

MANUFACTURER DOCUMENT PACKAGE

Manufacturer's Manual

Reference package for procurement and maintenance review

GENERAL ELECTRIC

IC693PBM200-FE

PROFIBUS DP MASTER MODULE

Used with the applicable Series 90-30 configuration.

REFERENCE PACKAGE

OFFICIAL DOCUMENT

Selected official manufacturer pages follow this cover.

Source: GE Fanuc GFK-2121A, Series 90-30 PROFIBUS Master User Manual



GE Fanuc Automation

Programmable Control Products

***Series 90™-30
PROFIBUS Master Module***

User's Manual

GFK-2121A

August 2004

Warnings, Cautions, and Notes as Used in this Publication

Warning

Warning notices are used in this publication to emphasize that hazardous voltages, currents, temperatures, or other conditions that could cause personal injury exist in this equipment or may be associated with its use.

In situations where inattention could cause either personal injury or damage to equipment, a Warning notice is used.

Caution

Caution notices are used where equipment might be damaged if care is not taken.

Note: Notes merely call attention to information that is especially significant to understanding and operating the equipment.

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Chapter 1

Overview and Specifications

This manual provides instructions for installing, programming, and troubleshooting control systems that use the Series 90-30 PROFIBUS master module, IC693PBM200. It is assumed that you have a basic understanding of Series 90-30 PLCs and are familiar with PROFIBUS-DP protocol.

The Series 90-30 PROFIBUS Master module allows the host Series 90-30 CPU to send and receive I/O data from a PROFIBUS-DP network. Its features include:

- supports all standard data rates
- supports a maximum of 125 DP slaves
- supports 244 bytes of input and 244 bytes of output for each slave
- supports Sync and Freeze modes
- has PROFIBUS-compliant Module and Network Status LEDs
- provides an RS-232 serial port (the Service port) for upgrading the firmware

PROFIBUS Information

Please refer to the following sources for PROFIBUS information:

- PROFIBUS standard DIN 19245 parts 1 (low-level protocol and electrical characteristics) and 3 (DP protocol)
- European standard EN 50170
- ET 200 Distributed I/O system, 6ES5 998-3ES22
- IEEE 518 Guide for the Installation of Electrical Equipment to Minimize Electrical Noise Input to Controllers

Related Publications

Series 90-30 PROFIBUS Slave Module User's Manual, GFK-2193

Series 90-30 Installation and Hardware Manual, GFK-0356.

Series 90-30/20/Micro PLC CPU Instruction Set Reference Manual, GFK-0467

Proficy™ Machine Edition Getting Started, GFK-1868

Proficy Machine Edition Logic Developer-PLC Getting Started Guide, GFK-1918

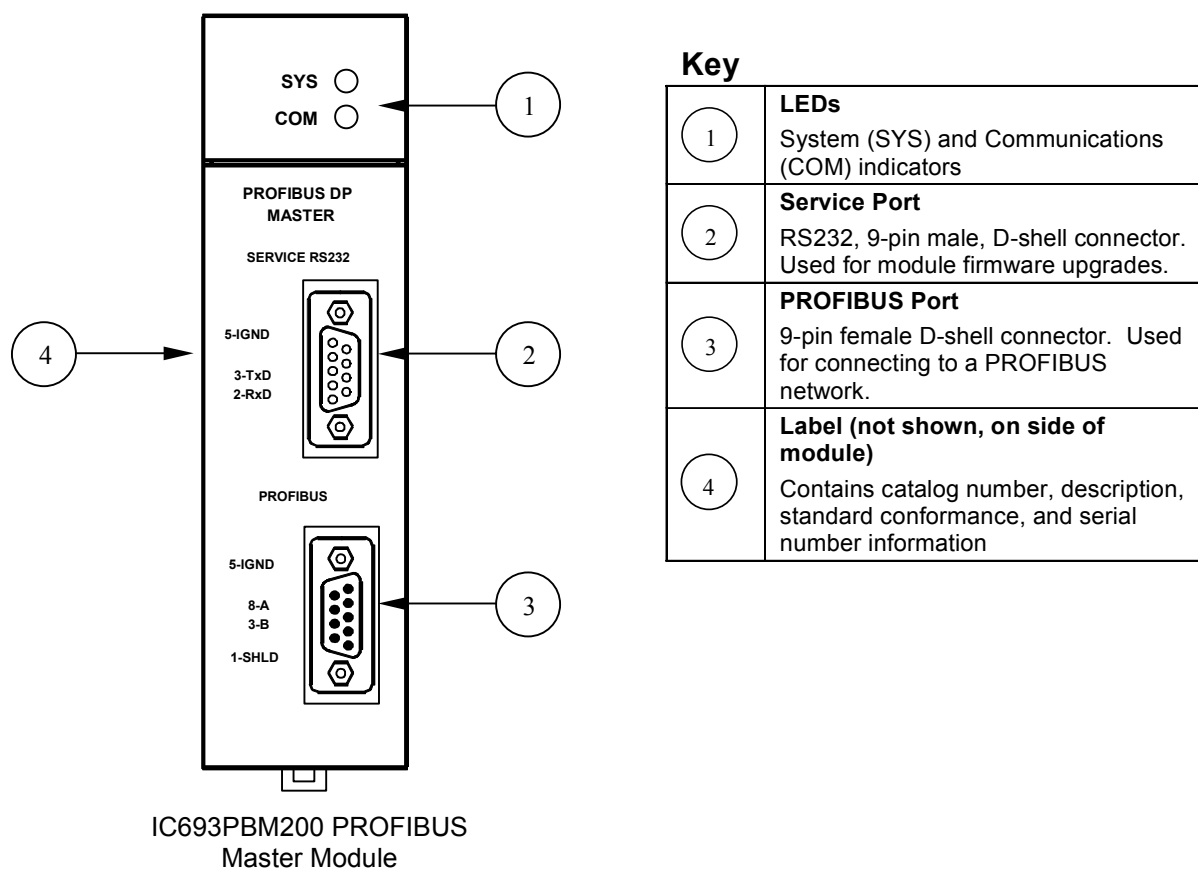


Figure 1-1. PROFIBUS Master Module

Specifications

Catalog Number	IC693PBM200
Description	Series 90-30 Master module for PROFIBUS DP networks
Configuration Software Requirement	Proficy™ Machine Edition Logic Developer version 2.6 or later
CPU Version Requirement	CPU firmware version 8.00 or later
Mounting Location	Any Series 90-30 baseplate (CPU, expansion, or remote) slot except slot 1 of a modular CPU baseplate
Environment	Storage temperature = -40°C to 85°C Operating temperature = 0°C to 60°C
Backplane Current Consumption	450mA @ 5VDC (typical)
Data rates	Supports all standard data rates (9.6K, 19.2K, 93.75K, 187.5K, 500K, 1.5M, 3M, 6M and 12M Baud)
Status Information Available	Slave Status Bit Array Slave Diagnostics/Firmware ID array Network diagnostic counters DP master diagnostic counters Firmware module revision Slave Diagnostic Address

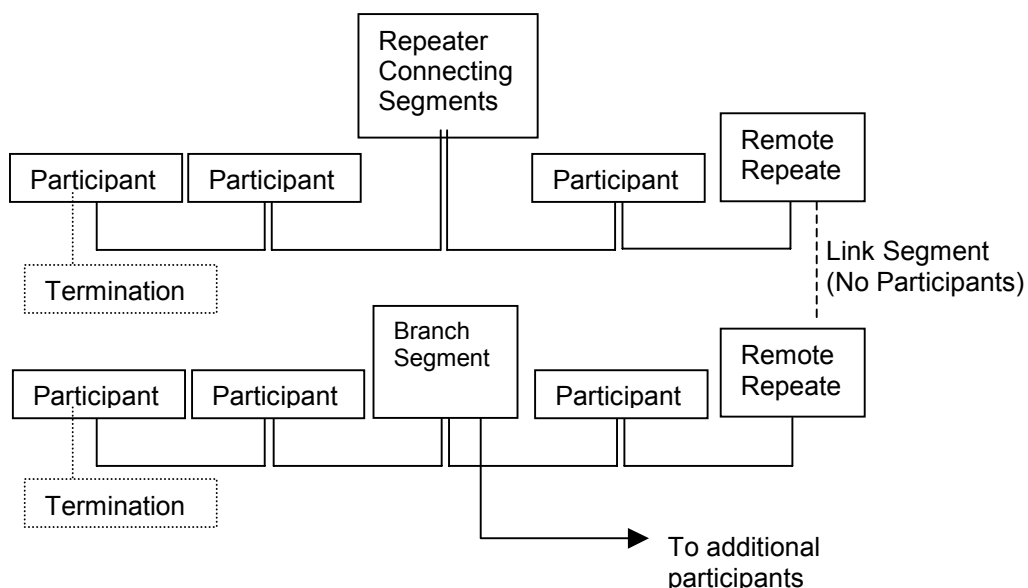


Figure 1-2. Repeaters and Bus Termination

Network Connectors

PROFIBUS connections are typically created with a 9-pin sub-D connector. Other connectors are used for IP67 devices. A minimum connection consists of a shielded twisted-pair cable (shield to pin 1 and twisted-pair wires to pins 3 and 8) with terminating connections in the appropriate bus plugs. The pin-to-signal conventions for a 9-pin sub-D connector are described below.

Pin-out Listing for the PROFIBUS Bus Plug Connector

Pin No.	Signal	Designation
1	Shield	Shield / Protective Ground
2	M24	Ground / Common of the 24V output voltage
3	RxD/TxD-P	Receive data / transmission data plus
4	CNTR-P	Control signal for repeaters (direction control)
5	DGND	Data transmission potential (ground to 5V)
6	VP	Supply voltage of the terminating resistance (+ 5V)
7	P24	Output voltage (+ 24V)
8	RxD/TxD-N	Receive data / transmission data negative
9	CNTR-N	Control signal for repeaters (direction control)

Note: For information on network segment length, network connectors and network termination, and network baud rate, refer to Chapter 2, “Installation.”

Chapter 2

Installation

This chapter contains information on the following procedures:

- Reviewing system power requirements
- Installing the PROFIBUS module in the PLC rack
- Installing PROFIBUS wiring
 - Connecting the Master to the PROFIBUS network
 - Selecting the proper line type
 - PROFIBUS cable types
 - Installing bus termination

Reviewing System Power Requirements

Review the power requirements of your system to ensure that your power supply has sufficient capacity to support the PROFIBUS Master. Power supply load is automatically calculated by the Machine Edition configuration software. Details on manually calculating power supply load can be found in the *Series 90-30 Installation and Hardware Manual*, GFK-0356.

Note: High capacity Series 90-30 power supplies IC693PWR330 or IC693PWR331 are recommended, particularly for systems with CPU350 or higher, or that have Ethernet adapters and/or multiple PROFIBUS modules. The Series 90-30 PROFIBUS Master module consumes 450mA at 5VDC (typical).

Installing the PROFIBUS Module in the PLC Rack

1. Remove power from Series 90-30 rack.
2. Turn off power to rack.
3. Place the module into slot 1 or higher in the rack (slot 2 or higher in the Main rack) by hooking the top of the module on the notch above the slot and slowly lowering the module until it snaps into place.
4. Attach the PROFIBUS cable and terminate as required.

Note: For details about installing Series 90-30 rack systems and modules, refer to the *Series 90-30 Installation Manual and Hardware Manual*, GFK-0356.

Connecting the Master to the PROFIBUS Network

The module contains a standard female DB9 connector, labeled "PROFIBUS," that can be connected to a PROFIBUS bus terminal.

- **PROFIBUS DB-9 connector recommendation:** Siemens 6ES7-972-0BB50-OXAO (12MB)

Pin-out Listing for PROFIBUS Connector

Pin #	Pin Description	DB9 Line * Termination
1	rack ground	
2	reserved	
3	data +	connect this pin to pin 8 (data -) with 220 ohm resistor
4	TX Enable	
5	Isolated ground	connect this pin to pin 8 (data -) with 390 ohm resistor
6	Isolated +5V	connect this pin to pin 3 (data +) with 390 ohm resistor
7	reserved	
8	data -	
9	reserved	

* For line A cable (135-165 ohm impedance)

The module has no built-in termination. If you require termination, you must use a bus terminal that has built-in selectable termination.

Warning

Do not connect any devices to the +5V pin (pin 6). It is to be used for termination purposes only.

Network Segment Length

A PROFIBUS network uses either fiber optic or RS-485 copper media. The copper bus line specified in EN 50 170 is "Line Type A" and is the recommended cable type. A more economical copper cable "Line Type B" is commonly used for smaller installations; however, it is not specified in EN 50 170. It is extremely important to use cable rated to PROFIBUS specifications. The higher the baud rate selected and the longer the distances involved, the more critical cable selection becomes. (PROFIBUS cable has a distinctive purple color.)

Stub or "T" type branch connections are supported if the total stub (branch) lengths do not exceed 6.6 meters. Do not use stubs at all on 12 Mbaud networks.

The data rates for network communication with maximum segment trunk length per cable type are provided below. Multiple segments may be connected via repeater stations to extend the total bus length.

Line Types

Baud Rate	Line A Distance (Max)^{1, 2}	Line B Distance (Max)^{1, 2}	Glass Fiber
9.6KBps, 19.2KBps and 93.75KBps	1200 m	1200 m	6Km
187.5KBps	1000 m	600 m	6Km
500KBps	400 m	200 m	6Km
1.5MBps	200 m	NA	6Km
3, 6 and 12MBps	100 m	NA	6Km

¹ If using a combination of both line types, divide the lengths shown by two.

² Values shown are the sum of all bus segment and drop cable lengths.

NA = Not Applicable

Note: The two physical ends of the PROFIBUS network should be terminated. There should be two, and only two, terminators on a network.

PROFIBUS Cable Types

The recommended cable is:

- Belden 3079A PROFIBUS cable

This is a shielded, 150 ohm twinaxial (single twisted pair) cable. It has 22 AWG conductors and a mutual capacitance of 9.0pF per foot, nominal. For complete specifications on this cable, please contact your Belden dealer or visit their website at www.belden.com.

Alternate cable types are:

- Siemens 6XV1 830-OAH10 Two Core shielded
- Siemens 6XV1 830-OBH10 w/PE Sheath
- Siemens 6XV1 830-3AH10 for underground burial
- Siemens 6XV1 830-3BH10 trailing cable
- Bosch Comnet DP #913 548 Flexible PROFIBUS cable
- Bosch Comnet DP #917 201 Trailing PROFIBUS Cable
- Bosch Comnet DP #917 202 Massive PROFIBUS Cable

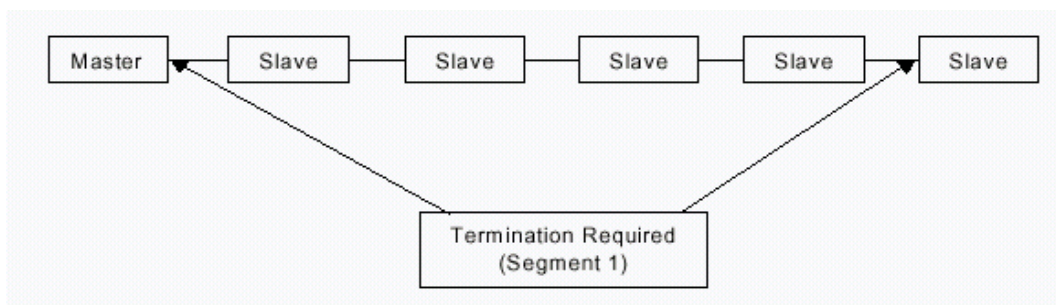
Note: Allen Bradley “blue hose,” which has an impedance of 78 ohms, is **not** recommended for this application.

Cable Specifications

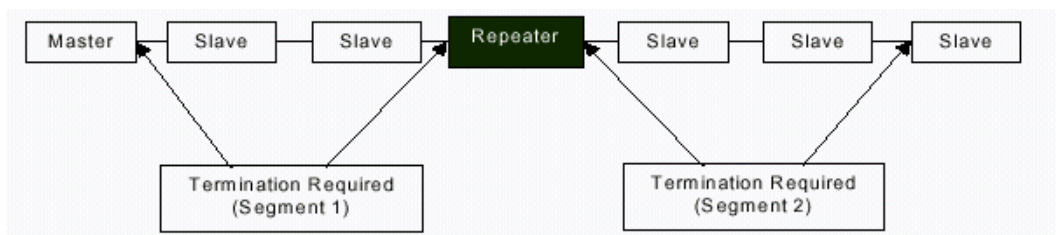
Cable Parameter	Type A	Type B
Impedance	135 to 165 ohms f = 3 to 20MHz	100 to 130 ohms f>100KHz
Capacitance	<30pF/m	<60pF/m
Resistance	<110 W/Km	-
Conductor area	0.34mm ² (22 AWG)	0.22mm ² (24 AWG)

Network Termination

Termination resistors are needed, as defined in DIN 19245 Part 1 section 3.1.2.5.



One terminator must be applied at each end of a network segment.



Generally, termination is provided in commercially-available PROFIBUS standard network connectors. Some connector vendors provide termination capability in the connector and a switch on the connector to enable/disable termination. Some connector vendors provide both terminated and unterminated connectors.

Note: For proper network termination, it is essential that the terminating devices maintain power. Power is provided by the device on Pin 6 and Ground on Pin 5. If power is lost to either terminating device, the network may not operate correctly. Generally, the lone network master device is one of the terminating devices. Therefore, a loss of power to the network master renders the network inoperable anyway. The other terminating device may be a critical slave device that must maintain power or a separately powered, stand-alone terminator. These stand-alone devices are commercially available.

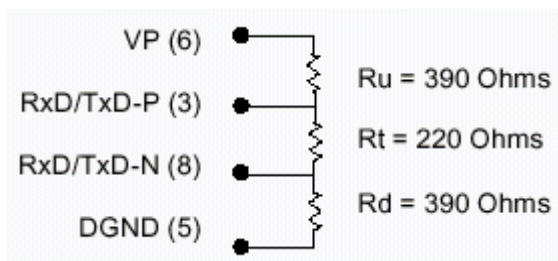


Figure 2-1. Bus Termination for Type A Cable in Accordance to PROFIBUS Specifications