# 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


| | |
|---|---|
| The United States | Mitsubishi Electronics America, Inc , (Industrial Automation Division)<br>800 Biermann Court, Mt Prospect, IL 60056<br>Phone: (708)298 9223 |
| Canada | Mitsubishi Electric Sales Canada, Inc , (Industrial Automation Division)<br>4299 14th Avenue, Markham Ontario L3R OJ2<br>Phone: (416)475-7728 |
| United Kingdom | Mitsubishi Electric UK Ltd. (Industrial Sales Division)<br>Travellers Lane, Hatfield Herts AL10 8XB<br>Phone: (0707)276100 |
| Germany | Mitsubishi Electric Europe GmbH, (Industrial Automation Division)<br>Gothaer Strasse 8, Postfach 1548, D 4030 Ratingen 1<br>Phone (02102)4860 |
| Taiwan | Setsuyo Enterprise Co , Ltd.,<br>(106) 11th Fl., Chung-Ling Bldg , 363 Sec 2, Fu Hsing S Rd , Taipei, Taiwan R.O.C.<br>Phone: (02)732 0161 |
| Hongkong (& China) | Ryoden International Ltd., (Industrial & Electrical Controls Division)<br>10/F Manulife Tower, 169 Electric Rd North Point Hong Kong<br>Phone: 8878870 |
| Singapore (& Malaysia) | MELCO Sales Shingapore Pte. Ltd , (Industrial Division)<br>307 Alexandra Rd #05 01/02 Mitsubishi Electric Bldg , Singapore 0315<br>Phone: 4732308 |
| Thailand | F.A Tech Co Ltd.,<br>1138/33 34 Rama 3 Rd , Yannawa Bangkok 10120<br>Phone: (02)295 2861~4 |
| Australia | Mitsubishi Electric Australia Pty Ltd , (Industrial Controls Division)<br>348 Victoria Rd , Rydalmere, N S W 2116<br>Phone: (02)684-7200 |
| Republic of South Africa | M S A. Manufacturing (Pty) Ltd , (Factory Automation Division)<br>P.O Box 39733, Bramley Johannesburg 2018<br>Phone: (011)444 8080 |

MITSUBISHI ELECTRIC CORPORATION

HEAD OFFICE:MITSUBISHI DENKI BLDG MARUNOUCHI TOKYO 100 TELEX: J24532 CABLE MELCO TOKYO
NAGOYA WORKS: 1-14, YADA-MINAMI 5, HIGASHI-KU, NAGOYA, JAPAN




IB (NA) 66613 (9609) MEE Printed in Japan Specifications subject to change without notice

## Csutions 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 warnig 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

**⚠ 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 MELSECNET/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 | O | — | I/O slot of main or extension base unit |
| AJ71QBR11 | | — | O | |

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

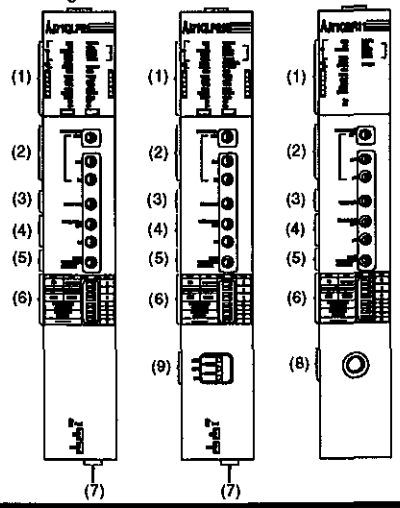
| Item | AJ71QLP21(S) | | AJ71QBR11 |
|---|---|---|---|
| Maximum number of link points per network | X/Y | 8192 points | |
| | B | 8192 points | |
| | W | 8192 points | |

| 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 | • Remot Master station → Remote I/O station $\left(\frac{B+Y}{8}+(2\times W)\right) \leq 1600$ bytes<br>• Remote I/O station → Remote Master station $\left(\frac{B+X}{8}+(2\times W)\right) \leq 1600$ bytes<br>• Remote master station → remote sub-master station Remote sub master station → remote master station $\left(\frac{Y+B}{8}+(2\times W)\right) \leq 2000$ bytes | |
| 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<br>[SI cable H type: station-to station distance 300 m<br>SI cable L type: station-to station distance 500 m<br>QSI cable: station to station distance 1 km] | 3C 2V: 300 m (station to-station distance 300 m)<br>5C-2V: 500 m (station to-station distance 500 m)<br>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) | 32 stations (control station: 1; normal station: 31) |
| | In remote I/O network | 65 stations (Remote master station: 1; remote I/O station: 64) | 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 | | • Loopback function in response to error detection and cable disconnection (AJ71QLP21(S) only)<br>• Diagnosis function for self-station link line check<br>• System down prevention by control station shift (PC-to-PC network only)<br>• Error detection using special relays and registers<br>• Network monitor and other diagnosis functions<br>• Transient transmission is possible even when a PC CPU error has occurred (the error cause can be checked from another station)<br>• Prevention of loopback due to external power supply (AJ71QLP21S) | |
| 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 5 dB/km or less | Conforms to JIS C 3501 |
| Current consumption (5 VDC) | | 0 65 A | 0 8 A |
| External power supply (AJ71QLP21S only) | Voltage | DC 20 4 to 31 2 V | ——— |
| | Current | 0 2 A | |
| | Applicable wire size | 0 75 to 2mm² | |
| | 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

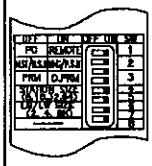
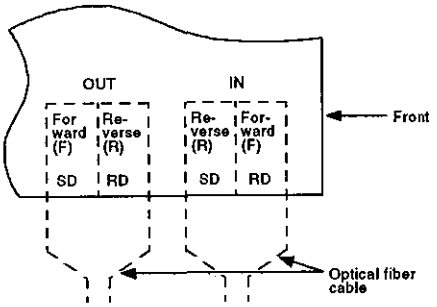
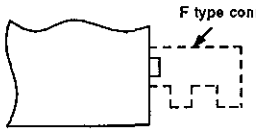
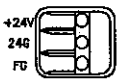
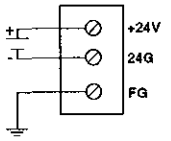
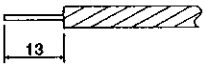
This section gives the names of each part of the AJ71QLP21(S) and AJ71QBR11 and explains their settings




| No | NLame | Description | |
|---|---|---|---|
| (1) | LED | RUN | When the module is normal: On<br>When a WDT error occurs: Off |
| | | PC | When PC-to-PC network is set: On<br>(SW1 off) |
| | | REMOTE | When remote I/O network is set: On<br>(SW1 on) |
| | | DUAL | During duplex transmission: On |
| | | SW E | When settings of switches (2) to (6) are incorrect: On |
| | | 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<br>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 |
| | | 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<br><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<br><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<br><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<br><Cause> Short WDT time, cable fault, noise, etc |
| | | DATA | When an error occurs due to receipt ofp more than 2 Kbytes of data: On<br><Cause> Cable fault, noise, etc |
| | | UNDER | When an error occurs due to internal processing of sent data at irregular intervals: On<br><Cause> Hardware fault |
| | | LOOP | When error occurs due to abnormal forward or reverse loop (F LOOP/R LOOP): On<br><Cause> Power OFF at adjacent station, cable disconnection, connection not made, etc |

| No | NLame | Description | |
|---|---|---|---|
| (1) | LED | SD | During data transmission: On |
| | | RD | During data reception: On |
| (2) *1 | Network number setting switch | Network number setting (setting on delivery: 1)<br><Setting range><br>1 to 239 : Network number<br>Any number out of the range will result in an error (the SW E LED comes on)<br>The online status is established | |
| (3) *1 | Group number setting switch | Group number setting (setting on delivery: 0)<br><Setting range><br>1 to 9 : Group No<br>The number "0" means that no group is specified | Effective with a PC-to-PC network |
| (4) *1 | Station number setting switch | Station number setting (setting on delivery: 1) | |
| | | Type | Setting |
| | | PC to PC network | 1 to 64 :station numer<br>Other than 1 to 64 :Setting error<br>(the SW E LED will come on) |
| | | Remote I/O netework | 0 : Remote master station<br>1 to 64 :remote sub-master station<br>Other than 1 to 64 :Setting error<br>(the SW E LED will come on) |
| (5) *1 | Mode setting switch | Mode setting (setting on delivery: 0) | |

| Mode | Name | Description |
|---|---|---|
| 0 | Online (automatic online return effective) | Data link with automatic online return effective |
| 1 | Unusable | ——— |
| 2 | Offline | Disconnects the host station |
| 3 | Forward loop test | Checks the forward loop line of the entire data link system |
| 4 | Reverse loop test | Checks the reverse loop line of the entire data link system |
| 5 | Station-to-station test (master station) | The mode for a line check between two stations, in which the station with the smaller number is regarded as the master station and the other is considered the slave station |
| 6 | Station-to-station test (slave station) | |
| 7 | Self-loopback test | Checks the hardware of a module in isolation, including the communication circuit and cables of the transmission system |
| 8 | Internal self-loopback test | Checks the hardware of a module in isolation, including the communication circuit of the transmission system |
| 9 | Hardware test | Checks the hardware inside the network module |
| A | Unusable | ——— |
| B | Unusable | ——— |
| C | Unusable | ——— |
| D | Test mode 8 | Network No check (LED indication) |
| E | Test mode 8 | Group No check (LED indication) |
| F | Unusable | ——— |

<table>
<tr><th>No</th><th>NLame</th><th>Description</th></tr>
<tr><td>(6)<br>*1</td><td>Condition setting switch<br>  </td><td>Operation condition setting (setting at delivery: all OFF)
<table>
<tr><th>SW</th><th>Description</th><th colspan="5">OFF</th><th colspan="5">ON</th></tr>
<tr><td>1</td><td>Network type</td><td colspan="5">PC to PC network</td><td colspan="5">Remote I/O network</td></tr>
<tr><td>*2 2</td><td>Station type</td><td colspan="5">Normal station /Multiplex sub-master</td><td colspan="5">Control station /Parallel sub master</td></tr>
<tr><td>3</td><td>Used parameter</td><td colspan="5">Common parameters</td><td colspan="5">Default parameters</td></tr>
<tr><td>4</td><td rowspan="2">Number of stations (valid with SW3 on)</td><td>OFF</td><td rowspan="2">8 stations</td><td>ON</td><td rowspan="2">16 stations</td><td>OFF</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>OFF</td><td>ON</td></tr>
<tr><td>*3 6</td><td rowspan="2">Total number of B/W points (valid with SW3 on)</td><td>OFF</td><td rowspan="2">2K points</td><td>ON</td><td rowspan="2">4K points</td><td>OFF</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>OFF</td><td>ON</td></tr>
<tr><td>8</td><td colspan="9">Not used (always OFF)</td></tr>
</table></td></tr>
<tr><td>(7)</td><td>Connector</td><td>An optical fiber cable is connected<br> 
</td></tr>
<tr><td>(8)</td><td>Connector</td><td>An F type connector is connected<br> 
</td></tr>
<tr><td>(9)</td><td>External power supply terminals<br> 
</td><td>The external power supply is supplied when the PC CPU power supply is turned OFF to prevent loopback<br> 
<br>Remove the insulation to expose 13 mm (0 51 in) of bare wire<br> 
</td></tr>
</table>

*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

## 4. CAUTIONS ON COAXIAL BUS SYSTEM CONFIGURATION

(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 )<br>13 to 17 m (42 65 to 55 77 ft )<br>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

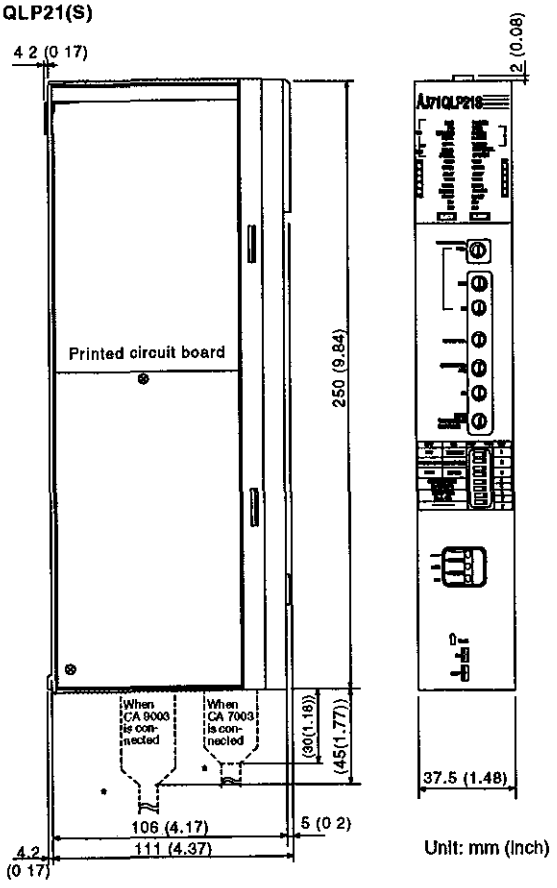
(b) It is advisable to connect double-shielded coaxial cable in locations susceptible to noise

Double-shielded coaxial coble

Mitsubishi cable 5C-2V-CCY

## 5. OUTSIDE DIMENSIONS

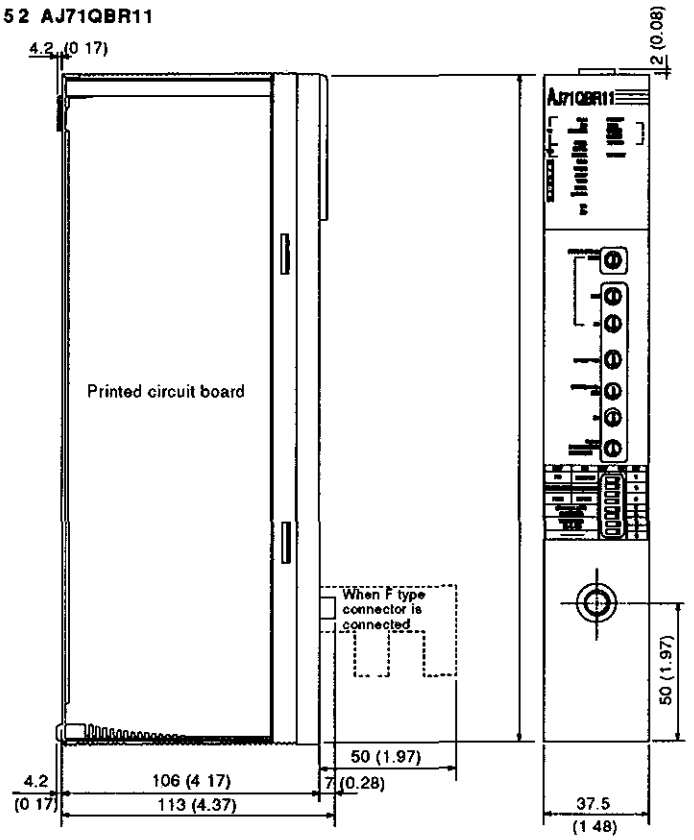
5 1 AJ71QLP21(S)




Unit: mm (inch)

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

5 2 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