


PROFIBUS Unit
for GP3000 Series
User Manual

GP3000 シリーズ用
PROFIBUS ユニット
ユーザーズマニュアル



Preface

Thank you for purchasing the PROFIBUS Slave unit “CA5-PFSALL/EX-01” (hereafter referred to as the “PROFIBUS unit”).

This unit is intended for use with expansion interface of the Pro-face’s GP3000 series*¹ programmable operator interface (hereafter referred to collectively as the “GP”), and as an interface between the PROFIBUS data network and any of the above mentioned GPs.

Before actually beginning to use the PROFIBUS unit, please be sure to read through this manual and other related manuals to fully understand all the settings and functions.

*1 Excluding the GP-3200 series.

NOTICE

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Essential Safety Precautions




All safety-related procedures stated in this document must be followed to operate the PROFIBUS unit correctly and safely. Be sure to read this and any related documents thoroughly to understand the correct operation and functions of the PROFIBUS unit.

Safety Icons

Throughout this manual, these icons provide essential safety information for PROFIBUS unit operation procedures requiring special attention. These icons indicate the following levels of danger:



 WARNING	Indicates situations where severe bodily injury, death or major equipment damage can occur.
 CAUTION	Indicates situations where slight bodily injury or minor equipment damage can occur.
	Indicates actions or procedures that should NOT be performed.
	Indicates actions or procedures that MUST be performed to ensure correct unit operation.





WARNING

-  Due to the possibility of an electrical shock, be sure that the power supply for the GP is not plugged in when installing the PROFIBUS unit.
-  Be sure to design your system so that a communication fault between GP and external device (PLC etc.) will not cause equipment to malfunction. This is to prevent any possibility of bodily injury or equipment damage.
-  Do not modify the PROFIBUS unit. Doing so may cause a fire or an electric shock.


CAUTION

General Safety Precautions

-  Do not allow water, liquids, or metal particles to enter into the PROFIBUS unit's case, otherwise it can cause a malfunction or electrical shock.
-  Avoid storing or operating the PROFIBUS unit in locations where it will be exposed to direct sunlight, high temperature, excessive dust, or vibration.




-  Avoid storing or operating the PROFIBUS unit in locations where it would be exposed to excessive temperature and dew condensation happens.
-  Do not store or operate the PROFIBUS unit where chemicals or acids are stored, or where high concentrations of fumes are present.
-  Because the PROFIBUS unit is a precision instrument, do not store or operate it in locations where something may strike or hit the unit.
-  Do not use paint thinner or organic solvents to clean the outside of the PROFIBUS unit. Instead, soak a soft cloth in a diluted neutral detergent, wring it tightly, and then wipe the unit's outside case.

Unit Disposal

-  When the product is disposed of, it should be treated as industrial waste products. Therefore, you are requested to obey the disposal standards or regulations of your country.

Information Symbols

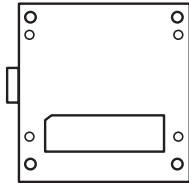
This manual uses the following icons:

	Indicates a warning or a product limitation. Be sure to follow the instructions given with this icon to ensure the safe operation of the PROFIBUS unit.
	Contains additional or useful information.
(1) (2)	Indicates steps used to accomplish a given task. Be sure to follow these steps in the order they are written.
*1	Indicates useful or important supplemental information.
	Indicates pages containing related information.
External Device	Indicates the PROFIBUS-DP Master CPU (PLC etc.), which connects a GP with PROFIBUS unit.
GP-Pro EX	Indicates the Screen editor program for Pro-face's GP3000 series.

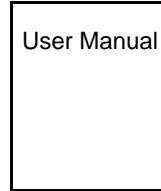
Package Contents

The following items are included in the PROFIBUS unit's package. Before using the PROFIBUS unit, please check that all items listed here are present.

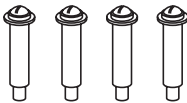
PROFIBUS Unit (1)



User Manual <This Manual> (1)



Screws(4)



This unit has been carefully packed, with special attention to quality. However, should you find anything damaged or missing, please contact your local distributor immediately for service.

Installation Prerequisites For Standards

The PROFIBUS unit "CA5-PFSALL/EX-01" is a UL/c-UL product, listed on UL File No.E220851 and UL File No.E182139.

The PROFIBUS unit "CA5-PFSALL/EX-01" is a UL/c-UL product, recognized on UL File No.E171486 and UL File No.E231702.

Product Model No.	UL Registration Model No.
CA5-PFSALL/EX-01	3383202

This product conforms to the following standards:

- UL508
Standard for Industrial Control Equipment
- UL60950-1
Information Technology Equipment - Safety - Part 1
- ANSI/ISA-12.12.01
Nonincendive Electrical Equipment for Use in Class I, Division 2 Hazardous (classified) Locations
- CSA-C22.2 No.14-95M (c-UL Approval)
Industrial Control Equipment
- CSA-C22.2 No.213-M1987 (c-UL Approval)
Non-incendive Electrical Equipment for Use in Class I, Division 2 Hazardous Locations
- CAN/CSA C22.2 No.60950-1-03 (c-UL Approval)
Information Technology Equipment - Safety - Part 1

<Cautions>

Be aware of the following items when building the GP into an end-use product:

- The GP unit's rear face is not approved as an enclosure. When building the GP unit into an end-use product, be sure to use an enclosure that satisfies standards as the end-use product's overall enclosure.
- The GP unit must be used indoors only.
- Install and operate the GP with its front panel facing outwards.
- If the GP is mounted so as to cool itself naturally, be sure to install it in a vertical panel. Also, it's recommended that the GP should be mounted at least 100mm away from any other adjacent structures or machine parts. The temperature must be checked on the final product in which the GP is installed.
- For use with the following models only: Models 3280007-01, -02, -03, -12, -13, -24; 3280024-02, -14, -22, -32; 3280035-01, -02, -31, -41.
- For use with the following models only: Models 3280024-01, -11, -13, -21; 3280035-45, -75; 3581301-01, -03.

<Hazardous locations - Compliance and Handling Cautions>

- Power and input/output wiring must be in accordance with Class I, Division 2 wiring methods - Article 501.10(B) of the National Electrical Code, NFPA 70 and in accordance with the authority having jurisdiction.
- Suitable for use in Class I, Division 2, Groups A, B, C, and D Hazardous Locations, or Non-Hazardous Locations.
- WARNING: Explosion hazard-substitution of any components may impair compliance to Class I, Division 2.
- WARNING: Explosion hazard-when in hazardous locations, turn the power OFF before replacing or wiring modules.
- WARNING: Explosion hazard-do not disconnect while circuit is live unless area is known to be non-hazardous.

CE Marking

The PROFIBUS unit “CA5-PFSALL/EX-01” is CE marked product that conforms to EMC directives, EN55011 Class A and EN61000-6-2.

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Memo

Chapter 1 General

This chapter describes the operation of the PROFIBUS unit and the cautions necessary for correct data communication.

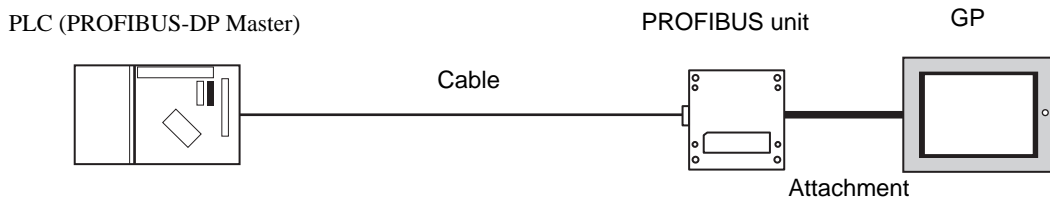
IMPORTANT

- This unit is a PROFIBUS DP-V0 interface. The PROFIBUS DP-V1 and DP-V2 additional requirements are not supported.

1.1 Operating the PROFIBUS Unit

The PROFIBUS is an extended unit of the Pro-face's GP3000 series. If the PROFIBUS unit is attached to the GP and connected directly to a connection device (PLC etc) that supports the PROFIBUS-DP master via a cable, the GP will be able to join the PROFIBUS network and communicate with the PROFIBUS-DP master.

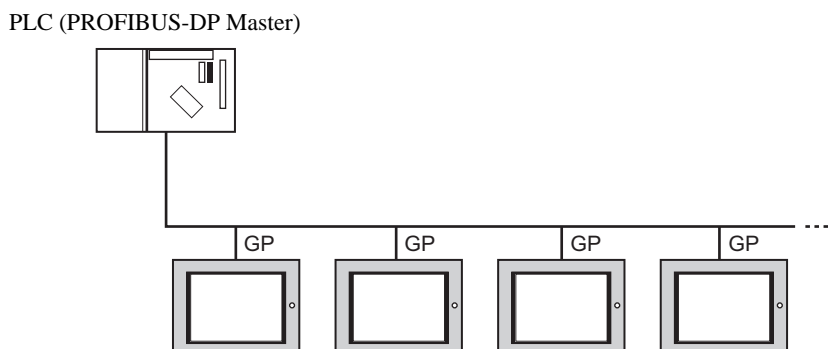
Host Computer (Master)	Connection Cable	I/F Module (Slave)	GP Type
Siemens Simatic Series (All CPU that have DP ports) e.g.) Any Host computers corresponded to DP master	See "3.2 Wiring for PROFIBUS-DP"	PROFIBUS unit (CA5-PFSALL/EX-01)	GP3000 Series



1.2 System Configuration

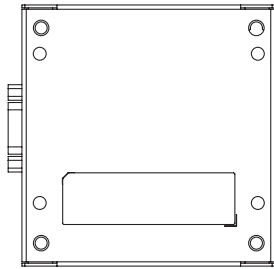
The connection method for the network is complied with the PROFIBUS-DP protocol.

The maximum number of slave devices that can be connected to the PROFIBUS-DP master is limited by I/O memory size of the master device. However, it's up to 4 units for packet communication. For details of the memory size, please refer to the manual of each PROFIBUS-DP master supporting device.

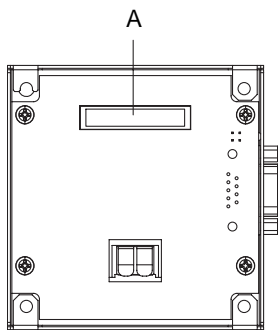


1.3 Parts Name and Functions

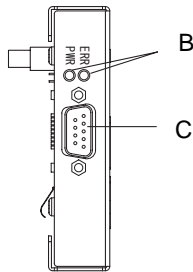
The following describes each parts name of the unit and its function.



Front



Rear



Side

- A. GP connector
For connection to the expansion interface of a GP unit.

B. Status LED

LED	Functions	Color
PWR-LED	When power ON, the LED lights.	Green
ERR-LED	When a communication error occurs, the LED lights.	Red

- C. PROFIBUS I/F Connectors
For connection to a PROFIBUS lead or user fabricated cable.

1.4 When Using Screen Creation Software

For communication, it's necessary to make communication settings such as Slave Address, I/O size, Packet Transfer with the screen creation software, GP-Pro EX. In order to make the communication settings, select [PROFIBUS International] for Maker and [PROFIBUS DP Slave] for Series in the Device/PLC Settings. For further detail of the setup, refer to the following manual.

For the installation method of a GSD file, please refer to the manual of each PROFIBUS-DP master supporting devices and the following manual..

SEE → “GP-Pro EX Device/PLC Connection Manual”

Chapter 2 Specifications

This chapter describes the specifications and dimensions of the PROFIBUS unit.

2.1 General Specifications

2.1.1 Electrical

Items		Specifications
Power Supply	Rated Voltage	DC5V \pm 5%(supplied by the GP unit)
	Power Consumption	Less than 2.4W
Voltage Endurance		AC500V 20mA for 1 minute
Insulation Resistance		More than DC500V 100M Ω

2.1.2 Environmental

Items		Specifications
Physical	Surrounding Operating Temperature	0°C to 50°C
	Storage Temperature	-20°C to +60°C
	Ambient Humidity	10%RH to 90%RH (Wet bulb temperature: 39°C max. - no condensation.)
	Storage Humidity	10%RH to 90%RH (Wet bulb temperature: 39°C max. - no condensation.)
	Dust	Less than 0.1mg/m ³ No electrically conductive dusty conditions
	Pollution Degree	Pollution Degree 2
	Atmosphere	Free of corrosive gas
	Atmosphere (altitude)	800 - 1114 hPa. (Height: at an altitude of less than 2000m)
Mechanical	Vibration Resistance	Comply with JIS B 3502, IEC61131-2 <u>When vibration is NOT continuous</u> 10 - 57Hz 0.075mm 57 - 150Hz 9.8m/s ² <u>When vibration is continuous</u> 10 - 57Hz 0.035mm 57 - 150Hz 4.9m/s ² 10 - 25Hz X, Y, Z directions for 10 times (80min.)
	Impact Resistance	Comply with JIS B 3502, IEC61131-2 (147m/s ² to twice X, Y, Z each directions)
Electrical	Noise Immunity (via noise simulator)	Noise Voltage: 1,200Vp-p Pulse Duration: 1 μ s Rise Time: 1ns
	Electrostatic Discharge Immunity	Contact Electrical Discharge 6kV (complies with IEC61000-4-2 Level 3)

2.1.3 Structural

Items		Specifications
Installation	Installation method	Screw fixing
	Cooling Method	Natural air circulation
	Weight	Approx. 500g [1.1lb]
	External Dimensions	W88.2mm [3.47in.] x H91mm [3.58in.] x D21.1mm [0.83in.] (excluding protection and connector part)

2.2 Performance Specifications

2.2.1 Transmission Specifications

Items	Specifications									
The number of connectable units	Max. 32 units/ segment (without repeaters) Max. 125 units/ segment (with repeaters)									
The range of exchange numbers	1 - 125									
Transmission channel configuration	Bus configuration (Multi drop)									
Transmission channel	Bus transmission channel: Twisted pair cable with shield (Extension of whole channel depends on the transmission speed)									
Transmission method	Half-duplex transmission, Serial transmission, and comply with EIA RS-485									
Transmission setting	Data length: 8 bits Parity: Even number Stop bit: 1 bit									
Baud rate (bps)/ Transmission length	9.6K	19.2K	93.75K	187.5K	500K	1.5M	3M	6M	12M	
	1200m			1000m	400m	200m	100m			
Encoding method	NRZ (Non Return Zero) method									
I/O points	Input-Output: 1 to 112 words									

2.3 Interface Specifications

2.3.1 PROFIBUS-DP interface

D-sub 9-pin socket connector is used. (Stacking Metal Fittings : #4-40 inch screw)

Pin No.	Signal Name	Direction	Details
1	NC	-	-
2	NC	-	-
3	RxD/TxD+	Input/Output	Send / Receive Data (+)
4	CNTR-P	Output	Repeater control signal
5	GND	-	GND
6	+5V	Output	+5V
7	NC	-	-
8	RxD/TxD-	Input/Output	Send / Receive Data (-)
9	NC	-	-
Shell	FG	-	Frame Ground

IMPORTANT

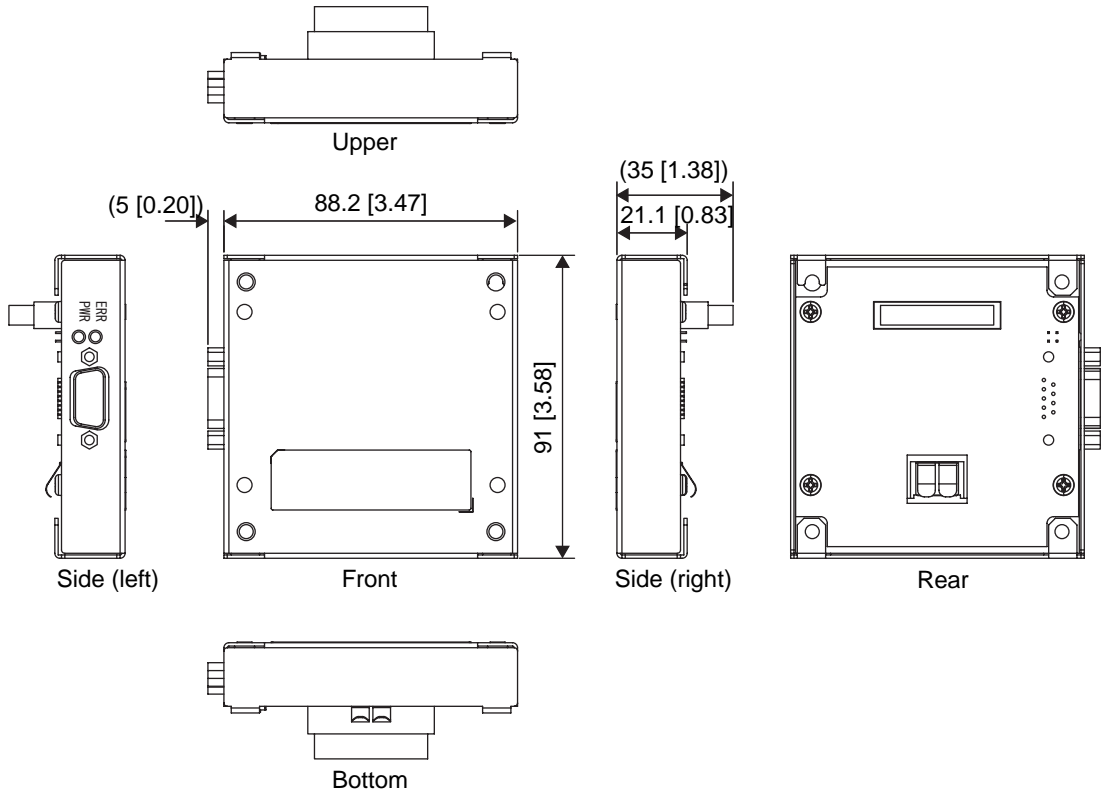
- For connection of this unit and any equipment related to PROFIBUS-DP, use cables and connectors which comply with the PROFIBUS specifications.

2.4 Dimensions

The following figures show the dimensions of the PROFIBUS unit.

2.4.1 PROFIBUS Unit External Dimensions

Unit: mm [in.]



Chapter 3 Installation

This chapter describes how to install and wire the PROFIBUS unit.

3.1 Installing the PROFIBUS Unit

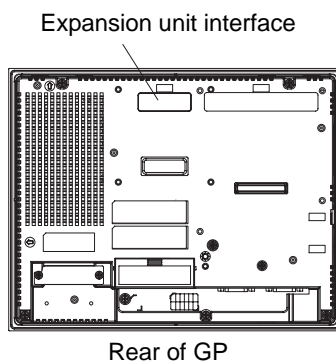
To install the PROFIBUS unit in the GP, follow the steps below.

⚠ WARNING

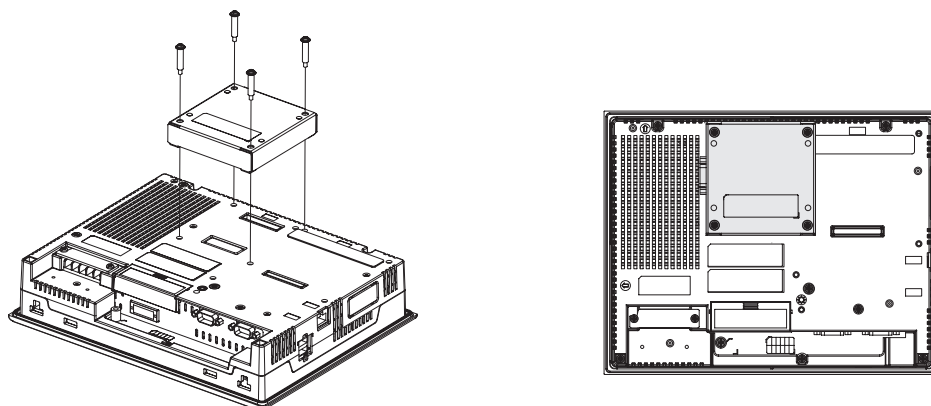
- ❗ Due to the possibility of an electrical shock before installation, be sure the GP's power cord is not plugged in to the power supply.

The following figure describes how to install the PROFIBUS module into a GP-3500T.

- (1) Disconnect the power cable and place the GP face down on a flat horizontal surface.
- (2) Insert the GP connector of the PROFIBUS unit into the Expansion Unit interface on the back of GP.



- (3) Fix the PROFIBUS unit by four screws. (Tightening torque : 0.5 ~ 0.6N•m)



3.2 Wiring for PROFIBUS-DP

⚠ CAUTION

❗ Be sure to earth the FG of the external device (PLC etc.) according to Class 3 earthing standards.

For details, please refer to the manual of the device/PLC used.

Collect all the data cable's shield wires and connect them to the FG of the external device (PLC etc.).

IMPORTANT • For connection of this unit and any equipment related to PROFIBUS-DP, use cables and connectors which comply with the PROFIBUS specifications.

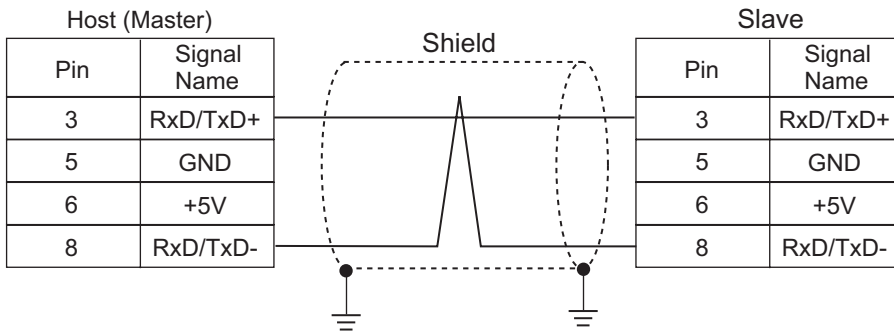
■ Cable Specification

This specification corresponds to the EN50170 standards.

Type A cable for PROFIBUS-DP	
Impedance	135 to 165 Ω/ 3 to 20 Mhz
Capacitance	< 30 pF/m
Resistance	> 110 Ω/km
Conductor Diameter	> 0.64mm
Conductor Area	> 0.34mm ²

■ Wire Connection Diagram

The following wire connection diagram should be used when making a cable for the PROFIBUS.



Chapter 4 Troubleshooting

The following section describes standard problems and their possible solutions.

4.1 No Data Communication

When GP doesn't communicate with PROFIBUS-DP master, use the following status LED Table and troubleshooting flowchart to diagnose the problems and find the solution.

When the error message is displayed on the GP screen, confirm the error code and take appropriate measures.

For Error messages, please refer to the following manual..

SEE → “GP-Pro EX Device/PLC Connection Manual”

There are 2 status LEDs on the PROFIBUS unit.

Status LED		Meaning	Cause
ERR (Red)	PWR (Green)		
Not lit	Not lit	No Power.	
lit	lit	No data exchange.	<ul style="list-style-type: none"> - Bus Disconnected - Master not Available / switched off - Master's I/O communication size setting and GP's disagree - Master's slave address setting and GP's disagree
Not lit	lit	The connection is correct and data are being exchanged.	

NOTE

- This flowchart describe the coping process for the trouble that has cause on PROFIBUS unit or GP unit.

⚠ WARNING



Before installing the PROFIBUS unit, due to the possibility of electrical shock, be sure the GP unit power cord is unplugged from the power supply.

