

MANUFACTURER DOCUMENT PACKAGE

Manufacturer's Manual

Reference package for procurement and maintenance review

GE 90-30 SERIES PLC

IC693PBM200

PROFIBUS MASTER MODULE

Used with the applicable Series 90-30 communications configuration.

REFERENCE PACKAGE

OFFICIAL DOCUMENT

Selected official manufacturer pages follow this cover.

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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

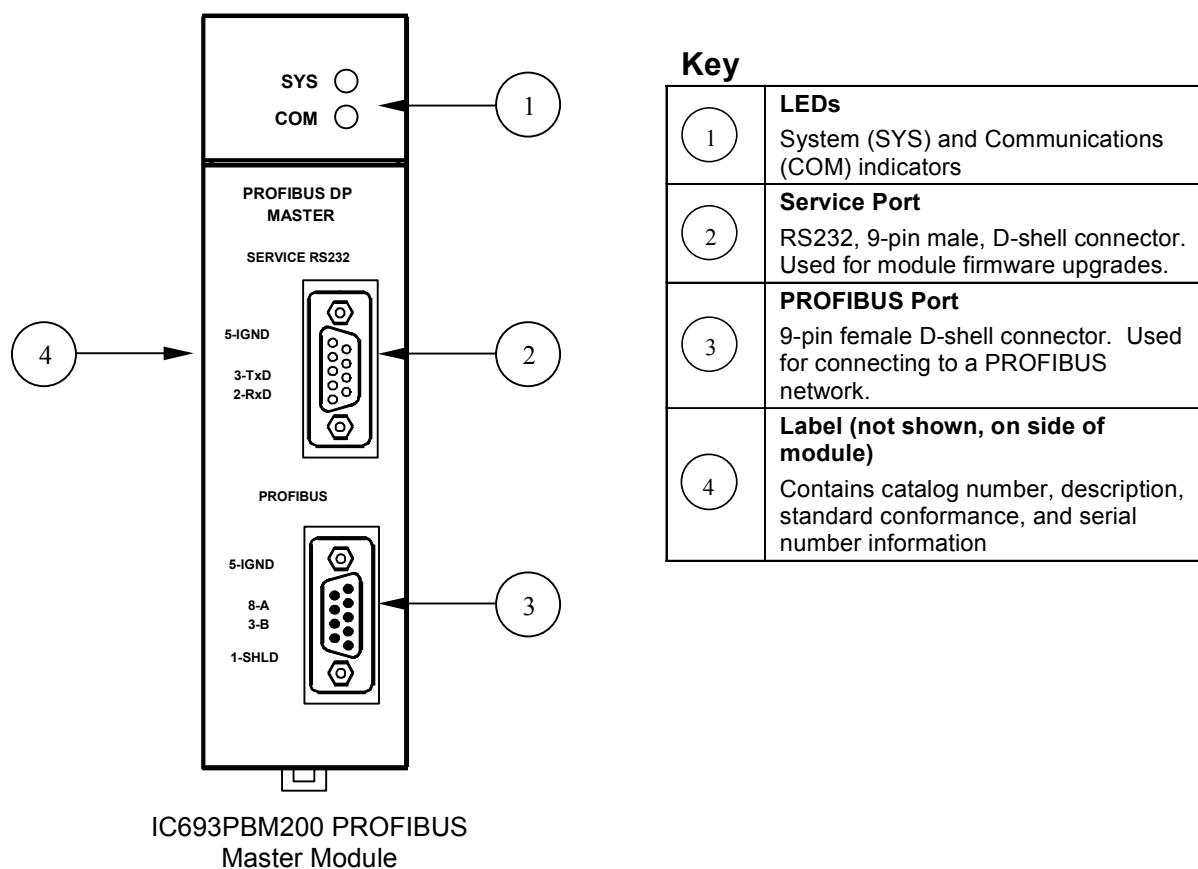


Figure 1-1. PROFIBUS Master Module

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

PROFIBUS Basics

PROFIBUS Network Overview

- PROFIBUS is an open, vendor independent FieldBus standard for a wide range of applications in industrial automation, including motion control.
- PROFIBUS is a dynamic technology that grows functionally while complying with the European FieldBus Standard EN 50 170.
- PROFIBUS Guidelines and Profiles provide the means for further technical development based on the ever-changing communication requirements of the networks, systems, and devices used in today's industrial automation applications.

PROFIBUS specifications reference three different protocols to cover a range of industrial requirements:

- **PROFIBUS-DP** High speed data communication. DP stands for *Decentralized Periphery*. In practice, the majority of slave applications are DP applications.
- **PROFIBUS-FMS** Object oriented general-purpose data communication. FMS stands for *FieldBus Message Specification*. FMS protocol devices may exchange data on the same bus used for DP devices.
- **PROFIBUS-PA** Meets requirements for intrinsic safety and non-intrinsic safety areas and includes bus powered field devices.

Note: The PROFIBUS logo is a registered trademark of the PROFIBUS International Organization. Membership in the organization is open to all individuals, companies and organizations. More information about the organization and the protocol is available at <http://www.profibus.com>

Bus Communication

The PROFIBUS specification defines the technical characteristics of a serial field bus system that links distributed digital controllers on the network, from field level to cell level. PROFIBUS is a multi-master system that allows the joint operation of several automation, engineering or visualization systems with their distributed peripherals on one bus. PROFIBUS distinguishes between the following types of devices:

- **Master devices** determine the data communication on the bus. A master can send messages without an external request when it holds the bus access rights (the token). Masters are also called active stations.
- **Slave devices** include motion controllers, drives, I/O devices, valves, and transducers. Slaves do not have bus access rights and can only acknowledge received messages or send messages to the master when requested to do so. Slave devices are passive stations and require only small portions of the bus protocol.

The majority of PROFIBUS-DP applications are located at the field level. The field level typically includes slave devices such as the S2K motion controller station and host devices like PLC or PC control systems for the PROFIBUS-DP master station. Operator interfaces and DCS type systems usually operate at the cell level.

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

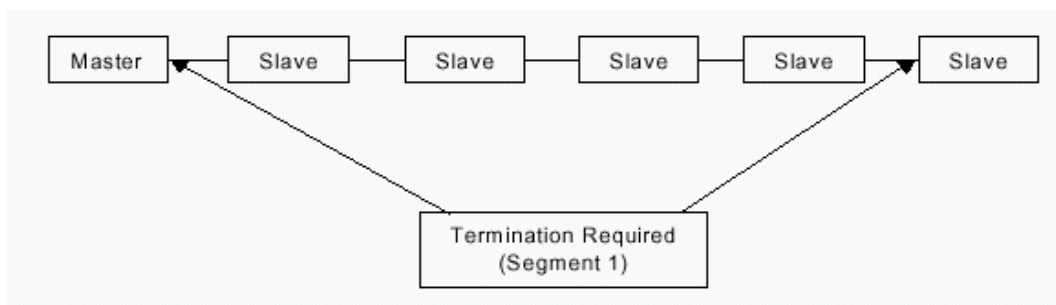
Note: Allen Bradley “blue hose,” which has an impedance of 78 ohms, is **not** recommended for this application.

Cable Specifications

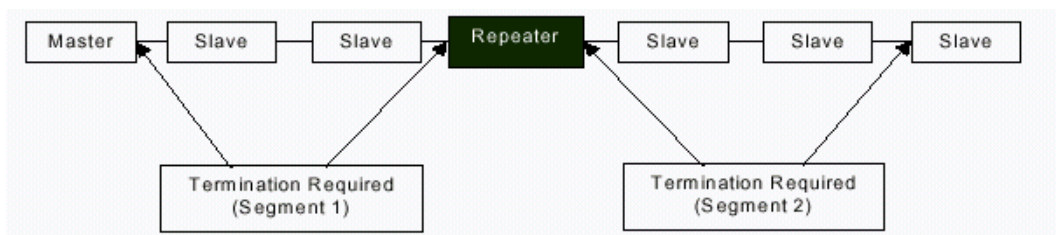
Cable Parameter	Type A	Type B
Impedance	135 to 165 ohms f = 3 to 20MHz	100 to 130 ohms f>100KHz
Capacitance	<30pF/m	<60pF/m
Resistance	<110 W/Km	-
Conductor area	0.34mm ² (22 AWG)	0.22mm ² (24 AWG)

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.

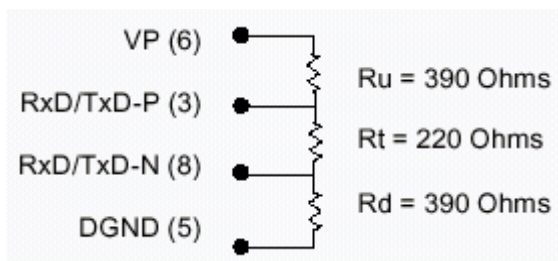


Figure 2-1. Bus Termination for Type A Cable in Accordance to PROFIBUS Specifications