MITSUBISHI

PROGRAMMABLE CONTROLLER

MELSEC-A

Mitsubishi General Use PC User's Manual

PROFIBUS-DP interface module
type AJ71PB92D/A1SJ71PB92D
(Hardware)

Thank you for buying the Mitsubishi General Use PC MELSEC-A Series.
Before use, please read this manual carefully and correctly operate the module with a sufficient understanding of the A series PC functions and performance.

Please place this manual in a location where it is available to end users.

MODEL	A1SJ71PB92D-U-H-E
MODEL CODE	13JL04

MITSUBISHI ELECTRIC

IB (NA) 66757-E (0404) MEE

● SAFETY PRECAUTIONS ●

(Read these precautions before using.)

When using Mitsubishi equipment, thoroughly read this manual and the associated manuals introduced in the manual. Also pay careful attention to safety and handle the module properly.

These precautions apply only to Mitsubishi equipment. Refer to the CPU module user's manual for a description of the PC system safety precautions.

These ● SAFETY PRECAUTIONS ● classify the safety precautions into two categories: "DANGER" and "CAUTION".

◇DANGER	Procedures which may lead to a dangerous condition and cause death or serious injury if not carried out properly.
⚠CAUTION	Procedures which may lead to a dangerous condition and cause superficial to medium injury, or physical damage only, if not carried out properly.

Depending on circumstances, procedures indicated by ⚠CAUTION may also be linked to serious results.
In any case, it is important to follow the directions for usage.
Store this manual in a safe place so that you can take it out and read it whenever necessary. Always forward it to the end user.

[DESIGN PRECAUTIONS]

◇DANGER
• When a communication error occurs in the PROFIBUS network, the status of the faulty station is as follows. Configure an interlock circuit in the sequence program using the communication status information (input X1, buffer memory 2040 to 2079) so that the system can operate safely. Erroneous outputs and mis-operation could cause accidents. (1) The input data of the master station maintains the data before abnormality of the communication. (2) When the master station is down, the output state of each slave station will be in accordance with the parameter settings. (3) When any slave station is down, the output state of other slave stations will be in accordance with the parameter settings of the master station. • If a stop error occurs in the CPU module, the communication status is as described below. (1) Communication with the slave station is stopped. (2) For the input data received from the slave station, the values at CPU module stop error occurrence are held. (3) The output data sent from the AJ71PB92D/A1SJ71PB92D to the slave station are cleared.

⚠CAUTION
• When the PROFIBUS cable is laid, do not lay it close to main circuits or power lines. They should be installed 100mm(3.9inch) or more from each other. Not doing so could result in noise that would cause malfunction.

[INSTALLATION PRECAUTIONS]

⚠CAUTION
• Use the module in the environment given in the general specifications of the CPU module's User's Manual. Using the module outside the range of the general specifications may result in electric shock, fire or malfunction, or may damage or degrade the module. • Insert the tabs at the bottom of the module into the mounting holes in the base unit before installing the module. (The AnS series module shall be fastened by screws in the base unit at the specified torque.) Not installing the module correctly could result in malfunctioning, breakdowns or pieces of the product falling. • Tighten the fixing screws of the PROFIBUS cable with the specified torque. If the screws are loose, it could result in malfunction of the module. • Do not touch the conductive area or electric parts of the module. Doing so may cause module malfunction or breakdowns.

[WIRING PRECAUTIONS]

⚠CAUTION
• Switch all phases of the external power supply of the PLC system off before connecting the PROFIBUS cable. Not doing so could cause failure or malfunction of the module. • Be careful not to let foreign matter such as filings or wire chips get inside the module. These can cause fire, breakdowns and malfunction. • The PROFIBUS cable which is connected to the module must be protected with a duct or secured in position with clamps. Unless the cable is thus protected or secured, the module or the cable could be damaged when the cable swings, moves or it is strained with careless pulls, or it could cause malfunction when the cable contacts with any undesirable objects. • When disconnecting the PROFIBUS cable from the module, do not pull by holding the cable section. To disconnect the cable, make sure to hold the connector which is coupled with the module. Do not attempt to pull the cable to disconnect it from the module. It could damage the module or the cable, or cause malfunction due to a poor contact of the cable.

[STARTING AND MAINTENANCE PRECAUTIONS]

◇DANGER
• Switch all phases of the external power supply off before cleaning. Not doing so could cause electric shock.

⚠CAUTION
• Never disassemble or modify the module. This may cause breakdowns, malfunction, injury and/or fire. • Switch all phases of the external power supply off before mounting or removing the module. If you do not switch off the external power supply, it will cause breakdowns or malfunction of the module. • Set the ON/OFF select switch of the terminal resistor before the operation. If the setting is switched during the operation, network error may occur, or error detection may not be performed by error.

[OPERATING PRECAUTIONS]

◇DANGER
• Do not write data into the "not usable" of the buffer memory of special function modules. Also, do not output the "not usable" signal as the output signal to a special function module from the PLC CPU. Writing data into the "not usable area" or outputting an "not usable" signal may cause system malfunctions in the PLC.

⚠CAUTION
• The online operations conducted for the CPU module being operated (especially when changing data or operation status), shall be conducted after the manual has been carefully read and a sufficient check of safety has been conducted. Operation mistakes could cause breakdowns to or malfunction of the module.

[DISPOSAL PRECAUTIONS]

⚠CAUTION
• When disposing of this product, treat it as industrial waste.

About This Manual

The following are manuals related to this product.
Request for the manuals as needed according to the chart below.

Detailed Manual

Manual Name	Manual No. (Model Code)
PROFIBUS-DP interface module type AJ71PB92D/A1SJ71PB92D User's Manual	IB-66773 (13JL20)

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1. OVERVIEW

This manual explains the system configuration, specifications, procedures before operation and error codes for the type AJ71PB92D/A1SJ71PB92D PROFIBUS-DP interface module (hereafter abbreviated as AJ71PB92D/A1SJ71PB92D) used to incorporate the PC CPU to the PROFIBUS-DP network system.

2. SYSTEM CONFIGURATION

2.1 Applicable CPU Modules

The following table shows the CPUs that the AJ71PB92D, A1SJ71PB92D can use and the number that can be installed.

The marked * on the Section 2.2 is the contents of the limit.

(1) AJ71PB92D

Applicable CPU Modules
A1SCPUC24-R2
A1SJHCPU, A1SHCPU, A2SHCPU, A2SHCPU-S1,
A1NCPU, A1NCPU P21, A1NCPU P21-S3, A1NCPU R21, A2NCPU, A2NCPU P21, A2NCPU P21-S3, A2NCPU R21, A2NCPU-S1, A2NCPU P21-S1, A2NCPU P21-S4, A2NCPU R21 A3NCPU, A3NCPU P21, A3NCPU P21-S3, A3NCPU R21
A2ASCPU, A2ASCPU-S1, A2ASCPU-S30, A2USHCPU-S1 A2ACPU,A2ACPU P21, A2ACPU P21-S3, A2NCPU R21, A2ACPU-S1, A2ACPU P21-S-1, A2ACPU P21-S4, A2ACPU R21 A3ACPU, A3ACPU P21, A3ACPU P21-S3, A3ACPU R21, A2UCPU,A2UCPU-S1, A3UCPU, A4UCPU
Q2ASCPU, Q2ASCPU-S1, Q2ASHCPU, Q2ASHCPU-S1, Q2ACPU, Q2ACPU-S1, Q3ACPU, Q4ACPU, Q4ARCPU

(2) A1SJ71PB92D

Applicable CPU Modules
A1SCPUC24-R2
A1SJHCPU, A1SHCPU, A2SHCPU, A2SHCPU-S1,
A2ASCPU, A2ASCPU-S1, A2ASCPU-S30, A2USHCPU-S1
Q2ASCPU, Q2ASCPU-S1, Q2ASHCPU, Q2ASHCPU-S1
Q02CPU-A, Q02HCPU-A Q06HCPU-A

2.2 Installable Base Units

The base units that can be installed in the AJ71PB92D, A1SJ71PB92D are shown below.

(1) AJ71PB92D

Installable Base Units	
Basic base unit	Extension base unit
A32B, A32B-S1, A35B, A38B, A38HB	A52B, A55B, A58B, A62B, A65B, A68B

(2) A1SJ71PB92D

Installable Base Units	
Basic base unit	Extension base unit *
A1S32B, A1S33B, A1S35B, A1S38B, A1S38HB	A1S52B (S1), A1S55B (S1), A1S58B (S1), A1S65B (S1), A1S68B (S1) QA1S65B,QA1S68B

*: The no power supply module extension base unit A1S5 [ ] B (S1) may not have sufficient power supply capacity, so use the A1S6 [ ] B (S1) when installing a AJ71PB92D/A1SJ71PB92D in the extension base unit.
When the A1S5 [ ] B (S1) must be installed, do so after referring to the chapter covering power supplies in the respective CPU Module User's Manual.

2.3 Combining with MELSECNET (II), MELSECNET/B, and MELSECNET/10

The AJ71PB92D, A1SJ71PB92D can be installed in the MELSECNET (II) and MELSECNET/B master stations and local stations, and in the MELSECNET/10 control stations and normal stations.
However, the AJ71PB92D, A1SJ71PB92D cannot be installed in the MELSECNET (II), MELSECNET/B, and MELSECNET/10 remote stations, so be careful.

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3. PERFORMANCE SPECIFICATIONS (Common to AJ71PB92D, A1SJ71PB92D)

Item		Specifications		
Electrical standards and characteristics		Complies with EIA-RS485		
Medium		Shielded twisted cable		
Network configuration		Bus (however, tree type when a repeater is used)		
Data link method		• Token passing method (master side) • Polling method (master/slave side)		
Transmission encoding method		NRZ		
Transmission specifications	Transmission speed/maximum transmission distance *1 *2	Transmission speed	Transmission distance [m/segment]	Maximum transmission distance when 3 repeaters are used
		9.6 [kbps]	1200	4800
		19.2 [kbps]		
		93.75 [kbps]		
		187.5 [kbps]	1000	4000
		500 [kbps]	400	1600
		1.5 [Mbps]	200	800
		3 [Mbps]	100	400
		6 [Mbps]		
		12 [Mbps]		
	Maximum number of repeaters/network	3 units *2		
	Maximum number of stations/segment	32 stations *3 (See "Point")		
	Maximum number of slave stations/master station	60 slaves		
	Number of connection nodes (number of repeaters)	32, 62 (1), 92 (2), 126 (3)		
	Transmittable data	32 bytes/1 station (Normal service mode) 244 bytes/1 station (Extended service mode)		
Number of occupied I/O		32 points		
5VDC Internal current consumption		AJ71PB92D	0.54A	
		A1SJ71PB92D	0.56A	
Noise durability, dielectric withstand voltage insulation resistor		Depending on the A1SJ71PB92D installation system power supply module specifications. (refer to the CPU Module User's Manual.)		
Weight		AJ71PB92D	0.37kg	
		A1SJ71PB92D	0.27kg	

*1 Transmission speed control within +/- 0.3% (PROFIBUS part 1)

*2 Distance that the transmission distance can be expanded by (m/network) using repeaters
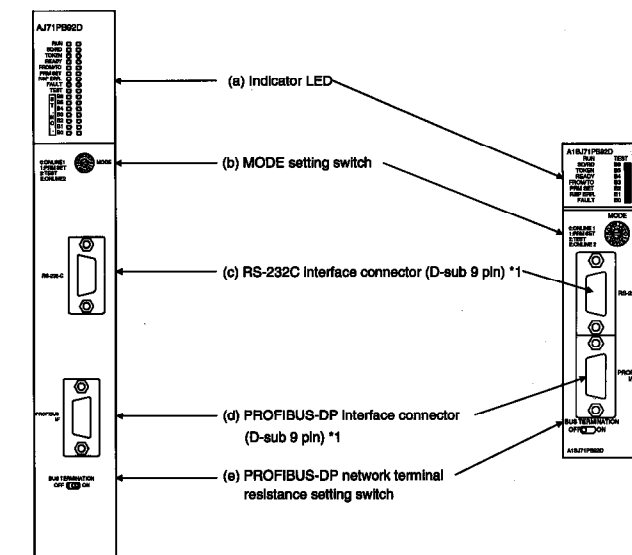Transmission distance (m/network) = (number of repeaters + 1) × transmission distance (m/segment)

*3 The *3 restriction will cease to exist when the system is configured exclusively by the master and slave stations of the hardware version B or later versions.

• Refer to the CPU Module User's Manual that you use for the general specification.

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4. PART NAMES AND SETTINGS

Following is an explanation of the AJ71PB92D, A1SJ71PB92D part names and settings.

(a) Indicator LED
(b) MODE setting switch
(c) RS-232C Interface connector (D-sub 9 pin) *1
(d) PROFIBUS-DP interface connector (D-sub 9 pin) *1
(e) PROFIBUS-DP network terminal resistance setting switch

No.	Name	Description	
(a)	LED	Displays the AJ71PB92D, A1SJ71PB92D status.	
		Name	Display description
		RUN	Displays the AJ71PB92D, A1SJ71PB92D operation status.
		SD/RD	Flashing during communication with the slave station on the PROFIBUS network. The flashing interval is the one set to Data control time of the Master Parameter.
		TOKEN	Turns on when token is maintained.

No.	Name		Description
(a)	LED	READY	Turns on when the PROFIBUS-DP network subscription preparation is completed and during subscription.
		FROM/TO	Turns on when a FROM/TO instruction from the PC CPU.
		PRM SET	Turns on (PARAMETER SET), when the parameter setting mode. When flashing during normal operation, the parameter is not written.
		RSP ERR.	Turns on when communication error is occured.
		FAULT	Turns on when an error occurs.
		TEST	Turns on when a self-diagnosis is executing.
		B0 to B6	Displays the station address during normal operation (Binary). Displays the test type during a self-diagnosis.
(b)	Mode setting switch		This sets the AJ71PB92D/A1SJ71PB92D operation status. (at time of shipment: 0) *2
(c)	RS-232C interface connector		Connector for connecting the peripheral equipment that conduct the AJ71PB92D, A1SJ71PB92D parameter setting. *1
(d)	PROFIBUS interface connector		Connector for connecting the table for the PROFIBUS-DP network.*1
(e)	PROFIBUS network terminal resistance setting switch		This sets whether or not there is terminal resistance inside the AJ71PB92D, A1SJ71PB92D. (at time of shipment: OFF) *3

*1 The appropriate screw size for the RS-232C connector and the PROFIBUS connector is #4-40 UNC.

*2 When the operation mode is written to the EEPROM, even if the AJ71PB92D/A1SJ71PB92D Mode setting switch is set to 0,1 or E when the system is started up, the AJ71PB92D/A1SJ71PB92D will operate according to the EEPROM operation mode.
The mode that the AJ71PB92D/A1SJ71PB92D is actually operating in can be confirmed with the buffer memory's "current operation mode".
(Corresponding software version, AJ71PB92D : C, A1SJ71PB92D : G)

*3 Operate the PROFIBUS network terminating resistor setting switch with your fingertips. Do not use a screwdriver or similar tool. To do so may damage the switch.

5. HANDLING PRECAUTIONS

This section explains handling precautions for AJ71PB92D, A1SJ71PB92D.

> **⚠ CAUTION**
>
> - Use the module in the environment given in the general specifications of the CPU module's User's Manual.
>   Using the module outside the range of the general specifications may result in electric shock, fire or malfunctioning, or may damage or degrade the module.
> - Do not touch the conductive area or the electronic parts of the module. Doing so may cause malfunctioning or breakdowns.
> - Switch all phases of the external power supply of the PC system off before connecting the PROFIBUS cable. Not doing so could cause failure or malfunction of the module.
> - Be careful not to let foreign matter such as filling or wire chips get inside the module. These can cause fire, breakdowns and malfunctioning.
> - Never disassemble or modify the module.
>   This may cause breakdowns, malfunctioning, injury and/or fire.
> - Insert the tabs at the bottom of the module into the mounting holes in the base unit before installing the module. (The AnS series module shall be fastened by screws in the base unit at the specified torque.)
>   Not installing the module correctly could result in malfunctioning, breakdown or pieces of the product falling.
> - Switch all phases of the external power supply off before mounting or removing the module. If you do not switch off the external power supply, it will cause failure or malfunction of the module.
> - Set the ON/OFF select switch of the terminal resistor before the operation. If the setting is switched during the operation, network error may occur, or error detection may not be performed by error check.
> - Before handling the module, always touch a grounded metal to discharge the static electricity from the human body.
>   A failure to do so can cause the module to fail or malfunction.

(1) The AJ71PB92D, A1SJ71PB92D's case is made of resin, so be careful not to drop it or strike it hard.

(2) The module fixing screw (M4) fastening torque should be tighten within the range of 78.4 to 117.6N · cm

6. WIRING

6.1. PROFIBUS Cable Wiring

This section explains the wiring to the AJ71PB92D, A1SJ71PB92D PROFIBUS.

(1) Pin assignments for the connector

Pin No.	Symbol	Name		Application
1		SHIELD	*1	Shield, Protective Ground
2		RP	*1	Reserved for Power
3	B/B'	RxD/TxD-P		Receive/Transmit-Data-P
4		CNTR-P	*1	Control-P
5	C/C'	DGND		Data Ground
6		VP	*2	Voltage-Plus
7		RP	*1	Reserved for Power
8	A/A'	RxD/TxD-N		Receive/Transmit-Data-N
9		CNTR-N	*1	Control-N

*1 Signal is optional.
*2 When the terminal resistance value of building into is made it is, signal is used. Wiring is not needed.

(2) Wiring

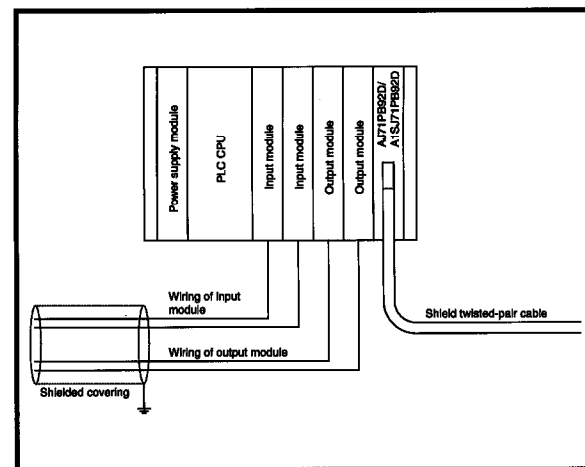AJ71PB92D/A1SJ71PB92D
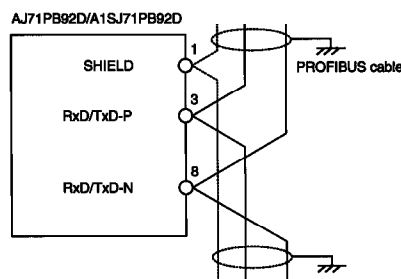
> **Remark**
>
> To apply to the EMC standard:
> Read the Section for the Installation in the A1S/A2SCPU User's Manual (Hardware) (after the IB-66468-E)
> * Please use the PROBUS cable with a braided shield.

6.2 Precautions Against Wiring

As one of the requirements to give full play to AJ71PB92D, A1SJ71PB92D's functions and make up the system with high reliability, it is necessary to have an external wiring unsusceptible to an influence of noise. Precautions against external wiring of AJ71PB92D, A1SJ71PB92D is described below.

(1) Do not route the wire of AJ71PB92D, A1SJ71PB92D close to or bundle it together with the main circuit and high-tension lines, or the load-carrying lines from other than the PLC. Otherwise, the module may be susceptible to an influence of noise and surge induction.

(2) Keep the wires from the input/output modules of the PLC away from the communication cable as much as possible as shown below.


(3) Grounding

(a) When using the AJ71PB92D/A1SJ71PB92D, ground the FG and LG terminals of the power supply module of the PLC.

(b) If communication cannot be performed after grounding because of abnormal voltage applied to the FG terminal, the module may be used without grounding.

(4) When the AJ71PB92D, A1SJ71PB92D BUS TERMINATION SWITCH is set to on (has terminal resistance), do not remove the PROFIBUS cable from the AJ71PB92D, A1SJ71PB92D during PROFIBUS-DP network operation. If the cable is removed, then the terminal resistance in the network will disappear, causing an error and bringing down the network.
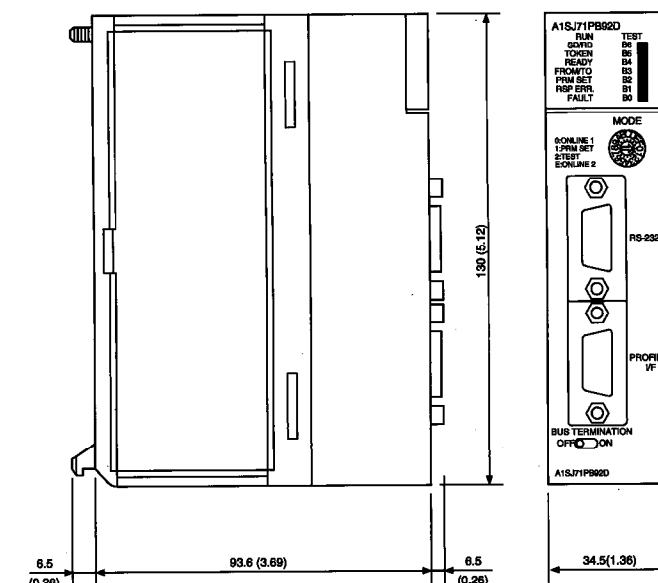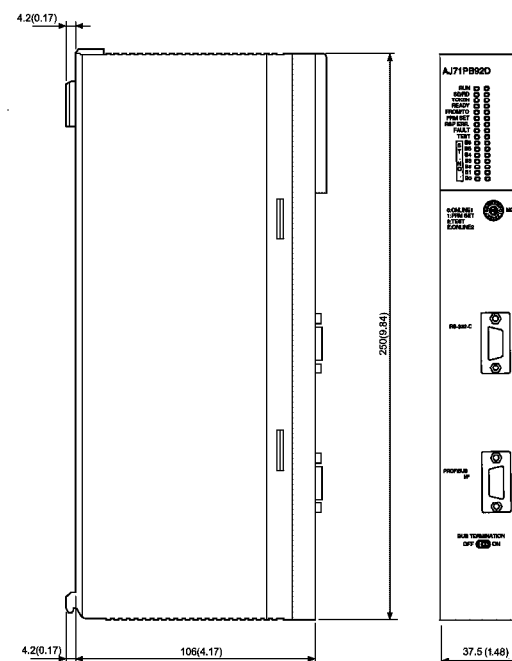
7. EXTERNAL DIMENTION

(1) AJ71PB92D

Unit : mm (inch)

(2) A1SJ71PB92D

Unit : mm (inch)