Siemens Energy & Automation, Inc.	Installation and Service Instruction

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APACS+™
PROFIBUS Fieldbus Module (PFM)

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Disclaimer of Liability

We have checked the contents of this manual for agreement with the hardware and software described. Since deviations cannot be precluded entirely, we cannot guarantee full agreement. However, the data in this manual is reviewed regularly and any necessary corrections included in subsequent editions. Suggestions for improvement are welcomed.

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Significant Changes for Revision 5

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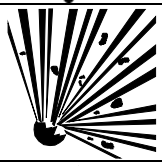
PREFACE

Conventions and Symbols

The following symbols may appear in this manual and may be applied to the equipment. The reader should become familiar with the symbols and their meaning. Symbols are provided to quickly alert the user to safety related situations, issues, and text.

Symbol	Meaning
	Indicates an immediate hazardous situation which, if not avoided, *will* result in death or serious injury.
	Indicates a potentially hazardous situation which, if not avoided, *could* result in death or serious injury.
	Indicates a potentially hazardous situation which, if not avoided, *may* result in minor or moderate injury.
CAUTION	Indicates a potentially hazardous situation which, if not avoided, may result in property damage.
NOTICE	Indicates a potential situation which, if not avoided, may result in an undesirable result or state.
Important	Identifies an action that should be taken to avoid an undesirable result or state.
Note	Identifies additional information that should be read.
	**Electrical shock hazard.** The included Warning text states that the danger of electrical shock is present.
	**Electrical shock hazard.** Indicated that the danger of electrical shock is present.
	**Explosion hazard.** Indicates that the danger of an explosion hazard exists.
	**Electrostatic discharge.** The presence of this symbol indicates that electrostatic discharge can damage the electronic assembly.

Qualified Persons

The described equipment should be installed, configured, operated, and serviced only by qualified persons thoroughly familiar with this publication. The current version, in Portable Document Format (PDF), is available at http://sitescape.sea.siemens.com/.

For the purpose of this publication and product labels, a qualified person is one who is familiar with the installation, construction, and operation of the equipment, and the involved hazards. In addition, he or she has the following qualifications:

- Is trained and authorized to energize, de-energize, clear, ground and tag circuits and equipment in accordance with established safety practices.
- Is trained in the proper care and use of protective equipment such as rubber gloves, hard hat, safety glasses or face shields, flash clothing, etc., in accordance with established safety practices.
- Is trained in rendering first aid.

Scope

This publication does not purport to cover all details or variations in equipment, nor to provide for every possible contingency to be met in connection with installation, operation, or maintenance. Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to one of the support groups listed in the Product Support section of this manual.

The contents of this manual shall not become part of or modify any prior or existing agreement, commitment or relationship. The sales contract contains the entire obligation of Siemens. The warranty contained in the contract between the parties is the sole warranty of Siemens. Any statements continued herein do not create new warranties or modify the existing warranty.

General Warnings and Cautions

This equipment contains hazardous voltages, and it has been certified for use in the hazardous locations specified on the product nameplate and in the Model Designation and Specifications section. Death, serious personal injury, or property damage can result if safety instructions are not followed. Only qualified personnel should work on or around this equipment after becoming thoroughly familiar with all warning, safety notices, and maintenance procedures contained herein. The successful and safe operation of this equipment is dependent upon proper handling, installation, operation, and maintenance.

The perfect and safe operation of the equipment is conditional upon proper transport, proper storage, installation and assembly, as well as, on careful operation and commissioning.

The equipment may be used only for the purposes specified in this publication.

CAUTION

Electrostatic discharge can damage or cause the failure of semiconductor devices such as integrated circuits and transistors. The symbol at right may appear on a circuit board or other electronic assembly to indicate that special handling precautions are needed.

- A properly grounded conductive wrist strap must be worn whenever an electronics module or circuit board is handled or touched. A service kit with a wrist strap and static dissipative mat is available from Siemens (PN15545-110). Equivalent kits are available from both mail order and local electronic supply companies.

- Electronic assemblies must be stored in anti-static protective bags when not installed in equipment.

DANGER

Explosion hazard

Will cause death, serious injury or property damage

- In potentially hazardous atmosphere, remove power from equipment before connecting or disconnecting power, signal, or other circuit, or extracting/inserting module.
- Observe all pertinent regulations regarding installation in hazardous area.
- Ensure all devices are rated for hazardous (classified) locations.

■

1 Introduction

The Siemens APACS+ PROFIBUS Fieldbus Module (PFM) creates an interface between an APACS+ control system and PROFIBUS DP (distributed peripheral) devices. This interface maps PROFIBUS devices to I/O channels in an APACS+ environment, extending the domain of ProcessSuite Integrated Process Automation Software, including the R4 Framework, an advanced HMI (human-machine interface). The PFM makes it possible for control architectures to include proven APACS+ hardware and software as well as third-party PROFIBUS field devices.

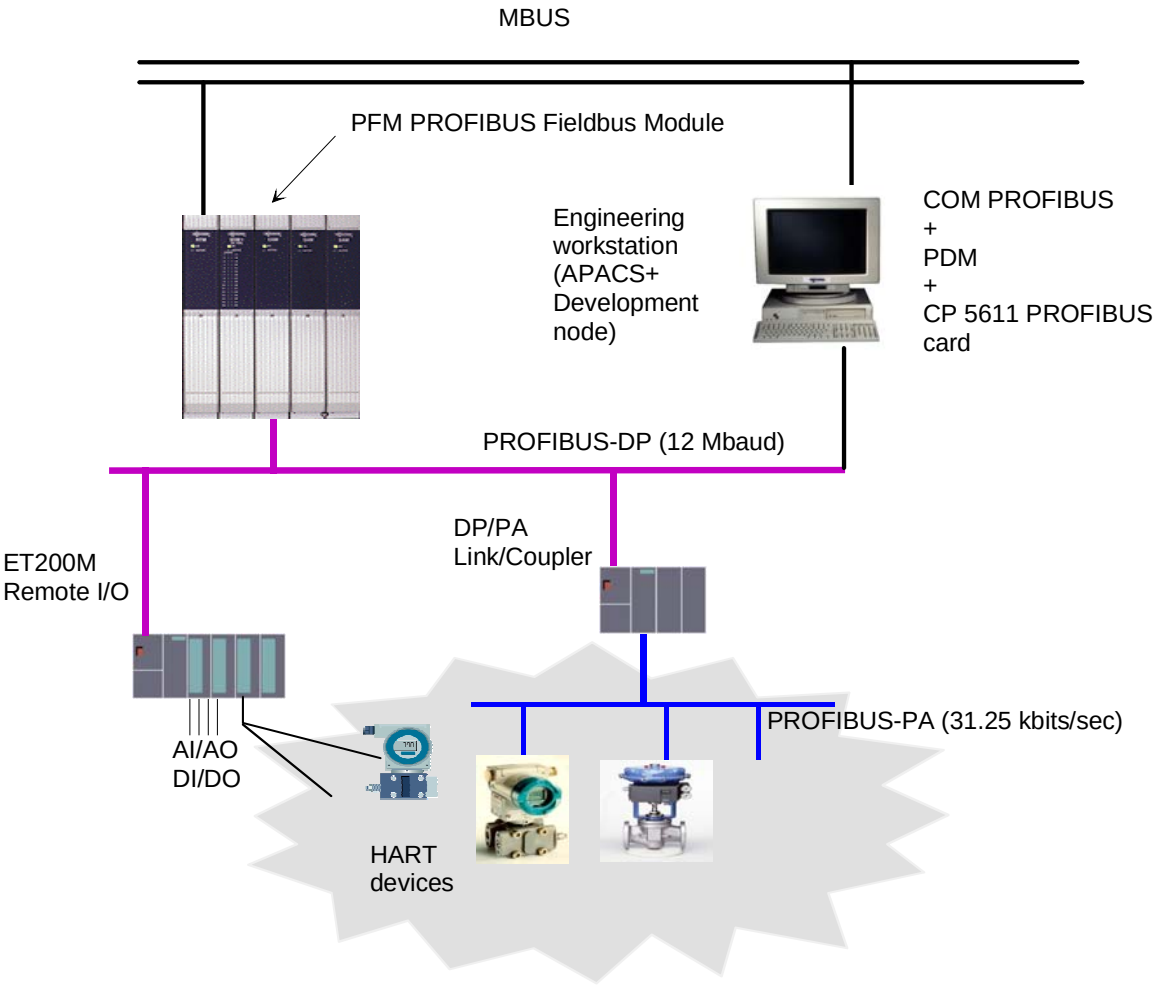


Figure 1–1 APACS+ PROFIBUS Fieldbus Module (PFM) in a Typical Architecture

1.1 Organization

Section 1–Introduction to the PFM, Siemens product support, and conventions used in this manual.

Section 2–Installation of the PFM hardware and software.

Section 3–Configuration of the PFM and related PROFIBUS components. In this sense configuration consists largely of using software tools to configure the PROFIBUS bus and set devices addresses and other parameters.

Section 4–Maintenance.

Section 5–Circuit Description.

Section 6–Spare Parts and Accessories.

Section 7–Specifications.

Warranty.

1.2 Product Support

Our Technical Support Centers (TSC) offer a variety of technical support services that are designed to assist you with Siemens products and systems. Our support engineers have experience with troubleshooting, development, system startup, and system test. They will help you to solve your issues in an efficient and professional manner.

Customers in North America can contact Siemens Technical Support Center at 1-800-333-7421, on the web at: http://support.automation.siemens.com, or by e-mail: techsupport.sea@siemens.com

Customers outside North America can contact their local Siemens subsidiary; addresses and telephone numbers are listed on the Internet at the web site: http://support.automation.siemens.com.

When contacting Siemens, customers will be asked to provide site-contact information (name, address, and phone number), the product involved and detailed information regarding the nature of the issue.

Product documentation is now located in the Library forum of the Process Automation User Connection at: http://sitescape.sea.siemens.com/. The Process Automation User Connection is a secure site. Registration is open to all verified users of Siemens process automation systems. If you are not already, and would like to become a member, please visit our Process Automation User Connection web page at: http://www.sea.siemens.com/process/support/papauc.html

Contained within the Process Automation User Connection is the APACS+/QUADLOG Secure Site at: http://sitescape.sea.siemens.com/forum/aca-1/dispatch.cgi/f.apacsquadlo forum. This site is only open to customers with an active service agreement. It contains all service manuals, service memos, service notes, configuration manuals, etc. for the APACS+ and QUADLOG family of products. If you are experiencing technical difficulties with the site, please contact SiteScape technical support at: toll free 1-877-234-1122 (US) or 1-513-336-1474.

A&D Technical Support

Worldwide, available 24 hours a day:

United States: Johnson City, TN	**Worldwide:** Nürnberg	**Asia / Australia**: Beijing
Technical Support and Authorization Local time: Monday to Friday 8:00 AM to 5:00 PM Telephone:+1 (423) 262 2522 or +1 (800) 333-7421 (USA only) Fax:+1 (423) 262 2289 Mail to: techsupport.sea@siemens.com GMT: -5:00	**Technical Support** 24 hours a day, 365 days a year Phone:+49 (180) 5050-222 Fax:+49 (180) 5050-223 E-Mail: ad.support@siemens.com GMT:+1:00 **Authorization** Local time: Monday to Friday 8:00 AM to 5:00 PM Phone: +49 (180) 5050-222 Fax: +49 (180) 5050-223 Mail to: ad.support@siemens.com GMT: +1:00	**Technical Support and Authorization** Local time: Monday to Friday 8:00 AM to 5:00 PM Phone:+86 10 64 75 75 75 Fax:+86 10 64 74 74 74 Mail to:ad.support.asia@siemens.com GMT:+8:00
Automation and Drives Service and Support International http://www.siemens.com/automation/service&support		
The languages of the SIMATIC Hotlines and the authorization hotline are generally German and English.		

1.3 For More Information

- APACS+™ I/O Module Configuration for Version 4.40 or Higher (CG39-24, Rev 3. or higher).
- *4-mation* Software Messages and Error Codes (document number CG39-21)

- Module Diagnostic Error Codes (document number CG39-19)

- On-line documentation provided with the COM PROFIBUS and the Simatic PDM programs provide extensive discussion of the operation of these programs.

- The authoritative source of information on the procedure for installing a license for Simatic PDM is the text file titled “Readme.txt” on the authorization diskette. Read this file before attempting to install a license.

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2 Installation

This section focuses on the installation of the following elements of an APACS+™ PROFIBUS system:

- An APACS+ Fieldbus Module (PFM) and its associated transition board
- A Siemens PROFIBUS PCI interface card (CP 5611) installed in a PC or a Siemens PCMIA interface card (CP 5511) installed in a PC laptop
- Cabling between these components and other elements of the PROFIBUS system.

These installation instructions assume that the following components are already installed and in place:

- An APACS+ controller, backplane, mounting rack, power supply, and enclosure
- A PC workstation with an M-Bus adaptor for development, storage, and downloading custom applications to an APACS+ controller

The APACS+ system and module rack must be available before the PFM and its transition board are installed. Other network components must be available before cabling and software configuration.

Installation of the APACS+ PFM network includes several major steps. The order of installation is flexible, with hardware installation preceding cabling:

- Installation and cabling of the PFM transition board, then the PFM module
- Installation and cabling of the Siemens PROFIBUS PC card or laptop PCMCIA interface, including a one-time installation of a Windows control panel applet that sets up the interface.
- Installation and cabling of an optional PROFIBUS DP-to-PA link or link/coupler
- Installation and cabling of PROFIBUS field devices

After the APACS+ PFM network hardware is installed, a set of software configuration tools and programs prepare the network for data acquisition and control.

Review and complete the preparatory steps in subsection 2.1 before proceeding with the installation.

IMPORTANT

The PFM installation should be in accordance with the National Electrical Code (NEC), other applicable construction, and electrical codes.

The PFM is only to be used for the purposes described by Siemens.

2.1 PFM Identification, Delivery, and Handling

2.1.1 PFM Module Identification

The PFM module is identified by the letters “PFM” on its bezel and by two nameplate labels. One nameplate label is large, similar to the one shown in Figure 2–1, located on the left side of the module. A smaller label is located inside the bezel compartment. Both labels contain the model designation, part number/issue level, software version number, and serial number (S/N). The larger label also lists the power requirements, and space is provided for information such as safety agency certifications and special precautions. The following is typical:

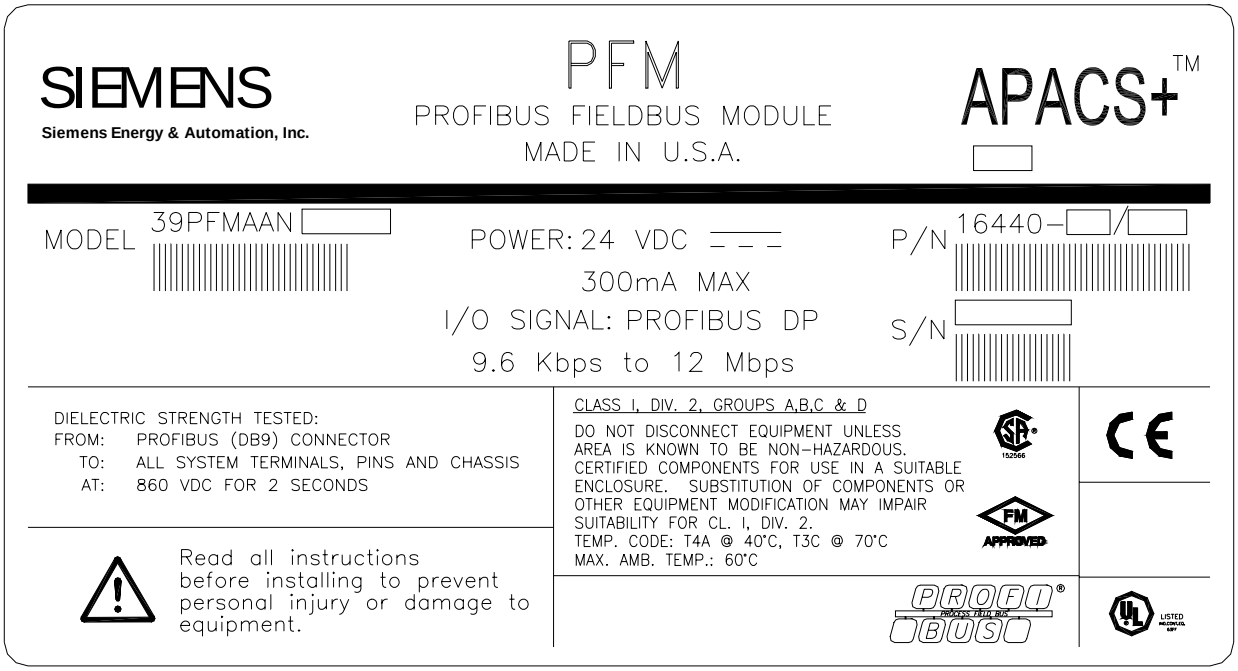


Figure 2–1 Typical PFM Module Identification Label

2.1.2 Transition Board Identification

The PFM is installed with its companion transition board assembly. The assembly has the following information printed on its surface:

SIEMENS
APACS+™
PFM
PROFIBUS FIELDBUS
MODULE
TRANSITION BOARD
P/N 16439-

2.1.3 Environmental Considerations

Many industrial environments create severe operating conditions. The conditions where the PFM is located must be within the specifications stated in section 6.2.

To ensure reliable data communications, it is prudent to locate PFM hardware away from sources of interference, such as high-current electrical equipment that emits strong electromagnetic fields and switching transients.

High-power EMI-producing equipment should not be connected to any power lines dedicated to PFM signal channels.

2.1.4 Equipment Delivery, Return, and Handling

The following subsections provide information of interest to shipping, receiving, and warehouse personnel.

2.1.4.1 Predelivery Test

Each PFM is fully tested and inspected to ensure proper operation. If the module is ordered factory-installed in a MODULPAC enclosure or other cabinet, the module is tested as part of the system and inspected to ensure proper operation.

2.1.4.2 Factory Shipment

Each PFM is enclosed in a static shielding bag and packaged for shipment. Accessories are packaged separately. If a PFM is ordered factory-installed in a rack housed in a MODULPAC enclosure or other cabinet, the enclosure is bolted to a pallet and wrapped for protection during shipment.

2.1.5 Return of Equipment within North America

US Customers:

- Call the Repair Order PAS Inside Sales/Order Management Group at (215) 646-7400, ext 4RMA (4762) weekdays between 8:00 a.m. and 4:45 p.m. eastern time to obtain an RMA number. Mark the RMA number prominently on the outside of the shipment.

- When calling for an RMA number, provide the reason for the return. If returning equipment for repair, a detailed description of failure symptoms and system behavior will be requested. Supply a purchase order number for repairs. Follow the TSC specialist's recommendation for battery connection, if applicable.

- If applicable, you must supply a Material Safety Data Sheet (MSDS) with each item being returned if it was stored or used in a location where hazardous materials were present.

- Package items to be returned in their original shipping containers. Otherwise, package it for safe shipment or contact the factory for shipping recommendations. A module must be placed inside a static shielding bag to protect it from electrostatic discharge.

Canadian customers:

Contact Siemens Canada.

2.1.6 Return of Equipment outside North America

Contact your Siemens Representative.

2.1.6.1 Equipment Handling and Storage

The PFM is completely enclosed and can be safely handled without undertaking special ESD (electrostatic discharge) handling procedures provided the bezel compartment door is closed and secured. DO NOT touch the connector pins on the back of the module. Handle the module carefully and do not subject it to excessive shock or vibration.

The storage temperature and humidity parameters listed in section 6 must be met for storage of a PFM.

2.2 PFM Installation

The PFM module plugs into the backplane of the APACS+ system and into a connector on the transition board assembly. Before installing the PFM into a module track, secure the PFM transition board to the local termination panel.

2.2.1 Transition Board Installation

Tool required: slot head screwdriver.

See Figure 2–2, which shows how the transition board is installed. The transition board assembly consists of a PFM transition board, a mounting support, and a set of captive screws.

1. Identify the slot the APACS+ module rack where the PFM module will be located.

2. Locate the groove in the extruded spacer beneath the APACS+ module rack backplane.

3. Slide the top edge of the transition board assembly into the groove on the extended spacer, as shown in Figure 2–2.

4. Rotate the transition board assembly toward the local termination panel, until the alignment pin on the panel protrudes through the transition board.

5. Secure the assembly to the local termination panel using the captive screws provide with the assembly.

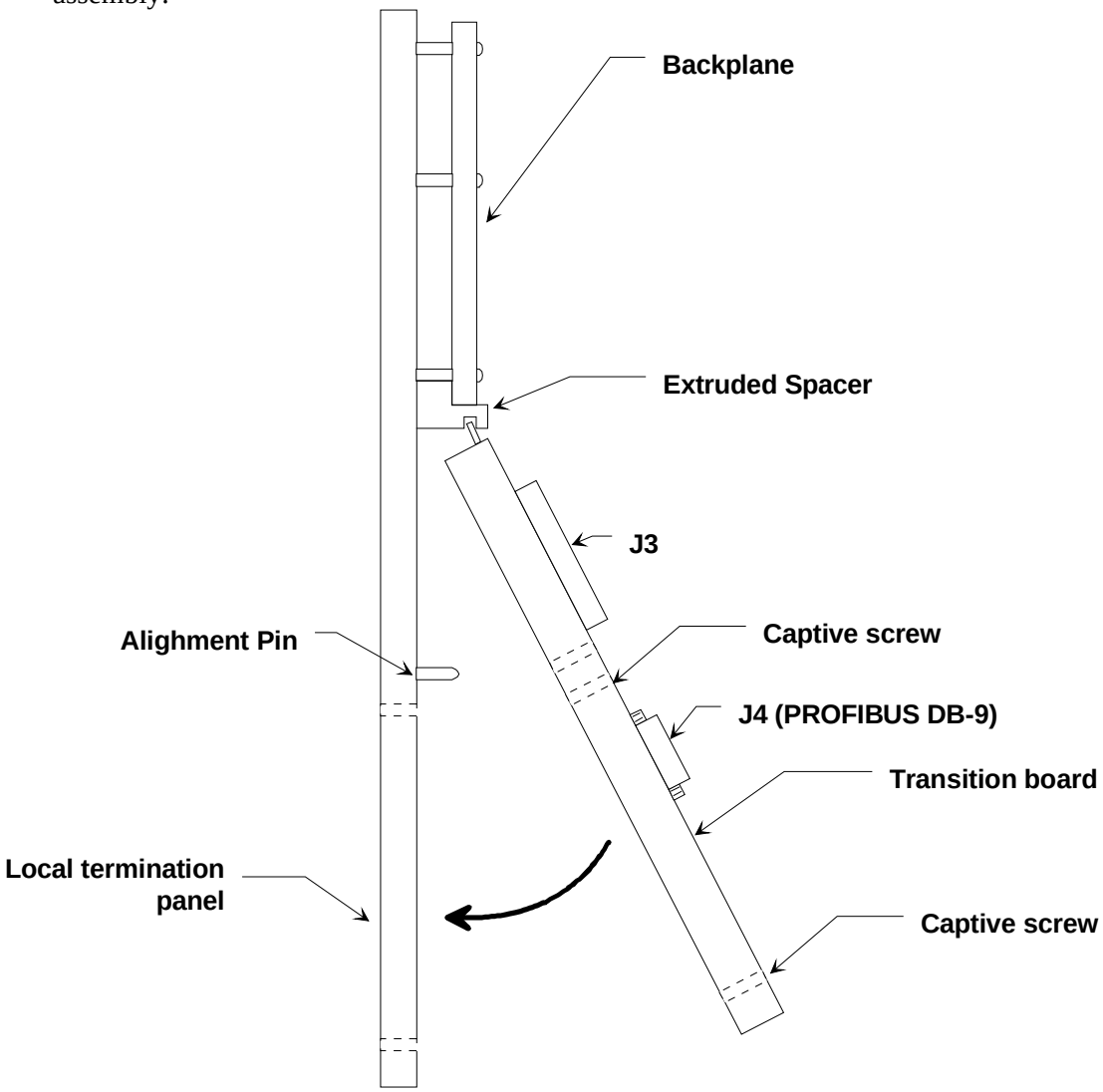


Figure 2–2 Transition Board Installation

2.2.2 Keying the PFM Module and Rack

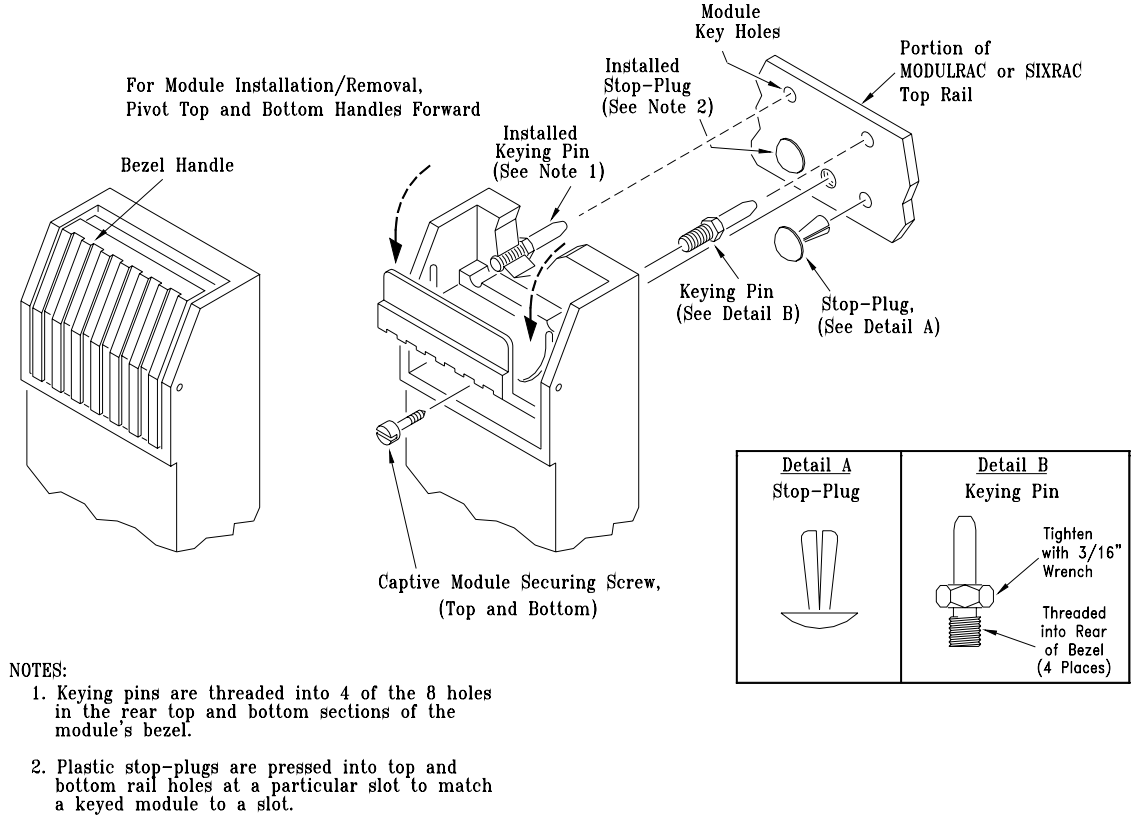
APACS+ Modules are shipped individually packaged in protective, sealed, static shielding bags. Refer to subsection 2.1.5 for module handling considerations.

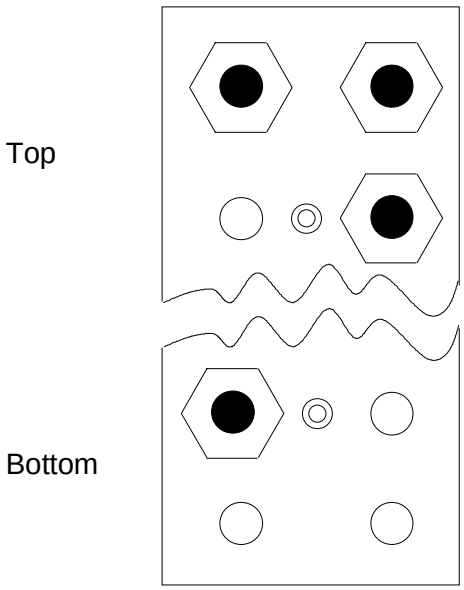
Each APACS+ slot and each module can be keyed to prevent accidental installation of a module into an incompatible slot, which may impair system performance. **Module and rack keying is highly recommended**; see Figure 2–3.

Modules are keyed at the factory. The keying pattern is unique to each module type (e.g. PFM, ACM, CAM, CDI, CDO-DC).

A factory-assembled rack is keyed at the factory. If you are assembling the rack on site, you must key each slot according to the module type assigned to it. The slot keying pattern complements the module's keying pattern. Stop plugs are supplied with the rack.

Before adding a module to a rack, be sure to key its slot.





Module bezel
Keying pin locations
(rear view)

Figure 2–3 Module Rack Mechanical Keying

1. Locate the rack Keying Kit supplied with the rack.

2. Refer to Figure 2–3 and note the rack-keying pattern applicable to the PFM. Also, locate the rack's top and bottom rails.

3. Press the stop plugs into the appropriate key holes of the top and bottom rails as identified by the solid dot keying patterns in the figure.

2.2.3 Module Installation

1. Where applicable, refer to your system documentation and note the assigned rack and slot numbers for the module to be installed.

2. Remove the PFM module from its static-shielding bag and ensure that the module's bezel is keyed. Also, check the rack slot assigned to the module to be sure it is keyed. If required, refer to subsection 2.2.2 for rack keying information.

3. Insert the module in its assigned slot in the rack. Use uniform pressure to firmly seat the rear of the module in the rack's backplane and transition board connectors. If the module does not seat properly, check its keying pattern. A properly seated module has the rear of its bezel flush against the rack's front rails. A keyed module that is not matched to a slot does not engage the backplane or transition board connectors or seat flush against the rack's front rails.

4. As shown in Figure 2–3, pivot open the bezel's pivoting top and bottom handles to expose the slotted captive mounting screws then secure the module to the top and bottom rails. Close the bezel's handles when finished.

CAUTION

Do not use the captive mounting screws in the bezel to seat the module. Damage to the bezel can result. Properly seat the module **before** tightening the captive screws.

2.3 Field Wiring

This section describes making PFM field wiring connections to a PROFIBUS remote device from the PFM. This section assumes that tagged field I/O wires have been pulled into the enclosure and are ready for preparation and connection.

2.4 PROFIBUS DP Interface Installation and Cabling

DANGER

Explosion hazard

Will cause death, serious injury or property damage

- In potentially hazardous atmosphere, remove power from equipment before connecting or disconnecting power, signal, or other circuit, or extracting/inserting module.
- Observe all pertinent regulations regarding installation in hazardous area.
- Ensure all devices are rated for hazardous (classified) locations.

2.4.1 DP Wire Standards

PROFIBUS-DP Type-A cable is recommended, and has the following parameters:

Table 2–1 DP Wire Standards

Table Column Title	Table Column Title
Impedance:	135 to 165 Ohms
Capacitance:	< 30 pf/m
Loop resistance:	110 Ohms/km
Wire gauge:	0.64mm
Conductor area:	> 0.34mm²
Shield:	Braid and foil with >80% shield density

2.4.2 DP Wiring Guidelines

PROFIBUS-DP uses RS 485 communications protocol, (often referred to as H2).

- The RS 485 transmission technology is easy to handle, and installation of the twisted pair cable does not require expert knowledge. All devices are connected in a bus structure (multi-drop configuration) with up to 32 stations (master or slaves) connected per segment.

- A DP network can contain a maximum of 126 devices. When more than 32 stations are used, repeaters (line amplifiers) must be used to connect the individual bus segments.

- This bus (multi-drop) structure permits addition and removal of stations, as well as step-by-step commissioning of the system without influencing the other stations. Later expansions have no effect on stations already in operation.

- An active bus terminator at the beginning and end of each segment terminates the bus. To ensure error-free operation, the bus terminations must be enabled at each end of the segment. Siemens and other vendors have switchable bus terminators designed into their devices or plug connectors. Various well-known manufacturers offer PROFIBUS cable and plug connectors (See the PROFIBUS product guide for company names and addresses).

- When connecting the stations, make sure that the 2 wires are connected with correct polarity. The red wire is for signal B (pin3 - TXD/RXD-positive), and the green wire is for signal A (pin 8 - TXD/RXD-negative).

- The shield braiding and, if present, the shield foil should be connected to protective ground at both ends of the cable with good conductivity via shield clamps covering as large an area as possible. If a potential difference occurs between the grounding points, an equalization current can flow through a shield connected at both ends. In this case, install an additional potential equalization line.

- It is recommended that the data lines be kept separate from all high-voltage cables.

2.4.3 Considerations for Baud Rates >1.5Mbaud

- Baud rates greater than 1.5 MBaud require the use of special connectors. These connectors (and some devices) have built in Inductors, which are necessary in order to run with higher baud rates (as stated in the PROFIBUS guidelines).

- Spurs or stub lines should be avoided for data transmission speeds of more than 500 kbaud, and are not allowed when using baud rates greater than 1.5 Mbaud**.** Plug connectors are available that permit the incoming data cable and the outgoing data cable to be connected directly into the plug connector. This type of connector eliminates stub lines, and also allows stations to be connected and disconnected without interrupting data communication with the other stations.

- 12 MBaud installations require a minimum cable length between two stations of 1m/ 3feet.

A detailed installation guideline is also available from the PROFIBUS Trade Organization (PTO): PTO order number 2.112

2.4.4 DP Segment, Speed, Distance Constraints

- Transmission speeds (frequencies) between 9.6 kbaud and 12 Mbaud can be selected. One unique transmission speed is selected for all devices on the bus at the time of system commissioning based on the devices connected, and the length of the PROFIBUS DP network. The following table shows the maximum bus length corresponding o each selectable baud rate:

Table 2–2 DP Segment, Speed, and Distance Constraints

Baudrate (Kbaud)	Max. Segment length	Max. Expansion (using repeaters)
9.6	1000m / 3278feet	10,000m / 32786feet
19.2	1000m / 3278feet	10,000m / 32786feet
93.75	1000m / 3278feet	10,000m / 32786feet
187.5	1000m / 3278feet	10,000m / 32786feet
500.0	400m / 1311feet	4,000m / 13114feet
1,500.0	200m / 655feet	2,000m / 6557feet
3,000.0	100m / 327feet	1,000m / 3270feet
6,000.0	100m / 327feet	1,000m / 3270feet
12,000.0	100m / 327feet	1,000m / 3270feet

2.4.5 Segments and Repeaters

A segment in PROFIBUS is a section of the bus that is not separated by any repeaters

The specified cable length can be increased by the use of repeaters (with a maximum of 9 repeaters in series). It should be noted that the Use of more than 3 repeaters in series is not recommended.

Segments are needed for

- Extending the length of the bus
- Installing more than 32 devices

Segments can be used for

- Building branch segments
- Connecting up to 126 stations

Segment rules

- A Segment can have a maximum of 32 devices (including repeaters).
- The first and the last segment can have 31 stations.
- Segments between the first and last can have a maximum of 30 stations.

2.5 PROFIBUS PA Installation and Cabling

PROFIBUS-PA uses the extended PROFIBUS-DP protocol for data transmission. In addition, the PA profile, which defines behavior of the field devices, is used. Transmission technology, in accordance with IEC 1158-2, permits intrinsic safety and also allows the field devices to be powered over the bus. PROFIBUS-PA devices can be easily integrated in PROFIBUS-DP networks using a segment coupler.

2.5.1 IEC 1158-2 Transmission for PA

Transmission technology in accordance with IEC 1158-2 meets the requirements of the chemicals and petrochemicals industries. It permits intrinsic safety and allows the field devices to be powered over the bus. This technology is a bit-synchronous protocol with continuous current-free transmission. It is often referred to as H1. IEC 1158-2 technology is used by PROFIBUS-PA. Transmission is based on the following principles:

- Each segment has only one source of power, the power supply unit.
- No power is fed to the bus when a station is sending.
- Every field device consumes a constant basic current at steady-state.
- The field devices act as passive current sinks.
- The passive line termination is performed at both ends of the main bus line.
- Linear, tree and star networks are allowed.
- To increase reliability, redundant bus segments can be designed.

For modulation it is assumed that a basic current of at least 10 mA is required by each bus station to supply the device. Communication signals are generated by the sending device by modulation from +/- 9 mA to the basic current.

2.5.2 Installation Hints for IEC-1158 Transmission

Usually located in a control room are the process control system, operator control and monitoring devices, and the segment coupler implementing the linking of bus segments with IEC 1158-2 technology (PA) to segments with RS 485 transmission (DP). Segment couplers adapt the RS 485 signals to the IEC 1158-2 signals. They provide the current for the remote powering of the field devices. The power supply unit limits current and voltage on the IEC 1158-2 segment.

Table 2–3 Characteristic Features of IEC 1158-2 Transmission Technology

Characteristic	Implementation
Data transmission	Digital, bit-synchronous, Manchester coding
Transmission speed	31.25 kbit/sec, Voltage Mode
Data security	Preamble, error-proof start and end delimiter
Cable	Two wire twisted pair cable (shielded/unshielded)
Remote powering	Optional, via data lines
Explosion Protection type	Intrinsically safe and non-intrinsically safe operation possible
Topology	Line and tree topologies, or a combination
Number of stations	Up to 32 stations per line segment, maximum total of 126
Repeater	Can be expanded with up to 4 repeaters

For network topologies PROFIBUS-PA offers both tree and line structures, or a combination of the two. The line structure permits connection points along the fieldbus cable similar to the installation of power supply circuits. The fieldbus cable can be looped through the field devices. Branches for connection of one or more field devices are also possible. The tree structure can be compared to the classic field installation technique.

Table 2–4 Specification of the Reference Cable or IEC 1158-2 Transmission

Characteristic	Implementation
Cable design	shielded twisted pair cable
Conductor area (nominal)	0.8 mm² (AWG 18)
Loop resistance (direct current)	44 Ohms/km
Impedance at 31.25 kHz	100 Ohms ±20%
Attenuation at 39 kHz	3 dB/km
Capacitive asymmetry	2 nF/km

A combination of tree and line structures permits optimization of the bus length and adjustment to existing system requirements. Maximum permissible stub line lengths must be considered. A two-wire cable (shielded or unshielded) is used as the transmission medium. It is recommend that you use the reference cable specified in the Table 2–4. Other cables with larger conductor areas are also possible. For details refer to the installation guidelines for PROFIBUS-PA from the PROFIBUS Trade Organization (PTO). The order number is 2.092.

Both ends of the main bus cable are equipped with a passive line terminator which consists of an RC element switched in series with R=100 Ohms and C=1 µF. When a bus station is connected with its poles reversed, this has no effect on the functionality of the bus. It is recommend that devices be equipped with automatic polarity recognition. The devices then operate correctly no matter what the assignment of input terminals to the data signals is.

The number of stations which can be connected in one segment is limited to 32. This number is further restricted by the type of explosion protection class selected and any powering over the bus. When intrinsically safe networks are operated, both the maximum supply voltage and the maximum supply current are specified within clearly defined limits. Even when intrinsically safety is not required, the power of the remote power supply unit is limited.

2.5.3 External Power Supply

Connection of bus-powered devices and externally-powered devices on an intrinsically safe bus is permitted if the externally-powered devices are equipped with appropriate isolation in accordance with EN 50 020.

2.5.4 Fiber Optic Transmission

Fiber optic conductors can be used for PROFIBUS for applications in environments with very high electromagnetic interference and to increase the maximum distance for high transmission speeds. Two types of conductors are available: inexpensive plastic fiber conductors for distances greater than 50 m or glass fiber conductors for distances greater than km.

Siemens and other vendors offer special bus plug connectors with integrated conversion of RS 485 signals to fiber optic conductors and vice versa. This provides a very simple method of switching between RS 485 transmission and fiber optic transmission within one system. See PROFIBUS guideline 2.022 for the specification of the PROFIBUS-FO transmission technique. An overview of the fiber optic components which are available can be found in the PROFIBUS product guide.

2.6 Engineering Workstation with Modulbus Interface

This procedures in this manual assume the availability of an engineering workstation with a Modulbus Interface and the current versions of the following software:

- ProcessSuite
- *4-mation*

2.7 GSD Files

Manufacturers of PROFIBUS devices supply devices characteristics in structured ASCII text files generically known as "GSD" files. These files generally have *.gsd* filename extensions, hence the name, although they may also have *.gse* extensions, where *e* indicates *English.* Device characteristics listed in GSD files include vendor identification, supported baud rates, timing specifications, features, and I/O signals. GSD files are freely available from manufacturers and are usually supplied on diskette or CD and shipped with the devices they encompass. GSD files may also be downloaded from manufacturer's web sites. A device-specific GSD file is required for every device installed on a PROFIBUS.

Configuration software runs on the PC or laptop with the CP 5611 interface card installed. The software expects to find GSD files in the following directory of that PC or laptop:

`X:\SIEMENS\CPBV50\GSD,` where `X` represents a drive designation.

Before attempting to install a PROFIBUS device, ensure that its GSD file exists in the correct directory.

2.8 Preparing the PROFIBUS DP Configuration Workstation

Siemens provides interfaces that connect a PC or laptop to a PROFIBUS DP bus. The PC interface is a CP 5611 PCI card. The laptop interface is a CP 5511 PCMCIA card. After these interfaces are installed and set up properly, they are functional equivalents. The installation and setup procedures differ slightly.

- Subsection 2.8.1 pertains to laptops.
- Subsection 2.8.2 pertains to PCs.

2.8.1 Installing COM PROFIBUS and the CP 5511 Interface in a Laptop

Install COM PROFIBUS on a laptop before installing the CP 5511 PROFIBUS interface

Prerequisites:

- CD: COM PROFBUS V5.1 (PS02-2324V3.02)
- CP5511 PCMCIA CARD F/PROFIBUS (6GK15511AA00)
- Manufacturer's instructions for installing PCMCIA card into a laptop
- Compatible operating system software (see the documentation accompanying COM PROFIBUS, Simatic PDM, and the CP 5511 interface).

The COM PROFIBUS installation program provides on-screen messages and dialog boxes to guide you in making installation selection appropriate for your system. The program asks you to do the following:

- Read and agree to license provisions.
- Select a language for installation instructions and a language for on-line help.
- Select a destination directory for installed files (you can change the recommended drive and directory if you wish).

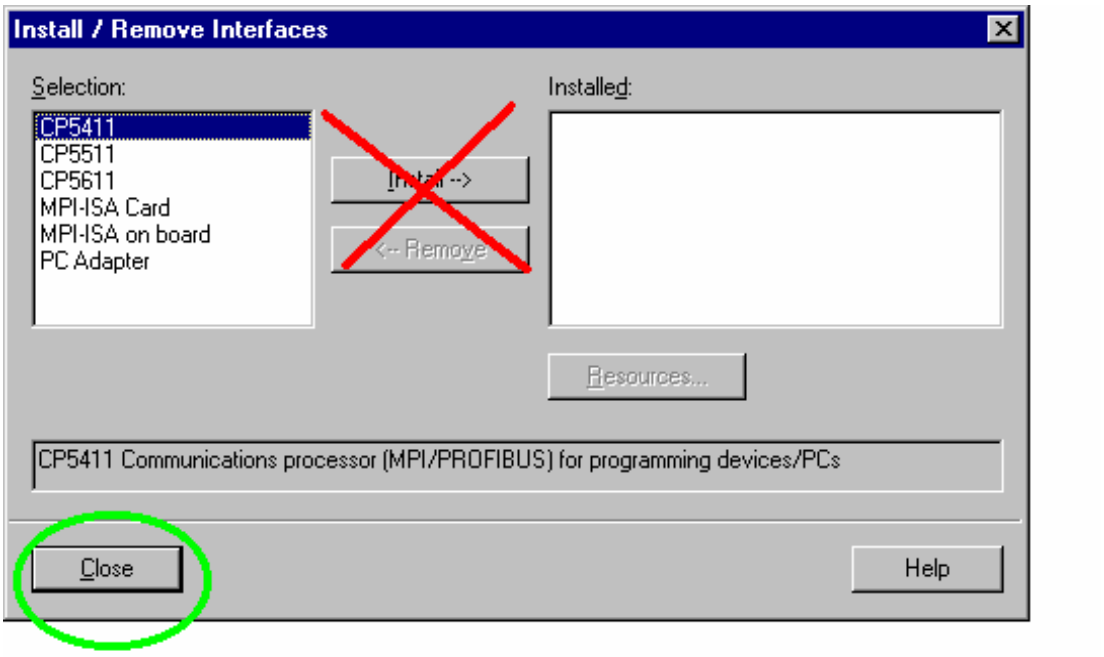
- Select Memory Card Parameter Assignment (select No EPROM Driver).
- Install Adobe Acrobat Reader 3.0 on your system (read note below before installing).

NOTE

Do not install Adobe Acrobat Reader 3.0 on a system used to display documents provided on the *APACS+*™ Electronic Manuals CD. Some documents on this CD require Acrobat Reader 4.05 or higher, which is included on the APACS+™ Electronic Manuals CD.

Acrobat Reader 4.05 and 5.0 are also available as free downloads from www.adobe.com. Acrobat Reader version 4.05 and 5.0 are compatible with PDF files that open with earlier versions.

1. Install the PROFIBUS interface and connect the card with a properly terminated cable to at least one DP device.
2. Insert the COM PROFIBUS V5.1 CD into the CD-ROM reader. The CD typically runs automatically when inserted into a CD-ROM drive (if the installation program does not start automatically, use the Windows Explorer program to locate the Autorun.exe program in the root directory. Double-click the program name or icon to start the installations procedure.
3. Follow the instruction displayed on the screen, until the program reaches the Install / Remove Interfaces window (shown below). At that point select the Close button without clicking Install.



4. Exit the program and shutdown Windows. Turn the laptop off and leave it off for a few moments.

5. Restart Windows.

6. Following instructions provided by the laptop manufacturer, insert the 5511 interface into the PCMCIA slot. Operating-system software recognizes and installs drivers for the card. Follow any instructions that require you to restart the laptop.

7. Follow the procedure in subsection 2.8.6.2

8. Follow the procedure in subsection 2.8.3.

9. Follow the procedure in subsection 2.8.6.1

10. Follow the procedure in subsection 2.8.4.

2.8.2 Installing the CP 5611 Interface Card and COM PROFIBUS in a PC

Prerequisites:

- CD: COM PROFIBUS v 5.1 (PS02-2324V3.02)
- CP5611 PCI CARD F/PROFIBUS (6GK15611AA00). The user may elect to install this CP 5611 PROFIBUS card into an APACS+ Development Node or choose to have a separate PC for PROFIBUS configuration tools.
- Manufacturer's instructions for installing a PCI card
- Compatible operating system software (See the documentation accompanying COM PROFIBUS, Simatic PDM, and the CP 5611 interface, all of which were compatible with Windows NT when the PFM was under development. The list of compatible operating system software is likely to expand as these products are revised and upgraded.)

Follow the instructions provided by the PC manufacturer to open the PC chassis and install a PCI card (the 5611 is a PCI card) in an empty PCI slot. Follow safe installation practices: turn the system off before removing the chassis, use a static-dissipating wrist strap, and avoid touching component leads or card-edge connectors. Return the chassis cover and secure with fasteners provided before turning the PC back on.

CD required: COM PROFBUS v 5.1 (PS02-2324V3.02)

The COM PROFIBUS installation program provides on-screen messages and dialog boxes to guide you in making installation selection appropriate for your system. The program asks you to do the following:

- Read and agree to licensing provisions.

- Select a language for installation instructions and a language for on-line help.

- Select a destination directory for installed files (you can change the recommended drive and directory if you wish).

- Select Memory Card Parameter Assignment (select No EPROM Driver).

- Install Adobe Acrobat Reader 3.0 on your system (read note below before installing).

NOTE

Do not install Adobe Acrobat Reader 3.0 on a system used to display documents provided on the *APACS+*™ Electronic Manuals CD. Some documents on this CD require Acrobat Reader 4.05 or higher, which is included on the APACS+™ Electronic Manuals CD.

Acrobat Reader 4.05 and 5.0 are also available as free downloads from www.adobe.com. Acrobat Reader version 4.05 and 5.0 are compatible with PDF files that open with earlier versions.

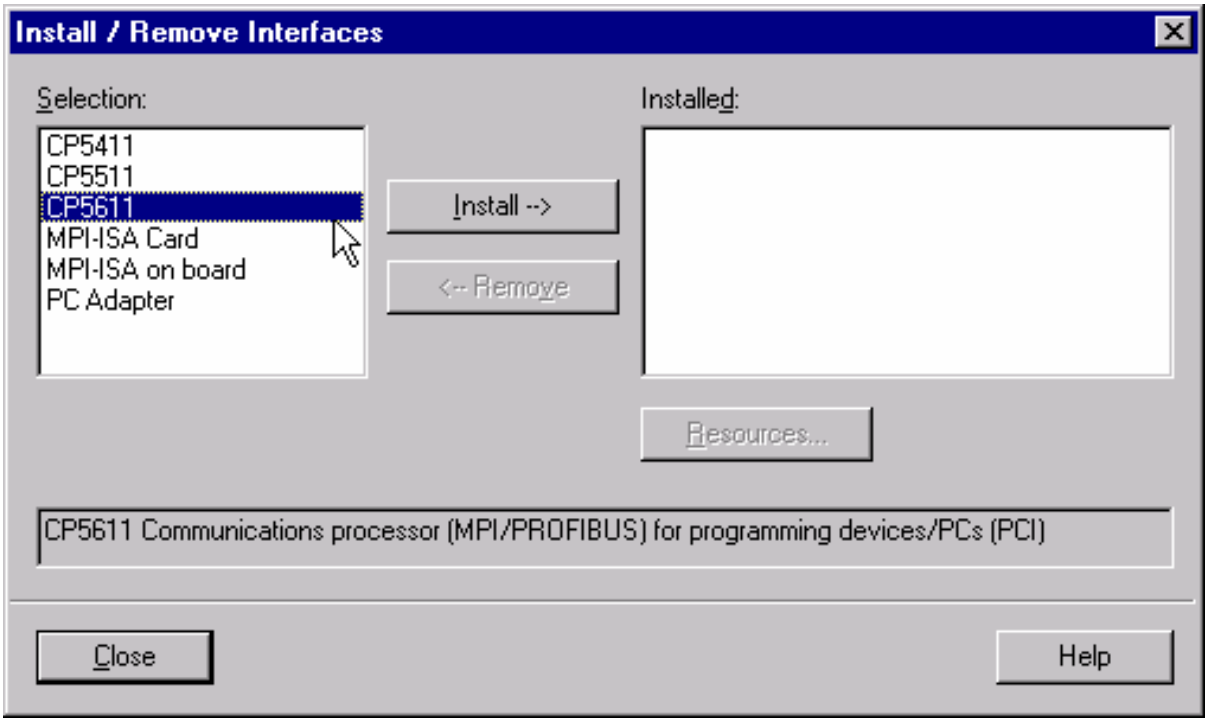
- Establish interfaces for the Set PG/PC Interface control panel applet.

1. Install the PROFIBUS interface and connect the card with a properly terminated cable to at least one DP device.

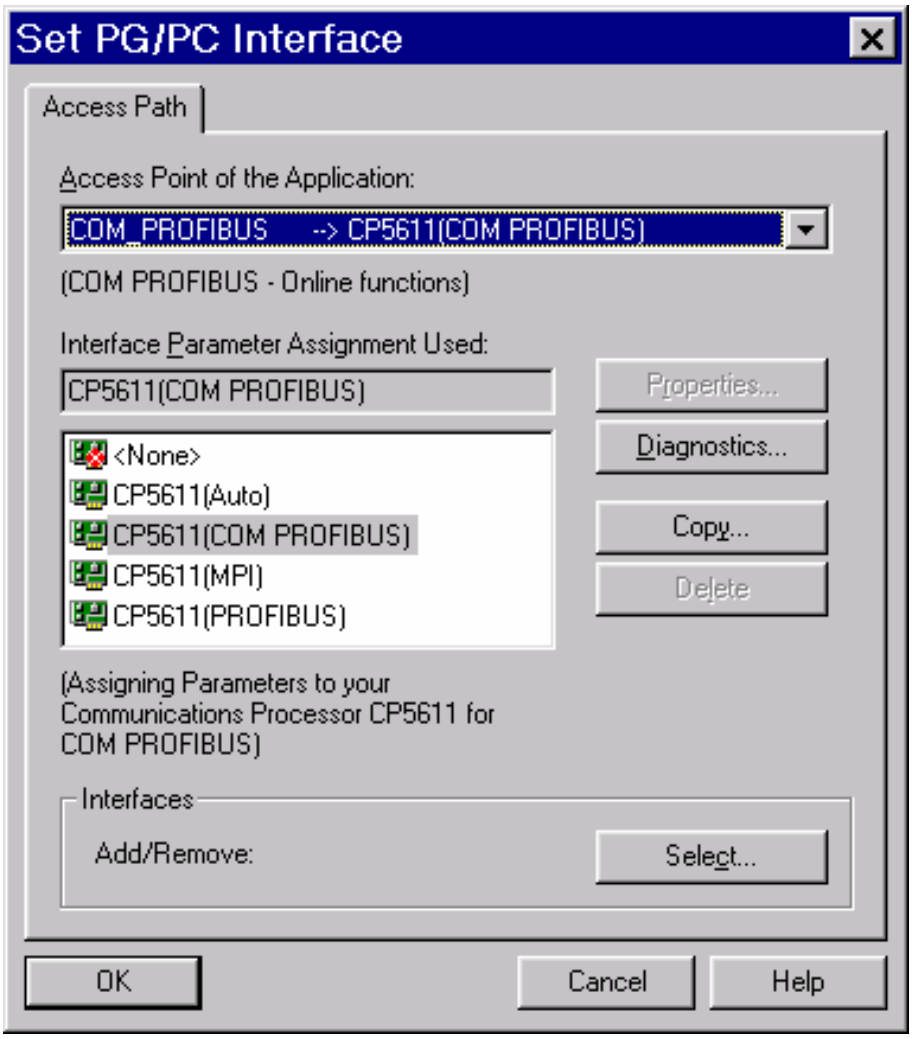
2. Insert the COM PROFIBUS V5.1 CD into the CD-ROM reader. The CD typically runs automatically when inserted into a CD-ROM drive (if the installation program does not start automatically, use the Windows Explorer program to locate the Autorun.exe program in the root directory. Double-click the program name or icon to start the installations procedure.

3. Follow the instruction appear on the screen.

4. When the Install / Remove Interfaces window appears, select CP5611 from the list (which may vary from the one shown below) and click the Install button. Then click the Close button:


Install / Remove Interfaces
Selection:
CP5411
CP5511
CP5611
MPI-ISA Card
MPI-ISA on board
PC Adapter
Install -->
<-- Remove
Installed:
Resources...
CP5611 Communications processor (MPI/PROFIBUS) for programming devices/PCs (PCI)
Close
Help

5. When the Set PC/PG Interface window appears, Select (highlight) "CP5611(COM PROFIBUS)" to ensure that the Access Point of the Application is `COM_PROFIBUS --> CP5611(COM PROFIBUS)`. You may have to select `COM_PROFIBUS --> CP5611(COM PROFIBUS)` from the drop down menu associated with the Access Point of the Application.



NOTE

The proper Access Point of the Application differs in COM PROFIBUS and SIMATIC PDM (and Lifelist.exe). After the access points are set up properly (subsection 2.8.5), the applications themselves select the necessary access point.

6. Follow instructions to finish installation, selecting not to launch COM PROFIBUS when installation concludes.

2.8.3 Installing SIMATIC PDM

CD required: PDM V5.1 + SP2
Optional Diskette: PDM license (you can install PDM now and install the license later if you wish)

This procedure installs SIMATIC PDM and the lifelist program.

1. Insert the PDM V5.1 + SP2 CD into the CD-ROM reader. The CD typically runs automatically when inserted into a CD-ROM drive (if the installation program does not start automatically, use the Windows Explorer program to locate the Autorun.exe program in the root directory. Double-click the program name or icon to start the installations procedure.

2. Follow the on-screen instructions and prompts to do the following:

- Accept license agreements.
- Select languages for setup and for documentation.
- Enter your name and organizational affiliation.
- Select a target (destination) drive for the program.
- Select program components (select both SIMATIC Manager and SIMATIC PDM).
- Select a destination directory for program components (this can differ from the default).
- Select Memory Card Parameter Assignment (select No EPROM Driver).
- Insert your authorization diskette (if you skip this step you can return to it by following the procedure in subsection 2.8.5

2.8.4 Creating a Desktop Shortcut to Lifelist.exe

The Lifelist program, which scans the PROFIBUS for installed devices, is useful for listing and confirming PROFIBUS addresses. If the program works as expected, you can assume that there are no faults preventing you from running the PDM program. It may be useful to make a desktop shortcut to the Lifelist program after PDM is installed, so that Lifelist can be launched easily. Such a desktop shortcut may reduce the time required to configure and assign parameters to PROFIBUS devices, a process that tends to be iterative.

1. Select Windows Explorer > Tools > Find > Files or Folders…
   In the Named: field, enter Lifelist.exe.
   You may have to change drive designations in the Look in: field
   Click the Find now button.
   The Lifelist.exe program appears in an expansion of the window.

2. Select and right-click the Lifelist.exe program icon.

3. Select Create Shortcut.
   A message cautions you that the program cannot create a shortcut where you have asked, but will offer to create it on the desktop

4. Click the Yes button to create the desktop shortcut.

2.8.5 Installing the Simatic PDM License

The Simatic PDM license is distributed on one or more Siemens diskettes. Authorization to use the PDM program, like a token, can be held by only one mass storage medium at a time. Authorization can exist either on the distribution diskette or on a hard disk drive of the workstation on which it has been installed, but not both places. It is not possible to copy the authorization by copying the diskette or the hard disk drive.

To manage authorization, the program AuthorsW.exe on the diskette does the following:

- Displays the available Simatic licenses on local disks of the workstation or laptop from which AuthorsW.exe has been run

- Installs licensing from the diskette to a hard disk drive

- Returns licensing from hard disk drive to the diskette

A text file on the diskette titled “Readme.txt” provides detailed instructions for using the program and important cautions about its licensing restrictions. These include discussion of

- Prohibitions forbidding write-protecting the diskette
- Damage to the licensing authorization due to computer virus
- Cautions against running a disk optimizing program (defragmenter) on a hard disk drive with licensing installed
- Partial backup of licensing authorizations
- Securing emergency, temporary licensing in the event of a catastrophic failure
- Prohibitions forbidding changing names and attributes of files and directories created by the program

WARNING

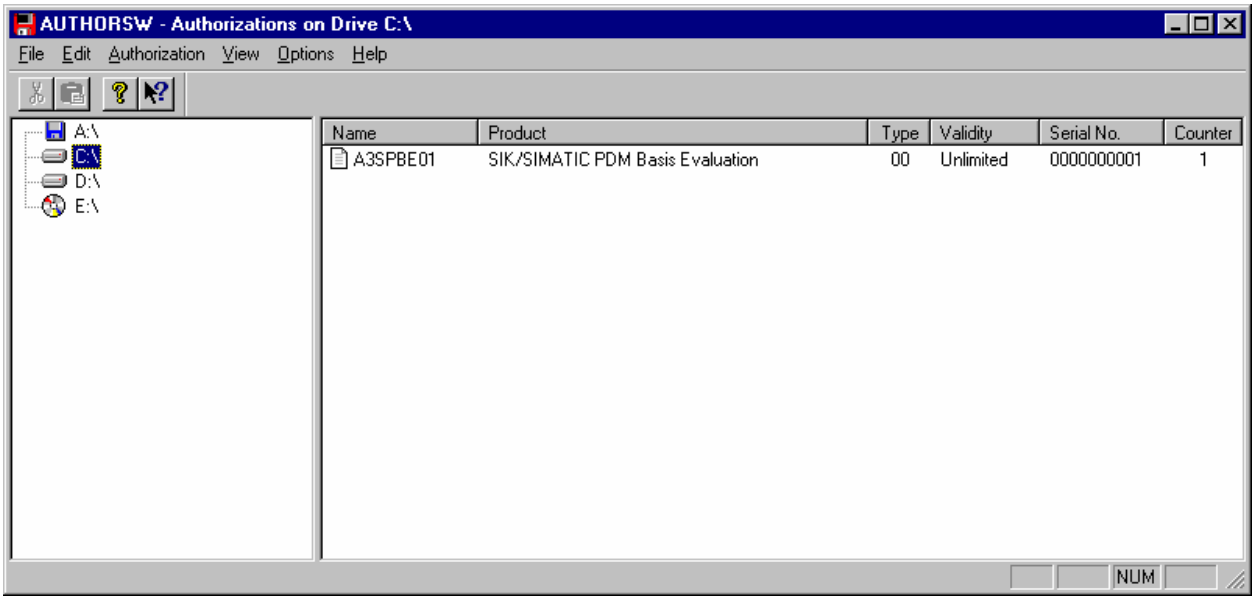
The authoritative source of information on topics related to licensing is the text file on the diskette titled “Readme.txt.” Failure to heed the information in this file could result in data loss and an inability to run configuration programs.

Having read and understood the text file on the diskette titled “Readme.txt,” installation of the licensing authorization is straightforward.

1. Insert the authorization diskette in your diskette drive.

2. Run the program AuthorsW.exe
   A window opens showing the authorizations for the mass storage medium selected in the left pane. In

the window shown below, the authorizations for the selected Drive C: are displayed.



3. To move an authorization from one drive to another, drag it from the right pane and drop it on the appropriate drive on the left pane. In the illustration above, it would be possible to remove authorization to run SIK/SIMATIC PDM Basis Evaluation from the selected drive (C:\) and either return it to the authorization diskette (A:\) or move it to another drive.

4. When you have made desired changes, wait for drive LEDs to stop, and click File > Exit.

2.8.6 Setting the PG/PC Interface through its Control Panel Applet

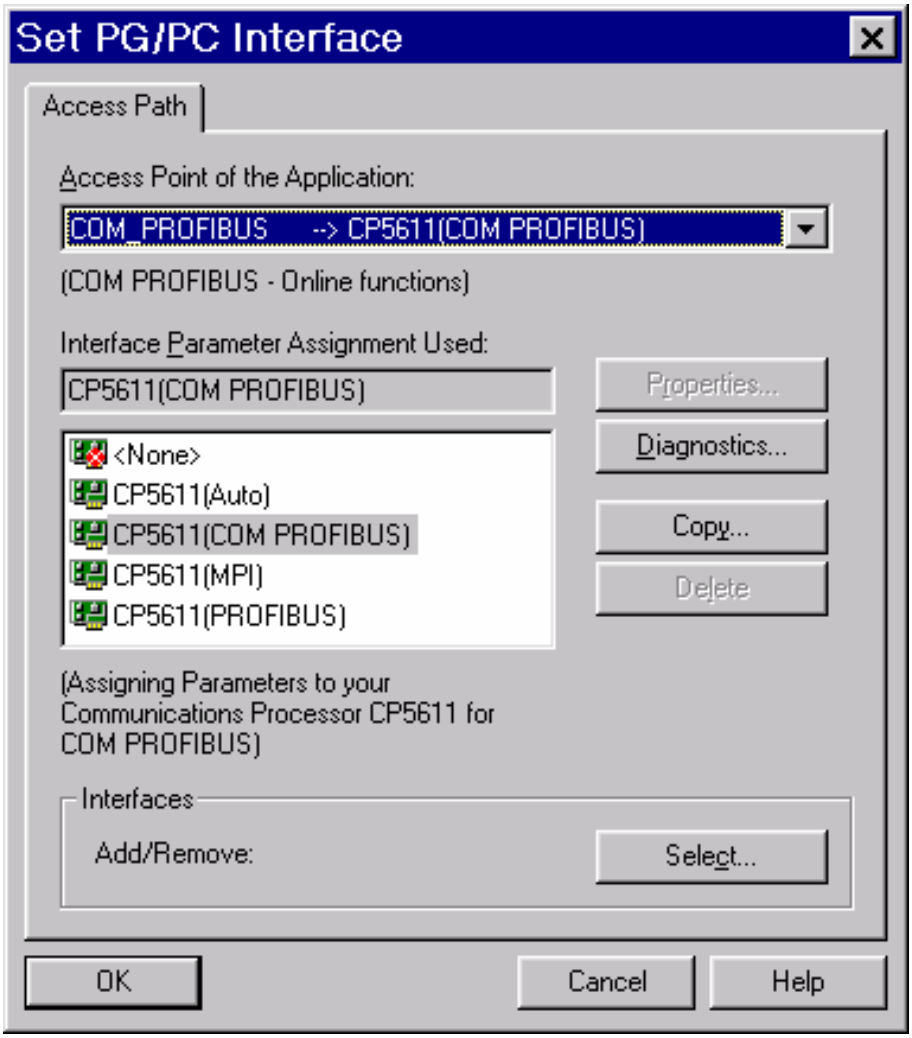
The PC/PC interface begins with the CP 5611 Interface card installed in a workstation or a CP 5511 installed in a laptop. These cards connect the workstation or laptop directly to the PROFIBUS DP network and indirectly to PA devices through intermediaries. The card enables the COM PROFIBUS and PDM programs running on the workstation to communicate with PROFIBUS masters and slaves. The proper setting for the card differs for COM PROFIBUS and Simatic PDM, but these programs select the correct settings automatically after the card is set up for initial use.

The Set PG/PC Interface control applet, which controls access settings, is installed in the Windows Control Panel when COM PROFIBUS is installed.

2.8.6.1 Setting the CP 5611 or 5511 Interface for PDM

Prerequisite information: the operating baud rate of the PROFIBUS DP network (you can change the baud rate setting later if you change the network's baud rate). Note: the factory default baud rate for the PFM is 19.2 kbps and its default PROFIBUS address is 0.

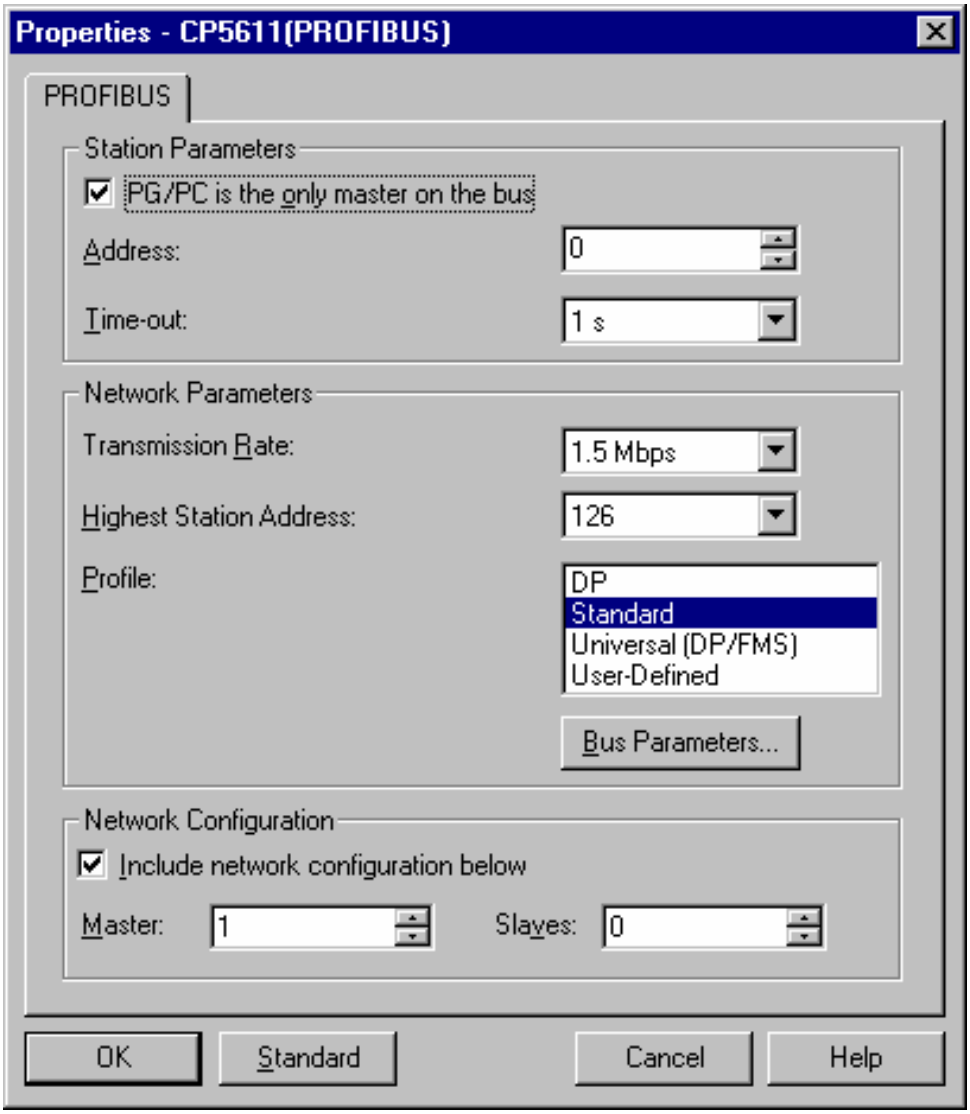
1. On the PC or laptop with the CP 5611 or 5511interface installed, select Start > Settings > Control Panel > Set PG/PC Interface.
   The "Set PG/PC Interface" window appears:



2. Ensure that the "Access Point of the Application:" is
   `S7ONLINE (STEP 7) --> CP5611(PROFIBUS)` for a workstation or
   `S7ONLINE (STEP 7) --> CP5511(PROFIBUS)` for a laptop

   You may have to use the drop-down menu associated with the access point. When you have done this, the Properties box becomes available as an option, as shown in the screen capture above.

3. Select the Properties box. A window like the following appears:



4. Ensure or confirm that the settings are as follows:

   - Check: “PG/PC is the only master on the bus” (this selection may be non-intuitive, because the PROFIBUS DP bus probably includes at least one other master, the PFM).
   - Ensure that the “Address” (of the CP 5611 or 5511 interface) is 0.
   - For “Transmission Rate:” select the baud rate of the PROFIBUS network.
   - For “Profile;” select Standard.
   - In the Network Configuration selection, check Include network configuration below.
   - Ensure that Master is 1.
   - Ensure that Slaves is 0.

   Click the OK button.
   The window closes, returning to a list of control panel applets.

2.8.6.2 Setting the CP 5611 or 5511 Interface for COM PROFIBUS

1. On the PC or laptop with the CP 5611 interface card installed, select Start > Settings > Control Panel > Set PG/PC Interface.
   The "Set PG/PC Interface" window appears:

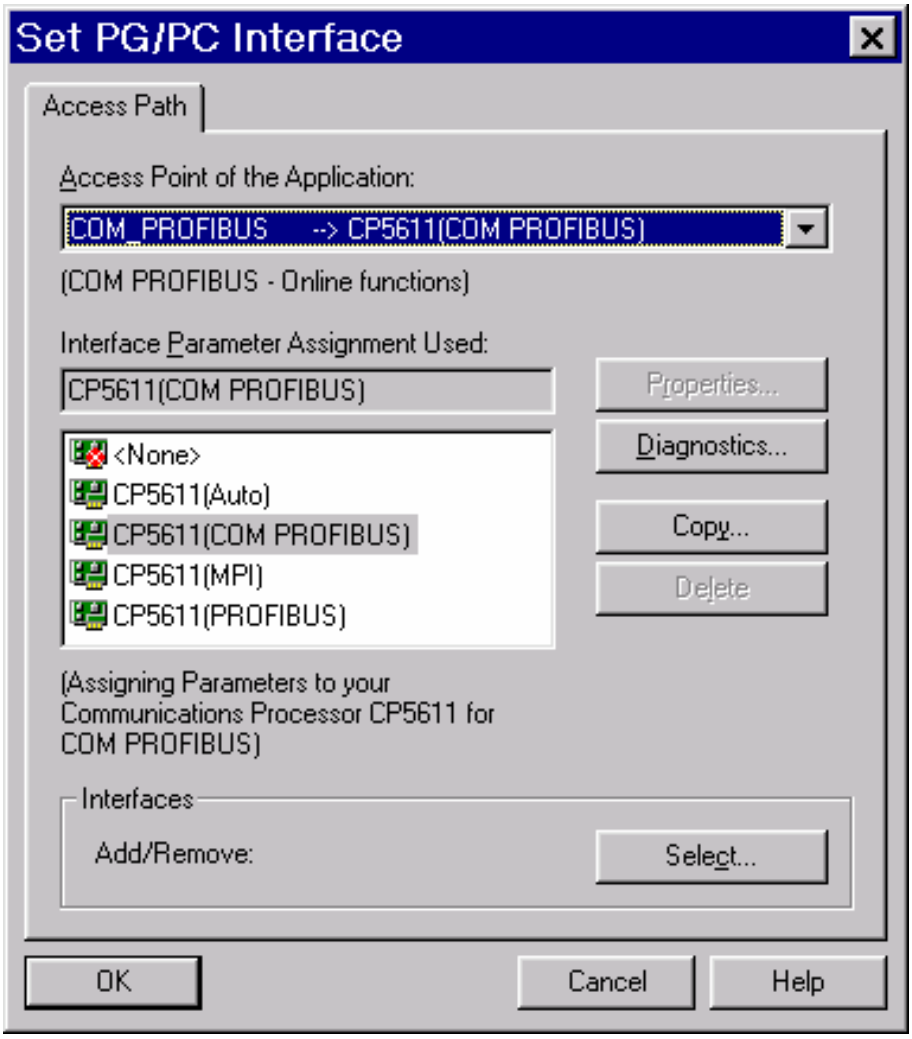


Figure 2–4 Access Point for COM PROFIBUS

2. Select COM_PROFIBUS from the pull down menu labeled Access Point of the Application.

3. Select (highlight) "`CP5611(COM PROFIBUS)`" to ensure that the Access Point of the Application is
   `COM_PROFIBUS --> CP5611(COM PROFIBUS)` for a workstation or
   `COM_PROFIBUS --> CP5511(COM PROFIBUS)` for a laptop..

4. Click the OK button the to exit the control applet.

3 Configuration

A set of software tools creates an interface between an APACS+ controller, a PROFIBUS Fieldbus Module (PFM), and a PROFIBUS network.

The purpose of this interface is to integrate PROFIBUS field I/O devices seamlessly into a Siemens *4-mation* software environment. Applications running in this environment may rely solely on PROFIBUS devices for field I/O, or they may include a mix of PROFIBUS devices and devices connected to the extensive line of analog and discrete I/O modules provided by Siemens.

Siemens configuration software, installed through procedures listed in Section 2.0, consists of the following:

- Set PG/PC Interface a control panel applet for configuring a Siemens CP 5611 or 5511 interface card and establishing PROFIBUS DP bus characteristics
- COM PROFIBUS, for configuring devices on a DP bus
- Lifelist, a special-purpose program for identifying, discovering, and documenting DP and PA devices
- PDM, a program for setting parameters of DP/PA devices and monitoring or simulating I/O

An APACS+ PROFIBUS network consists of these elements:

- An engineering workstation for developing and monitoring the Siemens *4-mation* application that runs on the APACS+ controller. This workstation includes a Siemens Modulbus interface card, connected to the APACS+ system containing the PFM module.
- A second PC workstation or laptop with a Siemens PCI CP 5611 interface card or a PCMCIA CP 5511 interface. This workstation or laptop provides a hardware platform for PROFIBUS configuration tools that configure the PFM and PROFIBUS slave devices.
- An optional PROFIBUS DP/PA link/coupler, which provide the hardware and software interface between the PFM and PROFIBUS PA devices.
- PROFIBUS DP and PA field devices from Siemens and other manufacturers.

NOTE

Configuring a PROFIBUS network for use in an APACS+ environment requires only a small fraction of the functions available in the configuration programs COM PROFIBUS and PDM. The instructions in this manual make no attempt to describe features that are not applicable to an APACS+ environment. Do not change settings or selections unless you are specifically told to do so or unless you possess expert knowledge and fully understand the implications of your actions.

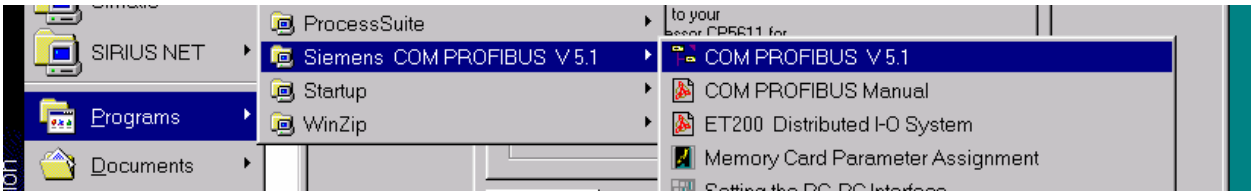
The procedures in this section do not explicitly remind you to save your work to hard disk or to back them up on removable media although it is obviously prudent to do so. Configuration developed in COM PROFIBUS and PDM are saved automatically, but you must explicitly save incremental versions of your configurations under different files names if you wish to revisit them.

3.1 Populating the PROFIBUS DP Network with COM PROFIBUS

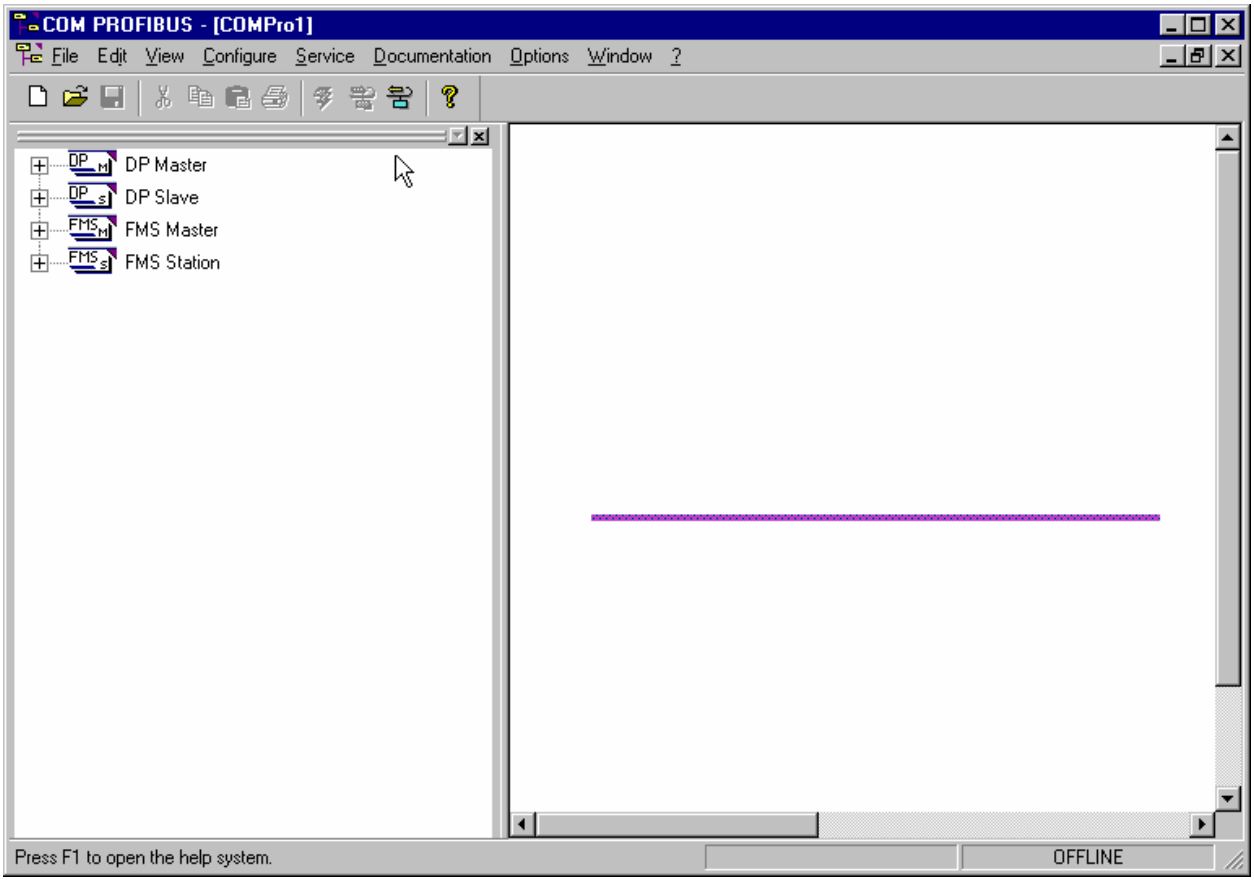
Identifying and configuring DP devices with COM PROFIBUS is an iterative process, repeated until all the devices are installed on the DP network. It is possible to interrupt the process, save the incremental version as a file, and return later, building on previous effort. It is not unusual to run the program repeatedly as you systematically add devices to the network.

If you already have an active DP configuration loaded into a master, you can import it into COM PROFIBUS from the master and load it into a new configuration. See subsection 3.5. You might elect to do this if you already have a working network and wish to add devices to it.

1. From the PC with the CP 5611 (or laptop with CP 5511) installed, run COM PROFIBUS. Select Start > Programs > Siemens COM PROFIBUS V 5.1 > COM PROFIBUS V 5.1.



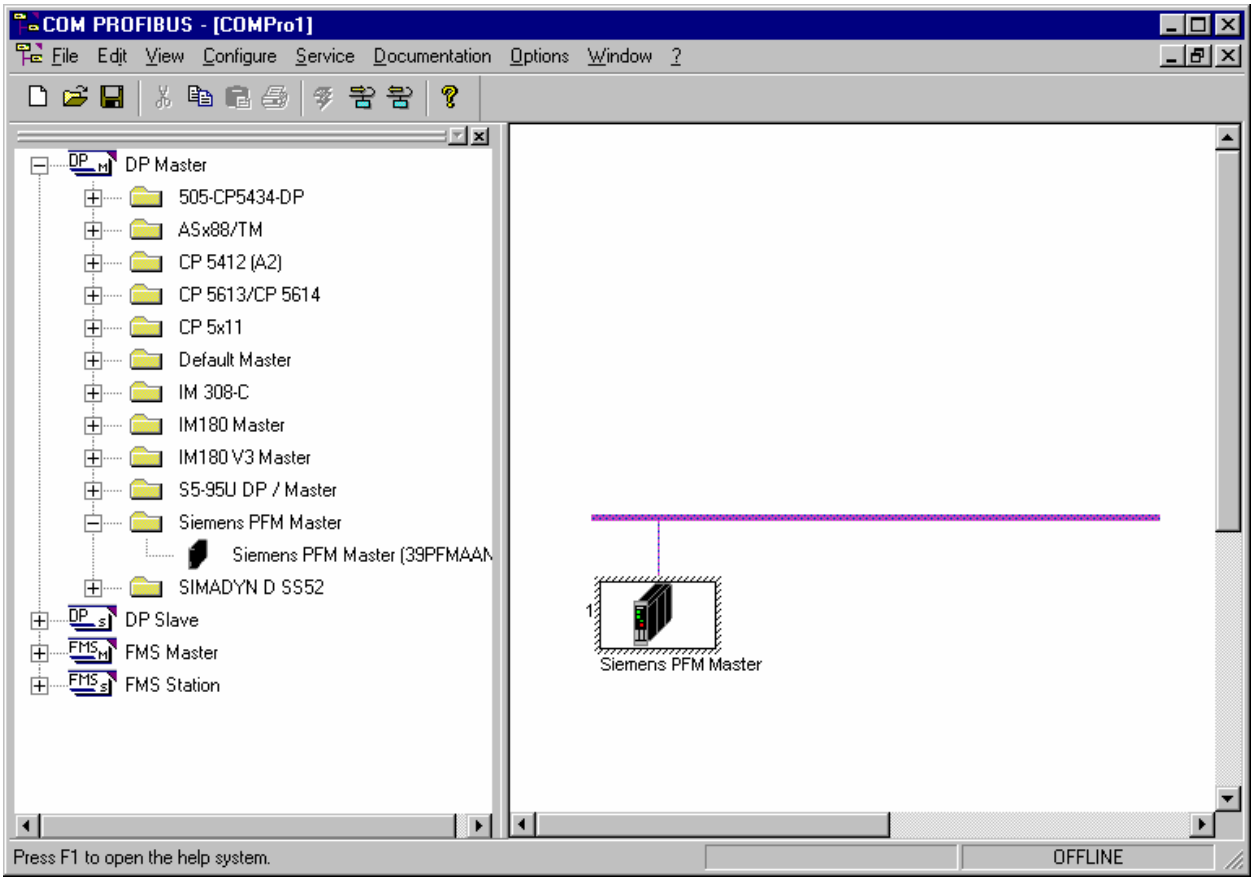
   The program displays a new, blank network, with a single purple line representing the PROFIBUS DP bus.



2. Populate the PROFIBUS DP network by expanding the DP Master and DP Slave lists in the left pane, also know as the "Hardware Catalog," then dragging and dropping devices into position on the PROFIBUS DP bus, represented by the purple line. You must add a master first. Start with the PFM module.

Devices in the left pane are listed in an indented outline format. Clicking a "+" sign expands a list, revealing subordinate objects. A "-" sign indicates that there are no subordinate elements in the list. Clicking a "-" sign contracts a list, providing a better overview of the list content, but less detail.

The following window shows the DP Master list expanded to reveal the PFM, a bus master, which has been dragged and dropped onto the PROFIBUS DP network.



Note that the COM PROFIBUS has assigned the first available PROFIBUS address, 1, to the device. As additional devices are placed on the bus, the program increments the PROFIBUS address from the lowest available number. An address assigned automatically may be inappropriate and may require modification.

NOTE

At least one DP slave connected to a PFM must be at an address lower than or equal to 32.

Note, too, that the CP 5611 interface card (or laptop with CP 5511 PCMCIA card), a master assigned the address 0, should not be added to the graphical display of the DP network. This may be non-intuitive.

The position of a device on this graphical representation of the bus is important only to the degree that it enables you to visualize and understand your system. It doesn't matter, for example, whether a device is dropped above or below the purple line representing the bus. The PROFIBUS address of the devices is, of course, critical and must be unique and match the setting of the devices itself. Consult the documentation supplied with each device to determine how to set its address.

If PROFIBUS PA devices are used in the system, the DP bus may include a DP/PA link and coupler, providing an interface between the DP bus and the PA bus. A DP bus may include other DP devices as well. The following illustration shows a DP bus consisting of the following:

- PFM master
- DP/PA link and coupler (the Siemens DP/PA Link IM157, is found under the category "DP Slave > Gateways.")
- ET 200M
- ET 200B

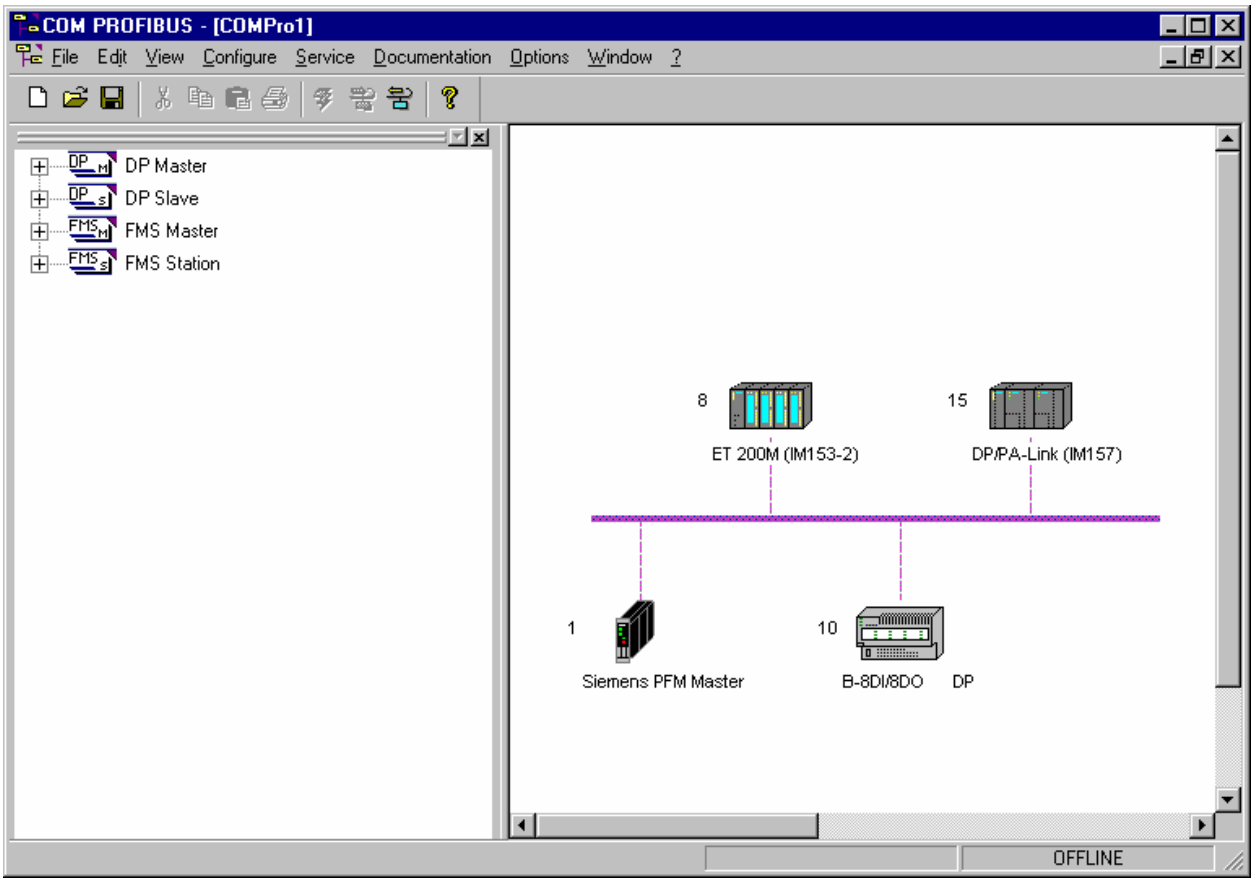


Figure 3–1 Typical PROFIBUS DP Network with an DP/PA-Link

If a device does not appear on the lists in the left pane of the COM PROFIBUS window, the device's GSD files does not exist in the specified directory (see subsection 2.7). You must secure a suitable GSD file and copy it to the directory `C:\SIEMENS\CPBV50\GSD.` Then from COM PROFIBUS, select File > Read in GSD Files, to make the GSD file and the device it represents available to the program.

3.2 Configuring DP Devices

1. Right-click a DP device and select the Properties. The illustration below shows the "Properties…" menu choice among others available after selecting and right-clicking device.

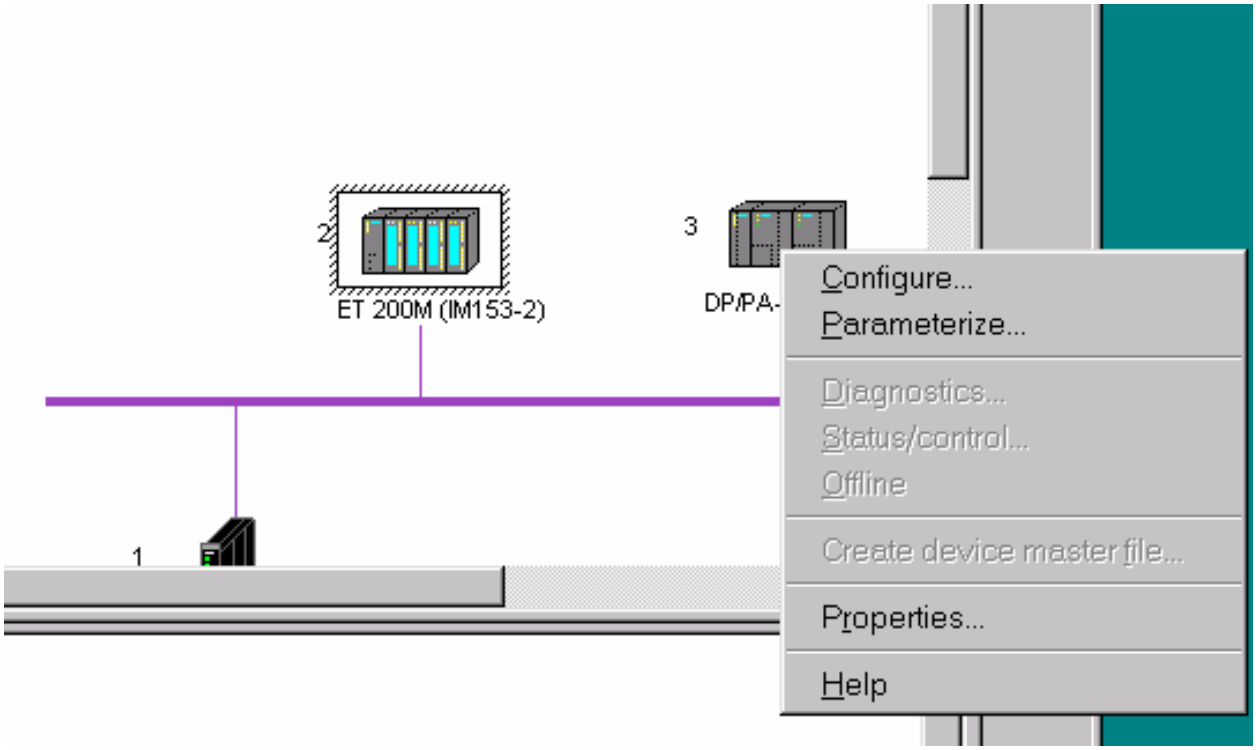
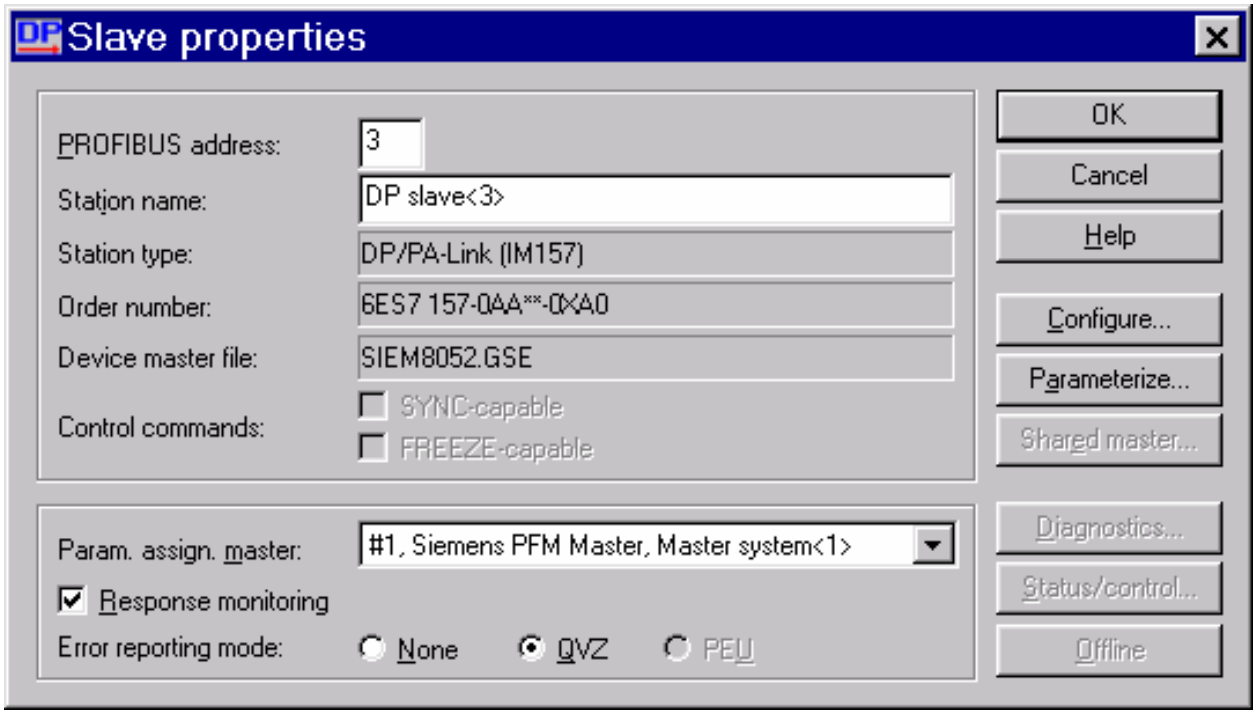


Figure 3–2 Right Clicking for Device-Specific Menus

The essential parameter is the PROFIBUS address, which must match the address assigned to the device. For DP devices some mechanical means, such as rotary switches or dual in-line package (DIP) switches, sets the PROFIBUS address. The Siemens CP5611 or 5511 interface card ordinarily takes address 0 and the PFM module takes address 1. The usual recommendation is that PROFIBUS devices be assigned the lowest possible addresses to ensure efficient scanning after the network is configured and running.

If you change a switch setting on a slave device, it may not recognize its new address until it has been powered off and then on again. For slave devices, it necessary to ensure that the “Parm.assign master” (parameter assigning master) is the PFM. In the illustration below, the PFM is identified by its PROFIBUS address and name: “#1, Siemens PFM Master.”



3.3 Configuration of DP/PA Link/Coupler Devices

A gateway device interfaces PROFIBUS PA devices with the PROFIBUS DP interface of the PFM. Siemens offers two such devices with different performance, complexity, and cost.

3.3.1 DP/PA Coupler

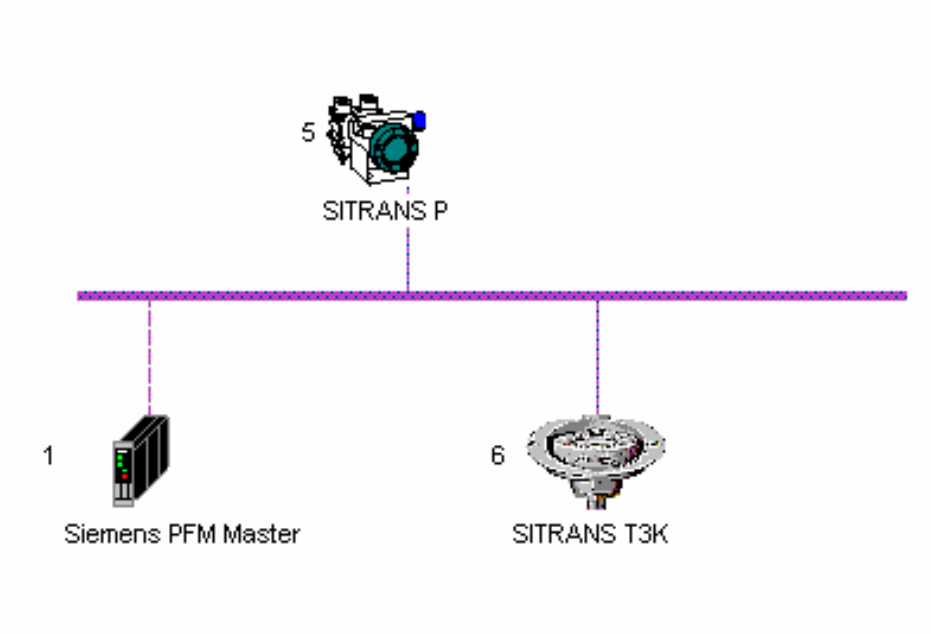
A DP/PA coupler provides a physical interface between DP and PA devices. A coupler has no PROFIBUS address and is transparent to the bus. The DP/PA coupler typically supplies power to the PA devices that are attached to it. The number of PA devices connected to a coupler is typically limited by the power-supply current they draw.

Networks that connect PA devices to the DP bus solely through a coupler are common and cost effective for networks consisting solely of PA devices. Where PA devices are connected to the DP network solely though a DP/PA coupler, the PA devices must be added to the network with COM PROFIBUS and given unique PROFIBUS addresses. The PA devices are thus seen as slaves on the DP bus and scanned like other DP devices.

The baud rate of the DP bus when using a coupler must be set to 45.45 kbaud. In networks consisting of a PFM and PA devices 45.45 kbaud should be adequate.

This is an important concern, so much so that the COM PROFIBUS program intercepts an attempt to install a devices that cannot handle the current DP baud rate:

As shown in the illustration below, the SITRANS P and SITRANS T3K are both PA devices. The DP/PA coupler is not shown because it is invisible to the DP network. Without it, however, the PA devices would be physically incompatible with the DP cabling. The illustration below, as provided by COM PROFIBUS, thus provides a logical, rather than physical, picture of the DP bus.



3.3.2 DP/PA Link/Coupler

A DP/PA link is an interface between a DP network PA devices, but unlike a coupler it is not transparent. A link has a unique PROFIBUS address and is acknowledged as a DP device on the DP bus. When a DP/PA link is mated with a coupler, the combination becomes a link/coupler pair. A single link can support multiple couplers (a maximum of 5). When shown graphically by the Lifelist.exe program a link/coupler is represented by a circle, half purple, representing the conventional color of DP cables, and half blue, the color of PA cables, emblematic of its position in both DP and PA environment (at address 15 in the illustrations):

```
PROFIBUS DP
   0: This Station   »CP5611(COM PROFIBUS)« via COM_PROFIBUS
   1: Active Station
   8: ET200M (IM153-2)  (SIEMENS)
      HART
  10: Ident: 000Bhex
  15: DP/PA Link (IM157)  (SIEMENS)
    PROFIBUS PA
       5: »SITRANS-P«                    ID: »421101LD17909965«  Profile:  2.00   (Siemens)
       6: »Temperature«                  ID: »SITRANS T3K PA  «  Profile:  3.00   (Siemens)
```

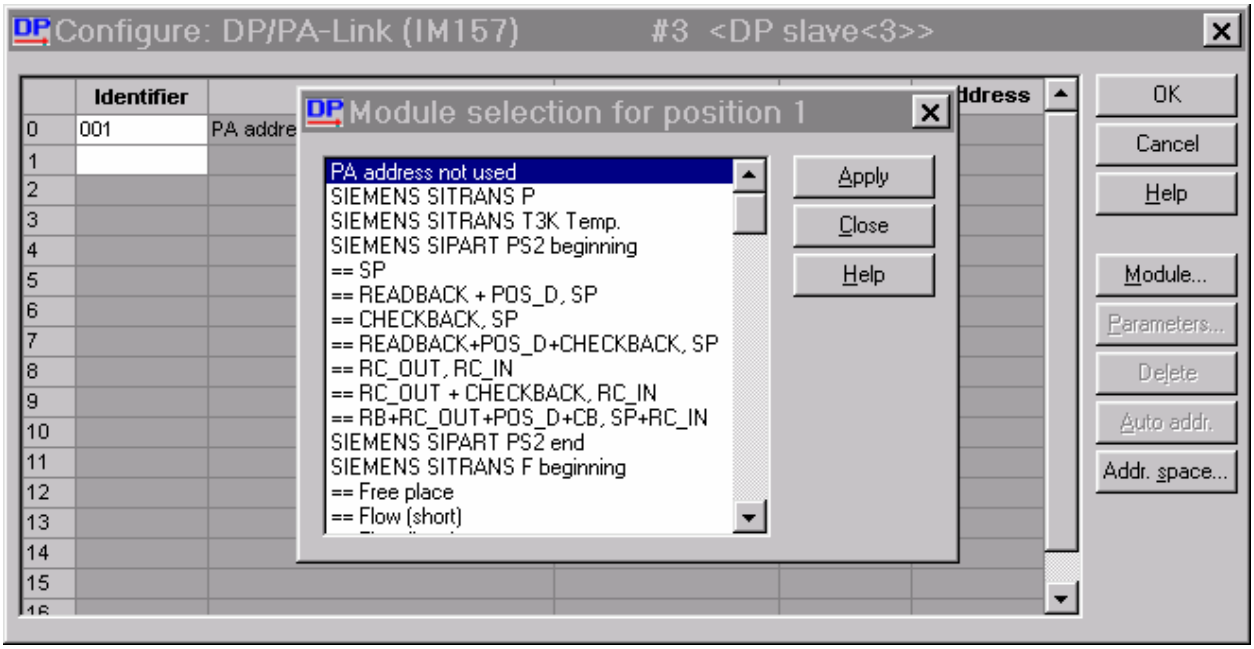
The link/coupler is a master on the PROFIBUS on the PA bus and becomes both a physical and software interface between the DP bus and a PA bus. PA devices connected to a coupler are assigned PROFIBUS addresses that are unique to the PA side of their link. Communications between the DP master and the PA devices are handled through the link/coupler. A DP master sees only the PROFIBUS address of the link, the coupler has no address, and the addresses of individual PA devices are hidden from the DP master.

The chief advantage to using DP/PA link/couplers is that the link can communicate with PA devices at the PA baud rate, but permit the DP bus to operate at any DP speed, up to 12 Mbaud.

In COM PROFIBUS a DP/PA link/coupler requires additional configuration to accommodate PA devices connected to it.

1. Right-click the link coupler to generate the device-specific menu shown in Figure 3–2

2. Select Configure… Then select Module.
   The following window appears:



Observe the following when adding modules:

- There can be no gaps in the “Identifier” list. A position can be either be “PA address not used” or one of the listed modules. Modules are listed if their they are included in the GSD file for the link (Siem8052.gse). To add an unlisted PA device type to the DP/PA link configuration, the link GSD file must be updated. As the term is used in the “Module selection for position X “list, a module represents either a PA device or a PA device module.

- It is considered a good practice to keep positions allocated to “PA address not used” to a minimum to ensure efficient scanning and data processing.

- The PROFIBUS PA address of the PA devices determines their position in the module list. Since some PA devices are set (or changed) through software, their position should reflect the address they will ultimately have (equal to the position number + 3). This means that the first available PROFIBUS PA address for devices connected through a link/coupler is 3. A device in position 1 of the identifier list will be assigned the PROFIBUS address 4, the device in position 2 will be assigned the PROFIBUS address 5, and so forth.

NOTE

The PFM requires at least one PA slave connected to a DP/PA link to be at an address lower than or equal to 32.

- In a system with more than one DP/PA link/coupler, it is possible to have more than one PA device with the same PA address because the master communicates with the DP/PA link/coupler using the link/coupler’s unique DP address. The PA devices connected to a link/coupler are invisible to the master. Their addresses must be unique to their PA bus, but not to the entire network.

3. Add modules to the list, making a note of their PROFIBUS addresses, which will be required by the Siemens PDM program. After you have added the first module (or “PA address not used”), the focus of moves to the next position, and so forth.

4. The following window shows a configuration ready for confirmation through the OK button. Identifier position 0 and 1 have been assigned “PA address not used” because the PROFIBUS address of the first PA device (in position 2) has a PROFIBUS address is 5 (PROFIBUS address = position + 3). The second device in the list has a PROFIBUS address of 6. After adding the last module, click the OK button.

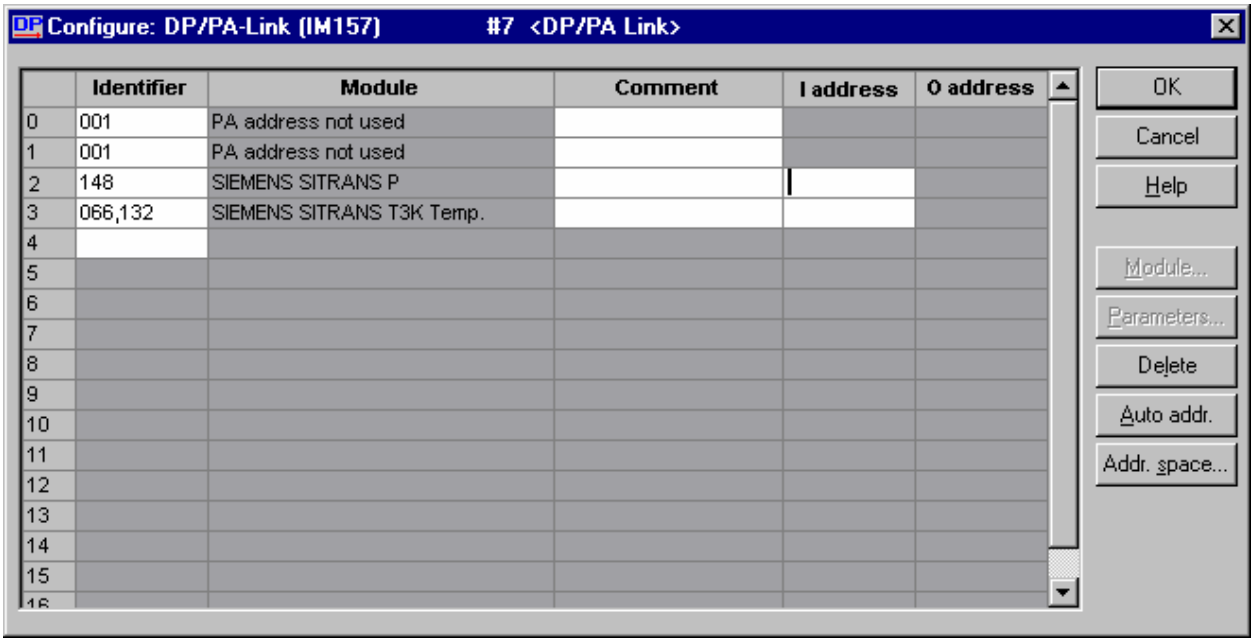
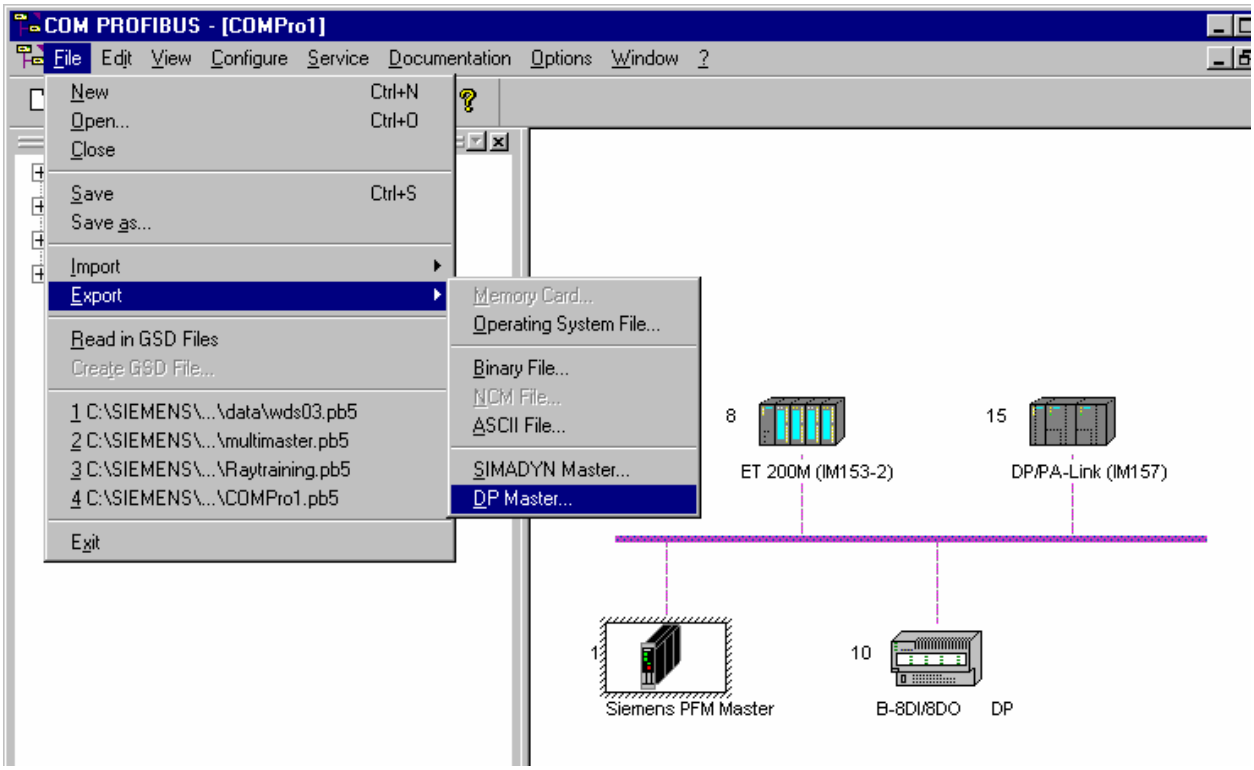


Figure 3–3 PA Devices Occupying Positions in DP/PA Link

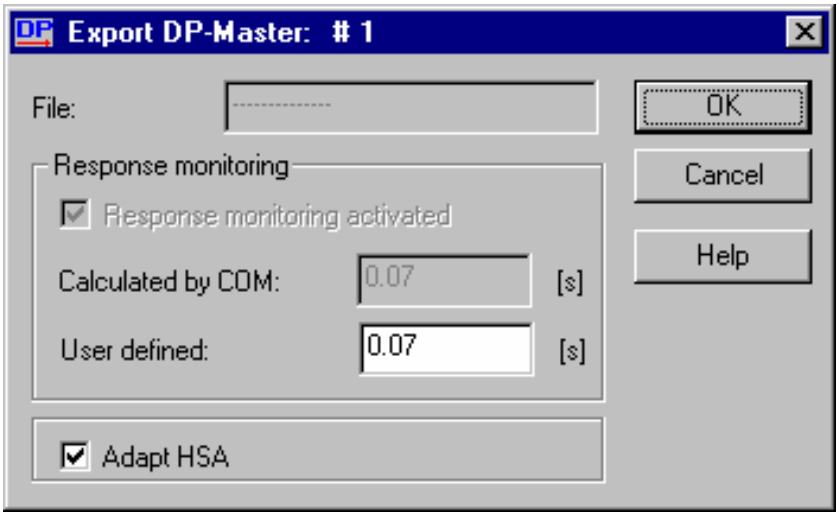
3.4 Exporting and Activating a DP Configuration

When the COM PROFIBUS configuration is complete or at a stage where it is ready for commissioning or testing, it must be exported to the PFM.

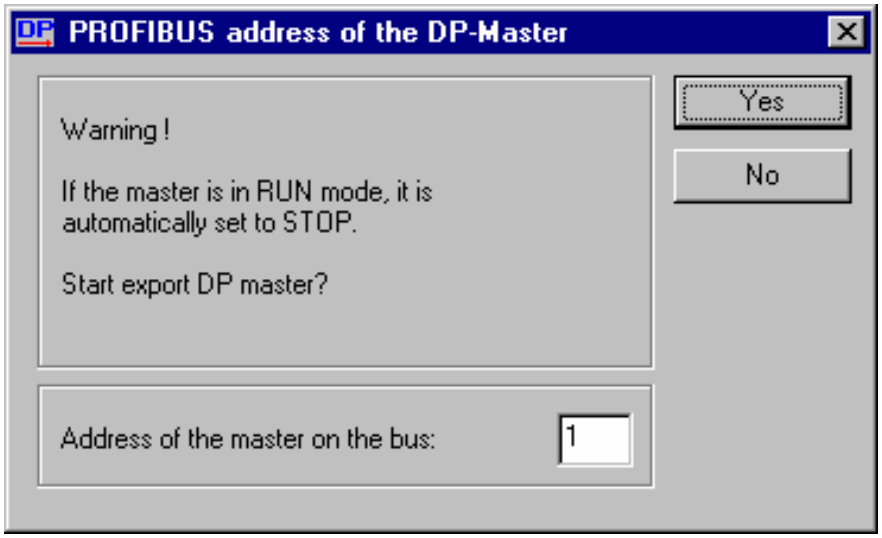
1. Select the PFM, the master, by right-clicking its icon in the right pane of the COM PROFIBUS window. Select File > Export > DP Master… See the illustration below:



A Window like the following appears:



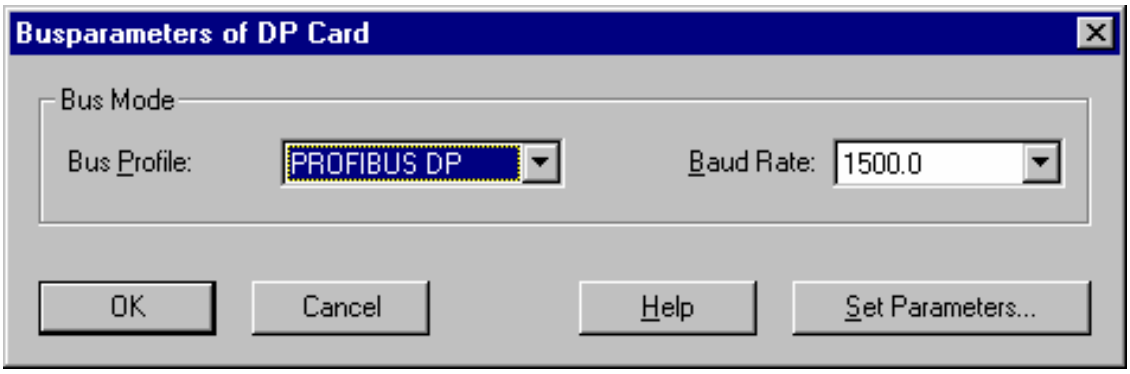
2. Ensure that “Adapt HSA” is selected, and click the OK button.
   The following window appears:



This message is not cause for alarm and will appear whether the master is running or halted.

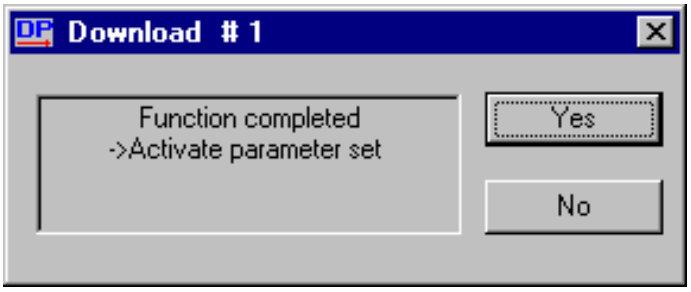
Ensure that the "Address of the master on the bus:" setting corresponds to the address of the correct PFM master (there can be multiple PFMs on a network). Click the Yes button.

The following window appears:



If a message indicating a baud rate error appears, repeat the procedure in subsection 2.8.5, reducing the baud rate to match the rate of the slowest DP device. Then return to the beginning of the procedure in this subsection (3.4)

3. If there are no errors, the following window appears:



Click the Yes button to transfer the parameter set to the PFM.

3.5 Importing an Active DP Configuration

Configuring and commissioning a network is seldom a linear process. Project requirements change, and it is common to take tentative steps, to reconsider, and to begin again.

COM PROFIBUS includes a feature that imports an Active DP Configuration into a blank, unnamed configuration. You can import a known-good configuration, then store the configuration as a file for subsequent recall, or you can modify a known-good configuration based upon new information or constraints.

1. Start COM PROFIBUS.

2. Select File > New.

3. Select File > Import > DP Master…

4. Select Siemens PFM Master.

5. Ensure that the PROFIBUS address setting is 1, corresponding to the address of the PFM.

6. Click the OK button.
   The existing DP configuration is loaded into COM PROFIBUS, with device icons appearing on the DP bus.

NOTE

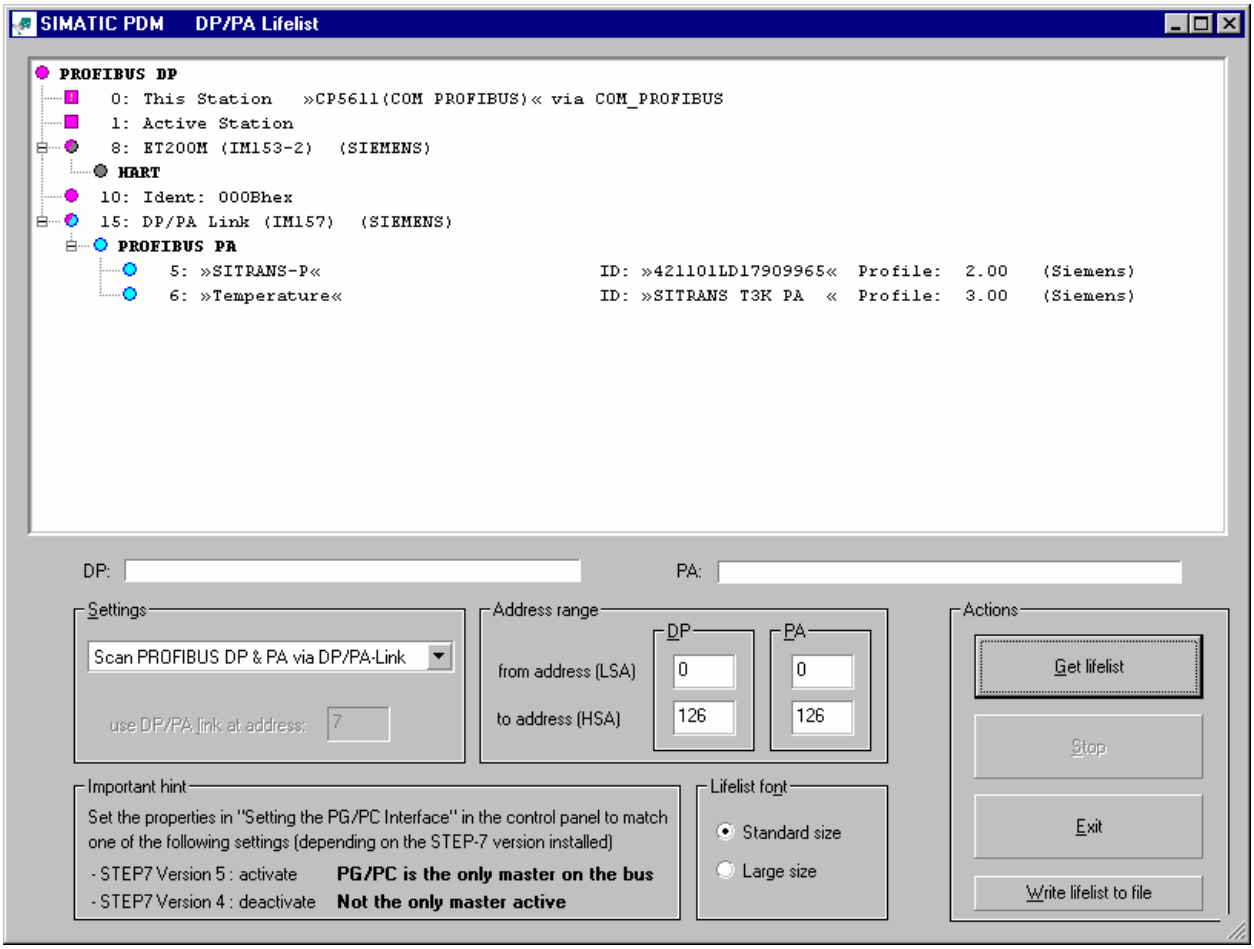
The import function does not import device configurations if there is not GSD file installed for the device (see subsection 2.7).

3.6 Using the Lifelist Program to Document the Network

The Simatic PDM Lifelist program is helpful for confirming that COM PROFIBUS has set up the DP network properly and for determining the addresses of devices on PA networks.

1. Run Lifelist by executing the Lifelist.exe program. See subsection 2.8.4 for instructions for finding this program and creating a shortcut to it.

2. Ensure that the Settings box selects “Scan PROFIBUS DP & PA via DP/PA Link” if your system contains a DP/PA Link.
   Unless you have a reason to change the address range to be scanned, leave LSA and HSA at their defaults.
   Click Get lifelist. The following list of installed network components is typical. Note that PROFIBUS DP elements are rendered in purple and PA elements are rendered in blue.



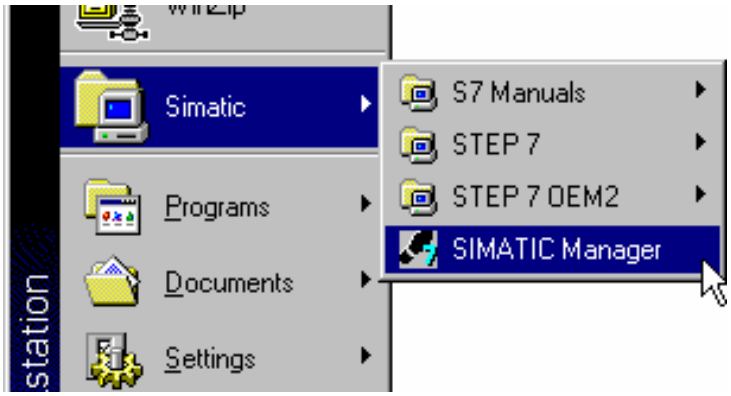
3. Make a note of the contents of the lifelist or select “Write lifelist to file” to put a shortcut to the list on the desktop.

3.7 Setting Up PROFIBUS Devices with SIMATIC PDM

The program SIMATIC PDM sets up PROFIBUS PA devices and automatically stores the setting on the hard disk.

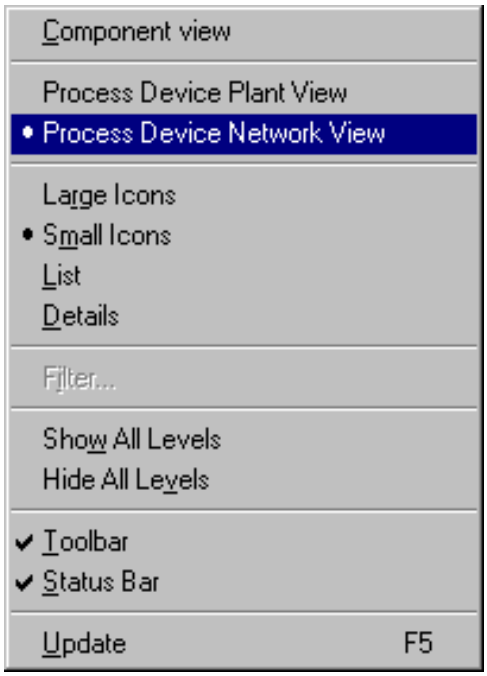
The procedure in this subsection explains the first-time setup of PA devices. The settings are stored in a "parameter table" that is stored with each named PDM configuration. It is also possible to read the parameter table from an on-line device and then save it to a PDM configuration. To do this, complete step 1 through 12 and then select Device > Load into PG/PC from the menu bar.

1. Start the PDM program by selecting Start > Simatic > SIMATIC Manager



2. Select File, then New and enter a new project name.

3. Select View > Process Device Network View:

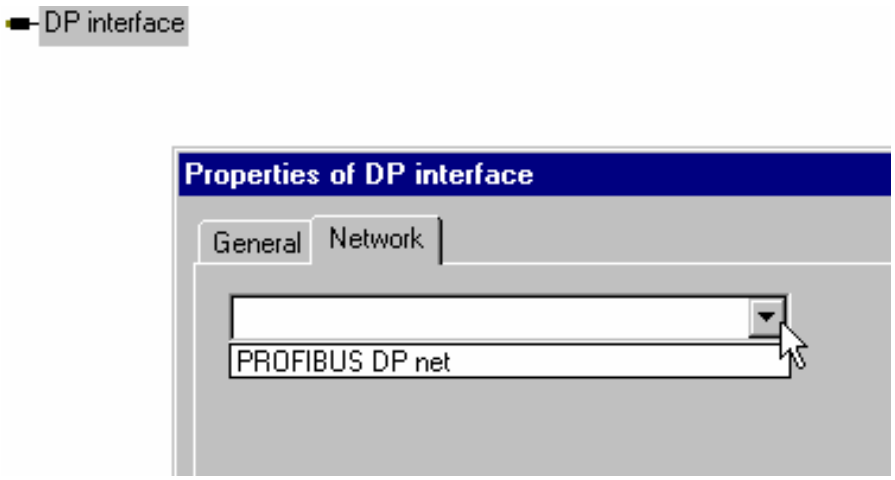


4. Expand the list in the left pane by clicking the "+" sign as necessary to see network components. In the left pane, select and right-click the networks icon.
   Select Insert > Insert new object > PC.

5. Expand the list in the left pane by clicking the "+" sign as necessary.
   In the left pane, select and right-click the PC icon.
   Select Insert > Insert new object > DP Interface.

6. Expand the list in the left pane by clicking the "+" sign as necessary.
   In the left pane, select and right-click the networks icon
   Select Insert > Insert new object > PROFIBUS DP net

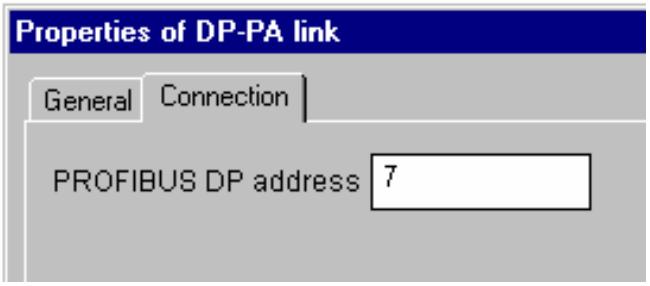
7. Expand the list in the left pane by clicking the "+" sign as necessary.
   In the left pane, select PC.
   In the right pane, right-click the DP interface icon.
   An object menu appears.
   Select Object Properties… from the menu.
   The "Properties of DP interface" window appears:



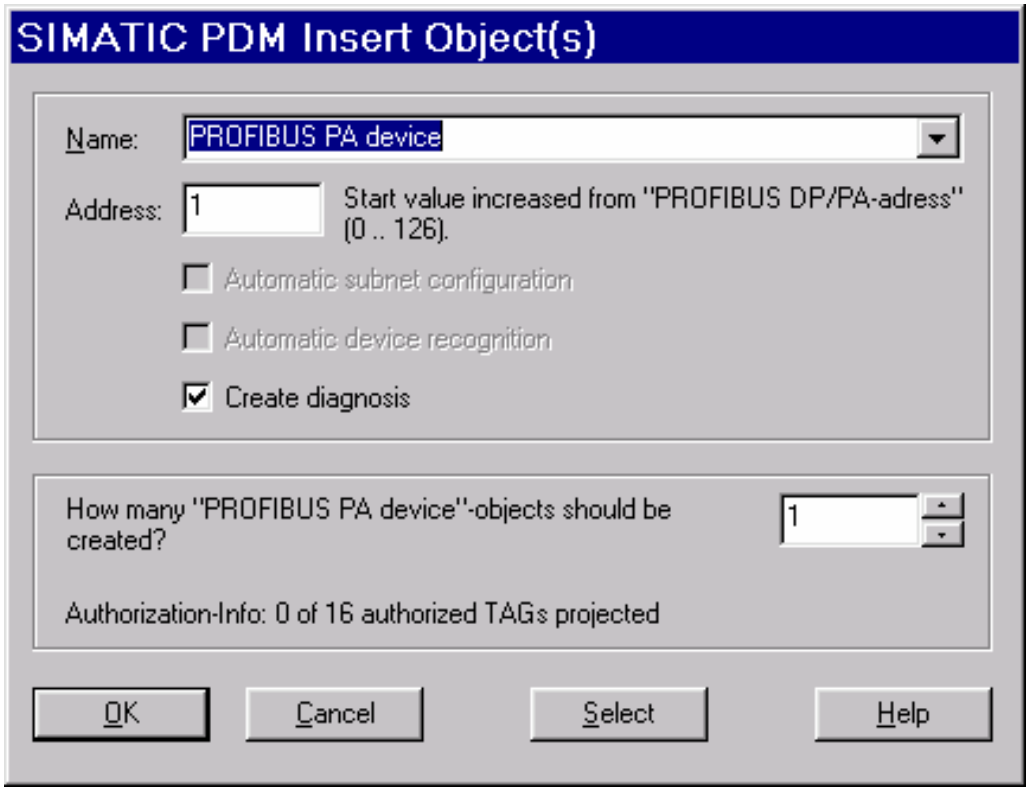
   Select the Network tab.
   Select "PROFIBUS DP net."
   Click the OK button (not shown in the illustration)

8. In the left pane, select the PROFIBUS DP net icon and right-click.
   Select Insert new object > DP-PA link.

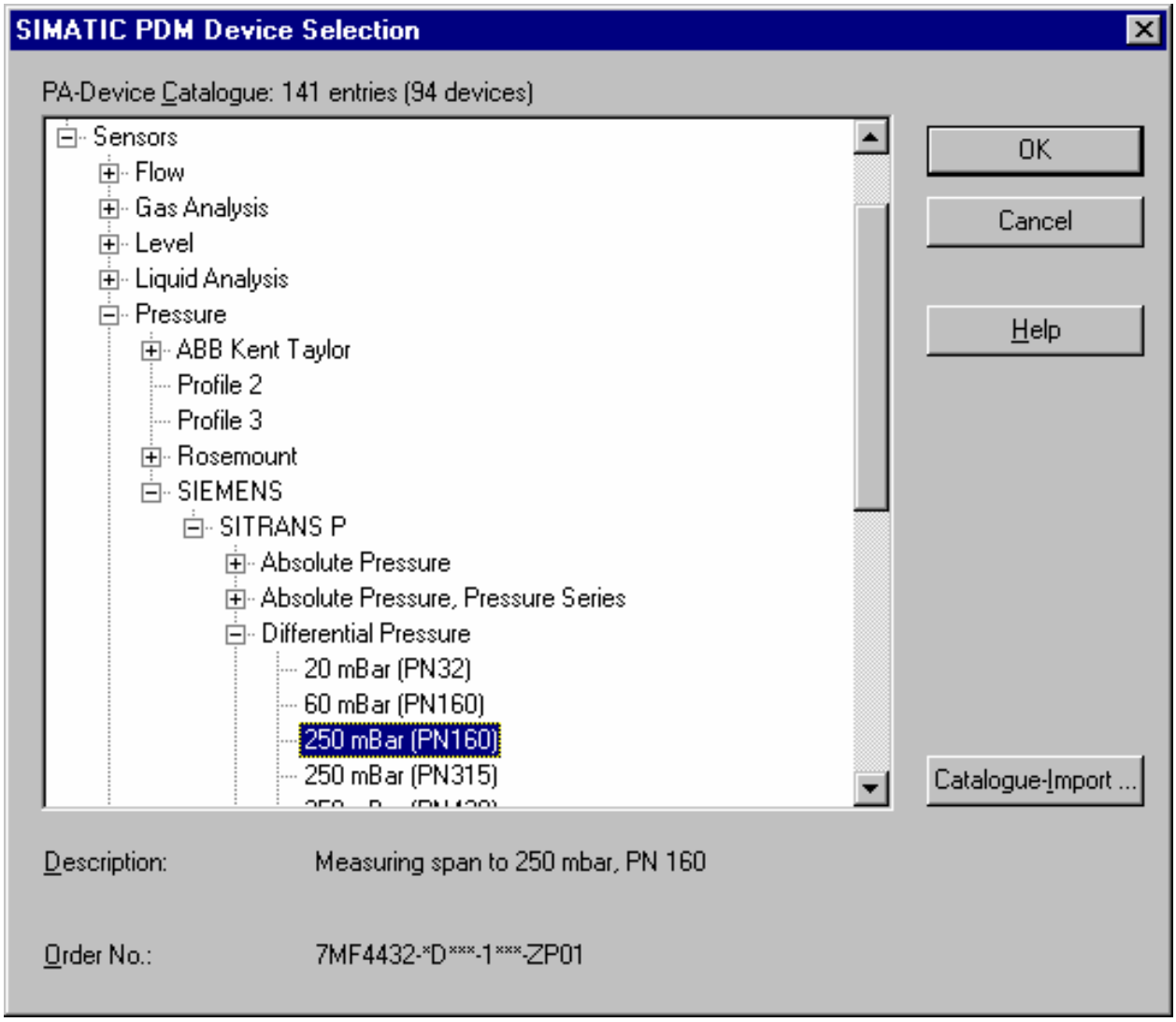
9. In the left pane, select the PROFIBUS DP net icon.
   In the right pane, right-click the DP-PA link icon.
   An object menu appears.
   Select Object Properties… from the menu.
   The Properties of the DP-PA link window appears.
   Select the Connection tab in the Properties of DP-PA link window (shown below).
   Change the PROFIBUS DP address as necessary (the default is 126). The correct address should be available from the Lifelist, (see procedure in subsection 3.5). This address should also match the address determined by switches on the device. The illustration below show the address changed to 7.
   Click OK when the address is correctly set.



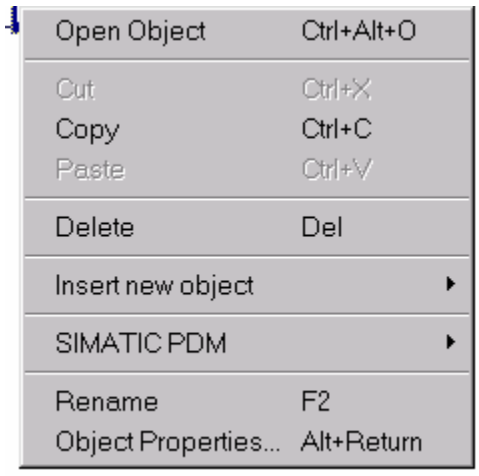
10. In the right pane, select the DP-PA link icon and right-click.
    Select Insert new object > PROFIBUS PA device.
    A window opens giving you an opportunity to name the device, indicate the address of the first device, and specify how many more devices are connected to the DP-PA link. Additional devices are named automatically "PA PROFIBUS device*n*" and added to the list of PA devices in the left pane. You are not require to create a complete list of devices in one step. You can return to the "Insert new object" function and add devices individually.



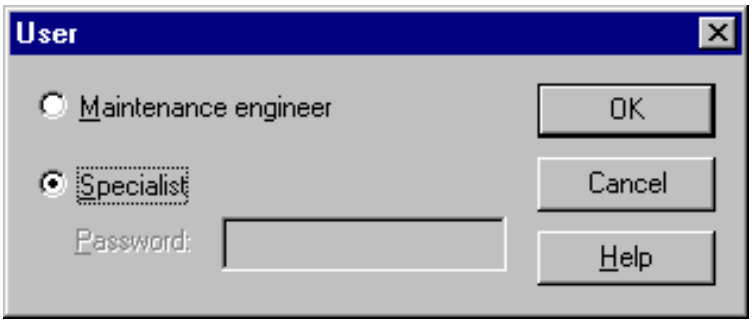
11. When the SIMATIC PDM Device Selection window opens, select the device from an indented listing. In the window below provide as an example, the device to be managed is a Siemens SITRANS P differential pressure sensor. Click OK when you have found your device.



12. Starting in the right pane and continuing with each device in turn, select the devices and right-click them. Select the Open Object from the menu, as shown in the example below



A license window appears, followed by a window asking whether you are a maintenance engineer or a specialist. Select specialist for access to all the parameters and click the OK button.

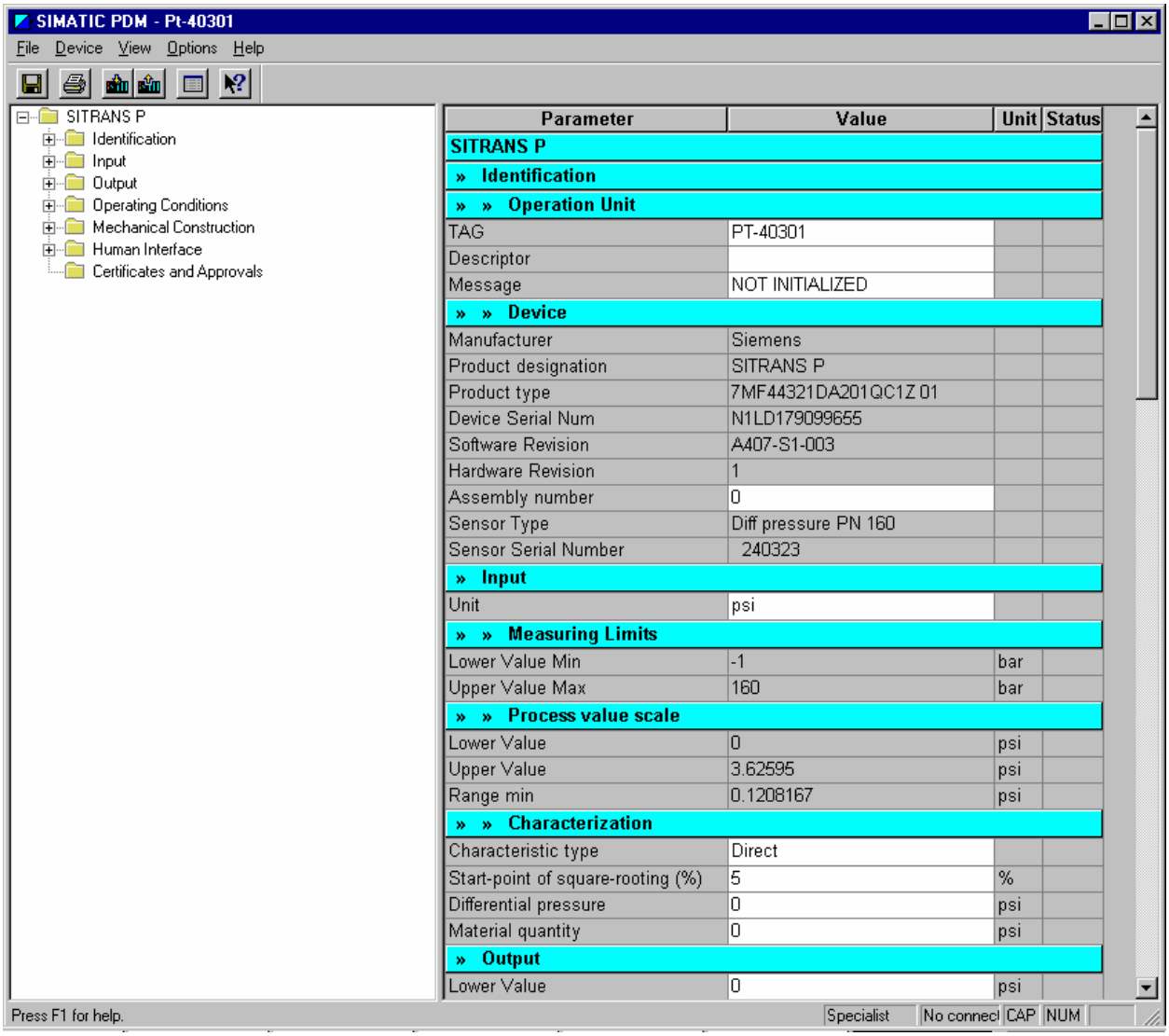


The differences between the operations permitted to maintenance engineers and specialists are provided in depth in the on-line help. For purpose of initial configuration and system development, select specialist.

13. The next window provides a comprehensive means of examining and changing the characteristics of the device. Setting the parameters requires detailed knowledge of the devices, its I/O characteristics, and its role in a system. The example below shows only of fraction of the characteristics that pertain to a Siemens SITRANS P pressure transmitter. To see the other characteristics, you could use the elevator bar at the right of the window, or click in the left pane to move more directly to the topic of interest. If you change any elements, the program gives you an opportunity to store your changes.

NOTE

The characteristics shown initially when the program is run and the PA device is selected are the default values. If you have previously configured the device and want to examine and change the characteristics, select Device > Load into PG/PC to display your previous values.



14. When you are satisfied with your choices, you can send them to the device using the menu bar selection Device > Load to Device. The program will make a connection to the device at this point if it is not already connected.

15. Repeat steps 10 through 12 for each device on the PA bus.

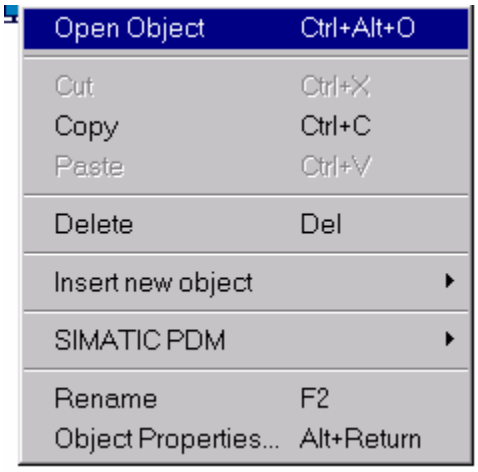
When you are finished you can save your results and exit the program, or you can move to step 2 of the next subsection and begin testing your device.

3.8 Testing a PA Device with Real-Time and Simulated Data

A valuable feature of the PDM program is its ability to display real-time and simulated data. You can use these features as a quick check to determine whether the devices is working properly and can be expected to provide useful I/O for the a *4-mation* application.

1. Select Start > Simatic > SIMATIC Manager.
   The program opens the most recent configuration. If you wish to see a different configuation, select it from the file menu. Ensure that the program is in the network view mode (View > Process Device Network View selected).

2. In the right pane of the network view, select the device you wish to test and right-click it. Select Open Object.

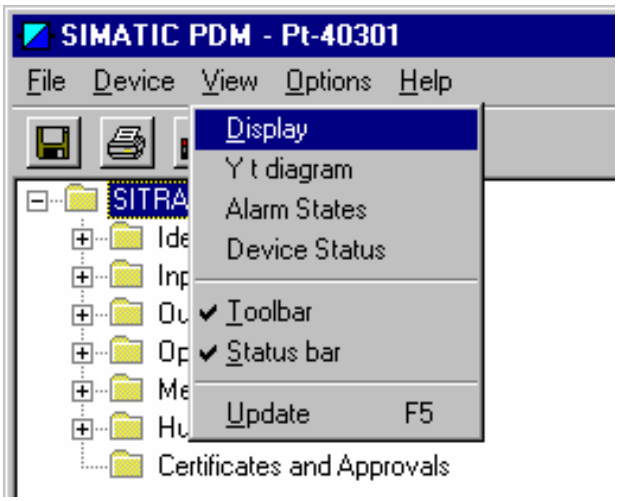


3. After the licensing screen appears, choose the user category Specialist.

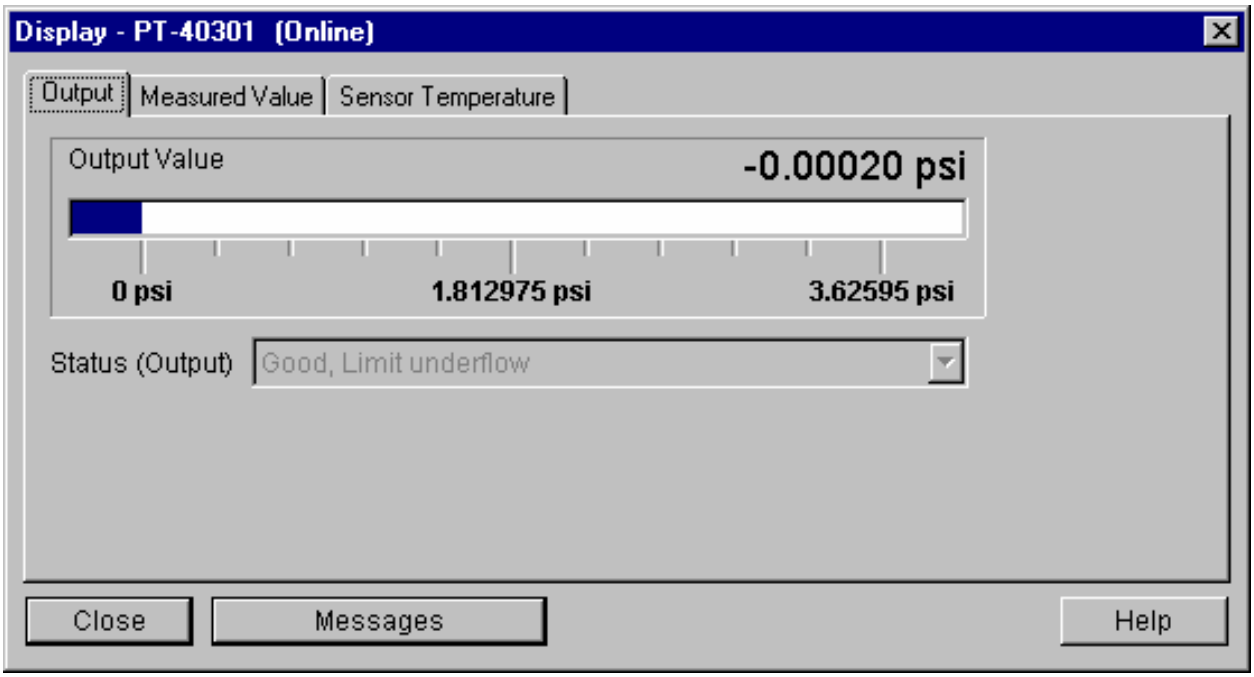
From this point you can read real-time data as well as force the device to output simulated values, which themselves can be read as if they were real-time values.

3.8.1 Reading Real-Time Data

Select View > Display.



The resulting window varies with the type of PA device selected. In the instance of a pressure transmitter, the following is typical. You can repeat this process with each device you wish to test.



3.8.2 Simulating Data

Depending upon the PA device, it may be possible to force it to output simulated data and status, which are especially useful in determining whether the *4-mation* application is reading and responding properly to channel data.

Select Device > Simulation

The resulting window varies considerably with the device under consideration. Figure 3–4 and Figure 3–5 show the available options for a typical pressure transmitter and a typical temperature sensor. Look for a means of enabling and disabling the simulation and for a button or menu selection that sends the simulated value to the device. Sometimes such a button is labeled with a form of the verb “transfer.”

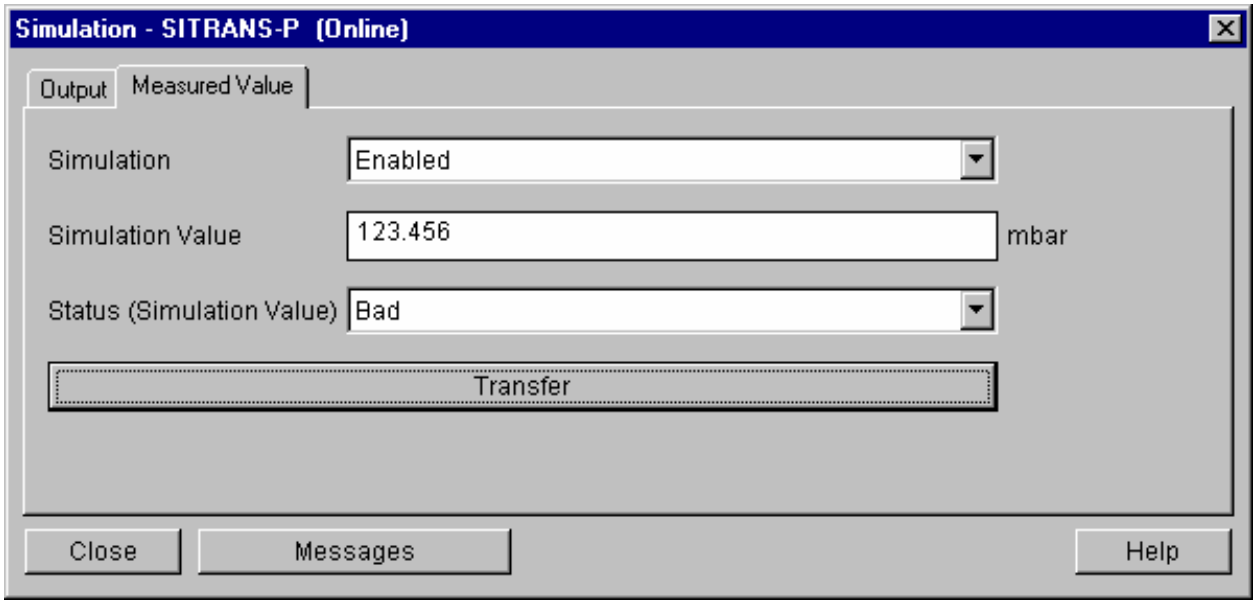


Figure 3–4 PDM Simulation Window for SITRANS-P

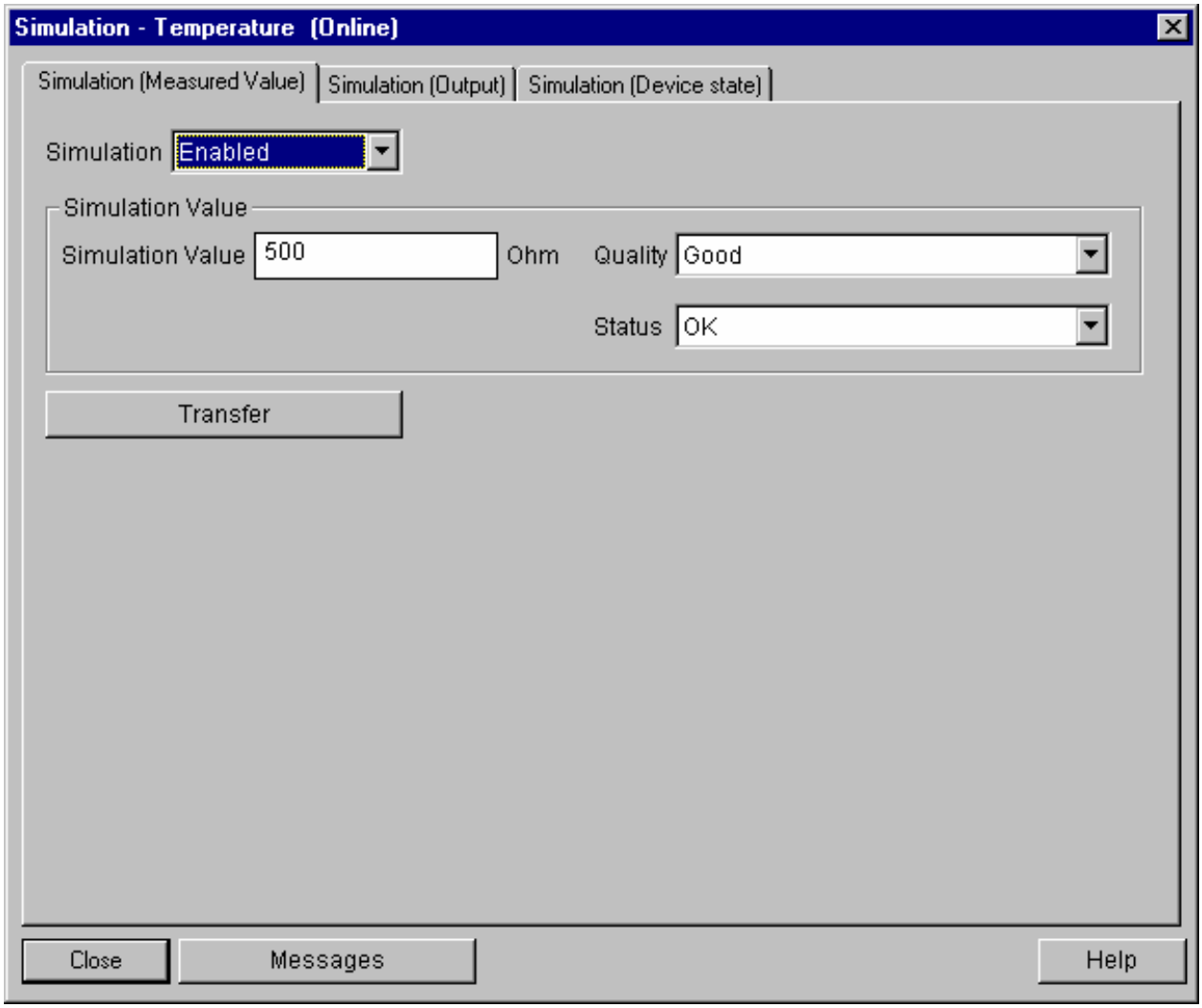


Figure 3–5 PDM Simulation Window for SITRANS-T3K

3.9 Configuring *4-mation* to Communicate with PROFIBUS Field I/O

This step maps PROFIBUS I/O data to *4-mation* I/O channels. This subsection focuses upon methods of determining and setting *4-mation* softlist parameters that are unique to the PFM. This section does not discuss in detail softlist parameters that are common to APACS+ I/O channels. A more expansive discussion of softlist parameters for the PFM is found the configuration Guide *APACS+™ I/O Module Configuration for Version 4.40 or Higher* (CG39-24, Rev 3. or higher).

Prerequisite knowledge:

- The PROFIBUS configuration and the characteristics of the I/O data it communicates, including DP and PA PROFIBUS addresses and PROFIBUS data types.
- Characteristics of the APACS+ system and its controller (type, memory, node-rack-slot address).

Prerequisite skill: the ability to create, modify, and transfer *4-mation* configurations and to understand the implications of these actions.

Prerequisite system:

- DP network configured with COM PROFIBUS, and loaded into the PFM master (subsection 3.4)
- PA devices configured with Simatic Manager PDM (subsection and 3.7) if PA devices are part of the network.

1. On the engineering workstation with a MODULBUS interface, start *4-mation* by selecting Start > Program > ProcessSuite > APACS+ > 4-mation 4.40 MBUS.

2. Open an online or off line *4-mation* configuration. The discussion to follow assumes an offline configuration later transferred to an online configuration.

NOTE

Whenever you transfer and offline configuration to an on-line PFM, the PFM reports an error condition that must be manually cleared before the PFM can communicate channel data with *4-mation*. The error message is not cause for alarm It merely ensures that the intention to change the PFM configuration is understood and acknowledged. The error message is shown in Figure 3–6. Clear the error by clicking its description in the CURRENT ERRORS box. When an error is displayed you can read on-line information about it by clicking the Detail button.

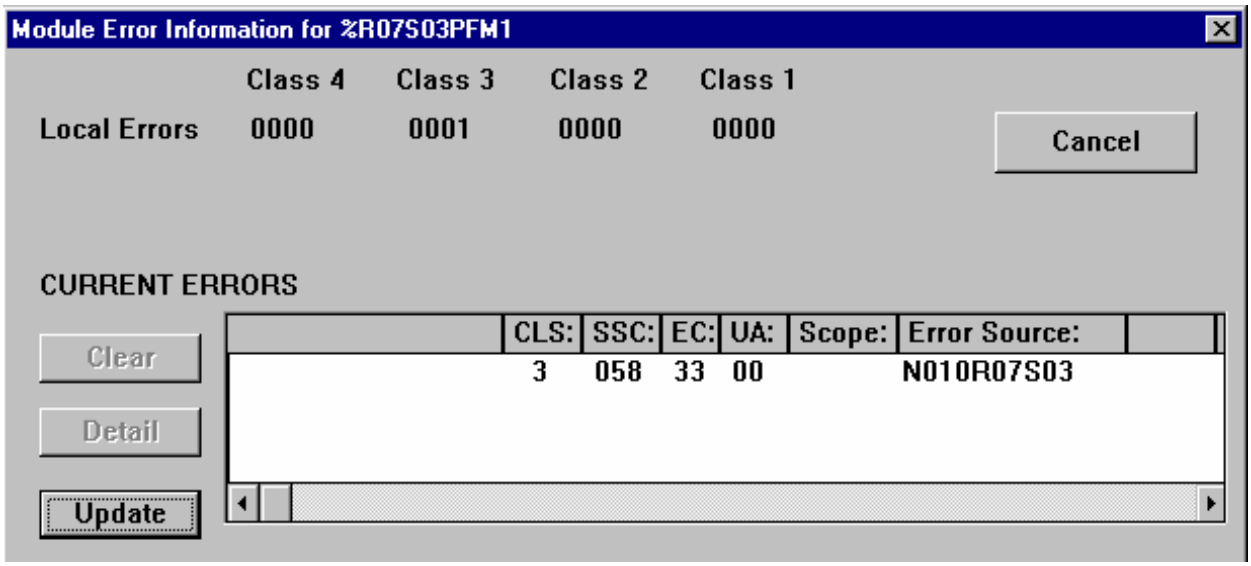
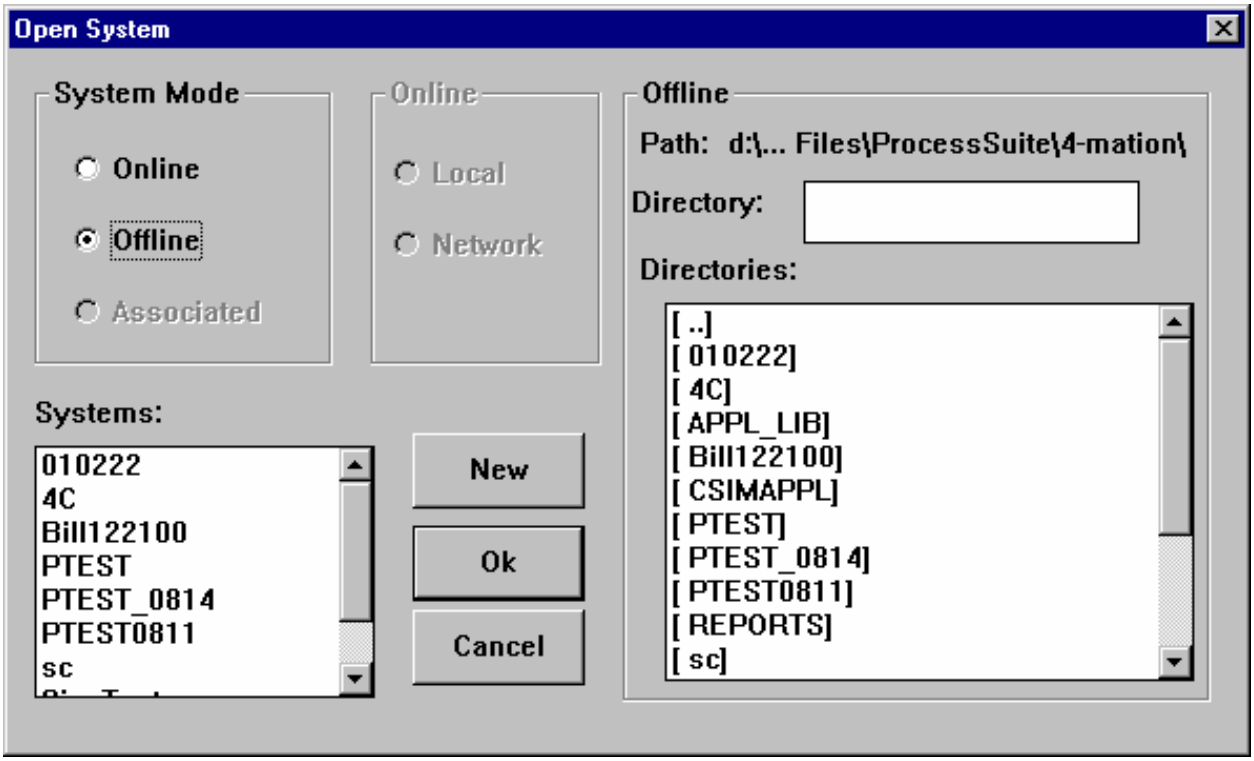
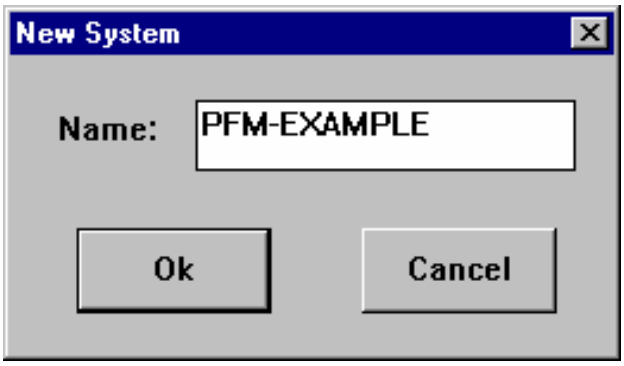


Figure 3–6 Error Message When PFM Configuration Changes

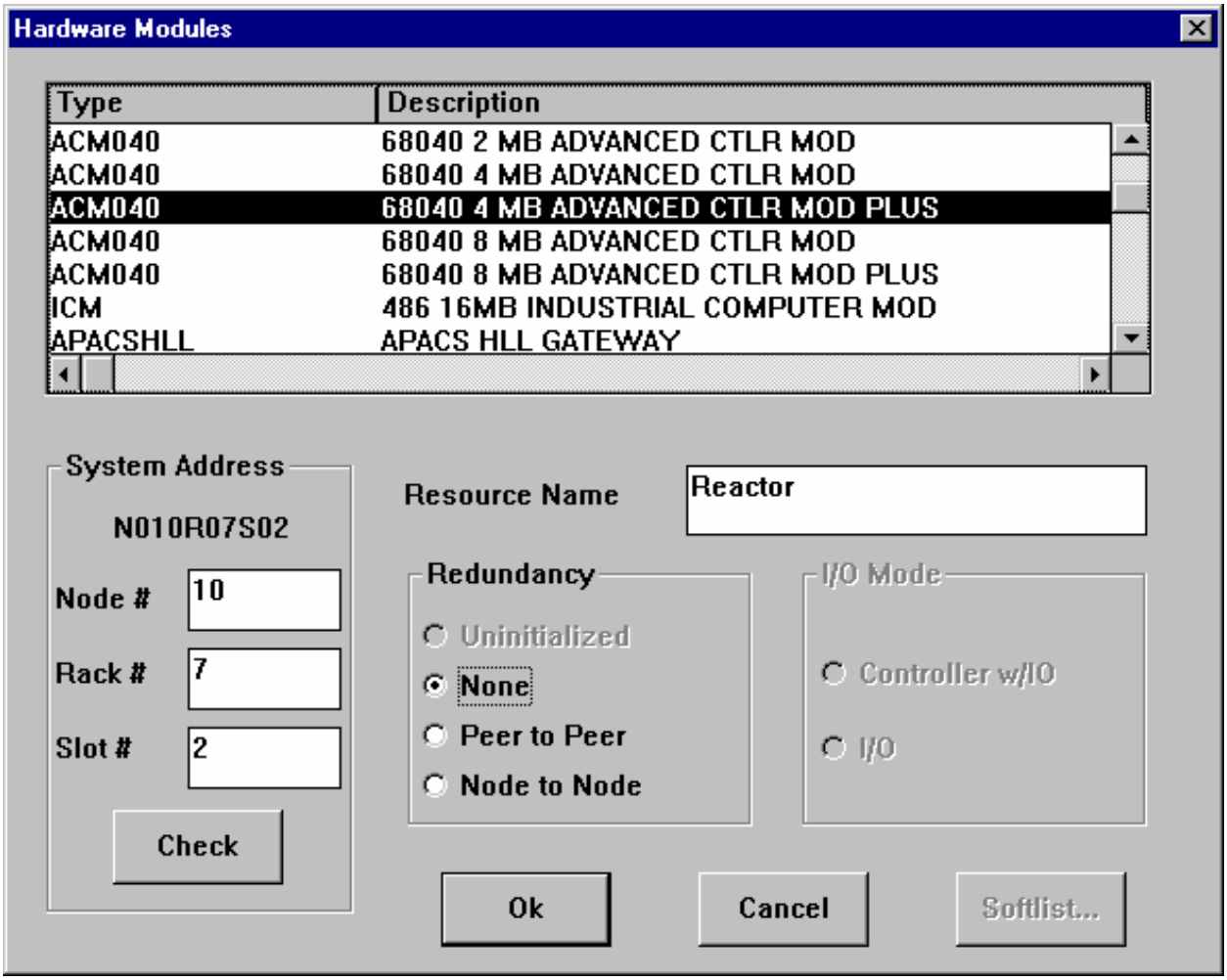


3. When prompted, give the configuration a name and click the OK button:



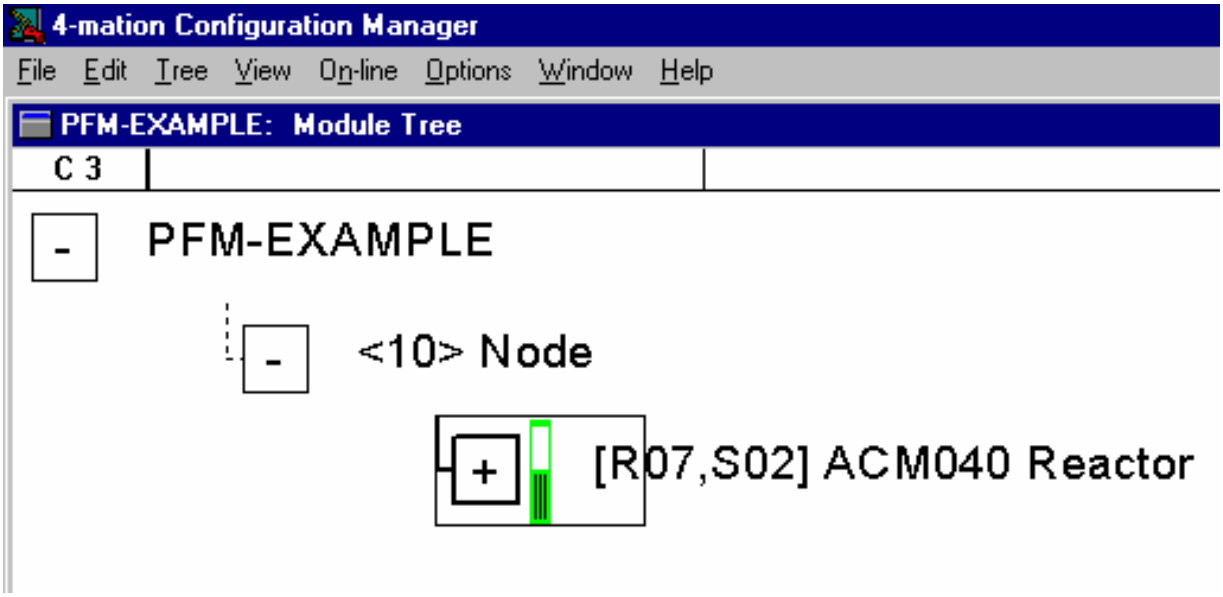
4. Click the Add button

A list of available hardware modules appears:



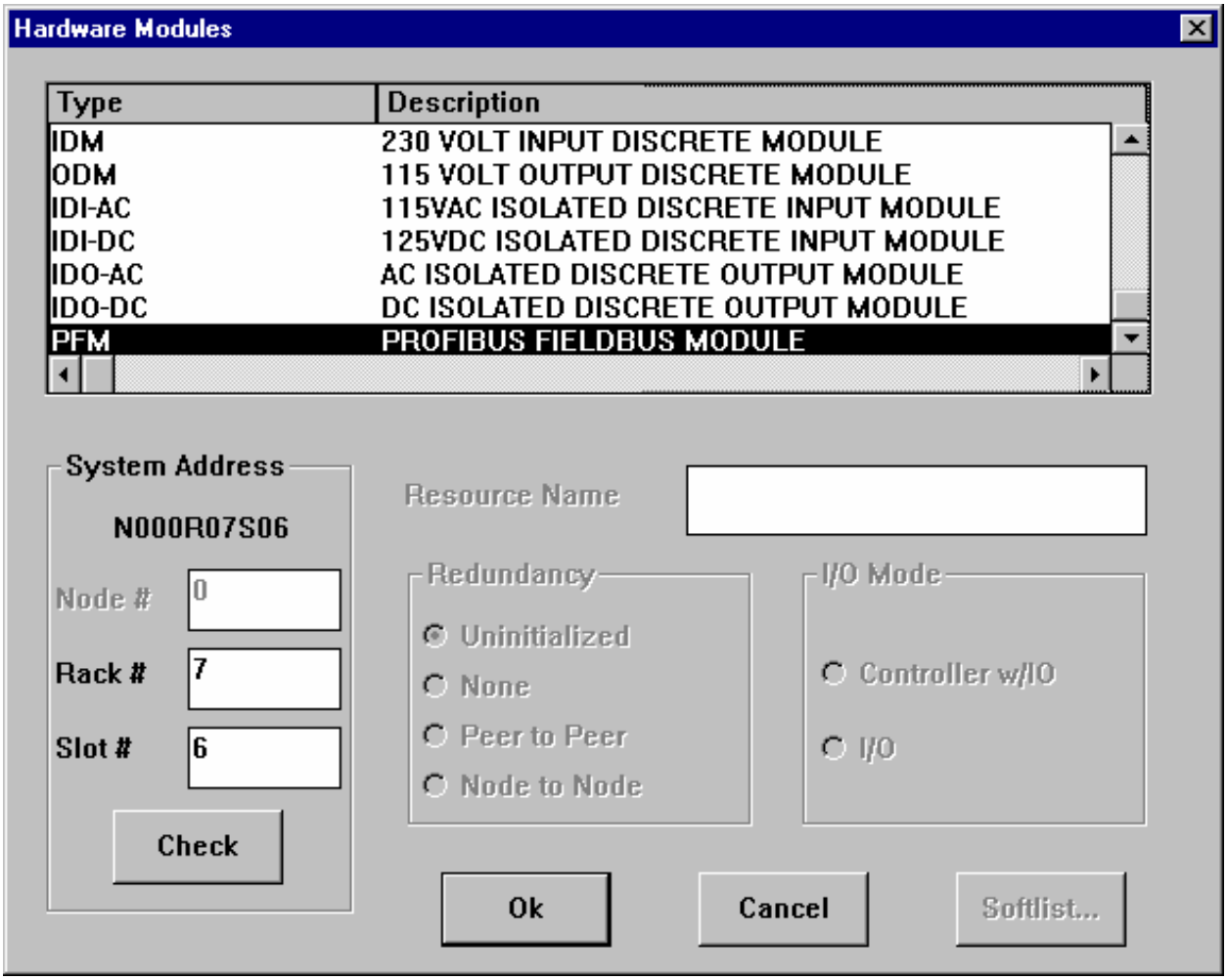
5. Select from the list provided the proper controller, then
   - Enter node-rack-slot information
   - Select redundancy scheme (node-to-node is not supported by PFM)
   - Assign the controller a name

   Click the OK button when you have finished.
   The *4-mation* module tree opens:



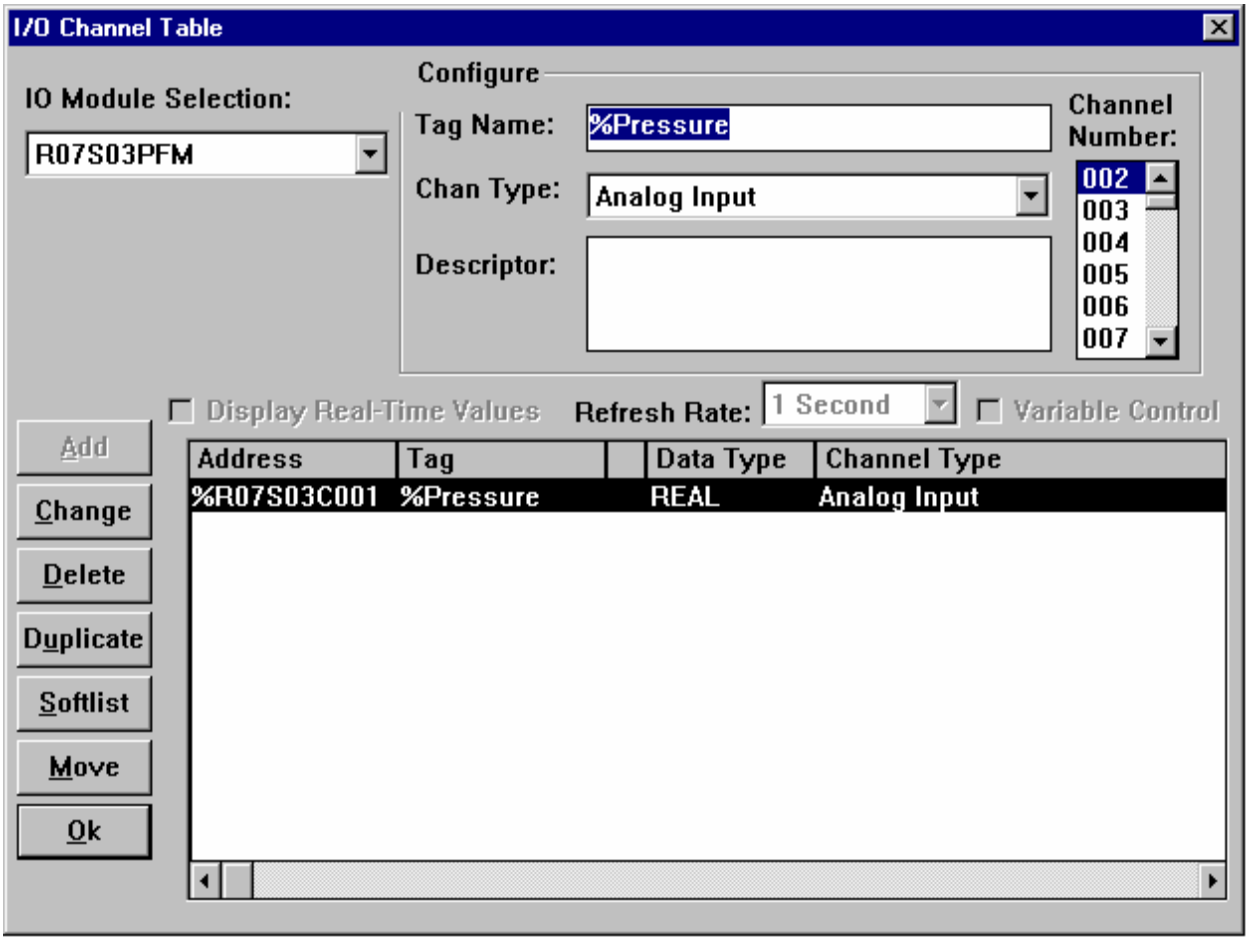
6. Select the controller module and click the Add button at the bottom of the window:

7. Add the PFM module, assigning it a proper node-slot-rack address:

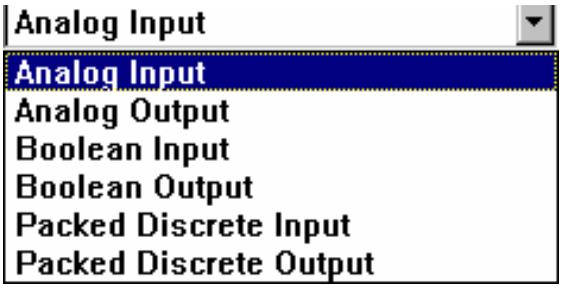


8. Add other devices in the configuration.

9. Double-click on the PFM in the module tree.
   The I/O Channel Table window opens:



10. For each PROFIBUS field I/O point in turn, assign a channel, selecting among the available channel types:

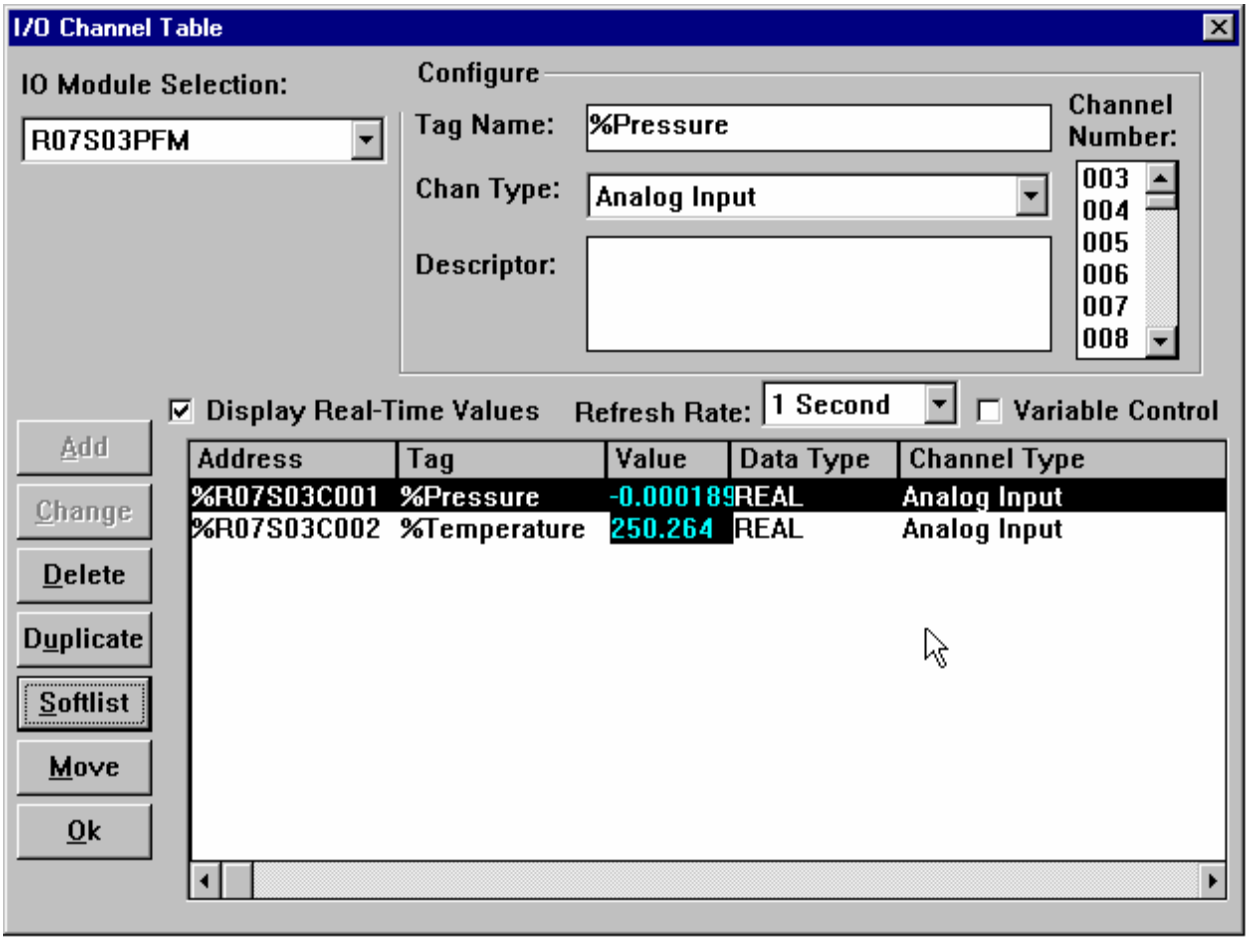


    You can also give the channel a name or tag identification.

11. Click the Softlist button to open the softlist parameters window. Set the softlist parameters. (See Section 3.11 for details about the Softlist parameters that are unique to PROFIBUS channels).

12. If the configuration developed thus far is satisfactory, it is prudent to ensure that it is saved off line. At this point you can perform some initial, cursory checks to confirm that the system is functional.

With an online configuration, it is possible in *4-mation* to double-click the PFM in the module tree and display the I/O Channel Table window. Clicking the Display Real Time Values checkbox produces a update of the current value of input channels as they are scanned:



Comprehensive testing of this kind requires the services of staff who are able to force field I/O to inject values into the channels scanned by *4-mation*. Similarly, by enabling variable control on output channels, it may be possible to compare expected results with observed results.

Keep in mind that the PDM program can also force devices to output simulated values. See subsection 3.8.2

3.10 Installing the COM PROFIBUS and Simatic PDM Licenses

The Simatic PDM license is distributed on one ore more Siemens diskettes, depending upon available options. This disk labeled “AuthorsW” contains the SIEMENS Authorization Tool software. Authorization to use the PDM program, like a token, can be transferred, but not duplicated. Authorization can exist either on the distribution diskettes or on a hard disk drive, but not both simultaneously. It is not possible to copy the authorization by copying diskettes or the hard disk drive.

To manage authorization, the program AuthorsW.exe does the following:

- Displays the current Simatic licensing installation on all the local disks on the workstation or laptop from which AuthorsW.exe has been run

- Installs licensing from diskette to a hard disk drive

- Returns licensing from hard disk drive to diskette

A text file on diskette titled “Readme.txt” provides detailed instructions for using the program and important cautions about its licensing restrictions. These include discussion of

- Prohibitions forbidding write-protecting diskettes.
- Damage to the licensing authorization due to computer virus
- Cautions against running a disk-optimizing program (defragmenter) on a hard disk drive with licensing installed
- Partial backup of licensing authorizations
- Securing emergency, temporary licensing in the event of a catastrophic failure
- Prohibitions forbidding changing names and attributes of files and directories created by the program

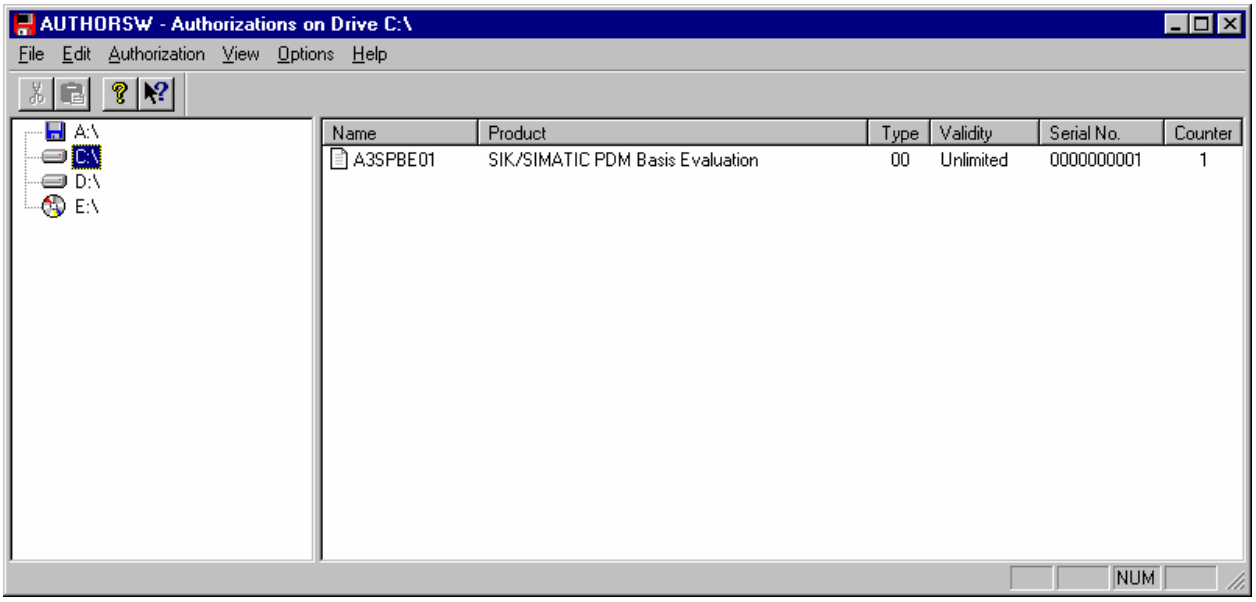
WARNING

The authoritative source of information on topics related to licensing is the text file on diskette titled “Readme.txt.” Failure to heed the information in this file could result in data loss and an inability to run configuration programs.

Having read and understood the text file on diskette titled “Readme.txt,” installation of the licensing authorization is straightforward.

1. Insert the diskette containing AuthrorsW.exe authorization in your diskette drive.

2. Run the program AuthorsW.exe
   A window opens showing the authorizations for the mass storage medium selected in the left pane. In the window shown below, the authorizations for the selected Drive C: are displayed.



3. To move an authorization from one drive to another, drag it from the right pane and drop it on the appropriate drive on the left pane. In the illustration above, it would be possible to remove authorization to run SIK/SIMATIC PDM Basis Evaluation from the selected drive (C:\) and either return it to the authorization diskette (A:\) or move it to another drive.

4. When you have made desired changes, wait for drive LEDs to stop, and click File > Exit.

3.11 PFM Softlist Parameters

3.11.1 PFM Channel Types

In the PFM, channel type refers to *4-mation* I/O channels. PROFIBUS data type refers to data and data structures defined by PROFIBUS specifications. Channels in parentheses (X) are default mappings. If in *4-mation* you define a channel as an analog input, for example, the default PROFIBUS data structure is a DP INT16.

Table 3–1 Data to Channel Type Mapping

PROFIBUS Data Types	PFM Channel Types					
	Analog In	**Analog out**	**BOOLEAN In**	**BOOLEAN Out**	**Packed Discrete In**	**Packed Discrete Out**
PA BOOLEAN			X	X		
DP BOOLEAN			X	X		
DP UINT8			(X)	(X)	(X)	(X)
DP UINT16	X	X	X	X	X	X
DP UINT32	X	X				
DP INT8	X	X				
DP INT16	(X)	(X)				
DP INT32	X	X				
DP Float	X	X				
PA Float	X	X				

3.11.2 PFM Module Scope

To examine the softlist parameters that apply to the entire module:

1. In *4-mation*, open the application and display the module tree.
2. Select the PFM module.
3. Select Edit > Object/Item.
4. Select PFM1
5. Select Softlist…
   A window displays the softlist parameters for the module.

ProfiBitRateKbps—a read-only softlist parameter that corresponds to DP baud rate and is given in kbps (default: 1500.0 kbps)

The remaining parameters are reserved for future use.

3.11.3 PFM I/O Channel Common Softlist Parameters

Softlist parameters enable *4-mation* to translate between raw binary field I/O and three supported *4-mation* channel types: BOOLEAN, packed discrete, and analog. Softlist parameters vary according to the channel type.

DP_Slave_Addr—default is 126, which must be changed to the PROFIBUS address assigned to the device. All the APACS+ channels mapped to a multichannel PROFIBUS device have the same DP_Slave_Addr.

Byte_Offset—The Byte_Offset is the distance in bytes between the beginning of an input or output data block in the PFM and the first byte of the channel of interest.

The procedures for determining the Byte_Offset for input channels and for output channels are based upon similar underlying principles. For each of its DP slaves, the PFM allocates an input block and output block in its memory.

A DP device presents its inputs to the PFM in an unstructured I/O string not longer than 244 bytes. The PFM extracts input data from the string and stores it in its input block it has allocated for the device. The block is uniquely identified by the DP slave address of the device that provides the data. The location and length of individual channel data in the block is determined by three softlist parameters: DP slave address of the DP device, the PROFIBUS data type, and the Byte_Offset. For input channels, the Byte_Offset points to the first byte of the channel's data in the PFM input block for the device. For output channels, the Byte_Offset points to the first byte of a channel's output data in the output block.

NOTE

The PFM supports input data lengths of 122 bytes (maximum) and output data lengths of 244 bytes (maximum) for data transfer into field devices.

Determining the byte offset so that you can set a channel's softlist parameters requires an understanding of the device supplying or receiving data.

In the following illustration, an ET200M, a DP slave that connects with a variety of multichannel I/O modules, has a PROFIBUS DP address of 9. The ET200M is connected to three modules, a 4 channel analog input module (4AI), a 4-channel analog output module (4AO), and another 4 channel input module (4AI). The data type for the analog channels is signed 16-bit integer (each channel is 2 bytes long). Given the DP address of the module and the PROFIBUS data type, the Byte_Offset parameter identifies the beginning of individual channel data in the PFM block. As this illustration shows, the PFM block for input channels is separate and distinct from the PFM block for output channels. Note, too, that although the input modules are not contiguous, there are no gaps in the input data block.

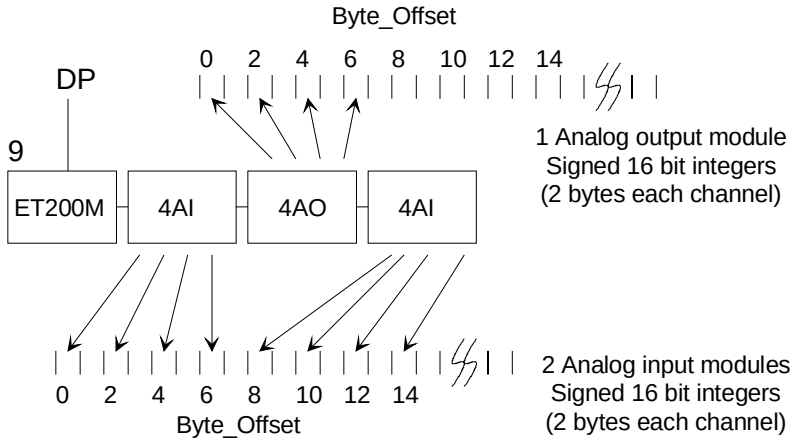


Figure 3–7 Byte_Offset for Typical Input and Output Block

A DP/PA link is another common DP device that sends and receives an I/O string. In the case of the DP/PA link, downstream PA devices supply or receive the I/O data.

In the case of PA devices connected to the PFM through a DP/PA link, the PA input device with the lowest PROFIBUS address has its data stored in the input block of the PFM at Byte_Offset 0. The next PA input device on the bus, in order of ascending PROFIBUS address, has a Byte_Offset equal to the bytes used by the first device. The third input device has a Byte_Offset equal to the bytes used by the first two devices, and so forth. Byte_Offset for output devices is calculated in the same way.

In the illustration below, the DP/PA link device has a PROFIBUS address of 11. The addresses of the PA devices (5, 7, and 8) must be unique to their PA bus, and there may be gaps. In the illustration, the data type of each PA device is a PA floating point structure, which consists of 4 bytes of data and 1 byte of status per channel. The Byte_Offset for the channel associated with the PA address 5 is 0, the Byte_Offset of device with address 7 is 5, and the Byte_Offset of the device with address 8 is 10. See Figure 3–8

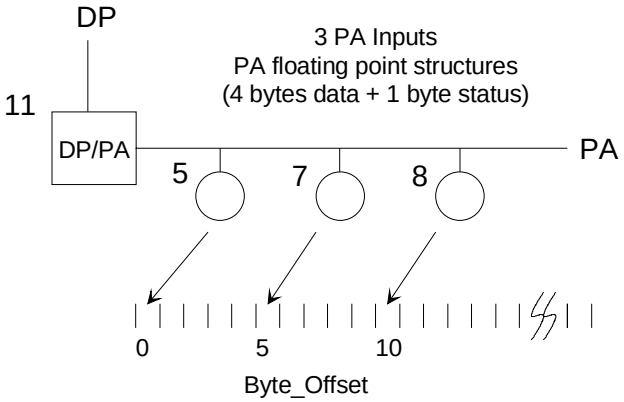


Figure 3–8 Byte_Offset for Typical Input String

Input and output data blocks in the PFM are distinct and independent of one another. The Byte_Offset for an input channel is thus independent of the Byte_Offset for an output channel.

The COM PROFIBUS program provides a useful tool for determining or confirming Byte_Offset:

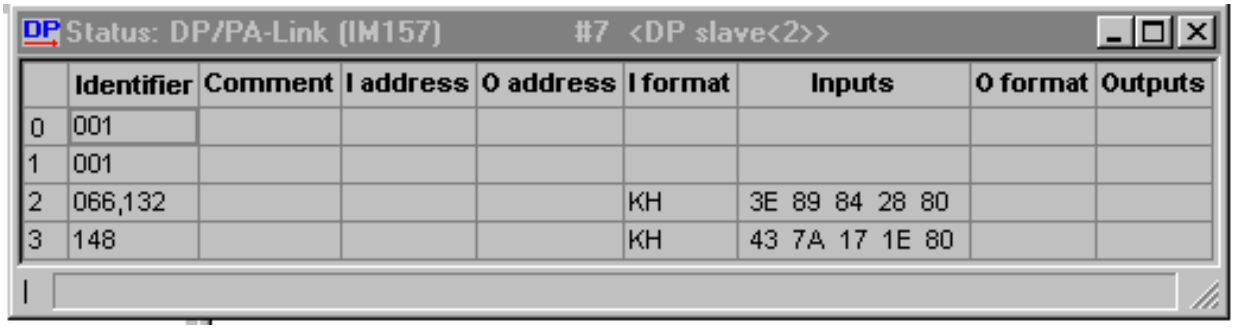
1. With the PROFIBUS network configured through COM PROFIBUS and Simatic PDM, open COM PROFIBUS and either open the current configuration or import it from the DP master

2. Select the DP/PA link.

3. From the menu bar select Services > Observe/Control/Inputs/Outputs.
The resulting display shows the current value in bytes of PA devices connected to the DP/PA link. You can count the bytes of input or output preceding a device of interest to determine the device's Byte_Offset. Keep in mind that the data stream from a PA device includes one byte of status per channel. The illustration below shows data input from two PA floating point devices, both providing four bytes in data and one byte of status (for example, 80 hex).

   In the example, the PROFIBUS PA address of the first device is 5, so the device is located in position 2 (if its PROFIBUS address were 3, the lowest permissible address for a PA device connected to a DP/PA link, the device would be located in position 0). The Byte_Offset of the input channel of the first device, regardless of its address, is always 0.

   The Byte_Offset of the input channel of the next device (in position 3) is 5, which is the number of input bytes preceding it. If there were a device in position 4, the Byte_Offset for its input channel would be 10, again determined simply by counting the preceding input bytes. See Figure 3–9.



	Identifier	Comment	I address	O address	I format	Inputs	O format	Outputs
0	001							
1	001							
2	066,132				KH	3E 89 84 28 80		
3	148				KH	43 7A 17 1E 80		

Figure 3–9 Using COM PROFIBUS to Determine Byte_Offset

Profibus_Slot_Number—in devices with more than one slot (module), the slot number identifies the slot if a PROFIBUS diagnostic message is reported. The Profibus_Slot_Number parameter has no effect on data I/O; it is used only for APACS error reporting.

Profibus_Ch_Number—in devices or modules with more than one channel, the channel number identifies the channel if a PROFIBUS diagnostic message is reported. The Profibus_Ch_Number parameter has no effect on data I/O; it is used only for APACS error reporting.

ProfiDataType—(default in parentheses). Table 3–2 show available PROFIBUS data types and lengths for PFM channels.

PFM Channel	ProfiDataType	Length (bytes)
Analog input (DP INT16) Analog output (DP INT16)	DP UINT8	1
	DP UINT16	2
	DP UINT32	4
	DP INT8	1
	DP INT16	2
	DP INT32	4
	DP Floating Point	4
	PA Floating Point Structure	5
BOOLEAN input (DP UINT8) BOOLEAN output (DP UINT8)	DP BOOLEAN	1
	PA BOOLEAN structure	2
	DP INT8 (as packed discrete)	1
	DP INT16 (as packed discrete)	2
Packed Discrete Input (DP UINT8) Packed Discrete Output (DP UINT8)	DP UNIT8	1
	DP UNIT16	2

Table 3–2 ProfiDataType SoftList Parameters

3.11.3.1 BOOLEAN Input and Output Channels

PA_SlaveAddr—default is 0, and the parameter is only applicable for PA devices connected to the PFM by a DP/PA link. The valid range is 0 through 125, corresponding to the PROFIBUS address of the PA device.

PA_Status—default is 128, indicates the status for the channel for PA devices.

BitNumber—default is 0, applicable only for BOOLEAN channel types mapped to PROFIBUS integer types. The bit number corresponds with the position of the data in the 8 or 16 bit data structure. Valid bit numbers range from 0 to 15, where 0 represents the first bit, and corresponds to labeling on commonly used DP discrete modules. Figure 3–10 shows how a single BOOLEAN value is stored in a DP UINT16 ProfiData type.

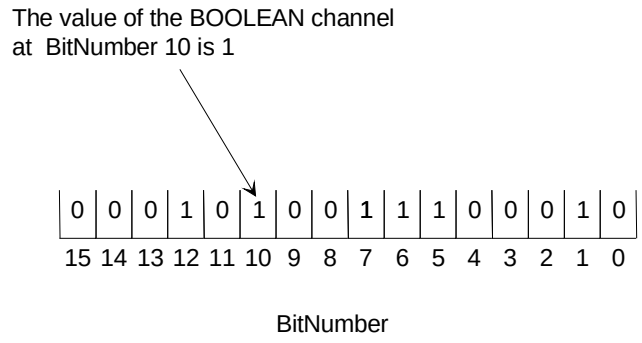


Figure 3–10 BitNumber in DP UINT16 Data Type

Table 3–3 BOOLEAN Input and Output Channels SoftList Parameters

Parameter	Selection	Default
BitNumber	0-15	0
DP_Slave_Addr	1-125 (valid range differs from default value, which must be changed)	126
Byte_Offset	0-243	0
Profibus_Slot_Number	0-63	0
Profibus_Ch_Number	0-63	0
ProfiDataType	DP BOOLEAN PA BOOLEAN Structure DP UINT8 DP UINT16	DP UINT8
PA_SlaveAddr		0
PA_Status	(input:read only, output: read/write 0-255) USINT	128

3.11.3.2 Packed Discrete Input and Output Channels

Table 3–4 Packed Discrete Input and Output SoftList Parameters

Parameter	Selection	Default
DP_Slave_Addr	1-125 (valid range differs from default value, which must be changed)	126
Byte_Offset	0-243	0
Profibus_Slot_Number	0-63	0
Profibus_Ch_Number	0-63	0
ProfiDataType	DP UINT8 DP UINT16	DP UINT8

The byte order of I/O values differs in *4-mation,* a DP slave, and COM PROFIBUS. For example, the bytes of a 16-bit packed discrete data type of a PROFIBUS DP slave with I/O value of 0xE65A is maintained as 0xE65A in *4-mation,* but byte-swapped to 0x5AE6 when displayed by COM PROFIBUS. See Table 3–5.

Table 3–5 Byte Order of Packed Discrete I/O Channel Data

Software environment	Value	
4-mation	E6	5A
	1110 0110	0101 1010
Slave Device	E6	5A
	1110 0110	0101 1010
COM PROFIBUS	5A	E6
	0101 1010	1110 0110

Any desired changes in the positions of bits can be accommodated in *4-mation* using fan-in and fan-out function blocks, which provide complete flexibility in encoding or decoding packed discrete data types. See Figure 3–11, Figure 3–12, Figure 3–13, and Figure 3–14.

Figure 3–11 shows a fan-out function block that takes a 16-bit packed discrete input channel as its input and produces 16 BOOLEAN outputs.

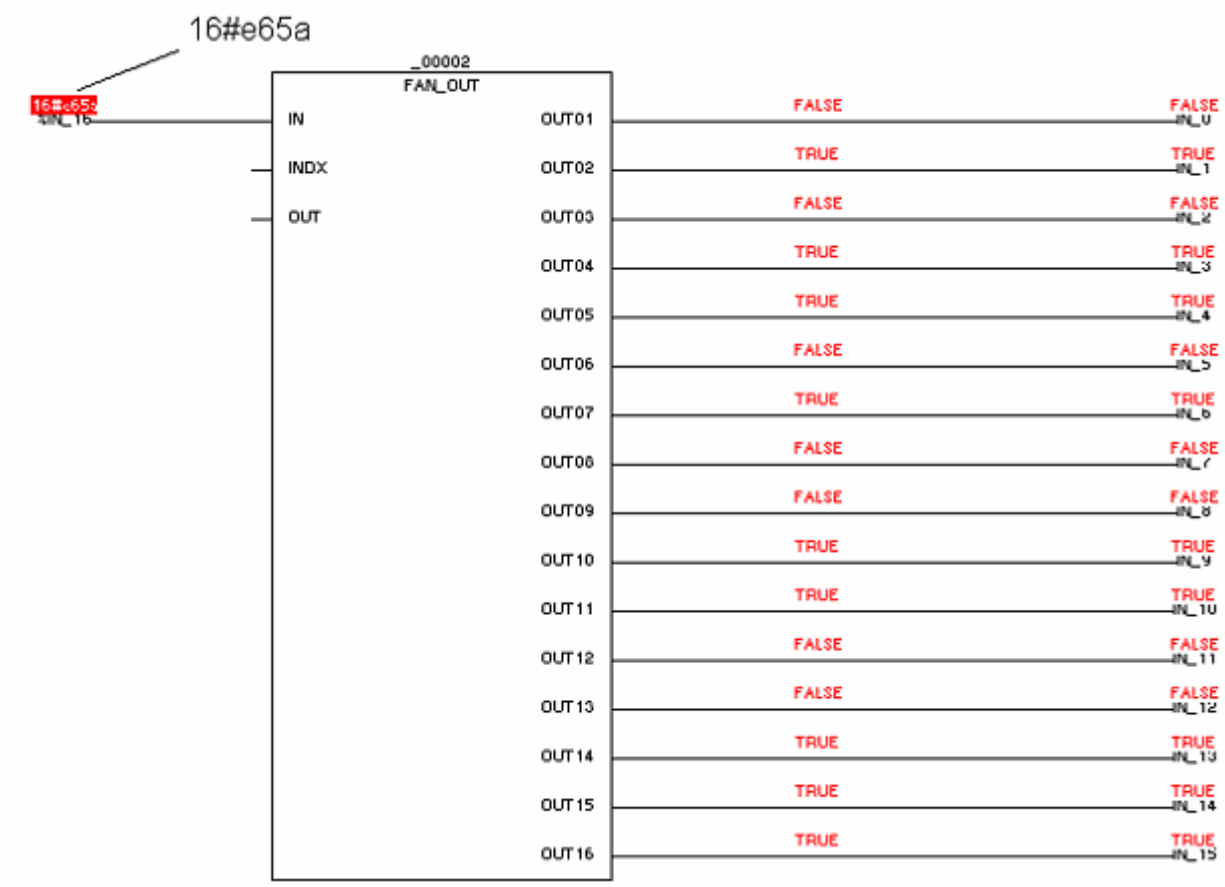


Figure 3–11 Fan-Out to 16 Bits

Figure 3–12 shows a fan-in function block that converts 16 individual BOOLEAN input tags to a 16-bit packed discrete output channel.

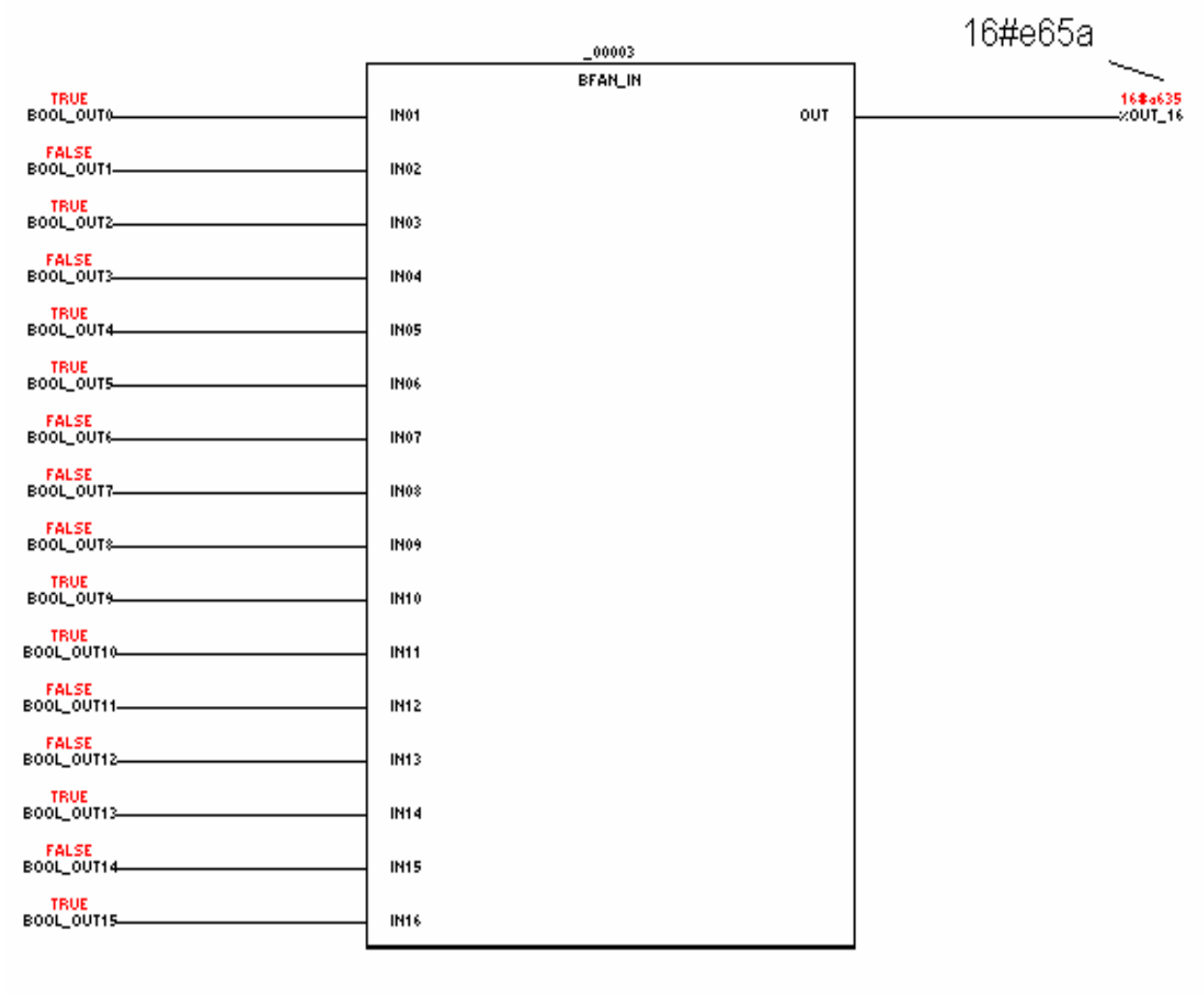


Figure 3–12 Fan-In from 16 Bits

Figure 3–13 shows a fan-out function block that takes an 8-bit packed discrete as its input and produces 8 BOOLEAN outputs.

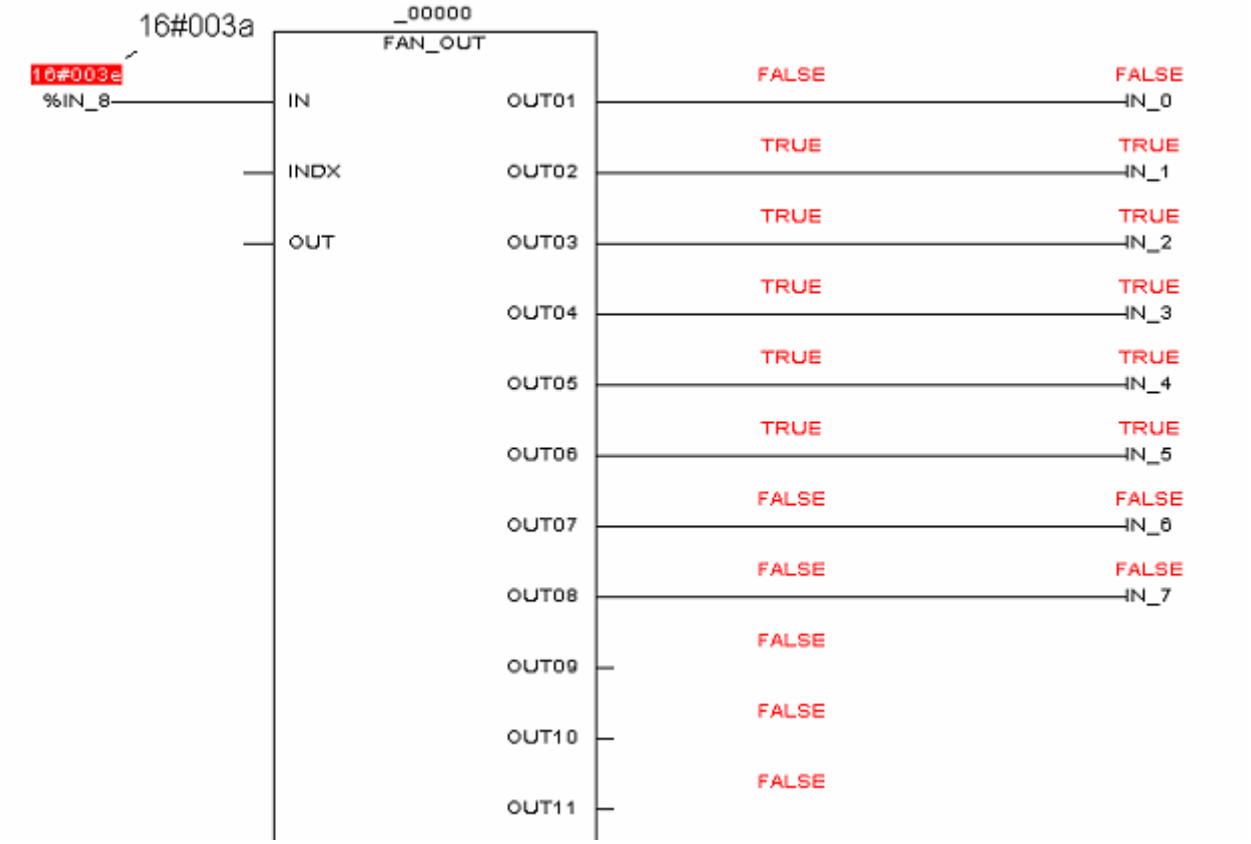


Figure 3–13 Fan-Out to 8 Bits

Figure 3–14 shows a fan-in function block that converts 8 individual BOOLEAN input tags to an 8-bit packed discrete output channel.

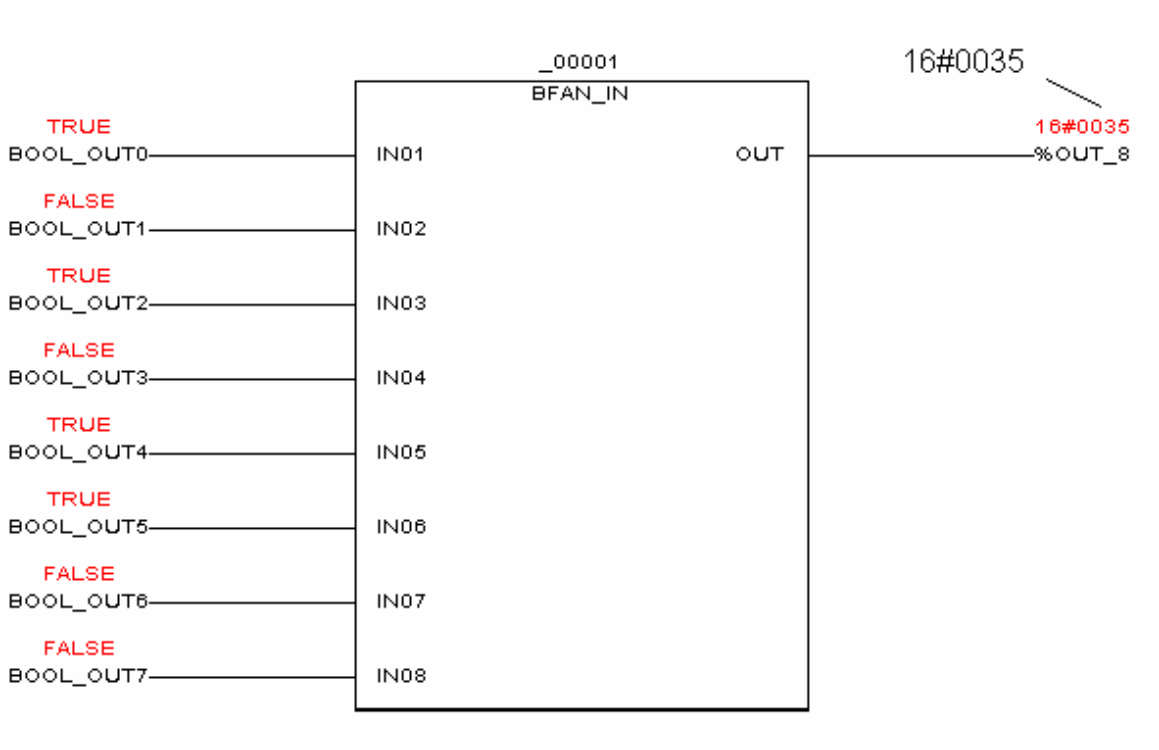


Figure 3–14 Fan-In from 8 Bits

3.11.3.3 Analog Input and Output

The PFM Analog input and output channel types use real (REAL) variables. The softlist parameters Bias, Min_Scale, Max_Scale, RawLo, and RawHi are all interrelated by equations provided in subsection 3.11.4.

Table 3–6 shows the softlist parameters for the analog channel types.

Table 3–6 Analog Input and Output SoftList Parameters

Parameter	Selection	Default
Min_Scale	Any Real Number	4
Max_Scale	Any Real Number	20
EngUnits	in, ft, mm, cm, m, in3, ft3, bbl, ml, liter, m3, lb, ton, mol, g, kg, ft/sec, m/sec,ft/sec2, msec2, DegF, DegR, DegC, DegK, psi, psia, psig, InH2O, InHg, ATM, kPa, kPaa, kPag, mmHg, kg/cm2, mbar, bar, lb/ft3, g/cm3, kg/m3, mol/m3, ft3/lb, m3/kg, ppm, pH, PPH, KPPH, t/day, kg/hr, kg/day, gal/min, GPM, GPH, GPD, ACFM, ACFH, SCCM, SCFH, SCFM, MCFH, yd3/hr, yd3/day, BPD, gal/hr, gal/day, m3/hr, m3/day, l/min, l/hr, l/day, mV, Volts, mA, AMPS, Ohms, mhos, W, kW, MW, Btu, Btu/SCF, Btu/lbm, Btu/hr, hp, bhp, vars, VA, kVA, joules, Percent, pulses, Hz, rpm, deg, rad, cal, cal/SCF, cal/hr, cal/lbm, kcal, kcal/SCF, kcal/hr, kcal/lbm	mA
RawLoCounts	INT	-27648 (0x9400)
RawHiCounts	INT	27648 0x6c00)
DigFiltTimeCnst (input only)	0.0 to 159.0 sec	0.0
Bias	Any Real Number	0.0
DP_Slave_Addr	1-125 (valid range differs from default value, which must be changed)	126
Byte_Offset	0-243	0
Profibus_Slot_Number	0-63	0
Profibus_Ch_Number	0-63	0
ProfiDataType	DP UINT8 DP UINT16 DP UINT32 DP INT8 DP INT16 DP INT32 DP Floating Point PA Floating Point Structure	DP INT16
PA_SlaveAddr		0
PA_Status	(input:read only; output:read/write, 0-255)USINT	128

PA_SlaveAddr—default is 0, and the parameter is only applicable for PA devices connected to the PFM by a DP/PA link. The valid range is 0 through 125, corresponding to the PROFIBUS address of the PA device.

PA_Status—default is 128, indicates the status of the channel for PA devices.

EngUnits: Engineering units for the scaled value can be selected from a list of common engineering units.

DigFiltTimeCnst: (Input only) Digital filtering can be applied to analog input signals to reduce the effects of electrical noise. The digital filter is a first-order lag, adjustable for time constants of 0.0159 to 159.0 seconds (0.0 disables the filter). Equivalent breakpoint frequencies are 10.0 to 0.001 Hz. The default value can be increased for noisy signals.

Figure 3–15 shows the step release time of the digital filter.

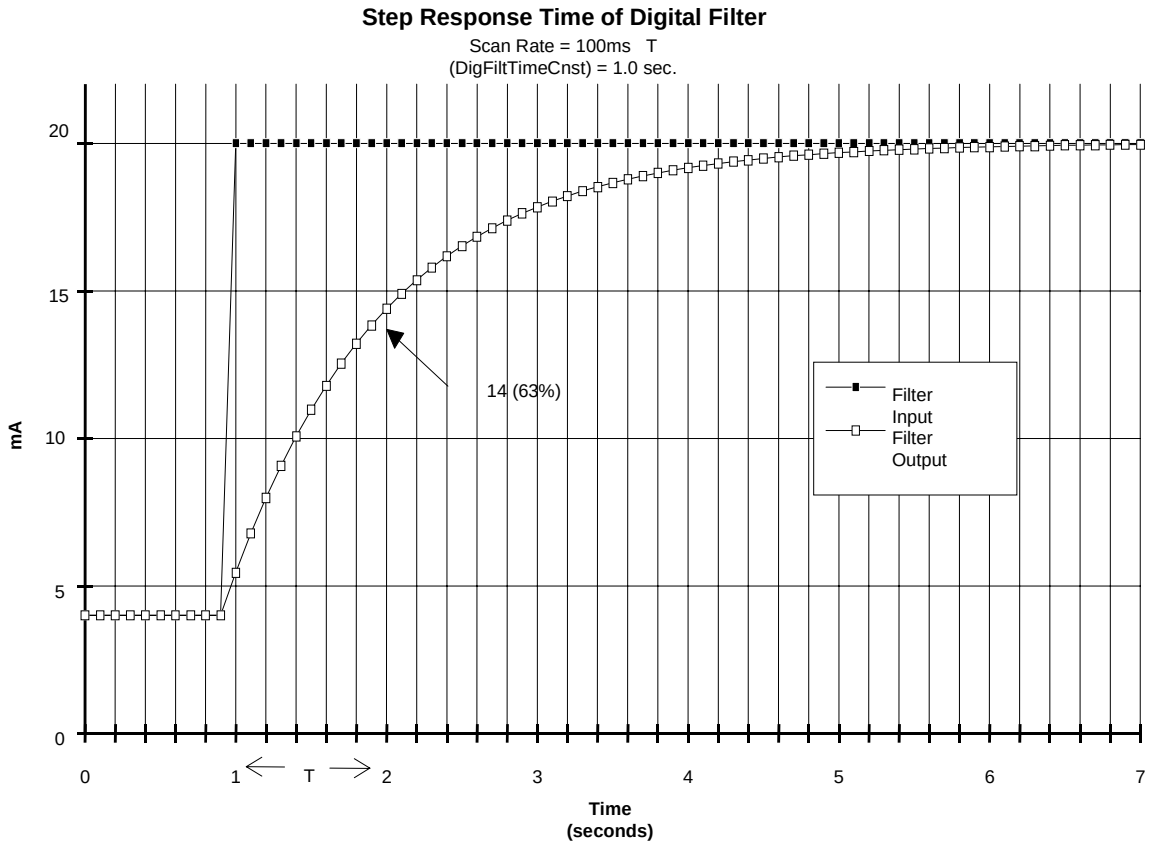


Figure 3–15 Step Time Response of Digital Filter

3.11.4 Mapping Analog Channels to PROFIBUS Integer Data Types

Bias: The user can enter a bias (in engineering units) on a per channel basis to compensate for known offsets. The bias value is added to a scaled input or subtracted from a scaled output.

Min_Scale/ Max_Scale: The module linearly scales raw data to engineering units for each channel. The scaling algorithm (equation below) uses the Min_Scale/Max_Scale parameters set by the user.

For example, given a 4 to 20 mA input, a MinScale of 0.0 and a MaxScale of 100.0; if the input to the channel is 12 mA, the scaled value is 50.0.

Min_Scale and Max_Scale can be any real (REAL) number (Real numbers are valid between -3.4028E38 and +3.4028E38.)

RawLoCounts: specified by the user to define the value of the associated process variable. The default is –27648 (0x9400) when the channel value equals min scale.

RawHiCounts: specified by the user to define the value of the associated process variable. The default is 27648 (0x6c00) when the channel value equals max scale.

Equations describe how analog values are mapped to integers. The result of equation (1) is used in equations (2) and (3).

APACS output analog channel mapped to PROFIBUS integer analog output:

$$counts\ per\ unit = \frac{(RawHiCounts - RawLoCounts)}{(Max\_Scale - Min\_Scale)} \quad (1)$$

$$PROFIBUS\ value = RawHiCounts - ((Max\_Scale - (Analog\ value - Bias)) * counts\ per\ unit) \quad (2)$$

NOTE

MaxScale may be less than MinScale, as might be required by a "reverse acting" device such as a reverse acting valve.

APACS analog input channels mapped to PROFIBUS integer analog input:

$$APACS\ value = \left(Max\_Scale - \frac{(RawHiCounts - PROFIBUS\ value)}{counts\ per\ unit} \right) + Bias \quad (3)$$

3.11.5 Out of Range Errors

Range is defined as Max_Scale – Min_Scale. The *4-mation* program sets an out-of-range error for a channel value that exceeds the absolute magnitude 0.05 x range (5%). A built-in hysteresis mechanism prevents the error from clearing until the channel value falls to the absolute magnitude of 0.03 x range (3%). See Figure 3–16.

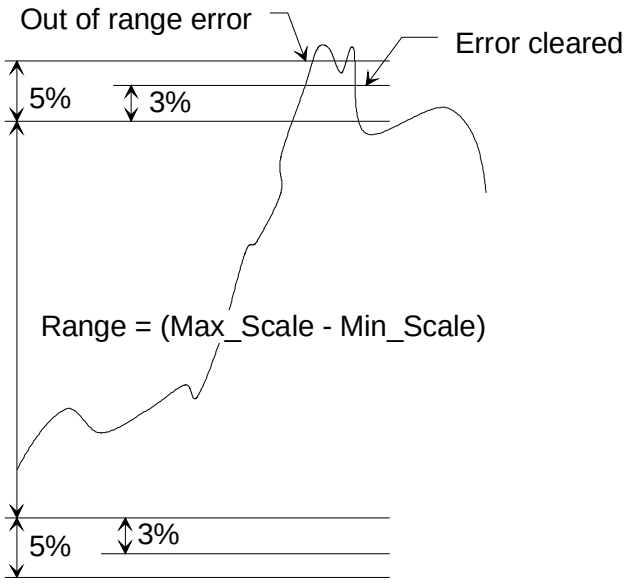


Figure 3–16 Out of Range Error and Hysteresis

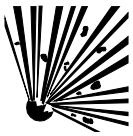
■

Notes

4 Maintenance

This section describes how to maintain the PROFIBUS Fieldbus Module (PFM) and its associated transition board. These items require minimal maintenance. Some routine maintenance is recommended in the form of a visual inspection and possible cleaning. A module's operating status is shown by Light Emitting Diodes (LEDs) located on its bezel. Replacement procedures are provided for the module and its termination board.

DANGER



Explosion hazard

Will cause death, serious injury or property damage

- In potentially hazardous atmosphere, remove power from equipment before connecting or disconnecting power, signal, or other circuit, or extracting/inserting module.
- Observe all pertinent regulations regarding installation in hazardous area.
- Ensure all devices are rated for hazardous (classified) locations.

4.1 Tool Requirements

The following tools are necessary for servicing:
- Common electronic servicing hand tools
- Digital multimeter

4.2 Visual Inspection

The PFM and its associated assemblies should be subjected to periodic visual inspection. The frequency of inspection is dependent on the severity of the operating environment.

The primary aim of the inspection is to reveal any excessive accumulation of dust, dirt, or other foreign material adhering to the surfaces of the termination hardware and protective covers of the module. Accumulation of dirt and dust prevents efficient heat dissipation and can contribute to module or system failure. Refer to section 3.3 for cleaning instructions. Note that a PFM module installed in a cabinet complying with the NEMA (National Electrical Manufactures Association) 12/IP55 specification need not be inspected for cleanliness.

4.3 Cleaning

Cleaning the PFM involves brushing or vacuuming the protective covers to restore cooling efficiency that degrades by the accumulated dust, dirt, or other foreign materials.

Cleaning a transition board consists of careful brushing and vacuuming to remove accumulated dust and dirt harboring chemical particulate that can accelerate terminal or connector contact corrosion. When cleaning the termination hardware area, be careful not to disturb the field wiring.

WARNING

Electrical shock hazard. Remove power from all involved wires and terminals.

4.4 Troubleshooting

A module's operating status and errors are indicated by its status LEDs. Also, error codes and related diagnostic messages are displayed by the *4-mation* configuration software and the Diagnostic Logger utility. Details of error codes and messages are available in the following documents:

- *4-mation Software Messages and Error Codes* (document number CG39-21)
- Module Diagnostic Error Codes (document number CG39-19)

Module status and active channel LEDs are located on the module's bezel. Note LED indications, then refer to Table 4–1 for PFM status and the listed documents to determine the appropriate course of action.

Table 4–1 OK and ACTIVE LED Indications

LED	LED INDICATION	MODULE STATUS	ACTION
OK	Black (Off)	No 24V power input to module Module on-board power supply failure	Troubleshoot or replace 24V power supply Properly seat the module Replace module
OK	Solid Green	Module OK. Configured, with no faults or failures.	Normal, no action required.
OK	Flashing Green/ Black	Module not configured. No faults or failures.	Download configuration
OK	Solid Red	Module severe failure	Replace module
OK	Flashing Red/ Green	Class 2 error detected	Check *4-mation* error description (user action).
OK	Flashing	Class 3 error detected	Check *4-mation* error description

	(1/sec.)Red/Black		(user action).
OK	Flashing (5/sec.)Red/Black	IOBUS communications error	Check control module Check IOBUS cables Replace module
ACTIVE	Solid Green	1. Module in Control (calculate mode)	
	Black (Off)	2. Module in verify mode (or off-line)	

A digital multimeter can be used to test I/O wiring and I/O signals to the termination assembly. Power-off continuity tests can be used to test for correct wiring.

Table 4–2 RN (run) LED Indication

Indication	Meaning
Solid Green	Proper Profibus communications (operate mode). Transfer of the main part of firmware code concluded without error.
Black (off)	The PFM is in stop or offline mode. There has been a system error The PFM is waiting of activation of a transferred configuration
Flashing Green(1/sec, 50% duty cycle)	The PFM is in the clear mode, or the main part of firmware is being loaded.

Table 4–3 BF (Bus Fault) LED

Indication	Meaning
Off	No error, PFM is in communication with all configured slaves.
On (solid red)	Bus error, Possible cause: short circuit on the bus, differing baud rates, HSA less than master address, faulty RS 485 circuit.
Flashing RED (1/sec, 50% duty cycle)	Data communication is not being performed with at least one of the configured slaves. Any slave of the PFM can affect the BF LED. Only slaves that are relevant to PFM I/O channels generate *4-mation* errors.

Another way to troubleshoot the PFM is develop a test configuration using the *4-mation* configuration software. This test configuration is to be used in an off-line service environment. A test configuration can be used to exercise each channel's operation.

To obtain spare or replacement parts, refer to Section 4.7. To return a failed assembly to the factory for repair, refer to subsection 2.1.4. There are no user-serviceable parts within a PFM module.

4.5 PFM Removal/Replacement

During operation, the PFM module communicates with its associated control module (ACM+) over the IOBUS. This bus runs continuously along the backplane of a module rack. A PFM can be removed from or installed into a rack without removing power from the module slot, from field circuits, or from the module rack.

4.5.1 Removal

1. As detailed in Figure 2–3, pull open the bezel's pivoted top and bottom handles to expose the module's slotted captive mounting screws. Loosen the screws.

2. Grasp the top and bottom handles and pull the module from the rack.

3. Place the module in a static shielding bag and package it for safe return. Refer to section 3.9 for return instructions.

4.5.2 Replacement

Follow the procedure in subsection 2.2.3, “Module Installation.”

After replacement, the PROFIBUS master configuration must be exported to the new PFM using COM PROFIBUS.

4.6 Transition Board Removal/Replacement

4.6.1 Removal

Refer to the mechanical details of Figure 2–3.

1. As necessary, take appropriate steps to shutdown the processes monitored or controlled by the field devices connected transition board.

2. Remove the associated PFM from its slot in the rack. Place the module in a static shielded bag for protection.

3. Disconnect PROFIBUS DP cable from the DB-9 connector.

4. As shown in Figure 2–2, use a screwdriver to loosen the transition board from its local termination panel.

4.6.2 Replacement

Follow the procedure in subsection 2.2.1

4.7 Spare and Replacement Parts

One spare PFM should be stocked for every 10 in service. Spare and replacement assemblies can be ordered from one of the addresses in the Warranty statement and the end of this manual or through a local Siemens representative. Assembly part numbers are listed in Section 5 and printed on most modules.

When ordering, provide the model number from the module’s nameplate to be replaced or spared. A purchase order number should also be included.

There are no user-serviceable parts within PFM module. See Section 6 for descriptions of spare and replacement parts

4.8 Maintenance Records

An accurate record keeping system for tracking maintenance operations should be established and kept up to date. Data extracted from the record can serve as a base for ordering maintenance supplies, including spare parts. The record can also be useful as a troubleshooting tool. In addition, maintenance records may

be required to provide documentary information in association with a service contract. It is suggested that the following information be recorded:

- Date of service incident
- Name or initials of service person
- Brief description of incident symptoms and repairs performed
- Replacement part or assembly number
- Software compatibility code of original part
- Software code of replacement part
- Serial number of original part
- Serial number of replacement part
- Issue number of original circuit module
- Issue number of replacement circuit module
- Displayed error codes/channel states from module LEDs, user interface, and configuration software
- Date of completion

■

5 Circuit Description

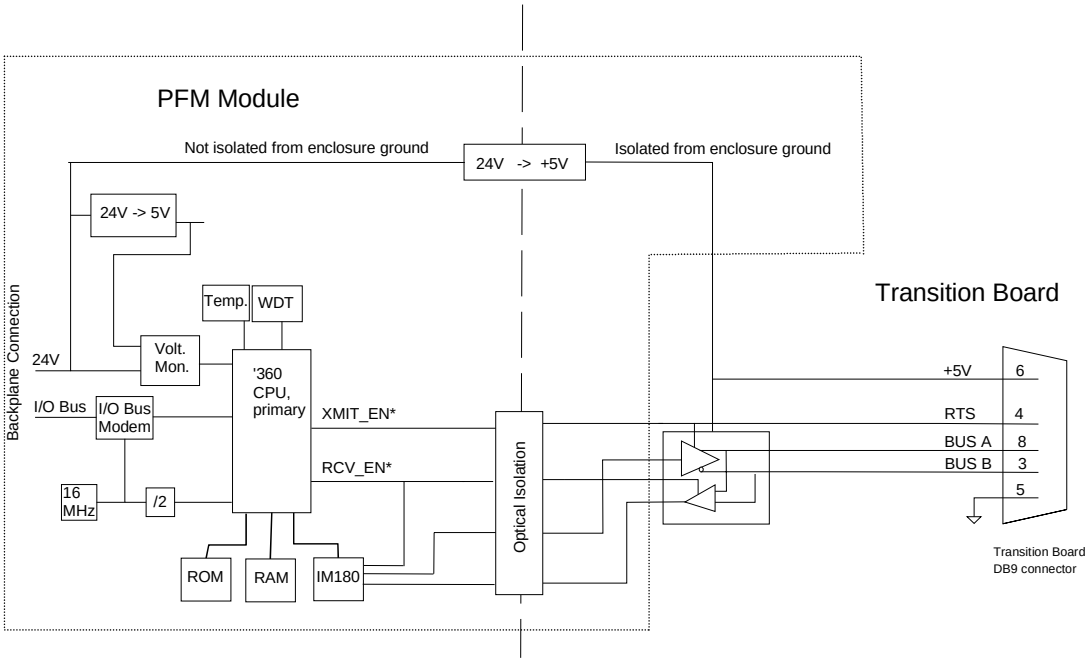


Figure 5–1 PFM Block Diagram

■

6 Parts and Accessories

6.1 Hardware

Table 6–1 PFM and Transition Board Part Numbers

Item	Part Number	Model Number
PFM Module	16440-21	39PFMAAN Not used Hardware compatibility code Firmware compatibility code
PFM Transition Board	16439-1	

Table 6–2 PC PROFIBUS Products

Product Description	Siemens Part Number	Purpose
CP5611 PCI CARD F/PROFIBUS	6GK15611AA00	Installed in a PC running COM PROFIBUS and PDM allowing direct communication to the DP and PA buses.
CP5511 PCMCIA CARD F/PROFIBUS	6GK15511AA00	Installed in a notebook PC running COM PROFIBUS and PDM allowing direct communication to the DP and PA buses.

Table 6–3 DP/PA Link

Product Description	Siemens Part Number	Purpose
PS 307 Power Supply – 2A	6ES73071BA000AA0	24 VDC power supply for a DP/PA link or a coupler
DP/PA Link	6ES71570AA810XA0	Allows integration of a PA bus with the DP bus without restricting DP communication speed.
DP/PA COUPLER NON-EX-VERSION	6ES71570AC800XA0	Allows integration of a PA bus with the DP bus (non explosion proof version)
DP/PA COUPLER EX-VERSION	6ES71570AD000XA0	Allows integration of a PA bus with the DP bus (explosion proof version)
DIN rail – 482 mm	6ES73901AE800AA0	To install DP/PA link or coupler

Table 6–4 PROFIBUS Connectors

Product Description	Siemens Part Number	Purpose
PROFIBUS DP FastConnect Bus Connector (180°, 12Mbit/s)	6GK15000FC00	DP bus connector with switchable terminator
Connector RS 485 (axial)	6GK15000EA02	DP bus connector with switchable terminator
DP Bus connector Fast Connect (90°)	6ES79720BA500XA0	DP bus connector with switchable terminator
DP Bus connector Fast Connect (90°) w/ additional 9 pin Sub-D	6ES79720BB500XA0	DP bus connector with switchable terminator
DP Bus connector (90°) (screw terminals)	6ES79720BA110XA0	DP bus connector with switchable terminator
DP Bus connector (90°) (screw terminals) w/ additional 9 pin Sub-D	6ES79720BB110XA0	DP bus connector with switchable terminator
DP Bus connector (35°) (screw terminals)	6ES79720BA400XA0	DP bus connector with switchable terminator
DP Bus connector (35°) (screw terminals) w/ additional 9 pin Sub-D	6ES79720BB400XA0	DP bus connector with switchable terminator

Table 6–5 Field Devices

Product Description	Siemens Part Number	Purpose
BT200 DP-Test device	6ES71810AA010AA0	Handheld PROFIBUS communication troubleshooting tool.
BT200 TESTING CONNECTOR	6EP81060AC20	
BT200 NC BATTERY	6EP81060HA01	
BT200 TEST CABLE	6EP81060HC01	
BT200 CHARGER 110VAC (V2)	6ES71938LB000AA0	
BT200 PROTOCOL KIT 95/98/NT	6ES71938MA000AA0	
RESISTOR RS485	6ES79720DA000AA0	
BUS TERMINAL 12M W/1,5M CABLE	6GK15000AA10	
S7 RE485 REPEATER,CONN.PRO/MPI	6ES79720AA010XA0	
SpliTConnect Tap, create PROFIBUS-PA segments & connecting PA field devices	6GK19050AA00	PA bus connection
SpliTConnect M12 Outlet, PA field devices to SpliTConnect Tap via M12 connection	6GK19050AB00	PA bus connection

Table 6-5 Field Devices (continued)

SpliTConnect Coupler, coupling element cascades SpliTConnect Taps to create star points	6GK19050AC00	PA bus connection
SpliTConnect Terminator (Ex: flameproof)	6GK19050AD00	PA bus connection
SpliTConnect Terminator (non-flameproof)	6GK19050AE00	PA bus connection

Table 6–6 Cable and Accessories

Product Description	Siemens Part Number	Purpose
100 m PROFIBUS LAN Cable	6XV18300EH10	
PROFIBUS PA Process Cable Blue (IS area)	6XV18305EH10	PA cable for Intrinsically Safe area
PROFIBUS PA Process Cable Black (Non-IS area)	6XV18305FH10	PA cable for Non-Intrinsically Safe area
FastConnect Stripping Tool	6GK19056AA00	Wire stripping tool for PROFIBUS cables
Spare blade cassettes for FastConnect Stripping Tool	6GK19056AB00	Blades for wire stripping tool

6.2 Software

COM PROFIBUS V5.1 (Part Number PS02-2324V3.02) is used to configure master and slave addresses and bus parameters for PROFIBUS DP networks. This software is delivered with the PFM and does not have to be ordered separately as a line item.

PDM V5.1 + SP2 This software is needed to parameterize PROFIBUS DP/PA and/or any HART devices that are connected to the PFM via a linking device or remote I/O module. A control system that does not have any DP/PA or HART devices (connected to the PFM via ET-200M) does not need this software. Customers will have to purchase appropriate licenses (floppies) in order to be able to use PDM. A customer will need to order item 1 and one or more of the options listed in Table 6–7 below.

Table 6–7 SIMATIC PDM V5.1 +SP2

Option Description	Order Number
PDM Starter package V5.1 + SP2 FOR PCS 7 SIMATIC PDM Basic Software. Integration in STEP7/PCS 7, routing, PROFIBUS-DP/PA communication option. Maximum of 128 tags.	6ES7658-3PX01-0YC0
PDM V5.1 + SP2 Basic Package Basic software for operation and parameterization of process devices and components including communication via HART-modem, including RS232, Maximum of 16 tags.	6ES7658-3AX01-0YC0
PDM Maintenance Contract Basic software for operation and parameterization of process devices and components including communication via HART-modem, inlcuing RS232. Maximum of 16 tags.	6ES7658-3XX00-0XX0
PDM V5.1 + SP2 Options for Expansion of Basic Package	
Integration in STEP7/PSC 7	6ES7658-3BX00-2XD0
Routing via S7-400	6ES7658-3CX00-2XD0
Communications via PROFIBUS-SP-PA	6ES7658-3DX00-2XD0
Communications via Standard HART Multiplexer	6ES7658-3EX00-2XD0
Runtime Diagnostics	6ES7658-3FX00-2XD0
Tag Options for Simatic PDM V5.1 + SP2	
Up to 128 Tags	6ES7658-3XA00-2XD0
Up to 512 Tags	6ES7658-3XB00-2XD0
Up to 1024 Tags	6ES7658-3XC00-2XD0
Up to 2048 Tags	6ES7658-3XD00-2XD0
Up to 4096 Tags	6ES7658-3XE00-2XD0
Up to 8192 Tags	6ES7658-3XF00-2XD0
Up to 16284 Tags	6ES7658-3XG00-2XD0

7 Specifications

7.1 PFM Module Specifications

Table 7–1 PFM Module and I/O Specifications

Type	Specification	Data
Module	Module Weight	3.5 lbs. (1.6 kg)
	Module's Input Voltage	24VDC +/- 10%
	Maximum Supply Input Current	0.3 A
	Supply Inrush Current	2.5 A
	Dielectric Strength	Tested with 860 Vdc for 2 second between Profibus (DB9) Connector and chassis
	Heat Dissipation (typical)	8 W.
	Operating temperature	0° to 60°C (32° to 140°F)
	Storage Temperature	-25° to 85°C (-13° to 185° F)
	Operating Humidity	5 to 95% non-condensing
	Storage Humidity	0 to 100%, condensing
	Corrosives	Class GX
Inputs/Outputs	Profibus DP	9.6 Kbps to 12 Mbps
	Number of channels	210 max.
	Channel types supported	AI/AO, DI/DO, Packed DI/DO
	Module Scan Time	100 ms
	Redundancy	Support APACS+ module non-redundant and peer to peer redundant ACM configuration
	Agency Approvals	See module nameplate

7.2 Electrical Classification

7.2.1 Approvals

Table 7–2 Agency Approvals for the PFM

Agency	Standard	Level	Description
UL	UL 508	N/A	Industrial Control Equipment
CSA	C22.2 No. 0, 0.4,142, 213	Class I, Div. 2, Groups A,B,C,D	CLASS 2258 02 - PROCESS CONTROL EQUIPMENT – for Class I, Division 2, Group A, B, C and D Hazardous Locations
FM	Class 3611	Class I, Div. 2, Groups A,B,C,D	Safety standard for electrical and electronic test, measuring, controlling and related equipment for use in Class I, Div. 2 hazardous locations.
CE Mark	EN 50081-2:1993 EN 61000-6-2:1999	N/A N/A	Electromagnetic compatibility - Generic emission standard -Part 2: Industrial environment Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments
PNO	PROFIBUS Certification per EN 50170 (DIN 19245 part 3)	N/A	Interoperability and functional testing as a standard PROFIBUS DP Class1 Master

7.2.2 CSA Hazardous Locations Precautions

This section provides CSA hazardous location precautions that should be observed by the user when installing or servicing the equipment described in this Instruction. These statements supplement those given in the preceding section.

DANGER

Explosion hazard

Will cause death, serious injury or property damage

- In potentially hazardous atmosphere, remove power from equipment before connecting or disconnecting power, signal, or other circuit, or extracting/inserting module.
- Observe all pertinent regulations regarding installation in hazardous area.
- Ensure all devices are rated for hazardous (classified) locations.

Precautions—English

For Class I, Division 1 and Class I, Division 2 hazardous locations:

- Use only factory-authorized replacement parts. Substitution of components can impair the suitability of this equipment for hazardous locations.

For Division 2 hazardous locations:

When the equipment described in this Instruction in installed without safety barriers, the following precautions should be observed. Switch off electrical power at its source (in non-hazardous location) before connecting or disconnecting power, signal, or other wiring.

Précautions—Français

Emplacements dangereux de classe I, division 1 et classe I, division 2:

- Les pièces de rechange doivent être autorisées par l'usine. Les substitutions peuvent rendre cet appareil impropre à l'utilisation dans les emplacements dangereux.

Emplacement dangereux de division 2:

Lorsque l'appareil décrit dans la notice ci-jointe est installé sans barrières de sécurité, on doit couper l'alimentation électrique a la source (hors de l'emplacement dangereux) avant d'effectuer les opérations suivantes branchment ou débranchement d'un circuit de puissance, de signalisation ou autre.

7.2.3 Special Conditions for Safe Use

- Use of the equipment in a manner not specified by the manufacturer may impair the protection provided by the equipment.
- Install the equipment in a metal enclosure.
- Route electrical power to the equipment through a clearly labeled circuit breaker or on-off switch that is located near the station and is accessible by the operator. The breaker or switch should be located in a non-explosive atmosphere unless suitable for use in an explosive atmosphere.
- I/O and I/O wiring must be shielded.
- The last page of this document contains a Declaration of Conformity with the standards or other normative documents stated on the certificate.
- Environmental Conditions, Per IEC 664, Installation Category III, Pollution Degree 2
- A representative unit was tested in accordance with EN50082-2. Test results are available upon request.

■

DECLARATION OF CONFORMITY

according to EN 45014

Siemens Energy & Automation, Inc.
1201 Sumneytown Pike
Spring House, PA 19477

Declare under our sole responsibility that the products,

Profibus Fieldbus Module when labeled with the CE mark

to which this declaration relates is in conformity with the following standards or other normative documents

EN 50081-2:1993 Electromagnetic compatibility - Generic emission standard -Part 2: Industrial environment

EN 61000-6-2:1999 Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments

following the provisions of the:

EMC Directive 89/336/EEC and amended by 91/263/EEC, 92/31/EEC and 93/68/EEC

Manufactured in Spring House, PA U. S. A.

Date: 9/27/01

Peter F. Schiano
Vice President of Systems R & D

European Community Representative

Date: 10/05/01

Benno Grosser
Siemens AG Automation and Drives