MITSUBISHI ELECTRIC

MELSEC A Series

Programmable Controller

User's Manual

AJ71LP21/AJ71BR11
Network Module

01 10 1993
IB(NA)66444
Version A

REVISIONS

*The manual number is given on the bottom left of the back cover.

Print Date	*Manual Number	Revision
Oct., 1993	IB (NA) 66444-A	First edition

INTRODUCTION

Thank you for choosing the Mitsubishi MELSEC-A Series of General Purpose Programmable Controllers. Please read this manual carefully so that the equipment is used to its optimum. A copy of this manual should be forwarded to the end User.

CONTENTS

1. GENERAL DESCRIPTION

This manual covers the specifications and part names for the AJ71LP21 and AJ71BR11 network modules for use in a MELSEC-A series MELSECNET/10 network system.

AJ71LP21	Network module for optical loop system
AJ71BR11	Network module for coaxial cable system

For detailed information on the MELSECNET/10 network system, refer to the MELSECNET/10 Network System Reference Manual (PC-to-PC networks).

2. PERFORMANCE SPECIFICATIONS

The performance specifications for the AJ71LP21/AJ71BR11 modules are presented below.

Item	AJ71LP21		AJ71BR11	
Max. number of link points per network	LX/LY	8192 points		
	LB	8192 points		
	LW	8192 points		
Max. number of link points per station	$\frac{B + Y}{8}$ + 2 x W ≤ 2000 bytes			
Communication speed	20 MBPS (multiplex transmission)/10 MBPS		10 MBPS	
Communication method	Token ring method		Token bus method	
Synchronous method	Frame synchronous method			
Transmission path method	Duplex loop		Simplex loop	
Overall extension distance	30 km (18.6 miles) (When SI cable is used: 500 m (0.31 mile) between stations When QSI cable is used: 1 km (0.62 mile) between stations)		3C-2V	5C-2V
			300 m (0.2 mile) (300 m (0.2 mile) between stations)	500 m (0.31 mile) (500 m (0.31 mile) between stations)
Max. number of networks	255			
Max. number of groups	9			
Number of connecting stations	64 stations (1 control station, 63 normal stations)		32 stations (1 control station, 31 normal stations)	
Max. number of modules per CPU	AnUCPU : 4 Other than AnUCPU : 1			
Coding system	NRZI code (Non Return to Zero Inverted)		Manchester code	
Transmission format	Conforms to HDLC (frame method)			
Error control system	CRC (generating polynomial $X^{16} + X^{12} + X^5 + 1$) and retry after time-out			
RAS function	• Loopback function in the event of error detection or cable break (AJ71LP21 only) • Diagnosis function for self station link line check • Prevention of system "down" through control station shift function • Error detection by special relays and registers • Network monitoring and various diagnosis functions			
Transient transmission	• N : N communication (Monitoring, uploading/downloading of programs etc.) • ZNRD/ZNWR instruction (N : N)			
Connecting cable	SI-200/250	QSI-185/230	3C-2V, 5C-2V or equivalent	
Applicable connector	2-core optical connector plug CA9003	2-core optical connector plug CA7003	BNC-P-3-Ni-CAU BNC-P-5-Ni-CAU (DDK) or equivalent	
Cable transmission loss	12 dBm/km max.	5.5 dBm/km max.	Conforms to *JIS C 3501	

Item	AJ71LP21	AJ71BR11
Current consumption (DC 5V)	0.65 A	0.8 A
Weight	0.45 kg (0.99 lb)	
Number of occupied I/O points	32 points	

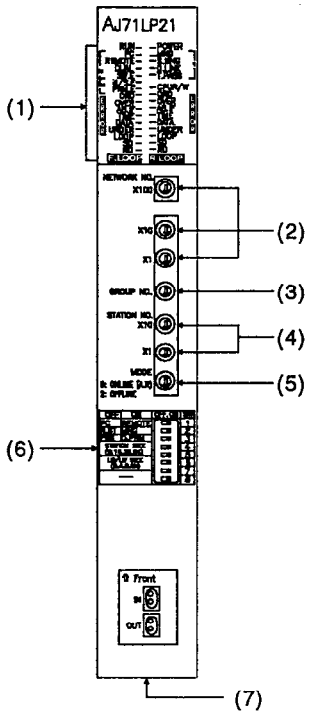
For general specifications, refer to the manuals on the programmable controller CPUs used in the network system.

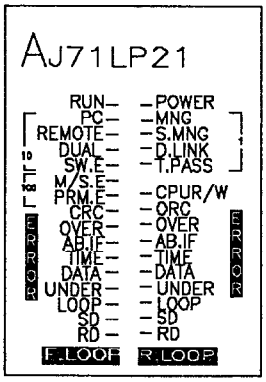
*: JIS: Japanese Industrial Standard

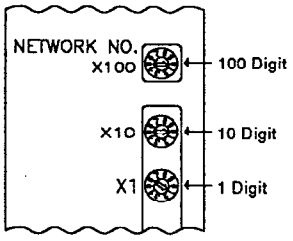
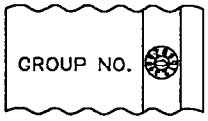
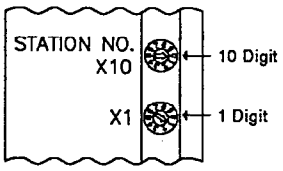
3. PART NAMES AND SETTINGS

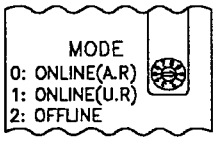
The names of the parts of the AJ71LP21 and AJ71BR11 modules and their applications are described below.

3.1 Names and Applications of AJ71LP21 Parts



No.	Name	Contents	
(1)	LED 	RUN	Lit when the module is running normally. Off when a WDT error or SP.UNIT ERROR occurs.
		PC	Lit when "PC-to-PC network" is set (SW1 setting = OFF).
		REMOTE	Lit when "remote I/O network" is set (SW1 setting = ON).
		DUAL	Lit when multiplex transmission is effective.
		SW.E	Lit when there is an error in switch settings (2) to (6).
		M/S.E	Lit if a station number is duplicated, or there is more than one control station, in the same network.
		PRM.E	Lit on occurrence of a common parameters/station specific parameters matching error, or if the parameters received from the subcontrol station differ from those that the self station received from the control station.
		POWER	Lit while power is supplied to the module.
		MNG	Lit when the module is set as a control station. Off when the module is set as a normal station.
		S.MNG	Lights when the module becomes a sub-control station.
		D.LINK	Lit while data link operation is in progress.
		T.PASS	Lit when the module participates in a baton pass.
		CPU R/W	Lit during communication with the CPU.

No.	Name	Contents	
(1)	LED	CRC	Lit if an error is discovered in the receive data code check. <Cause> Timing in which the station sending data to the relevant station goes noncontact, hardware fault, cable fault, noise, etc.
		OVER	Lit on occurrence of an error due to delayed processing of receive data <Cause> Hardware fault, cable fault, noise, etc.
		AB.IF	Lights on occurrence of an error caused by reception of more than the stipulated number of "1" bits in succession or by short data length of receive data. <Cause> Timing in which the station sending data to the relevant station goes noncontact, short monitoring time, cable fault, noise, etc.
		TIME	Lights on occurrence of a time-out error in data link monitoring. <Cause> Short monitoring time, cable fault, noise, etc.
		DATA	Lights on occurrence of a data error caused by reception of 2 kilobytes or more of faulty data. <Cause> Cable fault, noise, etc.
		UNDER	Lights when the internal processing of the send data is not performed at fixed intervals. <Cause> Hardware fault
		LOOP	Lights on occurrence of a foward/reverse loop error. <Cause> Power OFF at adjacent station, cable break, cable not connected, etc.
		SD	Lit while data is being sent
		RD	Lit while data is being received
(2)	Network number setting switches 	Network number setting (setting on shipment: "1") <Setting range> 1 to 255 Settings outside the 1 to 255 range will cause a setting error (the SW.E LED will light).	
(3)	Group number setting switch 	Group number setting (setting on shipment: "0") <Setting range> 0 to 9 Set "0" if there is no group designation.	
(4)	Station number setting switches 	Station number setting (setting on shipment: 1) <Allowable range> 1 to 64 Settings outside the 1 to 64 range will cause a setting error (the SW.E LED will light).	

<table>
<tr><th>No.</th><th>Name</th><th colspan="10">Contents</th></tr>
<tr><td>(5)</td><td>Mode setting switch
 
</td><td colspan="10">Mode setting (setting on shipment: 0)
<table>
<tr><th>Mode</th><th>Name</th><th>Description</th></tr>
<tr><td>0</td><td>Online (with automatic return)</td><td>Automatic return function in the data link</td></tr>
<tr><td>1</td><td colspan="2">Not usable</td></tr>
<tr><td>2</td><td>Offline</td><td>Set the self station for noncontact</td></tr>
<tr><td>3</td><td>Test mode 1</td><td>Loop test (forward loop)</td></tr>
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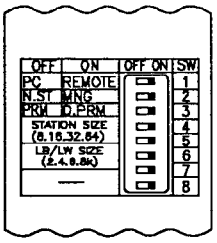
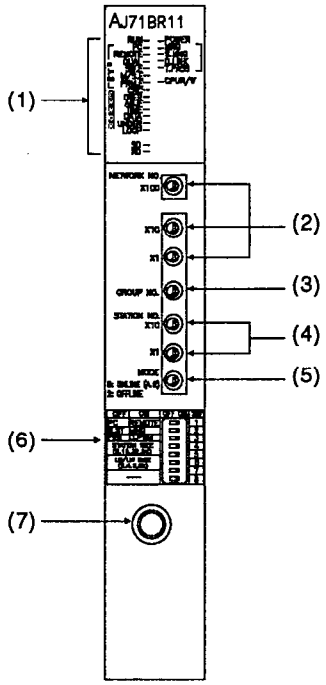
<tr><td>5</td><td>Test mode 3</td><td>Station to station test (master station)</td></tr>
<tr><td>6</td><td>Test mode 4</td><td>Station to station test (slave station)</td></tr>
<tr><td>7</td><td>Test mode 5</td><td>Self-loopback test</td></tr>
<tr><td>8</td><td>Test mode 6</td><td>Internal self-loopback test</td></tr>
<tr><td>9</td><td>Test mode 7</td><td>Hardware test</td></tr>
<tr><td>A</td><td colspan="2">Not usable</td></tr>
<tr><td>B</td><td colspan="2">Not usable</td></tr>
<tr><td>C</td><td colspan="2">Not usable</td></tr>
<tr><td>D</td><td>Test mode 8</td><td>Network No. check (LED display)</td></tr>
<tr><td>E</td><td>Test mode 9</td><td>Group No. check (LED display)</td></tr>
<tr><td>F</td><td>Test mode 0</td><td>Station No. check (LED display)</td></tr>
</table></td></tr>
<tr><td>(6)</td><td>Condition setting switches
 
</td><td colspan="10">Setting operating conditions (all switches OFF on shipment)
<table>
<tr><th>SW</th><th>Application</th><th colspan="4">OFF</th><th colspan="4">ON</th></tr>
<tr><td>1</td><td>Network type</td><td colspan="4">PC-to-PC network</td><td colspan="4">Remote I/O network</td></tr>
<tr><td>2</td><td>Station type</td><td colspan="4">Normal station</td><td colspan="4">Control station</td></tr>
<tr><td>3</td><td>Parameters used</td><td colspan="4">Common parameters</td><td colspan="4">Default parameters</td></tr>
<tr><td>4</td><td rowspan="2">Number of stations (effective when SW3 is ON)</td><td>OFF</td><td rowspan="2">8 stations</td><td>OFF</td><td rowspan="2">16 stations</td><td>ON</td><td rowspan="2">32 stations</td><td>ON</td><td rowspan="2">64 stations</td></tr>
<tr><td>5</td><td>OFF</td><td>ON</td><td>OFF</td><td>ON</td></tr>
<tr><td>6</td><td rowspan="2">Total number of B/W points (effective when SW3 is ON)</td><td>OFF</td><td rowspan="2">2k points</td><td>OFF</td><td rowspan="2">4k points</td><td>ON</td><td rowspan="2">6k points</td><td>ON</td><td rowspan="2">8k points</td></tr>
<tr><td>7</td><td>OFF</td><td>ON</td><td>OFF</td><td>ON</td></tr>
<tr><td>8</td><td colspan="9">Not used</td></tr>
</table></td></tr>
<tr><td>(7)</td><td>Connector</td><td colspan="10">Connect the fiber-optic cables here. The connection closer to the front face of the module is the "IN" connection and the connection further from the front face is the "OUT" connection.</td></tr>
</table>

* If the settings for (2), (3), (4), (5) and (6) have been changed, reset the ACPU. However, if the mode setting switch (5) is set to one of the modes "D" through "F", it is not necessary to reset the ACPU.

3.2 Names and Applications of AJ71BR11 Parts



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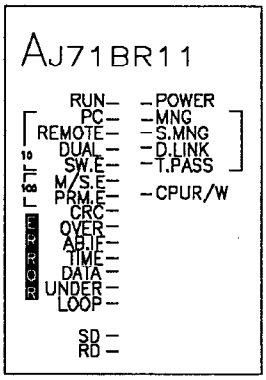
(1)	LED  	RUN	Lit when the module is running normally. Off when a WDT error or SP.UNIT ERROR occurs.
		PC	Lit when "PC-to-PC network" is set (SW1 setting = OFF).
		REMOTE	Lit when "remote I/O network" is set (SW1 setting = ON).
		DUAL	Off all the time.
		SW.E	Lit when there is an error in switch settings (2) to (6).
		M/S.E	Lit if a station number is duplicated, or there is more than one control station, in the same network.
		PRM.E	Lit on occurrence of a common parameters/station specific parameters matching error, or if the parameters received from the subcontrol station differ from those that the self station received from the control station.
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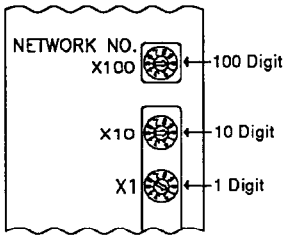
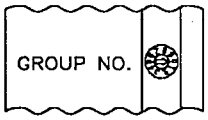
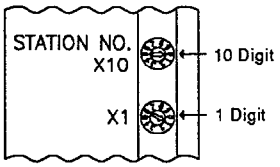
(2)	Network number setting switches 	Network number setting (setting on shipment: "1") <Setting range> 1 to 255 Settings outside the 1 to 255 range will cause a setting error (the SW.E LED will light).	
(3)	Group number setting switch 	Group number setting (setting on shipment: "0") <Setting range> 0 to 9 Set "0" if there is no group designation.	
(4)	Station number setting switches 	Station number setting (setting on shipment: 1) <Allowable range> 1 to 64 Settings outside the 1 to 64 range will cause a setting error (the SW.E LED will light).	

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 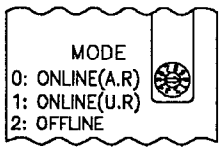
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 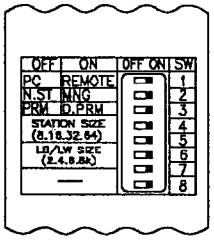
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<tr><td>6</td><td rowspan="2">Total number of B/W points (effective when SW3 is ON)</td><td>OFF</td><td>2k points</td><td>OFF</td><td>4k points</td></tr>
<tr><td>7</td><td>OFF</td><td>ON</td></tr>
<tr><td>8</td><td colspan="5">Not used</td></tr>
</table></td></tr>
<tr><td>(7)</td><td>Connector</td><td colspan="10">Connect an F type connector here.</td></tr>
</table>

* The AJ71BR11 is supplied with an F type connector (A6RCON-F).
If the settings for (2), (3), (4), (5) and (6) have been changed, reset the ACPU.
However, if the mode setting switch (5) is set to one of the modes "D" through "F", it is not necessary to reset the ACPU.

3.3 Cautions on Configuring a Network System

3.3.1 Installation positions of AJ71LP21/AJ71BR11

In order to ensure reliable data transmission, these network modules should not be installed next to the I/O modules which are listed below used with an AC input voltage and load voltage.

Input modules : AX10, AX11, AX20, AX21
Output modules : AY10, AY10A, AY11, AY11A, AY11E, AY13, AY13E, AY22, AY23

3.3.2 Cautions on building a coaxial bus system

(1) Terminal resistors (A6RCON-R75, which will soon be available, or BNC-TMP-05(75)) must be fitted at both ends of the system. These parts are not supplied with the modules and must be purchased separately.

(2) Restrictions on cable length between stations

The length of the coaxial cables used to connect stations is fixed according to the total number of stations, as shown in the table. Use the appropriate lengths.
Use of cable lengths other than those shown in the table may result in communication errors.
The total extension length is 500 m (0.31 mile), regardless of the total number of stations.

Total No. of Stations	Cable Length Between Stations
1 to 9	1 to 500 m (0.00062 to 0.31 mile)
10 to 32	1 to 5 m (0.00062 to 0.0031 mile)
	13 to 17 m (0.008 to 0.011 mile)
	25 to 500 m (0.016 to 0.31 mile)

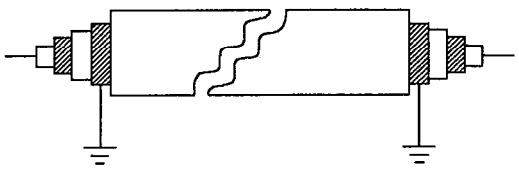
(3) Cautions on wiring

(a) When wiring, a distance of at least 100 mm (3.44 inches) should be kept between the coaxial cables and other power cables and control cables.

(b) In locations subject to a lot of noise, the use of double shielded coaxial cables should be considered.

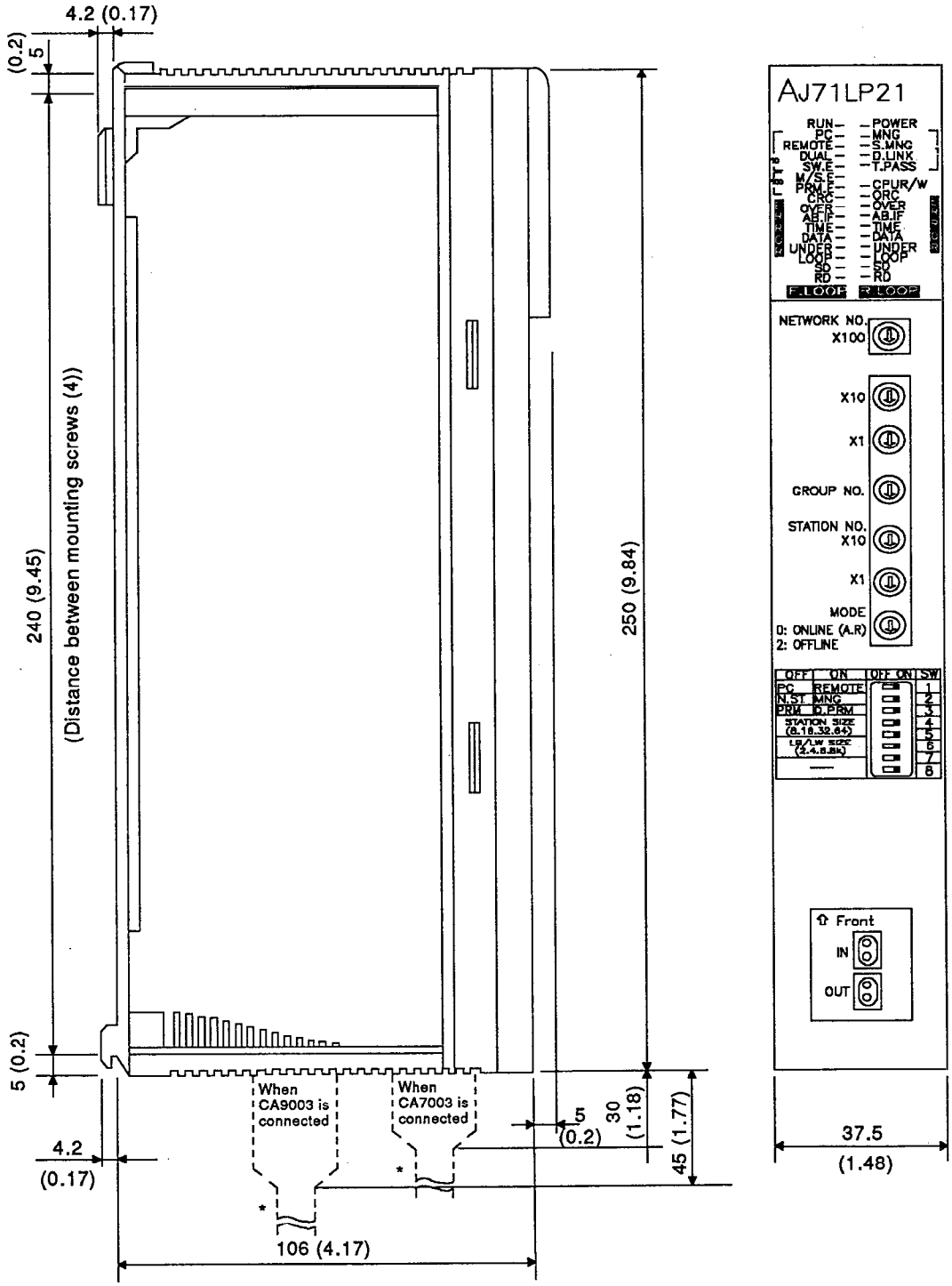
Double Shielded Coaxial Cable

Mitsubishi Densen 5C-2V-CCY



4. DIMENSIONS

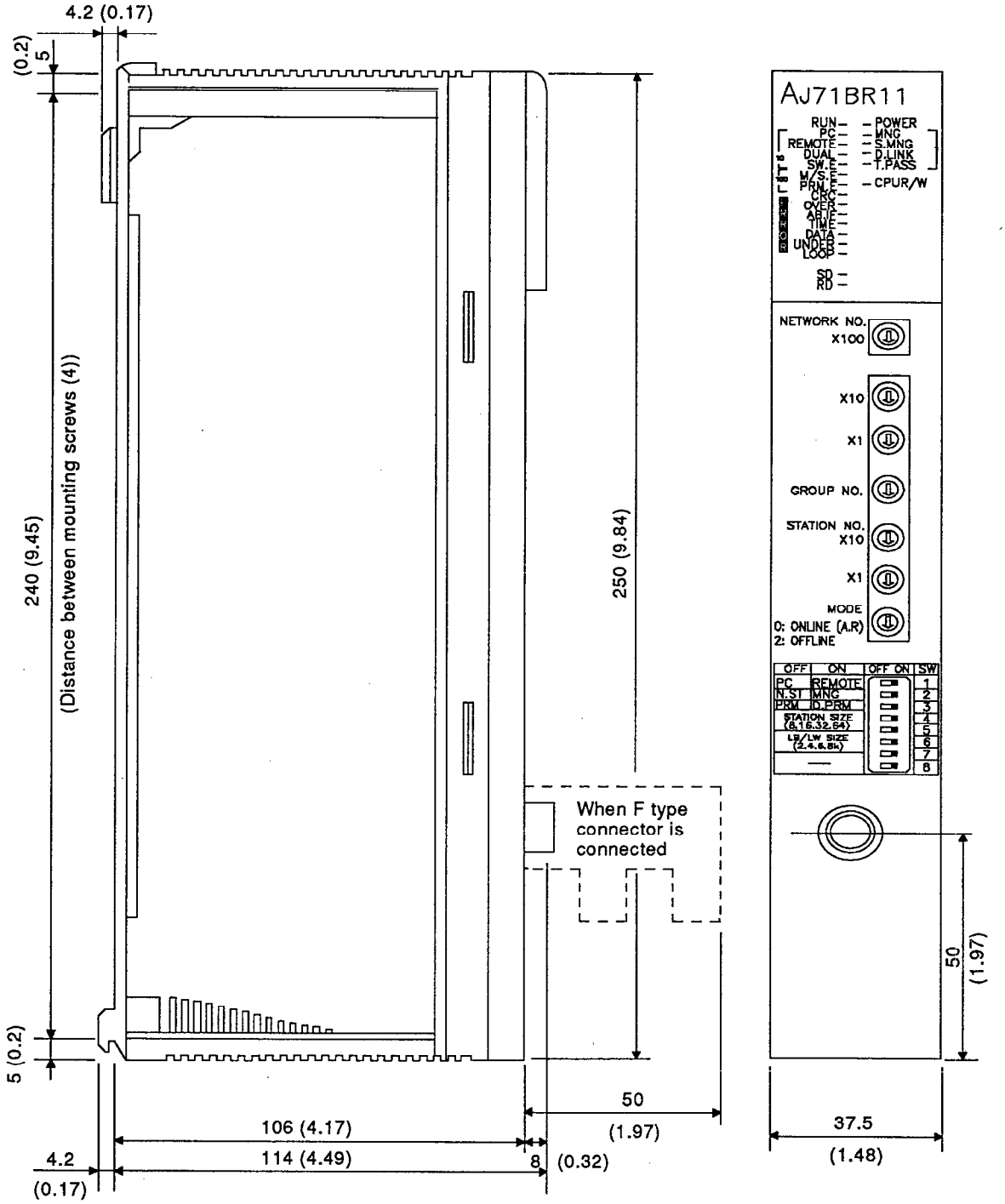
4.1 AJ71LP21



* Take the bending radius of the cable into account.

Unit: mm (inch)

4.2 AJ71BR11



Unit: mm (inch)

IMPORTANT

(1) Design the configuration of a system to provide an external protective or safety inter locking circuit for the PCs.

(2) The components on the printed circuit boards will be damaged by static electricity, so avoid handling them directly. If it is necessary to handle them take the following precautions.

(a) Ground your body and the work bench.

(b) Do not touch the conductive areas of the printed circuit board and its electrical parts with non-grounded tools, etc.

Under no circumstances will Mitsubishi Electric be liable or responsible for any consequential damage that may arise as a result of the installation or use of this equipment.

All examples and diagrams shown in this manual are intended only as an aid to understanding the text, not to guarantee operation. Mitsubishi Electric will accept no responsibility for actual use of the product based on these illustrative examples.

Owing to the very great variety in possible applications of this equipment, you must satisfy yourself as to its suitability for your specific application.

HEADQUARTERS

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