

MITSUBISHI

Data link module type A1SJ71AP21(-S3) /AR21

User's Manual (Hardware)

A1SJ71AP21
A1SJ71AP21-S3
A1SJ71AR21

Thank you for purchasing the Mitsubishi program logic controller MELSEC-A series.
Prior to use, please read this and relevant manuals thoroughly to fully understand the product.



MODEL	A1SJ71AP21/R21 (H/W)-U-E
MODEL CODE	13JE58
IB(NA)-66480-B(0602)MEE	

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● SAFETY PRECAUTIONS ●

(Be sure to read these instructions before use.)

Before using this product, please read this manual and the relevant manuals introduced in this manual carefully and pay full attention to safety to handle the product correctly.

The instructions given in this manual are concerned with this product. For the safety instructions of the programmable controller system, please read the CPU module user's manual.

In this manual, the safety instructions are ranked as "DANGER" and "CAUTION".



Indicates that incorrect handling may cause hazardous conditions, resulting in death or severe injury.



Indicates that incorrect handling may cause hazardous conditions, resulting in medium or slight personal injury or physical damage.

Note that the **CAUTION** level may lead to a serious consequence according to the circumstances.

Always follow the instructions of both levels because they are important to personal safety.

Please save this manual to make it accessible when required and always forward it to the end user.

[Design Precautions]

⚠ DANGER

- Refer to the type MELSECNET, MELSECNET/B Data Link System Reference Manual for each station's operating status when a communication error occurs in the network. Erroneous operation may result in accidents.
- When controlling a running PLC (data modification) by connecting a peripheral device or GX Developer to a CPU module or by connecting a PC to a special function module, create an interlock circuit in the sequence program so that the entire system will function safely all the time.
Also, before performing any other controls (e.g. program modification, operating status change (status control)), read the relevant manual(s) carefully to ensure the safety.
Especially in control from an external device to a PLC in a remote location, some PLC side problem may not be resolved immediately due to failure of data communications.
To prevent this, create an interlock circuit in the sequence program and set up corrective procedures to be taken in the event of communication failure between the external device and PLC CPU.

⚠ CAUTION

- Do not bundle the control wires and communication cables with the main circuit or power wires, or install them close to each other. They should be installed at least 100mm (3.94in.) away from each other. Failure to do so may generate noise that may cause malfunctions.

[Installation Precautions]

⚠ CAUTION

- Use the PLC in the operating environment that meets the general specifications of this manual.
Using the PLC in any other operating environments may cause electric shocks, fires or malfunctions, or may damage or degrade the product.
- Insert the module fixing projection into the fixing hole in the base unit to press the module using the hole as the fulcrum, and then tighten the fixing screw with the specified torque.
When no screw is tightened, even if the module is installed correctly, it may cause malfunctions, a failure or a drop of the module.
- Tighten the screws within the range of specified torque. If the screws are loose, it may cause the module to fallout, short circuits, or malfunction. If the screws are tightened too much, it may cause damage to the screw and/or the module, resulting in fall out, short circuits or malfunction.
- Completely turn off the externally supplied power used in the system before mounting or removing the module. Failure to do so may damage the product.
- Do not directly touch the conducting parts and electronic parts of the module. This may cause the module to malfunction or fail.

[Wiring Precautions]

⚡ DANGER

- Completely turn off the externally supplied power used in the system when installing or placing wiring.
Failure to do so may cause electric shocks or damage the product.

⚠ CAUTION

- Solder coaxial cable connectors properly. Incomplete soldering may result in malfunctioning.
- Be careful not to let foreign particles such as chaff and wire chips get inside the module. They may cause a fire, mechanical breakdown or malfunction.
- The top surface of the module is covered with a protective film to prevent foreign objects such as wire chips from entering the module during wiring work. Do not remove this film until all the wiring work is complete. Before operating the system, be sure to remove the film to provide adequate heat ventilation.
- Make sure to place the communication and power cables to be connected to the module in a duct or fasten them using a clamp. If the cables are not placed in a duct or fastened with a clamp, their positions may become unstable and may move, or they may be pulled inadvertently. This may damage the module and the cables or cause the module to malfunction because of faulty cable connections.

[Setup and Maintenance Precautions]

⚠ CAUTION

- Please read this manual thoroughly and confirm the safety before starting online operations (especially, program modifications, forced outputs, and operating status modifications), which are performed by connecting the GX Developer via the MELSECNET network system to a running CPU module of other station. Performing incorrect online operations may damage the machinery or result in accidents.
- Never disassemble or modify the module. This may cause breakdowns, malfunctions, injuries or fire.
- Use any radio communication device such as a cellular phone or a PHS phone more than 25cm (9.85 inch) away in all directions of the PLC. Not doing so can cause a malfunction.
- Shut off all phases of the external power supply in the system before mounting or dismantling the module. Failure to do so may cause failure or malfunction of the module.
- Do not touch the terminals while the power is on. Doing so may cause malfunctions.
- Shut off all phases of the external power supply in the system before cleaning or retightening the terminal screws or module fixing screws. Not doing so may cause failure or malfunction of the module.
If the screws are loose, it may cause the module to fallout, short circuits, or malfunction.
If the screws are tightened too much, it may cause damages to the screws and or/the module, resulting in fall out, short circuits or malfunction.
- Before touching the module, be sure to touch grounded metal, etc. to discharge static electricity from human body, etc. Failure to do so may cause the module to fail or malfunction.

[Disposal Precautions]

⚠ CAUTION

- When disposing of this product, treat it as industrial waste.

Manuals

The following manual is related with this product.
Please order it as necessary.

Related Manuals

Manual name	Manual Number (Model code)
type MELSECNET, MELSECNET/B Data Link System Reference Manual	IB-66350 (13JF70)

Please read type MELSECNET, MELSECNET/B Data Link System Reference Manual before using this module

Compliance with the EMC Directive and the Low Voltage Directive

When incorporating the Mitsubishi PLC into other industrial machinery or equipment and keeping compliance with the EMC and low voltage directives, refer to Chapter 3 "EMC Directive and Low Voltage Instruction" of the User's Manual (Hardware) for the CPU module used or the PLC CPU supplied with the base unit.
The CE logo is printed on the rating plate of the PLC, indicating compliance with the EMC and low voltage directives.
For making this product compliant with the EMC and low voltage directives, please refer to Section 3.1.3 "Cable" in Chapter 3 of the above-mentioned user's manual.

1. Overview

This manual provides the specifications and descriptions of the part names of the A1SJ71AP21(-S3)/AR21 Data Link Module (hereinafter referred to as A1SJ71AP21/AR21) used in the MELSEC-A series MELSECNET data link system.

(1) The following shows applications, applicable cable types and mounting positions of the A1SJ71AP21/AR21.

	Application	Applicable cable			Module mounting position
		Optical fiber cable		Coaxial cable	
		SI, H-PCF	GI		
A1SJ71AP21	Master or local station	○	—	—	I/O slot in A1S series main base or extension base (A1SJ71AR21 cannot be mounted in slot 0 of A1S6[]B extension base.)
A1SJ71AP21-S3		—	○	—	
A1SJ71AR21		—	—	○	

(2) After unpacking, confirm that the following is included.

• A1SJ71AP21

Product name	Quantity
A1SJ71AP21 data link module	1

• A1SJ71AP21-S3

Product name	Quantity
A1SJ71AP21-S3 data link module	1

• A1SJ71AR21

Product name	Quantity
A1SJ71AR21 data link module	1

(3) The following table lists PLC CPUs applicable to the A1SJ71AP21/AR21 and numbers of mountable modules.

Applicable PLC CPU	No. of Mountable Modules
A1SCPU, A1SJCPU-S3, A2SCPU, A1SHCPU, A1SJHCPU, A2SHCPU	1
A2ASCPU(S1), A2USHCPU-S1, Q2ASCPU(S1), Q2ASHCPU(S1)	2

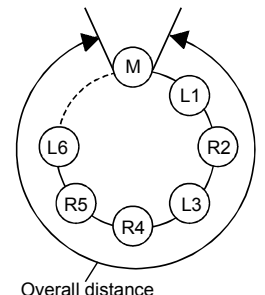
2. Specification

Item		Fiber-Optic Cable Data Link		Coaxial Cable Data Link
Model		A1SJ71AP21	A1SJ71AP21-S3	A1SJ71AR21
Max. number of link points used per station	Input (X)	Up to the max. I/O points for the CPU used		
	Output (Y)			
MELSECNET Mode	Max. number of link points per system	B	1024points (128bytes)	
		W	1024points (2048bytes)	
	Max. number of link points per station	$\frac{Y(\text{points})+B(\text{points})}{8} + 2 \times W(\text{points}) \leq 1024\text{bytes}$		
MELSECNET II Mode	Max. number of link points per system	B	4096points (512bytes)	
		W	4096points (8192bytes)	
	Max. number of link points per station	first half: $\frac{Y(\text{points})+B(\text{points})}{8} + 2 \times W(\text{points}) \leq 1024\text{bytes}$ second half: $\frac{B(\text{points})}{8} + 2 \times W(\text{points}) \leq 1024\text{bytes}$		
MELSECNET II Composite Mode	Max. number of link points per system	B	4096points (512bytes)	
		W	4096points (8192bytes)	
	Max. number of link points per station	first half: $\frac{Y(\text{points})+B(\text{points})}{8} + 2 \times W(\text{points}) \leq 1024\text{bytes}$ second half: $\frac{B(\text{points})}{8} + 2 \times W(\text{points}) \leq 1024\text{bytes}$		
Internal current consumption (5V DC)		0.33A	0.80A	
Weight		0.30kg	0.33kg	
No. of occupied I/O points		32points		
System's allowable momentary power failure time		Within 20ms		
Communication speed		1.25Mbps		
Communications method		Half-duplex bit serial		
Synchronous method		Frame synchronous		
Transmission path method		Duplex loop		
Overall loop distance		Max. 10km (32810ft) (1km (3281 ft) station intervals)	Max. 10km (32810ft) (2km (6562ft) station intervals)	Max. 10km (32810ft) (500m (1640.5ft) station intervals)
		Max. 65 stations/loop (1 master station, 64 local/remote I/O stations)		
		Demodulation method: CMI		
Transmission format		Conforms to HDLC (frame method)		
Error control system		Retry due to CRC (generating polynomial $X^{16} + X^{12} + X^5 + 1$) and time over		
RAS function		The loopback function checks error detection and cable breakage. The diagnostic function checks the self link line		
Connector		2-core optical connector plug (Arranged by user ^{*1})		—
Cable used	SI optical fiber cable	GI optical fiber cable	3C-2V, 5C-2V equivalent	
	H-PCF optical fiber cable			
Transmission loss		Max. 12dB/km	Max. 3dB/km	—
Sending level		-17 to -11 dBm (peak value)	-17 to -10 dBm (peak value)	—
Receiving level		-32 to -11 dBm (peak value)	-29 to -10 dBm (peak value)	—

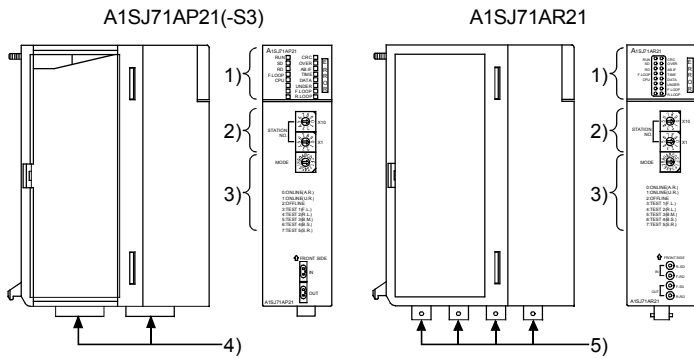
*1: Specialised skill and specific tools are required to connect the connector to the optical fiber cable; the connector itself is a custom product. Please contact your nearest Mitsubishi Electric System & Service Corporation when purchasing these products.

REMARK

- The overall loop distance refers to the distance from the master station sending port to the master station receiving port via slave stations.
For both the fiber optic cables and coaxial cables, The overall loop distance is a maximum of 10km (32810ft.).
- For general specifications of the date link system, refer to the user's manual for the PLC CPU module that is to be used.



3. Names and Settings of Each Part



No.	Name	Description																											
1)	LED 	RUN ON when data link is normal																											
		SD ON during data transmission																											
		RD ON during data reception																											
		F.LOOP <ul style="list-style-type: none"> ON while data are received from the forward loop side OFF while data are received from the reverse loop side 																											
		CPU ON during communication with PLC CPU																											
		CRC ON during code check of received data																											
		OVER ON indicating an error when receive data processing is delayed																											
		AB.IF ON indicating an error when too many consecutive 1s are received or when the length of received data is too short																											
		TIME ON indicating an error when the data link monitoring timer is activated																											
		DATA ON indicating an error when erroneous data of 2k bytes or more are received																											
		UNDER ON indicating an error when the internal processing of send data is not done at the fixed intervals																											
		F.LOOP Turns ON by a reception error on the forward loop side																											
		R.LOOP Turns ON by a reception error on the reverse loop side																											
		2)	Station number setting switches 	Set a station number within a range from 00 to 64. (factory set: 00)																									
<ul style="list-style-type: none"> master station 00 local station 01 to 64 X10 Set a tens digit. X1 Set a units digit. 																													
3)	Mode setting switch 	Select a mode from the following. (factory set: 00)																											
		<table border="1"> <thead> <tr> <th>No.</th> <th>Mode</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>On-line</td> <td>Data link with automatic return</td> </tr> <tr> <td>1</td> <td>On-line</td> <td>Data link without automatic return</td> </tr> <tr> <td>2</td> <td>Off-line</td> <td>Puts this station into cut-off status.</td> </tr> <tr> <td>3</td> <td>Forward loop test</td> <td>Checks the forward loop in the entire data link system.</td> </tr> <tr> <td>4</td> <td>Reverse loop test</td> <td>Checks the reverse loop in the entire data link system.</td> </tr> <tr> <td>5,6</td> <td>Station-to-station test</td> <td>Checks a line between 2 adjacent stations.</td> </tr> <tr> <td>7</td> <td>Self-loopback test</td> <td>Checks hardware of the data link module, including sending/receiving circuits in the communication system.</td> </tr> <tr> <td>8 to F</td> <td>—</td> <td>Use prohibited</td> </tr> </tbody> </table>	No.	Mode	Description	0	On-line	Data link with automatic return	1	On-line	Data link without automatic return	2	Off-line	Puts this station into cut-off status.	3	Forward loop test	Checks the forward loop in the entire data link system.	4	Reverse loop test	Checks the reverse loop in the entire data link system.	5,6	Station-to-station test	Checks a line between 2 adjacent stations.	7	Self-loopback test	Checks hardware of the data link module, including sending/receiving circuits in the communication system.	8 to F	—	Use prohibited
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4)	Connector For A1SJ71AP21(-S3) Optical fiber cable connector 																												
5)	Connector For A1SJ71AR21 Coaxial cable connector 																												

POINT

For details on the settings and the operating method in test mode, refer to the type MELSECNET, MELSECNET/B Data Link System Reference Manual.

4. Mounting and Installation

This section describes the handling precautions for procedures from unpacking to installation of the A1SJ71AP21/AR21 and its installation environment.

For details, refer to the user's manual for your PLC CPU.

4.1 Handling Precautions

In this section, handling precautions for the module are described.

- (1) The module case is made of resin, so do not drop it or apply strong impacts on it.
- (2) Do not remove the PC board from the module case. This may cause a fault.
- (3) Be careful to prevent foreign matter from entering from the module top during wiring.
- (4) Tighten the module fixing screws within the following ranges.

Screw location	Torque range
Module fixing screws (M4 screw)	78 to 118N·cm

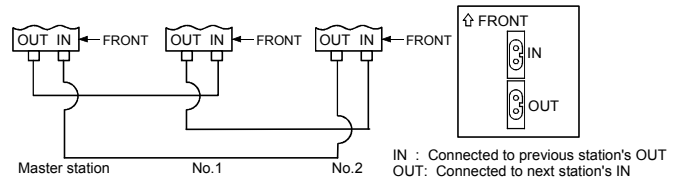
4.2 Installation Environment

Do not install PLCs in the following environments:

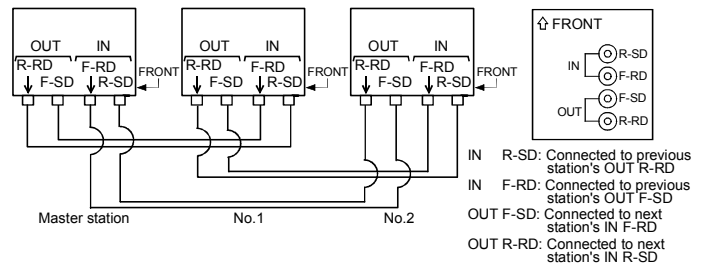
- (1) Locations where the ambient temperature is outside the range 0°C to 55°C.
- (2) Locations where the ambient humidity is outside the range 10% RH to 90%RH.
- (3) Locations where dewing occurs due to sudden temperature changes.
- (4) Locations exposed to corrosive or combustible gases.
- (5) Locations exposed to large amounts of highly conductive dust, iron powder, oil mist, salt or organic solvents.
- (6) Locations where the module is exposed to direct sunlight.
- (7) Locations where a strong electric or magnetic field is generated.
- (8) Locations where the module will be subject to direct vibration or impact.

5. Cable Connection

5.1 Connecting optical fiber cables



5.2 Connecting coaxial cables



5.3 Securing space for the cables

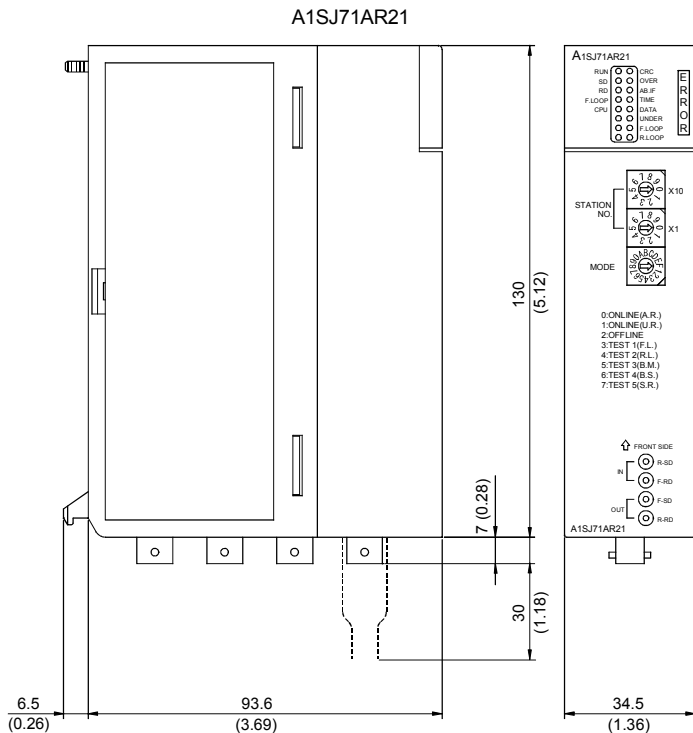
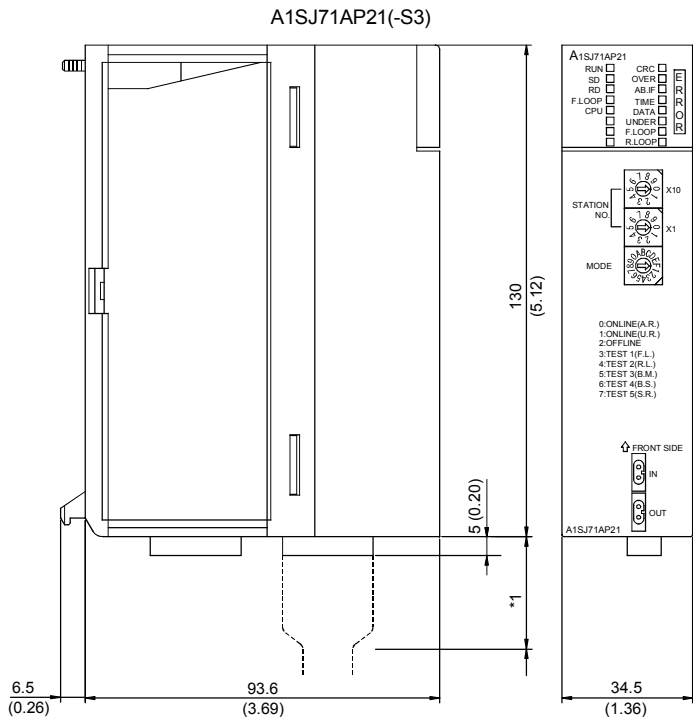
The radius of the fiber-optic cables or coaxial cables must not be smaller than the allowable bend radius.

When connecting a fiber-optic cable or coaxial cable to a link module, make sure that there is enough space for the cable to be bent to a larger radius than the allowable bend radius.

For connector A and bend radius r of the fiber-optic cable, contact Mitsubishi Electric System & Service Corporation.

Cable	Connector A (mm)	Allowable Bend Radius r (mm)
		30

6. External Dimensions



Unit: mm (inch)

*1: Please contact your nearest Mitsubishi Electric System & Service Corporation for detail.

Warranty

Mitsubishi will not be held liable for damage caused by factors found not to be the cause of Mitsubishi; machine damage or lost profits caused by faults in the Mitsubishi products; damage, secondary damage, accident compensation caused by special factors unpredictable by Mitsubishi; damages to products other than Mitsubishi products; and to other duties.

⚠ For safe use

- This product has been manufactured as a general-purpose part for general industries, and has not been designed or manufactured to be incorporated in a device or system used in purposes related to human life.
- Before using the product for special purposes such as nuclear power, electric power, aerospace, medicine or passenger movement vehicles, consult with Mitsubishi.
- This product has been manufactured under strict quality control. However, when installing the product where major accidents or losses could occur if the product fails, install appropriate backup or failsafe functions in the system.

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