MITSUBISHI

PROGRAMMABLE CONTROLLER

MELSEC-A

Mitsubishi General Use PC User's Manual

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

Art.No.: 102971
2000 02 25
IB 66757-C

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-C (9810) 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.

⚠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.
- Make sure that the module fixing projections on the bottom of the module are
  securely inserted into the fixing holes of the base unit before mounting the module.
  (AnS series modules must be screwed to the base unit with the stipulated torque.)
  If the module is not correctly mounted, malfunction or failure may occur, and the
  module may fall out.
- The PROFIBUS cable fixing screw must be tightened with the rated torque. Not
  doing so could result in malfunction.
- 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 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 filings or wire chips get inside the
  module. These can cause fire, breakdowns and malfunction.
- Be sure to fix the communication and power cables that are connected to the
  module in place, either by running them through a duct or by using clamps.
  If the cables are not fixed in one of these ways, dispersion, movement, or
  careless putting of the cables may cause damage to the module or malfunctions
  due to cable contact faults.
- When disconnecting a communication or power supply cable from the module,
  do not pull on the cable itself.
  Disconnect cables fitted with connectors by holding and pulling the cable
  connector. Disconnected cables not fitted with a connector by removing the
  screws from the part connected to the module.
  Pulling on a cable that is connected to the module can cause damage to the
  module or cable, or malfunction due to the cable connection faults.

[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]

⚠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)

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
A1SCPU, A1SHCPU, A1SJHCPU, A1SCPUC24-R2, A1SJCPU-S3, A2SCPU, A2SCPU-S1, A2SHCPU, A2SHCPU-S1, A0J2HCPU, A0J2HCPU P21/R21, A1NCPU, A1NCPU P21/R21, A2NCPU, A2NCPU P21/R21, A2NCPU-S1, A2NCPU P21/R21-S1, A3NCPU, A3NCPU P21/R21
A2ASCPU, A2ASCPU-S1, A2ASCPU-S30, A2ACPU, A2ACPU P21/R21, A2ACPU-S1, A2ACPU P21/R21-S1, A3ACPU, A3ACPU P21/R21, A2UCPU, A2UCPU-S1, A3UCPU, A4UCPU, Q2ACPU, Q2ACPU-S1, Q3ACPU, Q4ACPU, Q2ASCPU, Q2ASCPU-S1, Q2ASHCPU, Q2ASHCPU-S1, Q4ARCPU

(2) A1SJ71PB92D

Applicable CPU Modules
A1SCPU, A1SCPU-C24
A1SJCPU, A1SJCPU-S3, A1SCPU, A1SCPU-S1, A2SCPU, A2SCPU-S1, A1SHCPU, A1SJHCPU, A2SHCPU, A2SHCPU-S1
A2ASCPU, A2ASCPU-S1, A2ASCPU-S30
Q2ASCPU, Q2ASCPU-S1, Q2ASHCPU, Q2ASHCPU-S1

2.2 Installable Base Units

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

(1) AJ71PB96F

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

(2) A1SJ71PB96F

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

*: The no power supply module expansion base unit A5 [ ] B (S1)/A1S5 [ ] B (S1) may not have sufficient power supply capacity, so use the A6 [ ] B (S1)/A1S6 [ ] B (S1) when installing a AJ71PB92D, A1SJ71PB92D in the expansion base unit.
When the A5 [ ] B (S1)/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.

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 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		
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		24 bytes		
Number of occupied I/O		32 points		
Internal power consumption (5VDC)		AJ71PB92D	0.54A	
		A1SJ71PB92D	0.60A	
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 (0.82lb)	
		A1SJ71PB92D	0.27kg (0.60lb)	

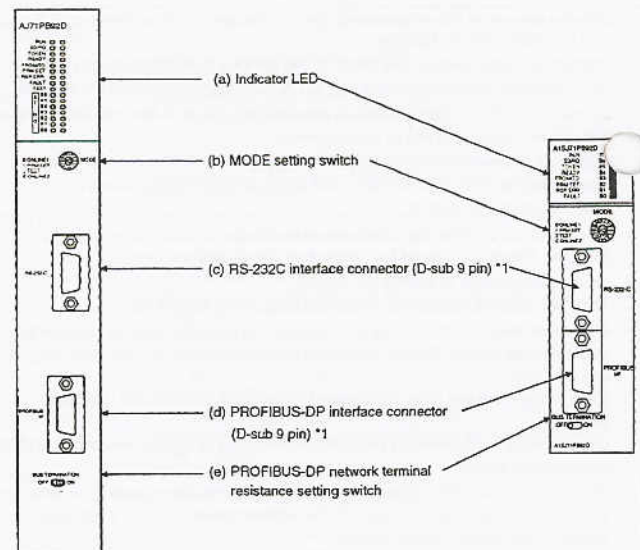*1 Transmission speed control within +/- 0.3% (PROFIBUS part 1)

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

4. PART NAMES AND SETTINGS

Following is an explanation of the AJ71PB92D, AISJ71PB92D 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 communicating with slave on the PROFIBUS-DP network. The flashing interval is the time interval of the bus parameter's Data Control Time.
		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)
(c)	RS-232C interface connector		Connector for connecting the peripheral equipment that conduct the AJ71PB92D, A1SJ71PB92D parameter setting.
(d)	PROFIBUS interface connector		Connector for connecting the table for the PROFIBUS-DP network.
(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)

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

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 Signal is only necessary at station at the end of the bus cable.

(2) Wiring

AJ71PB92D/A1SJ71PB92D
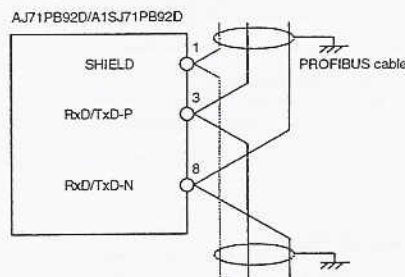
Remark

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.

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.
- Make sure that the module fixing projections on the bottom of the module are securely inserted into the fixing holes of the base unit before mounting the module.
  (AnS series modules must be screwed to the base unit with the stipulated torque.)
  If the module is not correctly mounted, malfunction or failure may occur, and the module may fall out.
- 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.

(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 {8 to 12kg · cm} [6.93 to 10.4lb · inch]

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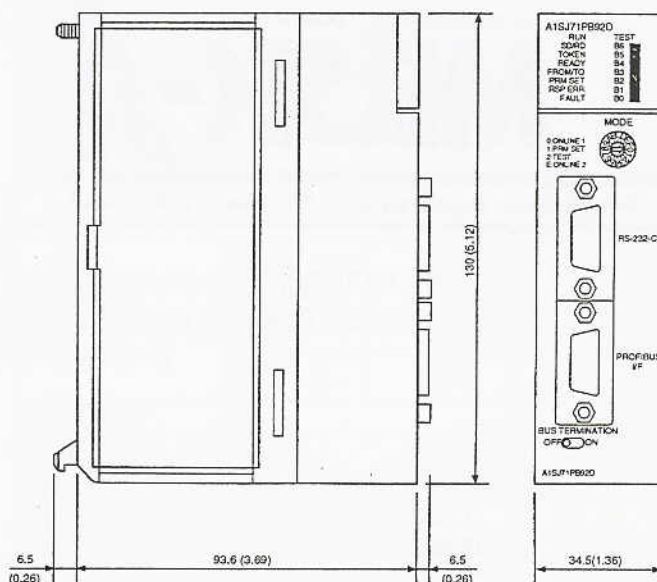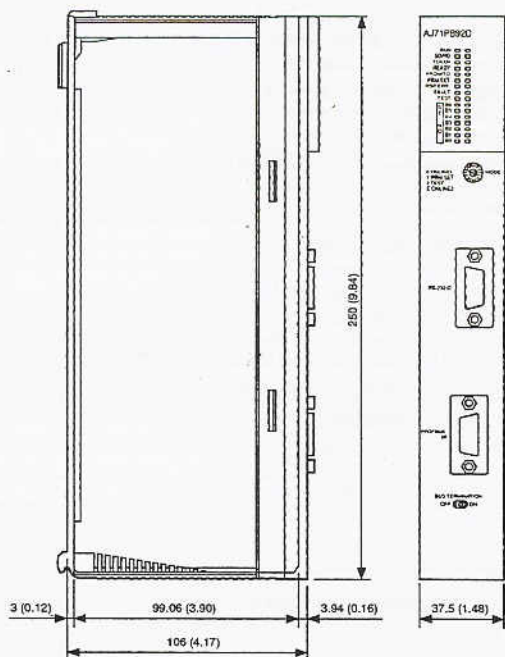
(1) Do not route the wire of AJ71PB92D, A1SJ71PB92D close to or bundle it together with the main circuit and high-tension lines, or the load-carrying lines from other than the PC. Otherwise, the module may be susceptible to an influence of noise and surge induction.

(2) The wires from the input/output modules of the PC should be away from the communication cable of PROFIBUS-DP interface module as far as possible as shown in the figure below.
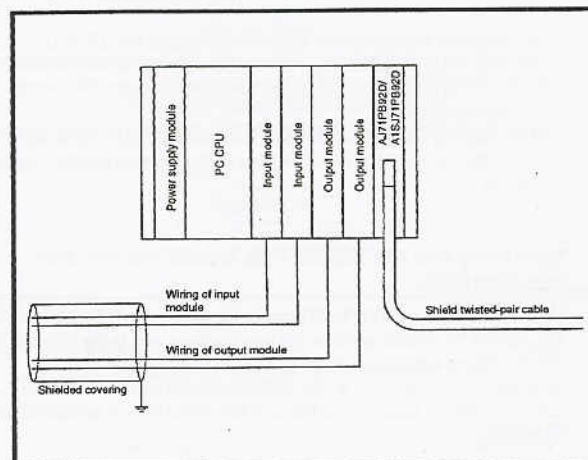
(3) Grounding

    (a) When the PROFIBUS-DP interface module is used, the FG and LG terminals of the power supply module of the programmable controller should basically be grounded.

    (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.

(5) 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.

Unit : mm (inch)

7. EXTERNAL DIMENTION

(1) AJ71PB92D

Unit : mm (inch)

When exported from Japan, this manual does not require application to the Ministry of International Trade and Industry for service transaction permission.