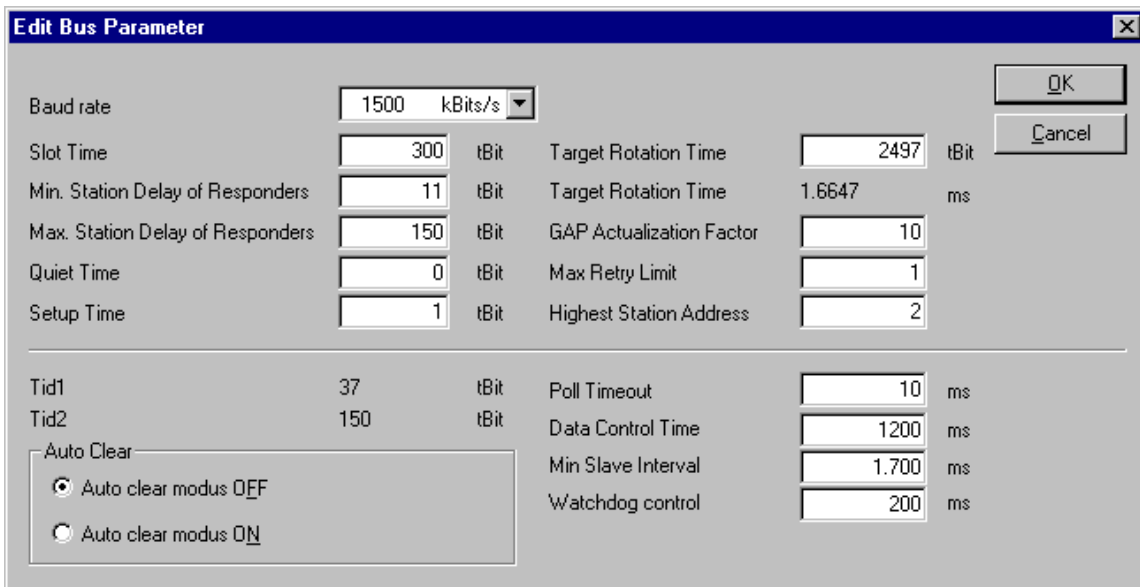
Caution: Changing the bus parameter individually can force a communication break.

The **Highest Station Address** is the highest bus address up to which the master will search for other active master stations to pass the send permission. This value should not be set below the master address.

DP Master Settings

The current version of PROLINX SyCon does not allow changing of DP-Master settings. These are the default parameters:

- Watchdog time: 1000 ms
- Addressing mode: Word addresses
- Storage formats: Big Endian

Parameter Data

User parameter data may be edited in the Parameter Data window by choosing **Settings - Parameter Data**.

If default parameters are configured in the GSD file for this slave, they are inserted automatically when the menu is chosen the first time.

Some DP-Slave devices need some further parameterization data to change for example, a measurement limitation or a value range. This data is slave-specific and the functionality cannot be explained at this point.

The explanation can normally be found in the corresponding slave manual.

This following dialog box shows an example of parameter data for a slave.
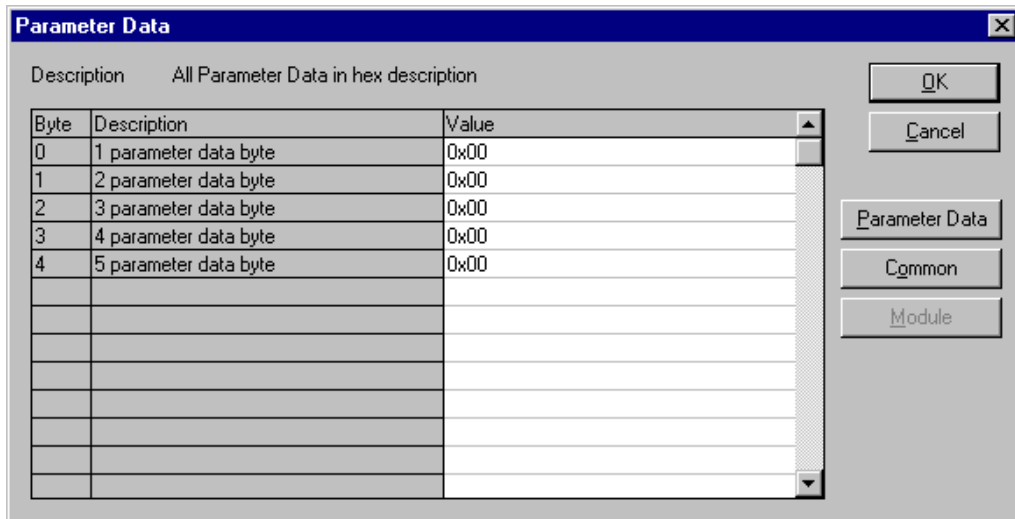
A modular PROFIBUS-DP slave station may need parameter data for one or more modules and for the slave station itself (head station). There are three selections possible:

- **Hex:** All parameters of the slave are shown in hexadecimal representation
- **Common:** Parameter data of the head station
- **Module:** Parameter data of the separate modules

After selecting the **Common** button, the following dialog box appears with the common parameter data. These parameters are for the head station.

Byte	Description	Value
7	timeout output modules (x100ms)	1
8	signal diagnosis	ON
8	spare	ON
8	spare	Byte
8	spare	1
8	spare	No
8	spare	FS complete
8	spare	freeze
8	IS1 CPM redundant	No
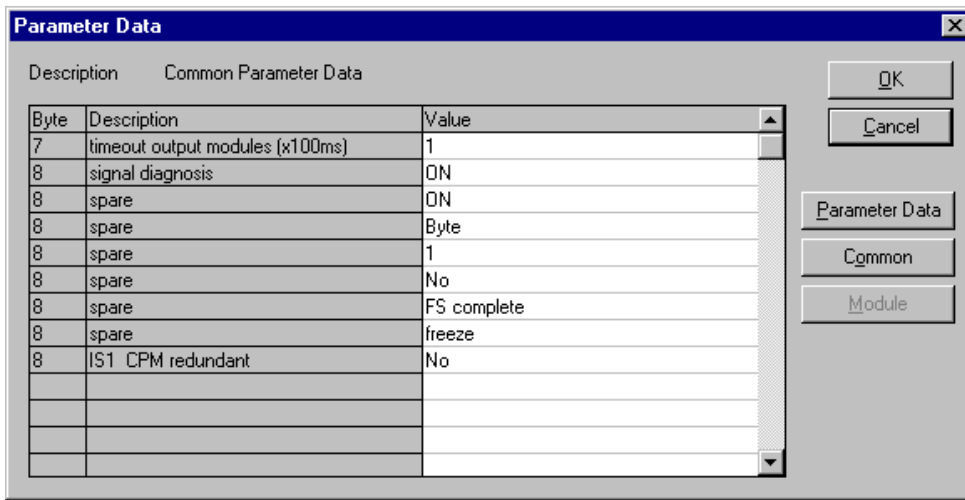
It is possible to change back into the hexadecimal description by selecting the Hex button.

With a double click on one row of the parameter data, you are able to change the value using the following dialog box.

timeout output modules (x100ms)

Data type	Unsigned8
Offset	
Min value	01 (hex)
Max value	FF (hex)
Value	01 hex
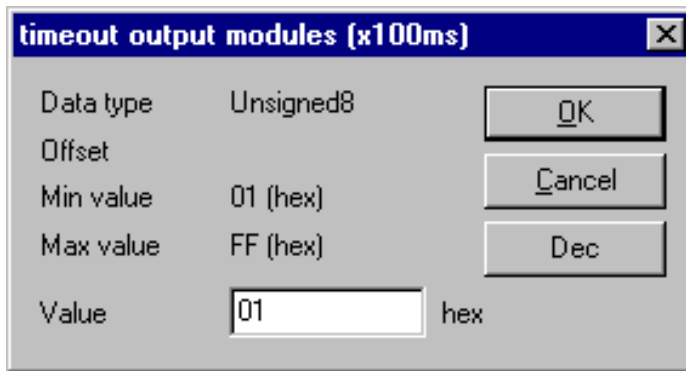
The description can also be selected by common adjustment.
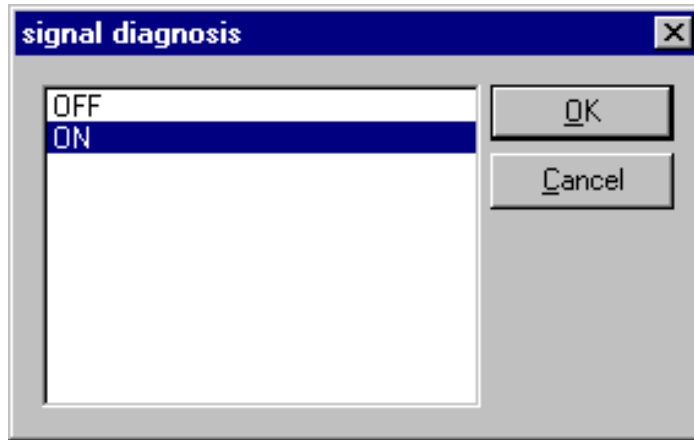
If there is more than one module configured, the relevant module must be selected first.

All parameter dialogs are taken from the GSD file. If there is no text dialog, the input is only possible as a hex value.

Group Membership

After a master is chosen, the slaves can be assigned to 8 different groups. These groups can be parameterized using the following dialog box.

Choose **Settings,** then **Group Membership** from the menu.

Select which group should support the DP-Freeze and DP-Sync command.
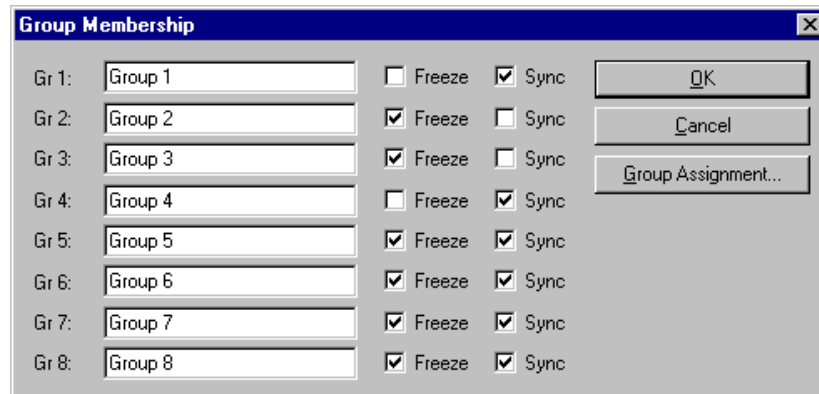
The **Group Assignment** button allows you to assign slaves to with the desired characteristics.

The following table shows all configured slave devices from the main editor window. Use this dialog box to assign slaves to selected groups.

Device	Addr.	Gr1:F,S	Gr2:F,S	Gr3:F,S	Gr4:F,S	Gr5:F,S	Gr6:F,S	Gr7:F,S	Gr8:S
ProLinx Profibus Slave	6		X	X					
1560-PDP SCANport	3				X		X		
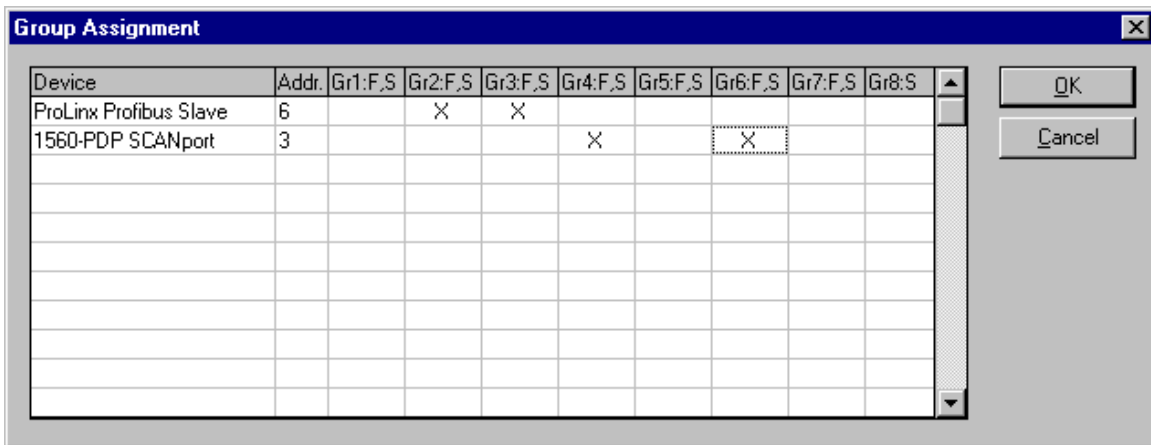
The chosen group selection is transferred to the slaves within their startup sequence. The group selection serves as a filter for a special DP command called ´global control´, which can be sent as a broadcast message to selective groups.

This command is normally used by an application program to send the output data Sync and the input data Freeze command.

3.1.8 Project Information

Common information regarding the project can be written to the configuration documentation by choosing **Settings,** then **Project Information** from the menu. This information can be printed or displayed in the window.

Project Information	
Design name	PROFIBUS new network
Version number	1.000
Company	ProLinx Comm Gateways, Inc.
Producer	ProLinx Comm Gateways, Inc.
Creation date	18.12.2000
Last alternation by	
Last alternation at	18.12.2000
Remark	
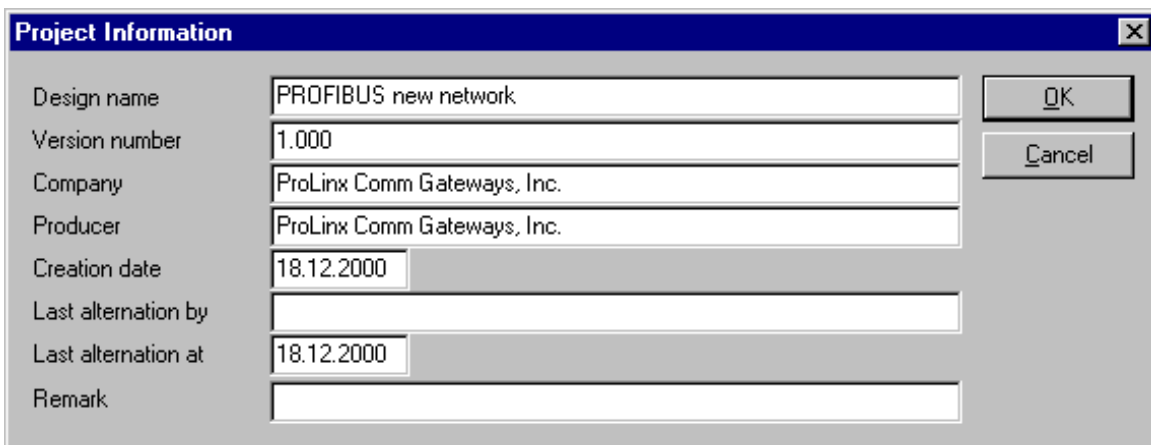
3.1.9 Path

To view the path of the GSD files, select **Settings**, then **Path** from the menu.
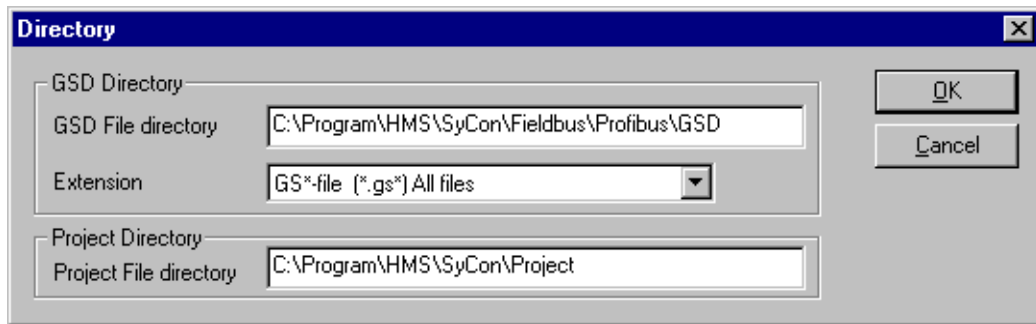
3.1.10 Language

Select **Settings,** then **Language** to display the Select Language dialog box. Use this dialog box to specify the appropriate language for the configurator.

Select the desired language, and confirm the entry with the **OK** button.
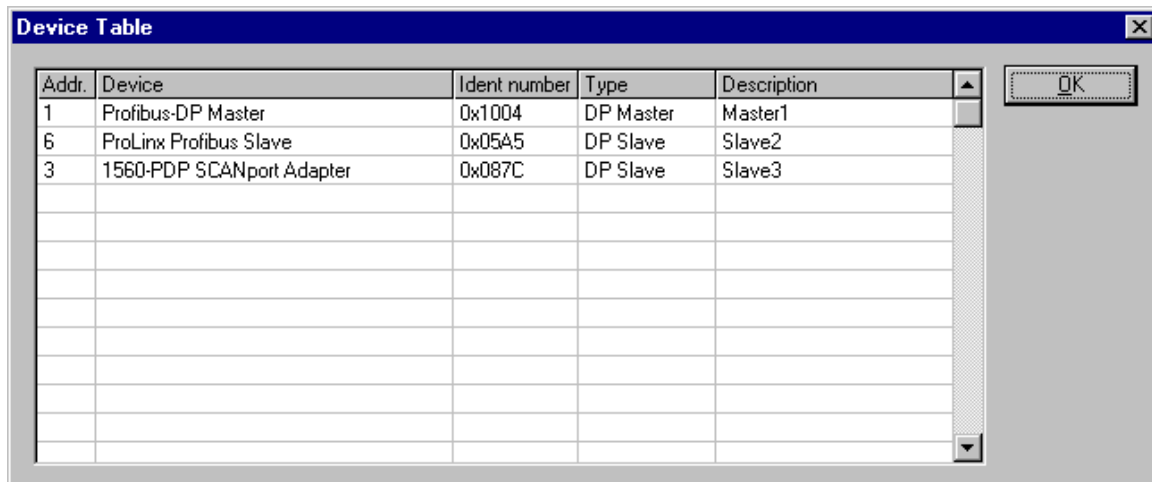
A comment appears, and prompts you to restart the application to make the changes effective. After restart, PROLINX SyCon will be uses the selected language.
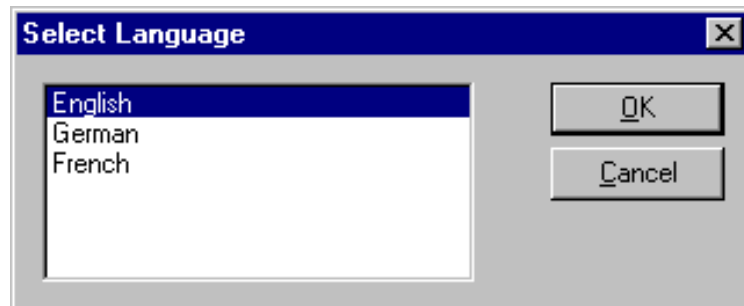
3.1.11 View the Configuration

View Device Table

Choose **View**, then **Device Table** to display the list of present devices.

Address Table

Choose **View**, then **Address Table** to display the list of addresses.

Select the master as actual master to display the address table. You can sort the addresses by station addresses or by data addresses.

Select the **Address Overview** button to display an overview about the addresses in the input and output area.

Address Table

Station address   1   1 / Profibus-DP Master

Description   Master1

Addr.	Slot	Idx.	Device	Module	Symbol name	IType	I Addr.	I Len.	OType	O Addr.	O Len.
3	0	0	1560-PDP SCANport	NO MODULES							
6	1	1	ProLinx Profibus Slave	1 Word Input	Module1	IW	0	1			
6	2	1		1 Word Output	Module2				QW	0	1

Sort according to station addresses   Sort according to data addresses   Address Overview...

Address Overview

Input area

Start offset

Following address

Overlapped address

Output area

1   The Auto Addressing mode must be inactive in order to change address assignments.
2   Click on a cross and hold down the left mouse button. The pointer changes to an arrow.

3 While holding down the left mouse button, move the arrow to the desired new (still not used) position and release the mouse button.

4 The system prompts you to verify if the change should be executed.

Choose the **Slave Configuration** menu to select offset assignments.

Overlapped addresses are shown with a red cross (indicating that the same address is used by more than one module.

View the slave address information by double-clicking on the corresponding cross. The **Byte Information Window** opens.

Note: While the addresses are given in bytes (8-bit), a block of data can only be placed on a word (16-bit) boundary.

3.1.12 Printing the Configuration File

Set up the appropriate printer using the Print Setup menu. Select Print to receive a printout of the configuration.

3.1.13 Saving the Configuration

Choose Save to save the configuration if the configuration has already been saved with a filename, otherwise, use the Save as function to assign the configuration a filename.

3.1.14 Downloading the Configuration

To enable the configuration and network access, the configuration must be downloaded to the master. Choose **Online**, then **Download** from the menu. This triggers a warning that the communication on the PROFIBUS will be interrupted. This has to be confirmed.

Before the download is accomplished, the configurator checks the configuration. If any error messages appear, the configuration should be checked. The most common errors are overlapped addresses, which can be located by viewing the **Address Table** overview.

If slave addressing is performed automatically, chose **Auto addressing** from the **Master Configuration** window.

The configuration is transmitted to the selected device and stored into FLASH memory statically. This enables it to be available after the power is switched off and on in the device.
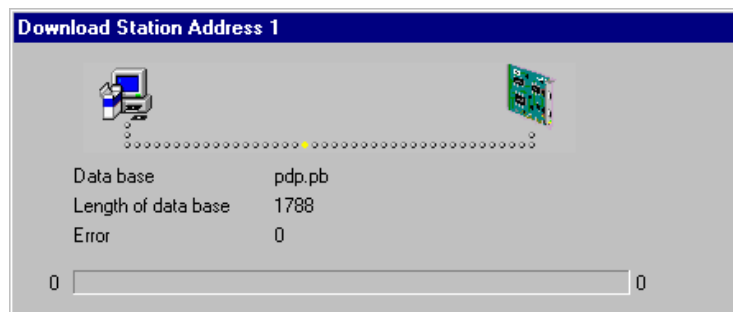
After the download procedure, the device executes an internal restart and begins with the communication if the start condition in **DP Master Settings** has been set to **Automatic release of the communication by the device**.

3.1.15 Online Functions

Starting Debug Mode

Choose Online, then Start Debug Mode from the menu. The system configurator cyclically interrogates the status of the network communication on the master and individual condition of the devices. To end Debug Mode, select **Online**, then **Debug Mode** from the menu.

The Debug Window

When the debug session is started, the Configuration Window changes to the Debug window. The devices and the line between them are displayed in green or red color depending on the established network communication.

When the debugger starts, PROLINX SyCon requests the status of all devices from the master. If there is an error on a device, the bus line to this device is drawn in red otherwise it is green.

PROLINX SyCon also displays the letters **Diag** if the device signals diagnostic information. This information is displayed closer if you click with the mouse onto the corresponding device in debug mode.

To activate Debug mode select **Online**, the **Start Debug Mode**. The menu
Online - Device Diagnostic activates the PROFIBUS device diagnostic. To end
Debug Mode, select **Online**, then **Stop Debug Mode**.
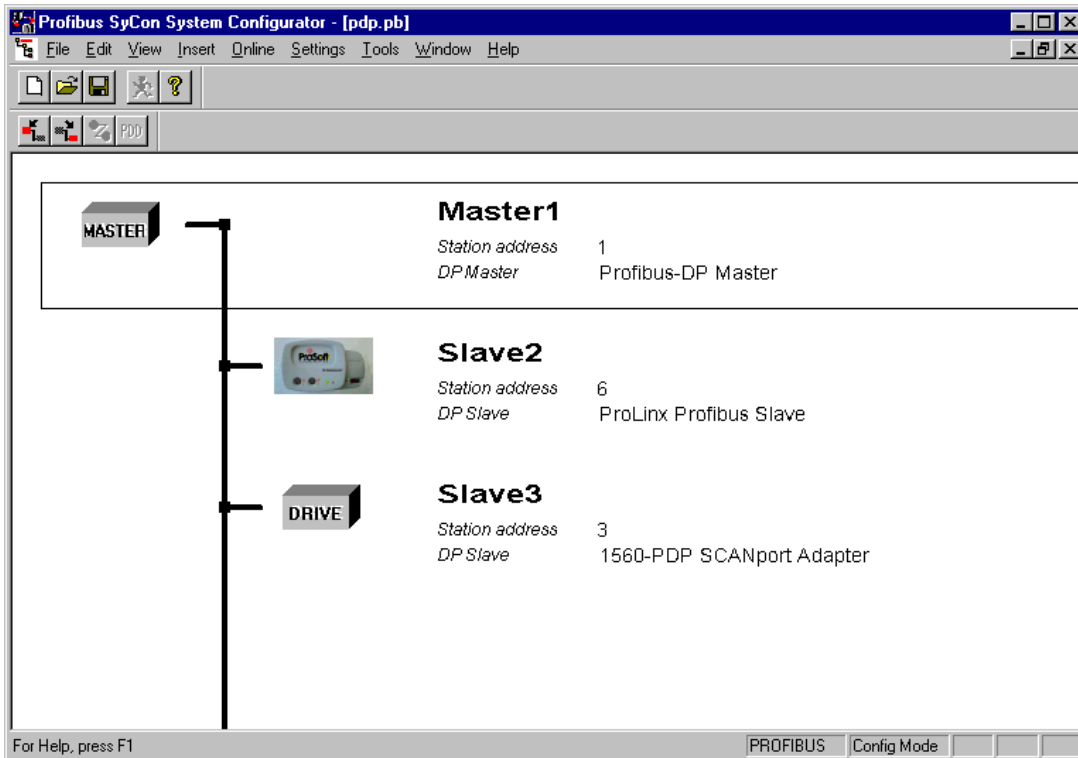
If diagnostic information is available for a specific device, the text Diag appears
next to the device icon in red. To access additional device-specific diagnostic
information, double-click on the device itself, or select the device, then select
Online - Device Diagnostic.

Device Diagnostic

The following example shows a diagnostic dialog box.
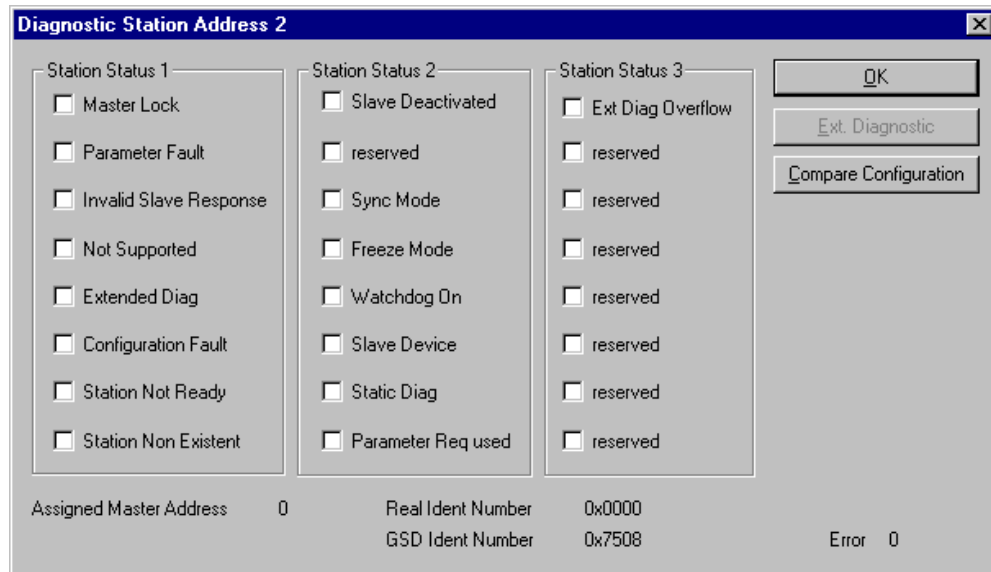
Device Diagnostic Descriptions

▪ **Master_Lock**

The slave has already been parameterized by another master and is locked. Search for another master on the network and delete its assignment to this slave station, or remove the other assigned master from the network to enable communication with this slave.

▪ **Parameter_Fault**

This bit is automatically set by the slave when the parameters sent by the master contain wrong or insufficient data. On every received parameter telegram, the slave executes a check routine on the entire parameter telegram. If the slave detects a faulty parameter value or detects illegal data during its check, it reports the "parameterization error". During the check routine, the slave compares its **ident_number** with the **ident_number** sent by the master. If the slave reports this error, compare the real ident_number shown in the slave diagnostic field in debugger mode with the one read out of the GSD-File. Use the View/Device Table menu to view this information. If parameter data is configured in PROLINX SyCon, but the slave does not support it, reduce the parameter data in PROLINX SyCon to a length of zero.

▪ **Invalid_Slave_Response**

This bit is set by the master when the master receives an invalid answer from the slave. The physical contact to the slave works, but the logical does not or was interrupted. This may occur if a PROFIBUS-FMS slave is connected to the DP-master. The slave does not understand the DP-Telegrams and rejects them. It is handled as "Invalid_Slave_Response".

- **Not_Supported**

  This bit is set by the slave when a function should be performed that is not supported. Newer releases of slave stations normally support the Sync and Freeze Mode for I/O data. This is set in the GSD file, read by PROLINX SyCon, and transferred to the slave in the parameter telegram. If "Not_Supported" is reported, the GSD file declares at least one of these commands as supported, but the slave does not. Ask the manufacturer of the slave device for another GSD file or ask if the slave reports "Not_Supported" on other wrong parameter data.

- **Extended_Diag**

  This bit is set by the slave if optional extended diagnostic data are a containment of the slave diagnostic field. A slave station normally uses extended diagnostic data if module-specific diagnostic information, for example, exceeded analog values or low power should be reported to the master. Click the Extended Diagnostic button to view a Hex-dump of the reported values.

- **Configuration_Fault**

  During the PROFIBUS-DP startup procedure, the slave compares its internal I/O configuration with the one configured in the master. If the slave detects differences, it reports the "Cfg_Fault" error. This indicates that the master has a different I/O module constellation for this slave configured, than the slave device physically holds down. First compare visually all configured I/O modules in the configuration data of PROLINX SyCon for this slave with its real physical constellation. Note that the order of the module is important and should also be compared. Some slaves need virtual I/O modules to be configured first or empty slot modules to get an even number of modules to run. This slave specific I/O module behavior can normally be read out in the slave documentation. Last help to get the slave module constellation is to read out its constellation by a PROFIBUS-DP command **Compare Configuration**. Click on this button in the diagnostic field and get a Hex-Dump of the real slave configuration data and the configured one **(Real Configuration and PROLINX SyCon Configuration)**. Note that the DP-configuration data is coded in bit defined byte arrays to hold the I/O information very compressed. The DP configuration is coded in a very compact form. The code for the modules is shown in the **slave configuration**.

- **Station_Not_Ready**

  When or at which event the slave sets this bit is not defined in the norm specification. The meaning "Not_Ready" can be seen as not ready to perform the I/O data exchange. This may indicate several slave specific reasons. Usually the bit is set in combination with one of the other fault bits.

- **Station_Non_Existent**

This bit is automatically set by the master if this slave is not responding on the bus. If this error occurs, compare the configured station address with the physical one of the slave. Then ensure that the slave module supports the configured baud rate. Some old modules only support bps rates up to 1.5 Mbps. Other modules must be jumpered to DP-Norm behavior first, to be operative with a DP-Norm master. Then check your bus cable. Only the TX/RX-pins 3<->3 and 8<->8 must be connected to get the contact between two PROFIBUS components.

- **Slave_Deactivated**

  This bit is automatically set by the master if the slave in its parameter set is marked as inactive, in order to be taken out of cyclic I/O processing.

- **Sync_Mode**

  This bit is set by the slave when it has received the sync control command.

- **Freeze_Mode**

  This bit is set by the slave when is has received the freeze control command.

- **Watchdog_ON**

  This bit is set by the DP-slave when its watchdog control is active to supervise its corresponding master connection.

- **Static_Diag**

  The slave sets this bit to indicate that the master system is not operative for I/O due to a general error. In a case of a set static diagnostic bit, the master has to collect diagnostic information as long as this bit is active. On which events or at what time this bit can be set by a slave device is not defined in the norm description.

- **Parameter_Req_used**

  The slave sets this bit to force the master system to do a new parameterization. This bit is set as long as new parameterization must be performed.

- **Ext_Diag_Overflow**

  This bit is set if there is more extended diagnostic information to report to the master than can be given to the master in one DP-diagnostic telegram. The DP-slave sets this bit, for example, if there is more diagnostic channel information than the slave can hold down in its diagnostic buffer.

- **Assigned_Master_Address**

  In this octet, the address of the DP-master that has done the parameterization of the slave is entered. If the DP-slave is not parameterized from any DP-master, the DP-slave puts the address 255 dec here.

- **Real_Ident_Number**

  With the Ident_Number, the slave reports its own unchangeable identification number that was assigned by the PROFIBUS user organization. This identification code can serve in PROLINX SyCon to compare it with the Ident code of the GSD file of the configured slave if a parameterization error is reported.

Firmware Download

If you want to make a Firmware download, select **Online,** then **Firmware Download** from the menu. The Open window appears. Select the new Firmware and confirm your entry with the Open button.

Firmware / Reset

Choose Online, then Firmware Reset from the menu to display the name and version of the firmware of the selected device. The Reset button resets the device.
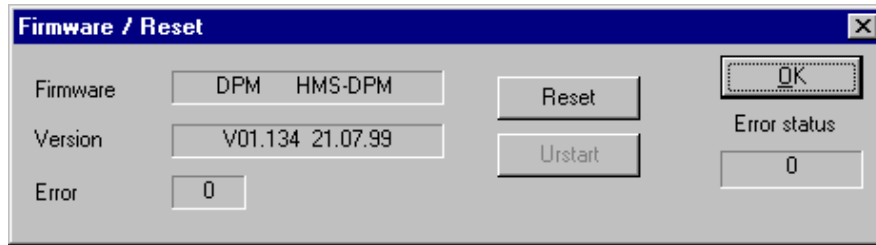
Extended Device Diagnostic

The menu item, **Online - Extended Device Diagnostic** helps to detect possible bus and configuration faults while trying to get the bus fully operative. When the normal debugger does not supply any helpful information, use this option to obtain fault localization information. This menu activates a list of available structures. The listed structures can be displayed to show the values.

Several task states are available.
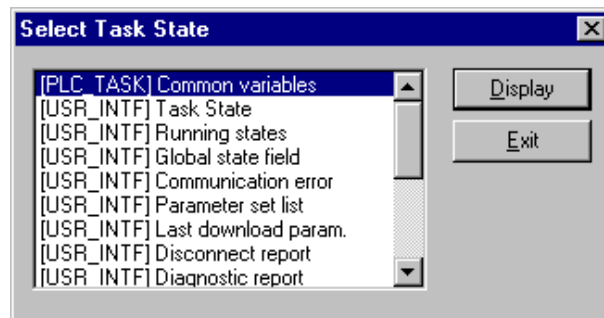
Note: All items in this list do not work for this master.

Global State Field

Select the menu **Online - Global State Field** to see information about the global state field. The first row shows the Online master main state for example, **OPERATE, STOP**. The next row shows the collective status bits. An activated bit is red. Further contents are given:

Collective online error location and corresponding error

Statistic bus information

Device specific status bits: **Parameterized Devices, Activated Devices** and **Devices with Diagnostic** are shown if you click on that button. The activated addresses are white numbers.

This application updates the status online in the global state field. You can see the diagnostic by double-clicking at a selected station address of a device. The meaning of the shortcuts is listed below:
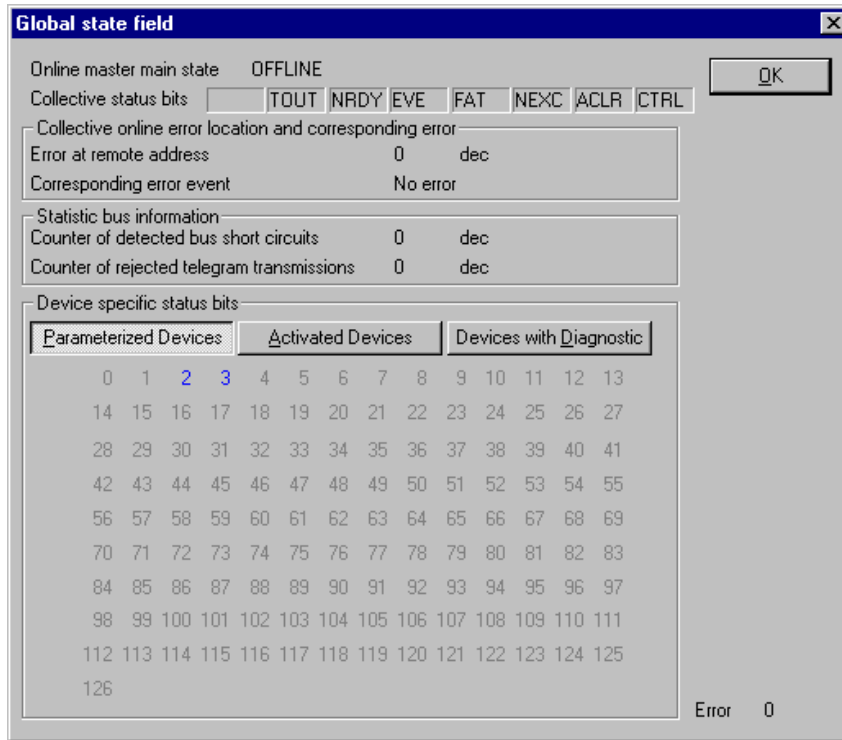

Collective Status Bits

- **TOUT** (TIMEOUT-ERROR) The device has detected an overstepped timeout supervision time because of rejected PROFIBUS telegrams. This is an indication for bus short circuits while the master interrupts the communication. The number of detected timeouts is fixed in the statistic bus information variable. The bit will be set when the first timeout was detected and will not be deleted.

- **NRDY** (HOST-NOT-READY-NOTIFICATION) Indicates if the host program has set its state to operative or not. If this bit is set the host program is not ready to communicate.
- **EVE** (EVENT-ERROR) The device has detected bus short circuits. The number of detected events is fixed in the statistic bus information variable. The bit will be set when the first event was detected and will not be deleted any more.
- **FAT** (FATAL-ERROR) Because of a heavy bus error, no further bus communication is possible.
- **NEXC** (NON-EXCHANGE-ERROR) At least one slave has not reached the data exchange state and no process data exchange is possible with it.
- **ACLR** (AUTO-CLEAR-ERROR) Device stopped the communication to all slaves and reached the auto-clear end state.
- **CTRL** (CONTROL-ERROR) Parameterization error.

Live List

If the menu **Online - Live List** is selected, an overall view of all active devices on your PROFIBUS network is shown. A green number (the number is the station address) for the master and a blue number for the slave is norm. The status of the live list is not automatically updated online.

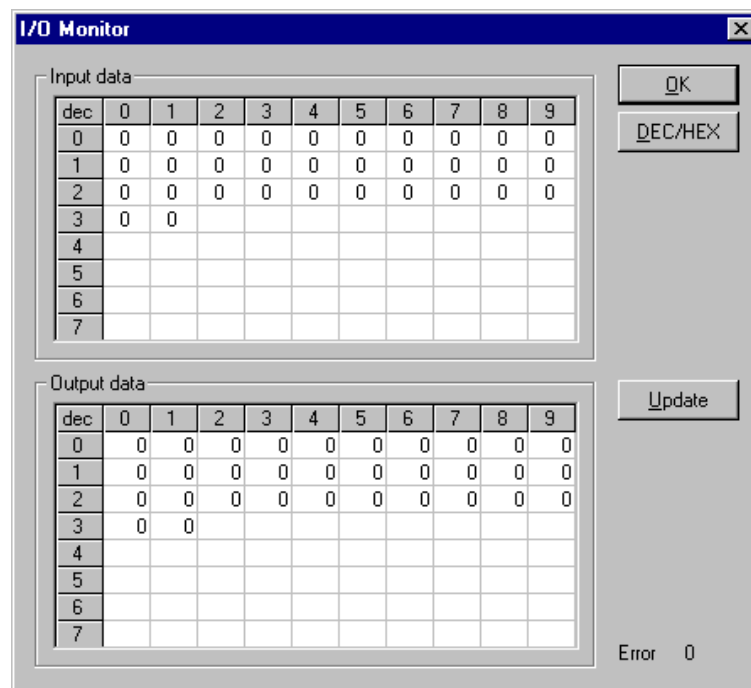Click on the **Update** button after you change your inputs to update this window.
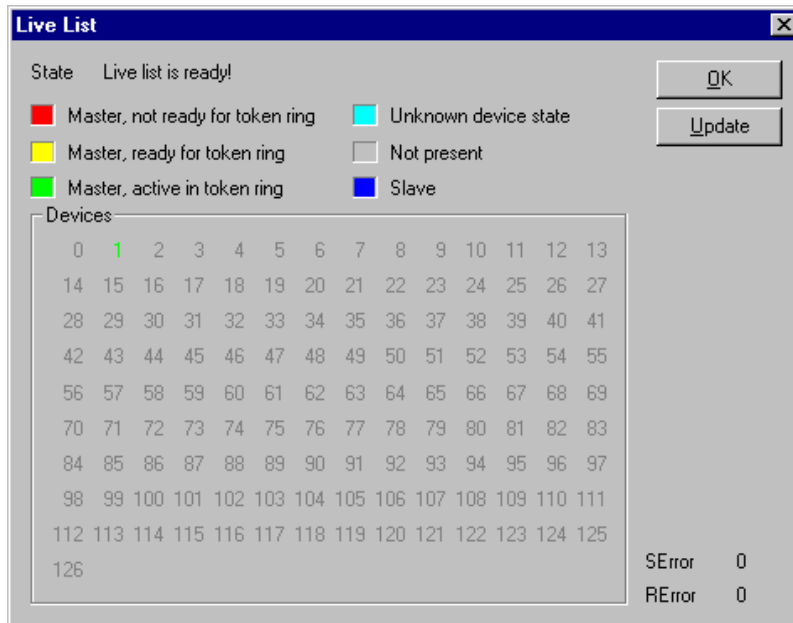
If you click on a colored station address you are given the Device type and Device state.
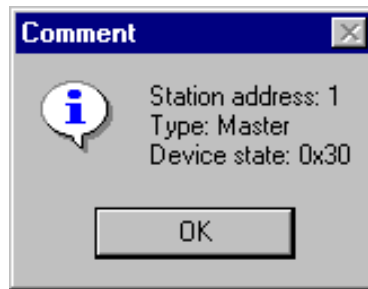
I/O Monitor

This is a simple tool used to display and enter only the first 32 bytes of the process image.

Note: The I/O monitor cannot be used with the ProLinx PROFIBUS Master unit.
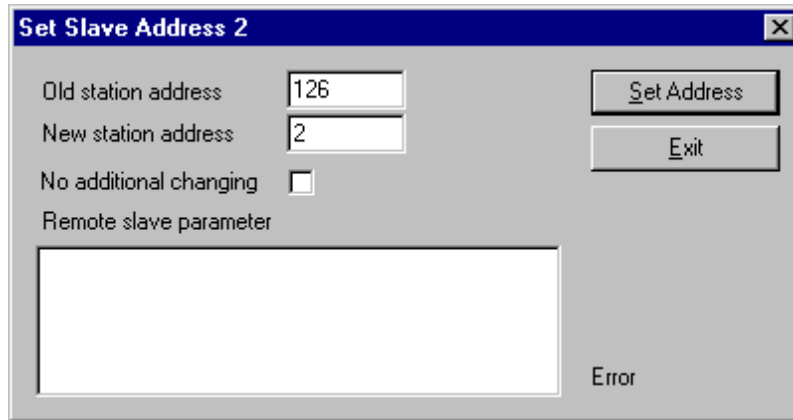
Set Slave Address

Select the **Online - Set Slave Address** menu to change a slave address.

Write the new address in the row **New Station Address**. If no further changes shall be allowed, select the field **No additional changing**. If necessary, add additional parameters in hex in the field **Slave parameter**.

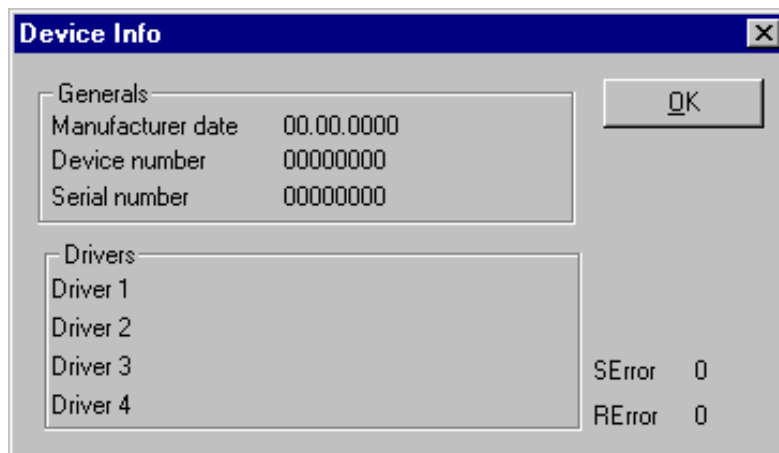Activate the command with the **Set Address** button.

Start/Stop Communication

Manually start or stop the communication between masters and slaves by selecting menu **Online - Start Communication** and **Stop Communication** respectively.

Device Info

Select the menu **Online - Device Info** to see information about the selected hardware in the configuration.

4   PDPM Protocol Configuration

In This Chapter

The following is excerpted from a configuration file showing typical examples of the PROFIBUS Master Port and PROFIBUS Master Command sections of a CFG file for a PDPM port. Shipped with each unit (or available from the web) is a default configuration file that can easily form the basis for a working solution. This file can either be downloaded from the ProSoft web site at www.prosoft-technology.com, or transferred from the module.

```
# This is the data area for setting the Profibus Master parameters

[Profibus Master]
Swap Input Bytes        :      No #Swap bytes in input image (yes or no)
Swap Output Bytes       :      No #Swap bytes in output image (yes or no)
Comm Failure Mode       :       1 #0=x-fer on comm fail, 1=no x-fer on fail
Watchdog Register       :    1000 #DB register to monitor for change (-
1=watchdog not used)
Watchdog Timeout        :      50 #.1 second intervals for watchdog timeout
Watchdog Reset Value    :     255 #Value to set Profibus outputs to on timeout
condition

# This section contains the Profibus Master commands to be processed by the
# module.

[Profibus Master Commands]
#          Database  Register        Poll          Command   Data
# Enabled   Address    Count  Interval  Node      Code   Length
START
        1       600        10           0     3        66       32
        1       610         7           0     4        66       32
        2       620         0          10     3       254        2
        2         0         0        1200     0       254        0
END
```

4.1   [PROFIBUS Master]

```
# This is the data area for setting the Profibus Master parameters

[Profibus Master]
Swap Input Bytes        :      No #Swap bytes in input image (yes or no)
Swap Output Bytes       :      No #Swap bytes in output image (yes or no)
Comm Failure Mode       :       1 #0=x-fer on comm fail, 1=no x-fer on fail
Watchdog Register       :    1000 #DB register to monitor for change
```

```
                              #(-1=watchdog not used)
Watchdog Timeout        :     50 #.1 second intervals for watchdog timeout
Watchdog Reset Value    :    255 #Value to set Profibus outputs to on
                              #timeout condition
```

4.1.1 Swap Input Bytes

Yes or No

This parameter specifies if the data in the input data area of the module is to be byte swapped. If the order of the bytes in the words stored in the database is not correct, use this option. A value of Yes causes the module's program to swap the bytes in each word. A value of No indicates no byte swapping will occur.

4.1.2 Swap Output Bytes

Yes or No

This parameter specifies if the data in the output data area of the module is to be byte swapped. If the order of the bytes in the words stored in the database is not correct, use this option. A value of Yes causes the module's program to swap the bytes in each word. A value of No indicates no byte swapping will occur.

4.1.3 Comm Failure Mode

0 or 1

This parameter sets the data transfer mode of the module's PROFIBUS input image to the internal database when a communication failure on the PROFIBUS interface is detected. If the parameter is set to 0, the input image will continue to be transferred. If the parameter is set to 1, the input image will not be transferred and the last values will be retained.

4.1.4 Watchdog Parameters

```
Watchdog Register       :   1000 #DB register to monitor for change
                              #(-1=watchdog not used)
Watchdog Timeout        :     50 #.1 second intervals for watchdog timeout
Watchdog Reset Value    :    255 #Value to set Profibus outputs to on
                              #timeout condition
```

The watchdog functionality allows the module to set the PROFIBUS output registers to a pre-defined value once a communication failure occurs. The watchdog is implemented through the monitoring of a specific database register (configured through the Watchdog Register parameter). The remote node should write a new value to this database register faster than the timeout period (configured through the Watchdog Timeout parameter). If this time period elapses but no change is detected then the module will force all PROFIBUS output registers to a specific value (configured through the Watchdog Reset Value parameter).

In order to disable this functionality set the Watchdog Register to -1.

4.2   [PROFIBUS Master Commands]

The [PROFIBUS MASTER COMMANDS] section of the CFG file sets the PROFIBUS master port command list. This list polls slave devices attached to a master port. The module supports three commands. This permits the module to interface with a wide variety of PROFIBUS slave devices.

The command list is formatted differently than the other sections of the configuration file. Commands are present in a block between the labels **START** and **END**. These labels inform the program where the list resides. The module's program will parse all commands after the **START** label until it reaches the **END** label or until the command count entered for the port is reached.

The format of each command in the list is the same with the content dependent on the operation to perform. The following table describes the format and list of PROFIBUS Master functions supported:

Column #	1	2	3	4	5	6	7
Function Type	**Enabled**	**Database Address**	**Register Count**	**Polling Interval**	**Node Address**	**Command Code**	**Data Length**
Read Diag	1 or 2	0 to 3999	1 to 122	0 to 65535	0 to126	66	32 or 106
Global Cmd	1 or 2	0 to 3999	0	0 to 65535	0 to126	70	Group
Read Cntrs	1 or 2	0 to 3997	0	0 to 65535	0 to126	254	1 to 40
Reset Cntrs	1 or 2	0	0	0 to 65535	0	254	0

Command list example:

```
[PROFIBUS Master Commands]
#           Database  Register      Poll          Command    Data
# Enabled   Address      Count  Interval  Node       Code  Length
START
        1       600         10         0     3         66      32
        1       610          7         0     4         66      32
        2       620          0        10     3        254       2
        2         0          0      1200     0        254       0
END
```

4.2.1 66 - Read Diag

Execute a station diagnostic command to the specified node placing the response message at the Database Address specified but only using the number of registers entered in the Register Count field.

4.2.2 70 - Global Cmd

Execute global command using the value at the specified Database Address to the Node Address. The Data Length field specifies the Group Select parameter.

4.2.3 254 - Read Cntrs

If the Data Length parameter is set to zero, the command will reset the counters for all slaves. If the Data Length is specified, it represents the number of slaves to read the static counter data. The Node Address specifies the first slave node to consider in the request. The counter data returned is placed at the Database Address in the command.

4.2.4 Command 70 Control Byte

The Freeze and Sync commands are used for synchronization purposes. The Freeze command causes a slave to freeze its inputs and the Sync command causes a slave to hold the outputs.

Bit	Definition
0	Reserved
1	Clear output data
2	Unfreeze input data
3	Freeze input data
4	Neutralize the sync command
5	Freeze output data until sync command is neutralized
6	Reserved
7	Reserved

Bit 2 or 4	Bit 3 or 5	Definition
0	0	No function
0	1	Function will be activated (that is, Freeze input data)
1	0	Function will be inactivated (that is, Unfreeze input data)
1	1	Function will be inactivated (that is, Unfreeze input data)

5 Diagnostics and Troubleshooting

In This Chapter

The module provides information on diagnostics and troubleshooting in the following forms:

- LED status indicators on the front of the module provide general information on the module's status.
- You can view status data contained in the module through the Configuration/Debug port or the Ethernet port, using the troubleshooting and diagnostic capabilities of *ProSoft Configuration Builder (PCB)*.
- You can transfer status data values from the module to processor memory and can monitor them in the processor manually or by customer-created logic. For details on Status Data values, see Status Data Table.

5.1 LED Indicators

Troubleshooting the operation of the PROFIBUS Master ports can be performed using several methods.

The first and quickest is to scan the LEDs on the module to determine the existence and possible cause of a problem. This section provides insight into the operation of the PROFIBUS Master Port status LEDs. Information on the module's other LEDs can be found in the ProLinx Reference Guide.

5.1.1 LEDs for the PROFIBUS Master Port
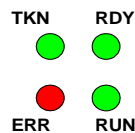
LED	Color	Description
TKN - Token	Green On	PROFIBUS Master owns token.

LED	Color	Description
RDY - Ready	Off	Hardware error.
	Green On	Module OK.
	Green cyclic flash, approx. 1 Hz.	Flash only contains boot loader, no valid firmware stored in flash.
	Green cyclic flash, approx. 4 Hz.	Hardware or system error or firmware/configuration database download in progress.
ERR - Error	Red Off	No errors detected.
	Red On	Error on communication line. Shows if a bus error has occurred, for example, a remote node was not found.
RUN - Run	Green On	Communication running.
	Green cyclic flash, approx. 4 Hz.	Ready for communication.
	Green acyclic flash	Configuration error or fatal error.

5.2   PROFIBUS Master Error and Status Data

The second and most thorough troubleshooting method for debugging the operation of the PDPM driver (and the module in general) is the powerful Debug port on the module which provides much more complete access to the internal operation and status of the module. Accessing the Debug capabilities of the module is accomplished easily by connecting a PC to the Debug port and loading a terminal program such as ProSoft Configuration Builder or HyperTerminal.

5.2.1   Viewing Error and Status Data

The following topics list the register addresses that contain error and status data. Use the Database View option from the ProLinx Main Menu to view the contents of each register. The *ProLinx Reference Guide* provides the information on using this option.

5.3   PROFIBUS Master: Error and Status Data

The PROFIBUS Master Error and Status Data register areas are discussed in this section.

The data area is initialized with zeros whenever the module is initialized. This occurs during a cold-start (power-on), reset (reset push-button pressed) or a warm-boot operation (commanded or loading of new configuration). The format of this data area is displayed below:

5.3.1 General Status

Database Address	Offset	Description
10400	0	State **Code Definition** -1 Master not in run or ready mode (restarting) 0 Waiting for initialization 1 Initialized and ready to run or running
10401	1	Mailbox State
10402	2	Scan Counter
10403	3	Mailbox Data Move Counter
10404	4	Mailbox Messages Received Counter
10405	5	Mailbox Message Error Count
10406	6	Global Command Counter
10407	7	Slave Diagnostic Request Counter
10408	8	Slave Counter Request Counter
10409	9	No Valid Data
…		
…		
10499		

5.3.2 Command Status

Command list errors are located in registers 10500 through 10699.

5.3.3 Standard PROFIBUS Slave Diagnostic Bytes

The diagnostic information consists of 6 bytes of standard diagnostic information plus any user-related diagnostic information. The standard information is shown in the tables below.

Byte	Description
0	Station status 1
1	Station status 2
2	Station status 3
3	Master address
4	Ident number high
5	Ident number low

5.3.4 Byte 0 - Station Status 1 Bits

Bit	Description
0	Station not existent
1	Station not ready
2	Configuration fault
3	Extended diagnostic data present
4	Not supported
5	Invalid slave response
6	Parameter fault
7	Master lock

5.3.5   Byte 1 - Station Status 2 Bits

Bit	Description
0	Parameter request
1	Static diagnostic
2	Slave device
3	Watchdog on
4	Freeze mode
5	Sync mode
6	Reserved
7	Slave deactivated

5.3.6   Byte 2 - Station Status 3 Bits

Bit	Description
0	Reserved
1	Reserved
2	Reserved
3	Reserved
4	Reserved
5	Reserved
6	Reserved
7	Extended diagnostic overflow

5.3.7 Byte 3 - Master Address

This byte shows the address of the assigned PROFIBUS Master after parameterization. If there is an error during the parameterization process, this byte will display the value FF (hexadecimal).

5.3.8 Byte 4 - Ident Number High

This byte shows the high byte of the specific Ident Number assigned to the module by the PROFIBUS User Organization.

5.3.9 Byte 5 - Ident Number Low

This byte shows the low byte of the specific Ident Number assigned to the module by the PROFIBUS User Organization.

5.3.10 Device Error Listing

Error	Description
0	No error
14	OS module, firmware download
50	RAM check not OK
53	FLASH PROM checksum not OK
100 to 107	Internal system error
200	Unknown interrupt received
201	Internal watchdog expired
202	Unexpected transmit interrupt from serial channel
203	Unexpected receive interrupt from serial channel
252	Firmware download or database download active
253	Bootstrap loader active, firmware not running

5.4   Error Numbers

5.4.1 Serial Driver Error Numbers (-20 … -71)

This is the list of error numbers using the serial driver associated with the PROFIBUS Master Configuration Port.

Error Number	Description
-20	DRIVER: No COM handle found
-21	DRIVER: COM port already opened
-22	DRIVER: Function call into driver failed
-23	DRIVER: Internal driver error
-24	DRIVER: Could not create read thread
-25	DRIVER: Could not create read event

Error Number	Description
-26	DRIVER: Could not create write event
-27	DRIVER: Could not create timer event
-28	DRIVER: Error by writing data
-29	DRIVER: Wrong COM state
-30	DRIVER: Set COM state error
-31	DRIVER: COM buffer setup failed
-32	DRIVER: COM set timeout failed
-33	DRIVER: RX buffer overrun
-34	DRIVER: RX buffer full
-35	DRIVER: TX busy
-36	DRIVER: Error during close driver
-40	USER: COM port not opened
-41	USER: Invalid handle value
-42	USER: Invalid COM number
-43	USER: Size parameter invalid
-44	USER: Size parameter zero
-45	USER: Buffer pointer is NULL
-46	USER: Buffer too short
-47	USER: Setup error
-50	USER: Send message, timeout error
-51	USER: Could not send a message
-52	USER: Send message, no device connected
-53	USER: Error by send message, message receiving
-54	USER: Telegram collision
-55	USER: Telegram, no acknowledgement received
-56	USER: Telegram, noise
-57	USER: Telegram, data overrun
-58	USER: Telegram, parity error
-59	USER: Telegram, framing error
-60	USER: Telegram, unknown error
-70	USER: Timeout by receive a message
-71	USER: No message received

5.4.2 RCS Error Numbers (4 to 93)

This is the list of error numbers returned by the RCS (Real-time Communication System), that is the operating system. The error number is returned in an answer message. Command messages and answer messages communicate between the application (for example, the system configuration) and the master device.

An example of this communication is the download of a configuration.

Error Number	Description
0	No error
4	Task does not exist
5	Task is not initialized
6	The MCL is locked
7	The MCL rejects a send command because of an error
20	Database not configured
21	Data base segment not configured or not existent
22	Number for message wrong during download
23	Received number of data during download does not match to that in the command message
24	Sequence identifier wrong during download
25	Checksum after download and checksum in command message does not match
26	Write/Read access of data base segment
27	Download/Upload or erase of configured data base type is not allowed
28	The state of the data base segment indicated an error. Upload not possible
29	The access to the database segment needs the bootstrap loader. The bootstrap loader is not present
30	Trace buffer overflow
31	Entry into trace buffer too long
37	No or wrong license. The OEM license of the system configuration allows only communication to devices that have the same license inside
38	The database created by the system configuration and the database expected by the firmware is not compatible
39	DBM module missing
40	No command free
41	Command unknown
42	Command mode unknown
43	Wrong parameter in the command
44	Message length does not match to the parameters of the command
45	Only a MCL does use this command to the RCS
50	FLASH occupied at the moment
51	Error deleting the FLASH
52	Error writing the FLASH
53	FLASH not configured
54	FLASH timeout error
55	Access protection error while deleting the FLASH
56	FLASH size does not match or not enough FLASH memory
60	Wrong structure type
61	Wrong length of structure
62	Structure does not exist

Error Number	Description
70	No clock on the device
80	Wrong handle for the table (table does not exist)
81	Data length does not match the structure of this table
82	The data set of this number does not exist
83	This table name does not exist
84	Table full. No more entries allowed
85	Other error from DBM
90	The device info (serial number, device number and date) does already exist
91	License code invalid
92	License code does already exist
93	All memory locations for license codes already in use

5.4.3 Data Server Error Numbers (1001 … 1009)

This is the list of error numbers using the Data Server.

Error Number	Description
1001	Invalid handle value
1002	No Driver object found
1003	No dual-port memory driver object found
1004	No serial driver object found
1005	Driver not found
1006	Wrong device ID
1007	Create command error
1008	Command ID not found
1009	Null pointer given by the application

5.4.4 Command Administrator Error Numbers (2001 … 2006)

This is the list of error numbers using the Command Administration.

Error Number	Description
2001	Function ID unknown
2002	Task ID unknown
2003	Wrong timeout value
2004	User function invalid
2005	User function pointer invalid
2006	User data invalid

5.4.5 Converting Functions Error Numbers (4000 … 4098)

The following table lists the error numbers of the converting functions.

Error number	Description
4000	No table existing
4001	Success in compromising
4002	Set not existing
4003	Last respectively first entry reached
4004	Not enough memory
4005	Table directory full
4006	Max number of entries reached
4007	No writing to this table possible, because the table is located in the FLASH
4008	Table name does already exist
4009	File name does not exist
4010	Free RAM length from RCS_CNF.P86 is smaller than E_F_INDEX * 2
4011	Parameter "next" wrong
4012	Not enough free space to copy data set
4013	Set is deleted
4014	Value for Index is wrong
4015	Access not allowed
4016	open_file used before init_file
4034	Length of converting stream is 0
4035	Non equal data set found
4036	Writing of set 0 is no allowed
4037	No entry in this file
4038	Data set has length 0
4039	The function DbmInit has assigned a Zero pointer during RCS initialization
4040	Printer not ready
4041	The data base is used from an other function
4042	New length of data base is smaller than used
4043	Unknown access mode
4044	Old databases has to be converted
4045	Error while converting. Function not known
4046	Unknown type in set 0 found
4047	No float function available
4048	Function not in RCS module
4050	Checksum check failed
4051	More segments are existing in file, than in the structure FILE_INFO_T in wMaxEintraege
4052	SegLen in structure FILE_INFO_T is smaller then the length in the file. Return of function dbm_restore_data
4053	The header file holds an other information for a length than in the segment itself
4054	Not enough memory for allocation on the PC

Error number	Description
4055	No index for file handle in structure FLASH_DIR of RCS found
4056	-
4057	File type 2 cannot be printed because of too many definitions
4058	The definitions need too many lines to display them, than in the program available
4059	An unknown format for the parameter. Valid is U, H, or S
4060	Unknown parameter type
4061	The database was transmitted into the FLASH
4062	Set 0 contains no structure definition
4063	Set 0 cannot be deleted
4064	Error during execution of a ODBC data base access
4065	Initializing of DBM through RCS had no success
4066	Passed data length incorrect
4067	Sorting function not linked
4068	Error in function parameter
4069	Error from ODBC table
4070	No free handle available. Too many data base links are already opened
4071	Unknown data type found in the table
4072	Structure of table GLOBAL not correct or no such table existing
4073	No name of an ACCESS database
4074	Download window cannot be created
4075	Download not fully performable
4076	Parameter SourceType of table SourceTab not existing
4077	Parameter Translate of table CreateTab does not exists
4078	Parameter Sourcefile of table CreateTab does not exists
4079	Parameter Sourcetable of table CreateTab does not exists
4080	Parameter Desttable of table CreateTab does not exists
4081	Parameter Special of table CreateTab does not exists
4082	More than 32 tables should be created
4083	No entry in element szSourceFile
4084	ODBC connection initialization not possible. This could happen when in file ODBCINST.INI in section [Microsoft Access Driver (*.mdb)] is no valid path to ODBCJT16/32.DLL.
4085	Error in structure in the ACCESS database that is in DBM format
4086	Error in structure in the ACCESS database that is in DBM format
4087	No data in a ODBC table
4088	No entry
4089	ODBC set length not valid
4090	Not enough data sets in ODBC table
4091	Table CreateTab not found
4092	Error in structure of table CreateTab

Error number	Description
4093	No entry in element szSourceTable
4094	No entry in element szDestTable
4095	Entry in iSourceType of table CreateTab is wrong
4096	Entry in iTranslate of table CreateTab is wrong
4097	Function SQLAllocStmt reports an error
4098	ODBC source table not found

5.4.6 Data Base Functions Error Numbers (5001 … 5008)

The following table lists the error numbers of data base functions DBM32.DLL.

Error number	Description
5001	Function PackLongToByteShort: Not enough space in pvD (Number of elements greater than reserved memory)
5002	Function PackLongToByteShort: Not enough space in pvD. Detected during converting of pvS
5003	Function StringToByte: Not enough space in pvD
5004	Function IntToByte: Not enough space in pvD
5005	Function LongToShort: Not enough space in pvD
5006	Function PackStringDumpToByteArray: Not enough space in pvD
5007	Function PackStringBumpToByteArray: A character was found, which does not match a HEX value
5008	Function PackStringDumpToByteArray: Number of character odd

6   Reference

In This Chapter

6.1   RS-232 Configuration/Debug Port

This port is physically an eight-pin, Mini-DIN8F connection. A Mini-DIN8M to DB9M adapter cable is included with the module. This port permits a PC-based terminal emulation program to view configuration and status data in the module and to control the module. Here are the cable pinouts for RS-232 communication on this port.
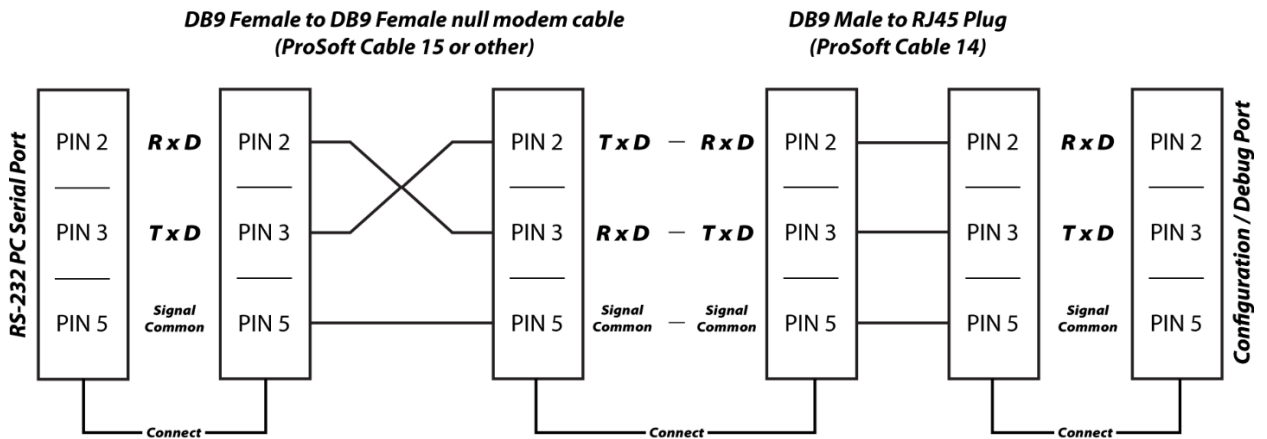
6.2 DB9 to Mini-DIN Adaptor (Cable 09)
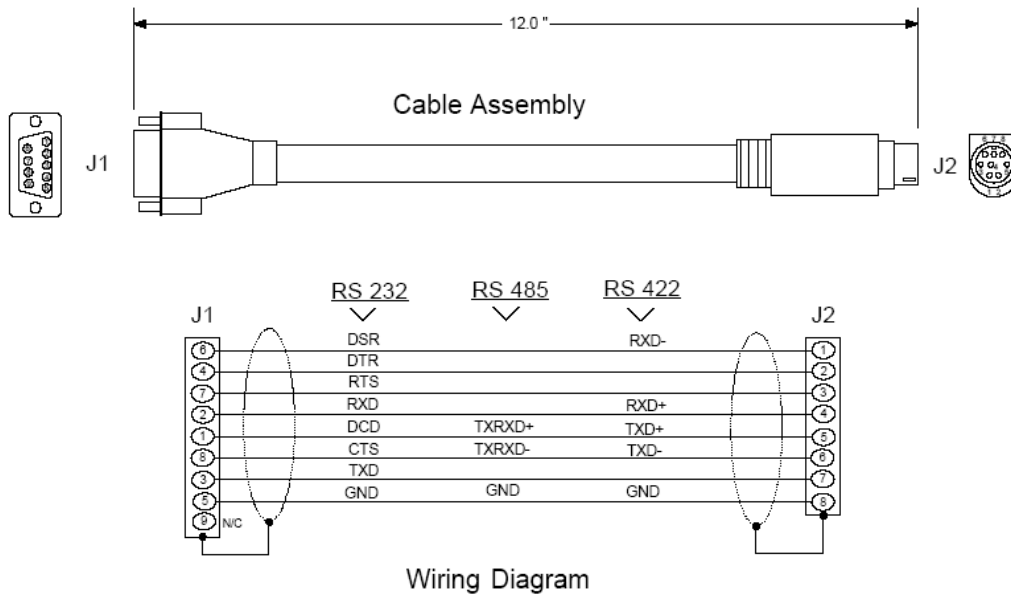
Wiring Diagram

6.3 PROFIBUS Master Port

The following diagram has been imported from the PROFIBUS Master documentation. Note that the signals to reference are the D-Sub signals in the table.

D-Sub (male)	Board to Board	Screw Terminal	Signal
Housing	1	5	Cable shield
1	4	-	-
2	7	-	-
3	6	4	B-Line
4	3	6	RTS
5	2	2	GND_BUS
6	8	1	+5V BUS (output)
7	9	-	-
8	5	3	A-Line
9	10	-	-
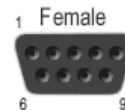
6.4 Supported PROFIBUS Services

The following table lists all available services according to the PROFIBUS specification.

Service	PROFIBUS Version	Master Class 1		Master Class 2	
		Request	Response	Request	Response
DDLM_Data-Exchange	DPV0	Yes		No	
DDLM_Set_Prm	DPV0	Yes		No	
DDLM_Chk_cfg	DPV0	Yes		No	
DDLM Slave Diag	DPV0	Yes		No	
DDLM_Global_Control	DPV0	Yes		No	
DDLM_Get_Cfg	DPV0			Yes	
DDLM_Set_Slave_Add	DPV0			Yes	
DDLM_Read_Input	DPV0			No	
DDLM_Read_Output	DPV0			No	
DDLM_Get_Master_Diag	DPV0		Yes		
DDLM_Start_Seq	DPV0		No	No	
DDLM_Download	DPV0		No	No	
DDLM_Upload	DPV0		No	No	
DDLM_End_Seq	DPV0		No	No	
DDLM_Act_Param_Brct	DPV0		No	No	
DDLM_Act_Param	DPV0		No	No	

6.5 Constructing a Bus Cable for PROFIBUS DP

The bus cable for connecting PROFIBUS DP devices must be constructed by the user. A special PROFIBUS cable (twisted pair) is required here. This standard cable is available from various manufacturers and is a Belden part number 3079A.

If you plan to construct your own bus cable, the following part numbers are provided for your convenience.

- PROFIBUS connector: Siemens part number 6ES7972-0BA40-0XA0
- PROFIBUS cable: Belden part number 3079A.

To construct the cable, proceed as follows:

1 Cut the cable to the required length.
2 Prepare the cable ends as shown in the illustration (dimensions in mm):
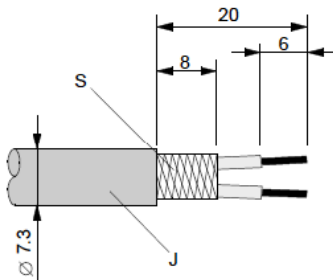
J   PVC Jacket
S   Braided shielding

3   Remove the PVC jacket J to the indicated length.
4   Wrap the provided copper shielding F around the shield braiding S:
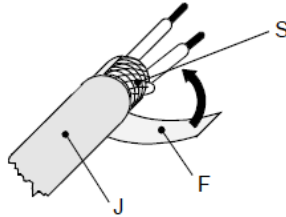
J   PVC jacket
S   Braided shielding
F   Copper foil shielding
Additional foil can be obtained from 3M.

5   Plug the leads of the corresponding cable(s) into the terminals as shown:
   o   Green leads in terminal A
   o   Red lead in terminal B

▪   **Note:** Do **not** tighten the corresponding screws yet.

Connection terminal assignment on the PROFIBUS DP:
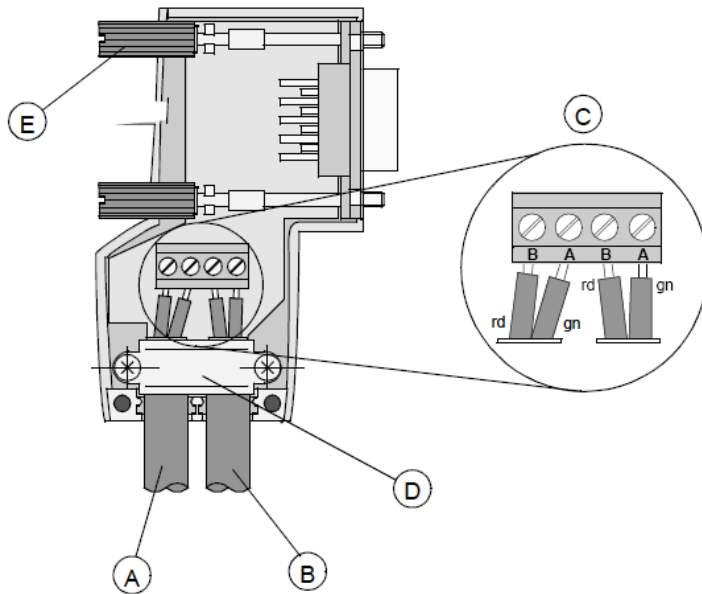
A   Incoming cable
B   Outgoing cable

    C Connection terminals (only once (B,A))
    D Cable cleat for reliving tension
    E Bus connector screws

6 Attach the cables with the provided cable cleat to create a robust shielded connection and to relieve any tension as shown:
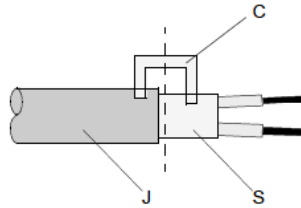
    J PVC Jacket
    S Braided shielding with foil shielding
    C Cable cleat

▪ **Note**: Half of the cable jacket must lie under the cable cleat!

Pay attention to the cable cleat installation instructions.

7 Fasten the individual wires of the PROFIBUS cable to the terminals
8 Close the connector housing.

▪ **Note:** The shielding of both cables is connected internally with the metal housing of the connector.

9 Complete the Central Shielding Measures (below) and grounding operations for the shielding before you connect the cable connector to the module.
10 Plug the PROFIBUS DP connector into the module and secure it with the screws.

Bus Begin and Bus End

The PROFIBUS connector with termination is required at the beginning and the end of the bus. These connectors emulate the line impedance.

It is recommended that at least one connector with diagnostics interface is used.

Wiring diagram for a PROFIBUS DP cable
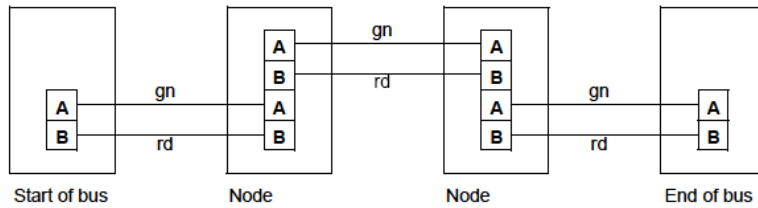
Grounding and Shielding for Systems with Equipotential Bonding

Each cable shield should be galvanically grounded with the earth using FE/PE grounding clamps immediately after the cable has been connected to the cabinet.

This example indicates the shielding connection from the PROFIBUS cable to the FE/PE rail.
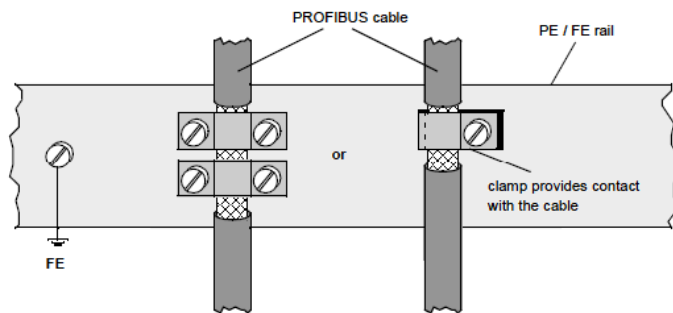
Note: An equalization current can flow across a shield connected at both ends because of fluctuations in ground potential. To prevent this, it is imperative that there is potential equalization between all the attached installation components and devices.

This example indicates the system components and devices in a system with equipotential bonding.
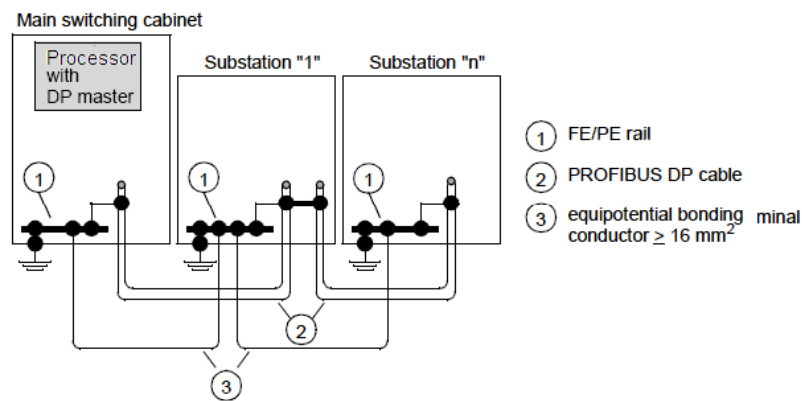
Grounding and Shielding for Systems without Equipotential Bonding

> **Note:** Grounding and shielding is to be carried out the same as for systems **with** equipotential bonding.

If this is not possible because of system or construction specific reasons however, use distributed ground with a capacitive coupling of high frequency interference signals.

This representation shows distributed grounding with capacitive coupling.
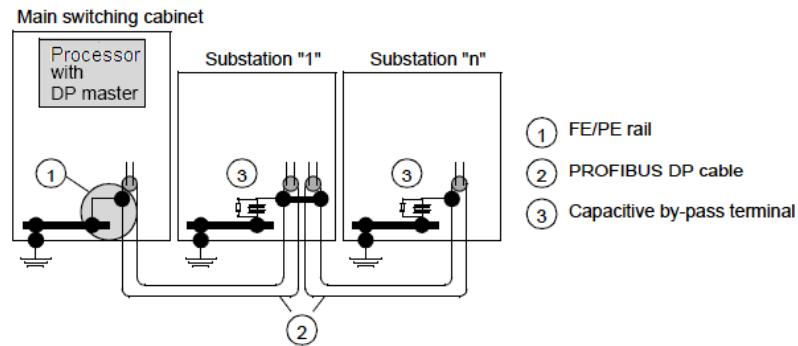
7   Support, Service & Warranty

Contacting Technical Support

ProSoft Technology, Inc. (ProSoft) is committed to providing the most efficient and effective support possible. Before calling, please gather the following information to assist in expediting this process:

1   Product Version Number
2   System architecture
3   Network details

If the issue is hardware related, we will also need information regarding:

1   Module configuration and associated ladder files, if any
2   Module operation and any unusual behavior
3   Configuration/Debug status information
4   LED patterns
5   Details about the serial, Ethernet or fieldbus devices interfaced to the module, if any.

Note: *For technical support calls within the United States, an emergency after-hours answering system allows 24-hour/7-days-a-week pager access to one of our qualified Technical and/or Application Support Engineers. Detailed contact information for all our worldwide locations is available on the following page.*

Internet	Web Site: www.prosoft-technology.com/support
	E-mail address: support@prosoft-technology.com
Asia Pacific	Tel: +603.7724.2080, E-mail: asiapc@prosoft-technology.com
(location in Malaysia)	Languages spoken include: Chinese, English
Asia Pacific	Tel: +86.21.5187.7337 x888, E-mail: asiapc@prosoft-technology.com
(location in China)	Languages spoken include: Chinese, English
Europe	Tel: +33 (0) 5.34.36.87.20,
(location in Toulouse, France)	E-mail: support.EMEA@prosoft-technology.com
	Languages spoken include: French, English
Europe	Tel: +971-4-214-6911,
(location in Dubai, UAE)	E-mail: mea@prosoft-technology.com
	Languages spoken include: English, Hindi
North America	Tel: +1.661.716.5100,
(location in California)	E-mail: support@prosoft-technology.com
	Languages spoken include: English, Spanish
Latin America	Tel: +1-281-2989109,
(Oficina Regional)	E-Mail: latinam@prosoft-technology.com
	Languages spoken include: Spanish, English
Latin America	Tel: +52-222-3-99-6565,
(location in Puebla, Mexico)	E-mail: soporte@prosoft-technology.com
	Languages spoken include: Spanish
Brasil	Tel: +55-11-5083-3776,
(location in Sao Paulo)	E-mail: brasil@prosoft-technology.com
	Languages spoken include: Portuguese, English

7.1   Warranty Information

For complete details regarding ProSoft Technology's TERMS & CONDITIONS
OF SALE, WARRANTY, SUPPORT, SERVICE AND RETURN MATERIAL
AUTHORIZATION INSTRUCTIONS please see the documents on the Product
DVD or go to www.prosoft-technology/warranty

Documentation is subject to change without notice

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