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 thorougly to fully understand the product.

MODEL	A1SJ71AP21/R21 (H/W)-U-E
MODEL CODE	13JE58
IB(NA)-66480-C(1112)MEE	

● 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 precautions are classified into two levels: "⚠WARNING" and "⚠CAUTION".

⚠WARNING	Indicates that incorrect handling may cause hazardous conditions, resulting in death or severe injury.
⚠CAUTION	Indicates that incorrect handling may cause hazardous conditions, resulting in minor or moderate injury or property damage.

Under some circumstances, failure to observe the precautions given under "⚠CAUTION" may lead to serious consequences.
Observe the precautions of both levels because they are important for personal and system safety.
Make sure that the end users read this manual and then keep the manual in a safe place for future reference.

[Design Precautions]

⚠ WARNING

- 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]

⚠ WARNING

- 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 dismounting 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.

●安全注意事项●

（使用之前请务必阅读）

在使用本产品之前，应仔细阅读本手册以及本手册中所介绍的相关手册，同时在充分注意安全的前提下正确操作。
本注意事项仅记载与本产品有关的内容。关于可编程控制器系统方面的安全注意事项，请参阅所使用的CPU模块的用户手册。
在安全注意事项中，安全注意事项被分为“⚠ 警告”和“⚠ 注意”两个等级。

⚠警告	表示错误操作可能造成危险后果，导致死亡或重伤事故。
⚠注意	表示错误操作可能造成危险后果，导致中度伤害、轻伤或财产损失。

此外，根据情况不同，即使标注为“⚠注意”的事项也有可能会引发严重后果。
这两个等级的注意事项记载的均为重要内容，请务必遵守。
请妥善保管本手册以备需要时取阅，并将本手册交给最终用户。

【设计注意事项】

⚠警 告

- 关于网络出现通信异常时各站的动作状态，请参照“MELSECNET、MELSECNET/B数据链接系统参考手册”。
  因为误动作有可能导致事故发生。
- 在CPU模块上连接外围设备或GX Developer，或在特殊功能模块上连接计算机等以对运行中的可编程控制器进行控制（数据更改）前，应在顺控程序上配置互锁电路，以保证整个系统始终能安全运行。此外，对运行中的可编程控制器进行其他控制（程序更改、运行状态更改（状态控制））前，应仔细阅读手册，在充分确认安全的基础上进行操作。特别是在通过外部设备对远程的可编程控制器进行上述控制时，可能会因为数据通信异常而导致无法立即对可编程控制器侧的故障做出反应。
  在顺控程序上配置互锁电路的同时，应在外部设备与可编程控制器CPU之间确定发生数据通信异常时的系统的处理方法。

⚠注 意

- 请勿将控制线及通信电缆与主电路及动力线等捆扎在一起或相互靠得太近。应相距大约100mm以上距离。因为噪声有可能导致误动作。

【安装注意事项】

⚠注 意

- 应在所使用的CPU模块的用户手册记载的一般规格环境下使用可编程控制器。如果在一般规格范围以外的环境中使用可编程控制器，可能导致触电、火灾、误动作、产品损坏或性能劣化。
- 应将模块下部的模块固定用凸起部切实插入基板的固定孔中，并在以模块固定孔为支点进行安装的基础上，以规定的扭矩拧紧模块固定螺栓。如果模块未正确安装并以螺栓固定，有可能造成误动作、故障或掉落。
- 应在规定的扭矩范围内拧紧螺栓。如果螺栓拧得过松，有可能导致掉落、短路或误动作。如果螺栓拧得过紧，有可能造成螺栓及模块破损从而导致掉落、短路或误动作。
- 在拆装模块时，必须将系统使用的外部供应电源全部断开后再进行操作。如果未全部断开，有可能导致产品损坏。
- 请勿直接触碰模块的导电部分及电子部件。否则可能导致模块误动作、故障。

【配线注意事项】

⚠警 告

- 在安装、配线作业等时，必须将系统使用的外部供应电源全部断开后再进行操作。如果未全部断开，有可能导致触电或产品损坏。

⚠注 意

- 同轴电缆用接口应正确焊接。如果焊接不牢固，有可能导致误动作。
- 应注意防止切屑及配线头等异物掉入模块内。否则有可能导致火灾、故障或误动作。
- 在电缆配线时，必须将系统使用的外部供应电源全部断开后再进行操作。
- 与模块相连接的通信电缆及电源电缆必须收入套管中，或者用夹具进行固定处理。如果未将电缆收入套管或未用夹具进行固定处理，可能由于电缆的晃动及移动、不经意的拉拽等造成模块及电缆破损、电缆接触不良而导致误动作。
- 在拆卸与模块相连接的通信电缆及电源电缆时，请勿用手拉扯电缆部分。带接口的电缆应握住与模块相连接部分的接口进行拆卸。端子排连接的电缆应在拧松端子排螺栓后再进行拆卸。如果在与模块相连接的状态下拉扯电缆，可能导致误动作或模块及电缆破损。

【启动 / 维护注意事项】

⚠注 意

- 经由MELSECNET连接GX Developer以对其他站点在运行中的CPU模块进行在线操作（特别是程序更改、强制输出、运行状态的更改）前，应仔细阅读手册，在充分确认安全的基础上进行操作。否则操作错误有可能导致机械破损或事故发生。
- 请勿拆解或改造各模块。 否则可能导致故障、误动作、人身伤害或火灾。
- 便携电话或PHS等无线通信设备应在距离可编程控制器本体（各个方向）25cm以上的地方使用。否则可能导致误动作。
- 在拆装模块时，必须将系统使用的外部供应电源全部断开后再进行操作。如果未全部断开，有可能导致模块故障或误动作。
- 在通电状态下请勿触摸端子。 否则可能导致误动作。
- 在清洁模块或重新紧固端子螺栓、模块安装螺栓时，必须将系统使用的外部供应电源全部断开后再进行操作。 如果未全部断开，有可能导致模块故障或误动作。如果螺栓拧得过松，有可能导致掉落、短路或误动作。如果螺栓拧得过紧，有可能造成螺栓及模块破损从而导致掉落、短路或误动作。
- 在触碰模块之前，必须先触碰已接地的金属等，释放掉人体等所携带的静电。如果不释放掉静电，有可能导致模块故障或误动作。

【报废处理注意事项】

⚠注 意

- 本产品报废时，应当作工业废物处理。

● CONDITIONS OF USE FOR THE PRODUCT ●

(1) Mitsubishi programmable controller ("the PRODUCT") shall be used in conditions;
i) where any problem, fault or failure occurring in the PRODUCT, if any, shall not lead to any major or serious accident; and
ii) where the backup and fail-safe function are systematically or automatically provided outside of the PRODUCT for the case of any problem, fault or failure occurring in the PRODUCT.

(2) The PRODUCT has been designed and manufactured for the purpose of being used in general industries.
MITSUBISHI SHALL HAVE NO RESPONSIBILITY OR LIABILITY (INCLUDING, BUT NOT LIMITED TO ANY AND ALL RESPONSIBILITY OR LIABILITY BASED ON CONTRACT, WARRANTY, TORT, PRODUCT LIABILITY) FOR ANY INJURY OR DEATH TO PERSONS OR LOSS OR DAMAGE TO PROPERTY CAUSED BY the PRODUCT THAT ARE OPERATED OR USED IN APPLICATION NOT INTENDED OR EXCLUDED BY INSTRUCTIONS, PRECAUTIONS, OR WARNING CONTAINED IN MITSUBISHI'S USER, INSTRUCTION AND/OR SAFETY MANUALS, TECHNICAL BULLETINS AND GUIDELINES FOR the PRODUCT.
("Prohibited Application")
Prohibited Applications include, but not limited to, the use of the PRODUCT in;
- Nuclear Power Plants and any other power plants operated by Power companies, and/or any other cases in which the public could be affected if any problem or fault occurs in the PRODUCT.
- Railway companies or Public service purposes, and/or any other cases in which establishment of a special quality assurance system is required by the Purchaser or End User.
- Aircraft or Aerospace, Medical applications, Train equipment, transport equipment such as Elevator and Escalator, Incineration and Fuel devices, Vehicles, Manned transportation, Equipment for Recreation and Amusement, and Safety devices, handling of Nuclear or Hazardous Materials or Chemicals, Mining and Drilling, and/or other applications where there is a significant risk of injury to the public or property.

Notwithstanding the above, restrictions Mitsubishi may in its sole discretion, authorize use of the PRODUCT in one or more of the Prohibited Applications, provided that the usage of the PRODUCT is limited only for the specific applications agreed to by Mitsubishi and provided further that no special quality assurance or fail-safe, redundant or other safety features which exceed the general specifications of the PRODUCTs are required. For details, please contact the Mitsubishi representative in your region.

Manuals

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

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 EMC AND LOW VOLTAGE DIRECTIVES

(1) Method of ensuring compliance
To ensure that Mitsubishi programmable controllers maintain EMC and Low Voltage Directives when incorporated into other machinery or equipment, certain measures may be necessary. Please refer to one of the following manuals.
• User's manual for the CPU module used
• User's manual (hardware) for the CPU module or base unit used
The CE mark on the side of the programmable controller indicates compliance with EMC and Low Voltage Directives.

(2) Additional measures
To ensure that this product maintains EMC and Low Voltage Directives, please refer to one of the manuals listed under (1).

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
A1SJ71AP21-S3		–	○	–	
A1SJ71AR21		–	–	○	(A1SJ71AR21 cannot be mounted in slot 0 of A1S6□B extension base.)

(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

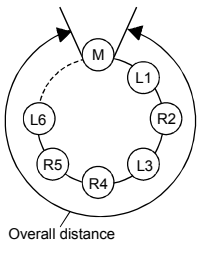
2. Specification

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		$\frac{Y(points)+B(points)}{8} + 2\times W(points) \leqq 1024bytes$		
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: $\frac{Y(points)+B(points)}{8} + 2\times W(points) \leqq 1024bytes$ second half: $\frac{B(points)}{8} + 2\times W(points) \leqq 1024bytes$		
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: $\frac{Y(points)+B(points)}{8} + 2\times W(points) \leqq 1024bytes$ second half: $\frac{B(points)}{8} + 2\times W(points) \leqq 1024bytes$		
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)
Number of connectable stations			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 H-PCF optical fiber cable	GI optical fiber cable	3C-2V, 5C-2V equivalent
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)	–

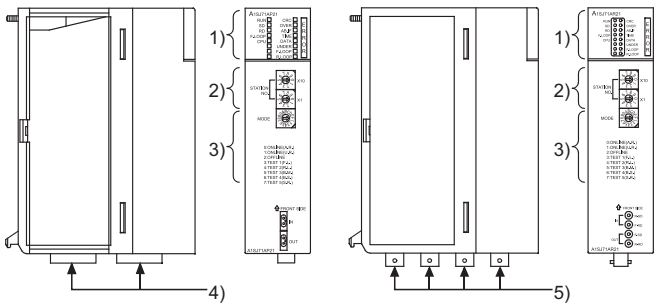
*1: Specialised skill and specific tools are required to connect the connector to the opticalfiber cable; the connector itself is a custom product. Please contact your nearest Mitsubishi Electric System & Service Corporation when purchasing these products.

REMARK

1) 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.).
2) 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	• 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) • 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)	
		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	
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

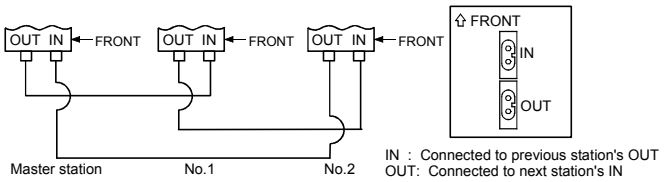
4.2 Installation Environment

Do not install PLCs in the following environments:

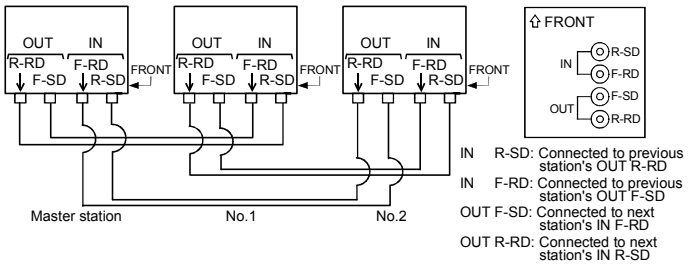
(1) Locations where the ambient temperature is outside the range 0℃ to 55℃.
(2) Locations where the ambient humidity is outside the range 10% RH to 90%RH.
(3) Locations where dewing occurs due to sudden temperature changes.
(4) Locations exposed to corrosive or combustible gases.
(5) Locations exposed 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

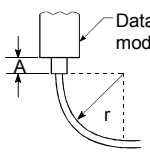


5.2 Connecting coaxial cables



5.3 Securing space for the cables

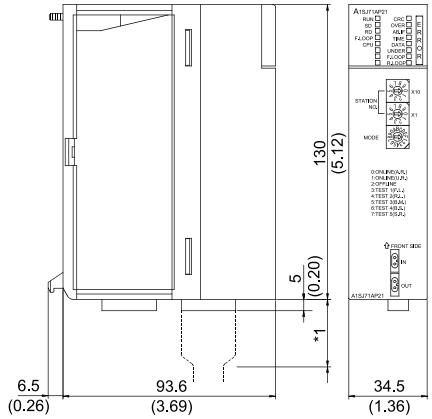
The radius of the fiber-optic cables or coaxial cables must not be smaller than the allowable bend radius.
When connecting a fiber-optic cable or coaxial cable to a link module, make sure that there is enough space for the cable to be bent to a larger radius than the allowable bend radius.
For connector 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)
Coaxial cable	3C-2V	30	23
	5C-2V		30

6. External Dimensions

A1SJ71AP21(-S3)



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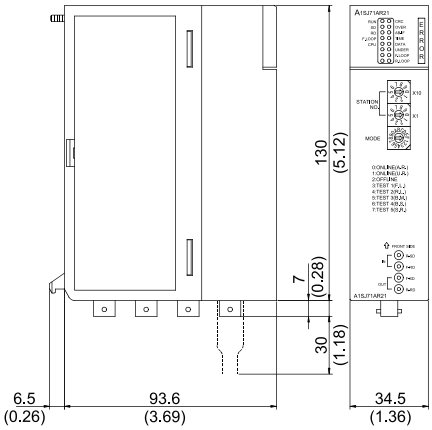

Unit: mm (inch)

*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.

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