

# MITSUBISHI

# MELSEC QnA Series

User's Manual

## MELSECNET/10 network module type AJ71QLP21(S)/AJ71QBR11 (Hardware)

### INTRODUCTION

Thank you for choosing the Mitsubishi MELSEC-QnA 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.

PROGRAMMABLE CONTROLLER

IB (NA) 66613-A

### Cautions on Safety

(Please read before using the module)


Please carefully read this manual and related ones mentioned herein to ensure safety and operate this module properly.

The following cautions are applicable only to the module. For the cautions on safety relating to the PC CPU system, see the PC CPU User's Manual.

The cautions in this cautions on safety are classified into two ranks, "DANGER" and "CAUTION", according to their importance.

 DANGER

A warning given when improper operation could result in a dangerous situation causing death or serious injuries.

 CAUTION

A caution given when improper operation could result in a dangerous situation causing moderate or injuries, and physical damage to the module, etc.

Even failure to observe a caution marked ! CAUTION may bring about a serious accident depending on the situation. Do not fail to follow the cautions. Retain this manual for consultation whenever necessary, and provide a copy to the end user.

### Cautions on Design


 DANGER

- When there is a communication fault in the data link system, the following happens at the faulty station. Using the communications status information, create an interlock circuit in the sequence program to ensure that the system will operate safely despite such faults.

(1) The data link data that existed before the fault is retained.

(2) All outputs of remote I/O stations go OFF.

For details on the method for confirming the faulty station and the operating status when a communication fault occurs, see the manual for the relevant data link.

 CAUTION


- Do not bundle the control wire and the communication cable with the main circuit or power line or keep them close to one another. Keep the control wire and the communication cable at least 100 mm away from the main circuit or power line; otherwise, noise or malfunctions will occur.

### Cautions on Installation

 CAUTION

- Use the PC in the environment specified in the General Specifications section in this manual. Using it in an environment which does not meet the general specifications could cause electric shock, fire or malfunctions, and damage or deterioration of the module.
- Install the module by engaging the module mounting projections on the lower part of the module in the mounting holes of the base unit. Incorrect installation could result in malfunctions, failure of detachment.

### Cautions on Wiring


 DANGER

- Always switch off all power supply phases externally before attempting installation or wiring work. If all power supply phases are not switched off, there will be a danger of electric shock or damage to the product.

 CAUTION

- Before connecting wires to the PC, check the rated voltage and the terminal arrangement. Connecting power of a different voltage or wiring incorrectly will result in fire or failure.
- Tighten the terminal screws to the specified torque. Loose terminal screws will cause a short, fire or malfunctions.
- Take all possible measures to prevent chips or wire scraps from entering the module. Entry of foreign material will cause fire, failure of malfunctions.
- Correctly solder connectors for coaxial cables. If the soldering is not completed correctly, malfunctions may occur.

### Cautions on Start-Up and Maintenance

 DANGER

- Do not touch the terminals while they are live. This will cause malfunctions.
- Switch the power off before cleaning the module or retightening the terminal screws. If the power is left on, the module will break down or malfunction.

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When imported from Japan, this manual does not need a translation in the Ministry of International Trade and Industry for service transaction purposes.

IB (NA) 66613 (9503) MEE Printed in Japan

Specifications subject to change without notice

**CAUTION**

- Read the manual carefully and confirm safety before attempting operations such as program changes, forced output, RUN, STOP, PAUSE, etc., during operation. Incorrect procedure could damage the machine or cause accidents.
- Do not disassemble or tamper with the module. This will cause failure, malfunctions, injuries or fire.
- Switch the power off before installing or removing the module. If the power is left on, the module will break down or malfunction.

**[Cautions on Disposal]**

**CAUTION**

- Dispose of the module as industrial waste.

**1. GENERAL DESCRIPTION**

This manual gives the specifications and nomenclature of the AJ71QLP21(S)/AJ71QBR11 type network modules to be used in a MELSEC-QnA series MELSEC-NET/10 network system.

- (1) The following table shows the applications, applicable cable and installation position of the AJ71QLP21(S) and AJ71QBR11.

	Application	Applicable Cable		Module Installation Position
		Optical Fiber Cable	Coaxial Cable	
AJ71QLP21(S)	For control, normal and master stations of MELSECNET/10	○	—	I/O slot of main or extension base unit
AJ71QBR11		—	○	

The AJ71QLP21S is a module that can receive its power supply from an external source, which means that even when the PC CPU power is turned OFF, the network module can continue to operate normally.

- (2) Please confirm that the following parts have been supplied on unpacking the package:

(a) AJ71QLP21(S)

Part Name	Quantity
AJ71QLP21(S) network module	1

(b) AJ71QBR11

Part Name	Quantity
AJ71QBR11 network module	1
F type connector (A6RCON-F)	1

- (3) When configuring a coaxial bus system a terminal resistor (A6RCON-R75) must be installed at both ends. The terminal resistors are not contained in the package and you must be obtained at your own expense.

- (4) Applicable CPU:  
 • Q2ACPU(S) • Q3ACPU • Q4ACPU

**1 1 Rated Manual**

QnA MELSECNET/10 Reference Manual (IB-66620)

**2. PERFORMANCE SPECIFICATIONS**

The following table shows the performance specifications of the AJ71QLP21(S) and of the AJ71QBR11.

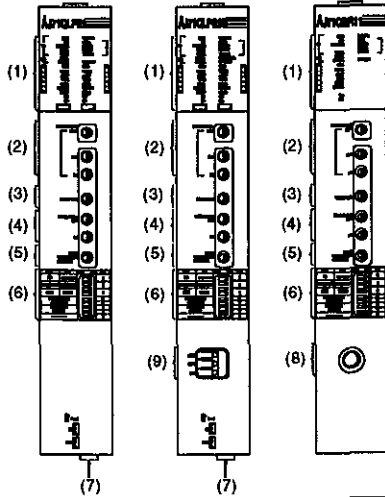
Item	AJ71QLP21(S)	AJ71QBR11
Maximum number of link points per network	X/Y	8192 points
	B	8192 points
	W	8192 points

Item	AJ71QLP21(S)	AJ71QBR11
Maximum number of link points per station	In PC-to-PC network	$\left(\frac{B+Y}{8} + (2 \times W)\right) \leq 2000$ bytes
	In remote I/O network	<ul style="list-style-type: none"> <li>• Remote Master station → Remote I/O station</li> <li><math>\left(\frac{B+Y}{8} + (2 \times W)\right) \leq 1600</math> bytes</li> <li>• Remote I/O station → Remote Master station</li> <li><math>\left(\frac{B+X}{8} + (2 \times W)\right) \leq 1600</math> bytes</li> <li>• Remote master station → remote sub-master station</li> <li>Remote sub master station → remote master station</li> <li><math>\left(\frac{Y+B}{8} + (2 \times W)\right) \leq 2000</math> bytes</li> </ul>
Communication speed	10 MBPS (20 MBPS: multiple transmission)	10 MBPS
Communication method	Token-ring method	Token bus method
Synchronization system	Frame synchronization	
Transmission channel type	Duplex loop	Single bus
Overall extension distance	30 km	3C 2V
		5C-2V
	<ul style="list-style-type: none"> <li>SI cable H type: station-to station distance 300 m</li> <li>SI cable L type: station-to station distance 500 m</li> <li>QSI cable: station to station distance 1 km</li> </ul>	<ul style="list-style-type: none"> <li>300 m (station to station distance 300 m)</li> <li>500 m (station to station distance 500 m)</li> </ul>
		Repeater unit Extension up to 2.5 km possible by using A6BR10 or A6BR10-DC
Maximum number of networks	239	
Maximum number of groups	9 (PC-to PC networks only)	
Number of stations connectable per network	In PC-to-PC network	64 stations (control station: 1; normal station: 63)
	In remote I/O network	65 stations (Remote master station: 1; remote I/O station: 64)
		32 stations (control station: 1; normal station: 31)
		33 stations (Remote master station: 1; remote I/O station: 32)
Maximum number of modules installed per CPU	QnACPU: 4	
Coding system	NRZI coding (Non Return to Zero Inverted)	Manchester coding
Transmission format	Conforms to HDLC (frame format)	
Error control system	Retry by CRC ( $X^{16} + X^{12} + X^5 + 1$ ) and overtime	
RAS function	<ul style="list-style-type: none"> <li>• Loopback function in response to error detection and cable disconnection (AJ71QLP21(S) only)</li> <li>• Diagnosis function for self-station link line check</li> <li>• System down prevention by control station shift (PC-to-PC network only)</li> <li>• Error detection using special relays and registers</li> <li>• Network monitor and other diagnosis functions</li> <li>• Transient transmission is possible even when a PC CPU error has occurred (the error cause can be checked from another station)</li> <li>• Prevention of loopback due to external power supply (AJ71QLP21S)</li> </ul>	
Transient transmission	• N : N communication (monitor, program upload/download, etc.)	
Connection cable	SI-200/250 ; QSI-185/230	3C-2V, 5C-2V or equivalent
Applicable connector	2-core optical fiber cable connector plug CA7003	BNC connector compatible with 3C 2V, 5C 2V cable
Cable transmission loss	12 dB/km or less ; 5 dB/km or less	Conforms to JIS C 3501
Current consumption (5 VDC)	0.65 A	
External power supply (AJ71QLP21S only)	Voltage	DC 20.4 to 31.2 V
	Current	0.2 A
	Applicable wire size	0.75 to 2mm <sup>2</sup>
	Tightening torque	41.1 N cm (4kg cm)
Weight (kg (lb))	0.45 (0.99) (AJ71QLP21S : 0.55(1.21))	
Number of occupied I/O points	32 points	

For general specifications, refer to the user's manual for the PC CPU used for the network system.

### 3. NOMENCLATURE AND SETTINGS


This section gives the names of each part of the AJ71QLP21(S) and AJ71QBR11 and explains their settings



No	NLame	Description		
(1)	LED	RUN	When the module is normal: On When a WDT error occurs: Off	
		PC	When PC-to-PC network is set: On (SW1 off)	
	AJ71QLP21	REMOTE	When remote I/O network is set: On (SW1 on)	
		DUAL	During duplex transmission: On	
		SW E	When settings of switches (2) to (6) are incorrect: On	
	AJ71QLP21S	M/S E	When two or more stations have the same number or two or more control stations exist in the same network: On	
		PRM E	On occurrence of a common parameter/station specific parameter matching error, and when parameters received from a sub control station do not match self-station parameters: On	
		POWER	When power is supplied: On	
		MNG	When a control or master station is set: On When normal stations are set: Off	
		S MNG	After shift to a sub-control station: On	
		D LINK	During data link: On	
		T PASS	When taking part in baton passing (during transient transmission): On	
		AJ71QBR11	EX POWER	When (9) external power supply (24 VDC) is supplied: On
			CPU R/W	During CPU communication: On
			CRC	When there is a code check error in the received data: On <Cause> Timing when the station that is sending data to a specific station is set off-line, hardware fault, cable fault, noise, etc
	OVER	When an error occurs due to delay in processing of received data: On <Cause> Hardware fault, cable fault, noise, etc		
	AB IF	When the number of '1's received in succession exceeds the specified number, or when an error occurs due to short data length of received data: On <Cause> Timing when the station that is sending data to a specific station is set off-line, WDT setting too short, cable fault, noise, etc		
	TIME	When an error occurs when the data link monitoring timer operates: On <Cause> Short WDT time, cable fault, noise, etc		
	DATA	When an error occurs due to receipt of more than 2 Kbytes of data: On <Cause> Cable fault, noise, etc		
	UNDER	When an error occurs due to internal processing of sent data at irregular intervals: On <Cause> Hardware fault		
LOOP	When error occurs due to abnormal forward or reverse loop (F LOOP/R LOOP): On <Cause> Power OFF at adjacent station, cable disconnection, connection not made, etc			

No	NLame	Description																																																
		SD	RD																																															
(1)	LED	During data transmission: On	During data reception: On																																															
(2)	Network number setting switch	Network number setting (setting on delivery: 1) <Setting range> 1 to 239 : Network number Any number out of the range will result in an error (the SW E LED comes on) The online status is established																																																
(3)	Group number setting switch	Group number setting (setting on delivery: 0) <Setting range> 1 to 9 : Group No The number '0' means that no group is specified																																																
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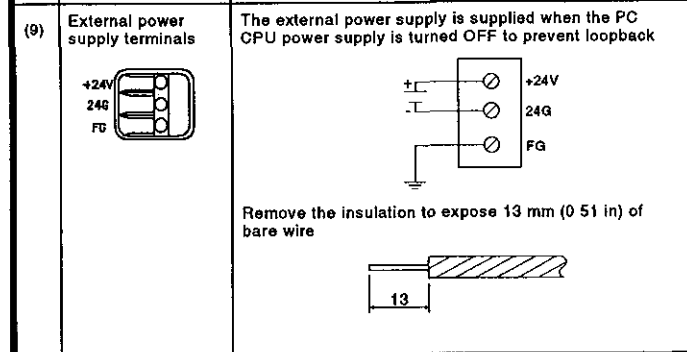
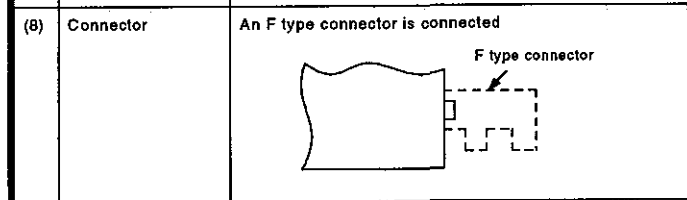
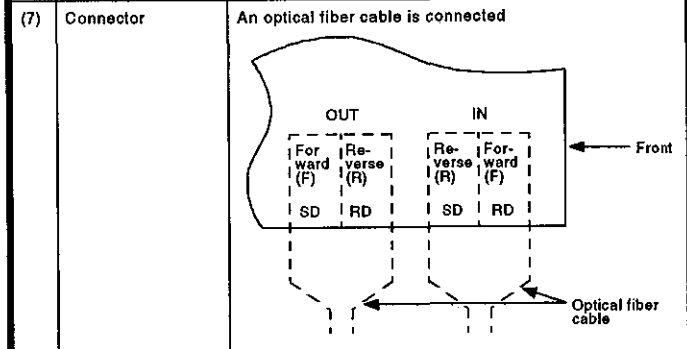
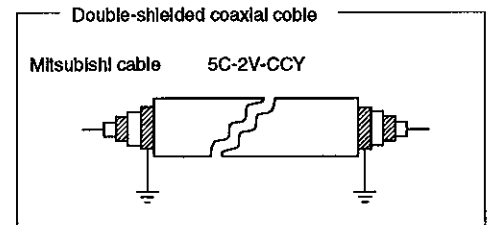
## 4. CAUTIONS ON COAXIAL BUS SYSTEM CONFIGURATION

No	NLame	Description					
(6) *1	Condition setting switch 	Operation condition setting (setting at delivery: all OFF)					
		SW	Description	OFF	ON		
		1	Network type	PC to PC network	Remote I/O network		
		2	Station type	Normal station / Multiplex sub-master	Control station / Parallel sub master		
		3	Used parameter	Common parameters	Default parameters		
		4	Number of stations (valid with SW3 on)	OFF	ON	OFF	ON
		8 sta tions		16 sta tions	32 sta tions	64 sta tions	
		5	Total number of B/W points (valid with SW3 on)	OFF	ON	OFF	ON
2 K points	4 K points	6 K points		8 K points			
7	Total number of B/W points (valid with SW3 on)	OFF	ON	OFF	ON		
2 K points		4 K points	6 K points	8 K points			
8	Not used (always OFF)						

- (1) Restrictions on the station-to-station cable length
- Use a station-to-station coaxial cable of an appropriate length for the total number of stations according to the table to the right
- Using a cable of a length other than that specified in this table may cause communication errors
- The overall extension length is 500 m (1640 ft), irrespective of the total number of stations

Total Number of Stations	Station-to-Station Cable Length
9 or fewer stations	1 to 500 m (3 28 to 1640 ft)
10 or more stations	1 to 5 m (3 28 to 16 4 ft)
	13 to 17 m (42 65 to 55 77 ft)
	25 to 500 m (82 02 to 1640 ft)

- (2) For an A6BR10 or A6BR10-DC type repeater unit, use a station-to-station cable whose length corresponds to one of the lengths specified for "10 or more stations"
- (3) Cautions on wiring
- (a) Keep coaxial cables more than 100 mm (3 94 in) away from other power cables and control cables
- (b) It is advisable to connect double-shielded coaxial cable in locations susceptible to noise



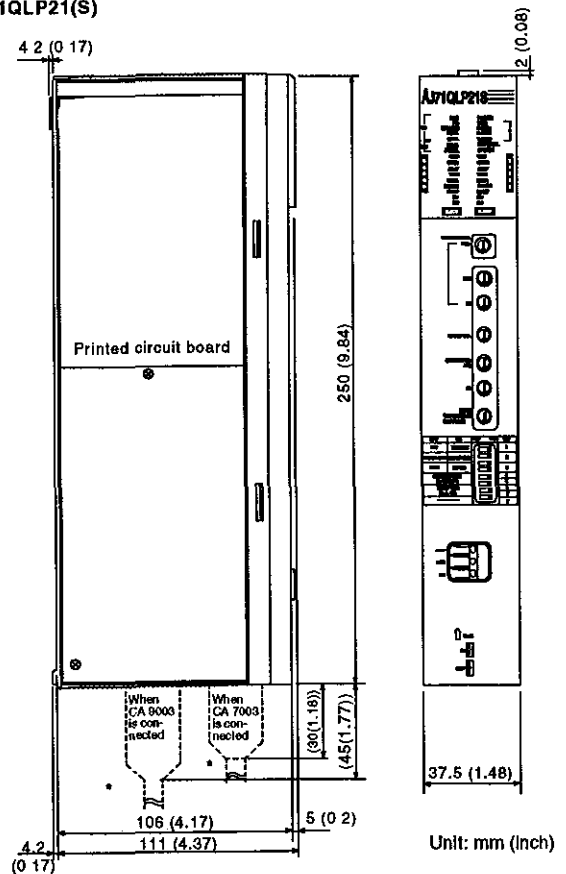
\*1: After changing a setting while the QnACPU power is ON, reset the QnACPU (turn the RUN/STOP key switch to "RESET", then to a setting other than "RESET")  
However, when the mode setting switch (5) is set to mode "D" or "E", the QnACPU does not have to be reset

\*2: When used with a remote I/O network, effective for station numbers 1 to 64

\*3: Effective for control stations in PC-to-PC networks

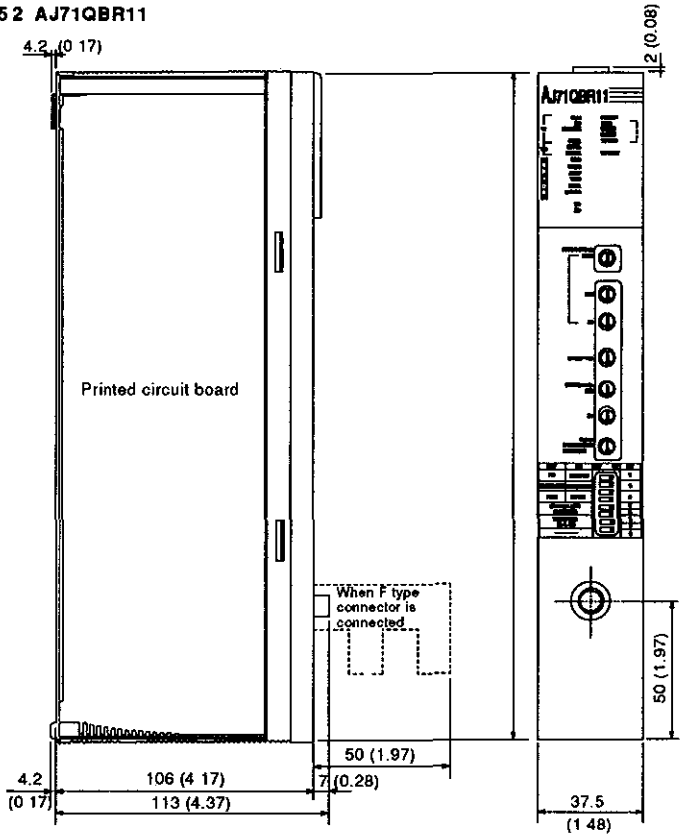
## 5. OUTSIDE DIMENSIONS

5 1 AJ71QLP21(S)



\* Take account of the bending radius of the cable (Refer to the Reference Manual)

52 AJ71QBR11



Unit mm (inch)

REVISIONS

A	
Mar., 1996	

**IMPORTANT**

- (1) Design the configuration of a system to provide an external protective or safety interlocking 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 human body and work bench
  - (b) Do not touch the conductive areas of the printed circuit board and its electrical parts with and 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.