MITSUBISHI MELSECNET/10 Network Module

User's Manual

(Hardware)

AJ71LP21, AJ71LR21 AJ71BR11

Thank you for buying the Mitsubishi general-purpose programmable controller MELSEC-A Series

Prior to use, please read both this manual and detailed manual thoroughly and familiarize yourself with the product.



| MODEL | AJ71LP21/BR11-U-E |
|-------|-------------------|
| MODEL | |
| CODE | 13JE32 |

IB(NA)-66444-D(0706)MEE

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SAFETY PRECAUTIONS •

(Always read before starting 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".



Note that the ACAUTION 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 store this manual in a safe place and make it accessible when required. Always forward it to the end user.

[INSTALLATION PRECAUTIONS]

| Use the programmable controller in an environment that meets the general specifications contained in CPU module user's manual. Using this programmable controller in an environment outside the range of the general |
|--|
| specifications could result in electric shock, fire, erroneous operation, and damage to or deterioration of the product. |
| Fully insert the protection on the bottom of the module into the hole in the base unit and press the module into position. |
| Not installing the module correctly could result in malfunction, damage, or drop of some pieces of the product. |
| If using the product in a vibratory environment, tighten the module with the screws. |
| Always tighten the module fixing screws within the specified torque range. Loose tightening could result in drop of some pieces of the product, short- circuit, and malfunction. |
| Tightening the screws too much could result in drop of some pieces of the product, short- circuit, or malfunction due to the breakage of a screw or the module. |
| Do not directly touch the printed circuit board, the conducting parts and electronic parts of the module. |
| It may cause damage or erroneous operation. |

- Before handling the module, touch a grounded metal object to discharge the static electricity from the human body. Failure to do so may cause malfunction or failure of the module.
- Completely turn off the externally supplied power used in the system before mounting or removing the module.

Not doing so could result in damage to the product.

[WIRING PRECAUTIONS]

 Before wiring, be sure to shut off all phases of the external power supply used by the system.

Failure to do so may cause electric shocks or damage the product.

- Be sure there are no foreign substances such as sawdust or wiring debris inside the module. Such debris could cause fires, damage, or erroneous operation.
- Solder the coaxial cable connector properly. Incomplete soldering may cause a malfunction.
- Make sure to place the communication and power cables into a duct or fasten them using a clamp.

Cables not placed in the duct or not clamped may hang or shift, allowing them to be accidentally pulled, which may cause a module malfunction and cable damage.

• When removing the communication cable or power cables from the module, do not pull the cable. When removing the cable with a connector, hold the connector on the side that is connected to the module.

When removing the cable connected to the terminal block, first loosen the screws on the terminal block.

Pulling the cable that is still connected to the module may cause malfunction or damage to the module or cable. Revisions

* The manual number is noted at the lower right of the top cover.

| Print Date | *Manual Number | Revision |
|------------|----------------|---------------------------------------|
| Oct., 1993 | IB(NA)-66444-A | First printing |
| Oct., 2004 | IB(NA)-66444-B | |
| 000, 2001 | | Manual size change |
| | | $A4 \rightarrow A6$ |
| | | Correction |
| | | Overall reexamination |
| May, 2006 | IB(NA)-66444-C | Correction |
| | | SAFETY PRECAUTIONS, Compliance with |
| | | the EMC Directive and the Low Voltage |
| | | Directive, Chapter 1, 2, 3, 4, 5, 6 |
| Jun., 2007 | IB(NA)-66444-D | Correction |
| | | Section 5.1, 5.2.1, 5.2.2 |
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Japanese Manual Version IB-68388-J

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About the Manuals

The following product manuals are available. Please use this table as a reference to request the appropriate manual as necessary.

Detailed Manual

| Manual name | Manual No. (Model code) |
|---------------------------------------|----------------------------|
| Type MELSECNET/10 Network System | (Model code) IB-66440 |
| Type MELSECNET/10 Network System | |
| (PLC to PLC network) Reference Manual | (13JE33) |
| Type MELSECNET/10 Network System | SH-3509 |
| (Remote I/O network) Reference Manual | (13JE72) |

Before use of this module, be sure to read the Type MELSECNET/10 Network System (PLC to PLC network) Reference Manual or the Type MELSECNET/10 Network System (Remote I/O network) Reference Manual.

Compliance with the EMC Directive and the Low Voltage Directive

When incorporating the Mitsubishi programmable controller 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 programmable controller CPU supplied with the base unit.

The CE logo is printed on the rating plate of the programmable controller, 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 explains the specifications and names of each part, etc., of the AJ71LP21, AJ71LR21 and AJ71BR11 model MELSECNET/10 network module (abbreviated as Network Modules) which are used with MELSECNET/10 network system of the MELSEC-A series.

(1) The use, cable used and installation position of the Network Modules are indicated on the following chart.

| | | Cable ι | | |
|----------|-----------------------------|-------------|------------|---------------|
| | Application | Optical | Coaxial | Position |
| | | fiber cable | cable | |
| AJ71LP21 | The control station, normal | \bigcirc | | Main base, |
| AJ71LR21 | station and remote master | | \bigcirc | Extension |
| AJ71BR11 | station of MELSECNET/10 | | Û | base I/O slot |

(2) After unpacking the Network Modules, confirm that any of the following products is enclosed.

| Model | Description | Quantity |
|----------|--|----------|
| AJ71LP21 | Model AJ71LP21 MELSECNET/10 network module (optical loop type) | 1 |
| AJ71LR21 | Model AJ71LR21 MELSECNET/10 network module (coaxial loop type) | 1 |
| AJ71BR11 | Model AJ71BR11 MELSECNET/10 network module (coaxial bus type) | 1 |
| | F-type connector (A6RCON-F) | 1 |

(3) The coaxial bus-type network system requires terminal resistors (A6RCON -R75: 75 Ω) at both terminal stations of the network. The user should arrange for terminal resistors, since the AJ71BR11 does not come with terminal resistors.

(4) The remote I/O network is supported from the software version J or later. (For the AJ71LR21, the software version must be "A" or later.)



In addition, make sure to use the following software version for the CPU module applicable to the remote I/O network.

| Model | Software version |
|--------------|------------------|
| A2UCPU(S1) | |
| A3UCPU | N or later |
| A4UCPU | |
| A2ASHCPU(S1) | D or later |
| A2USHCPU-S1 | A or later |

2. Performance Specifications

The performance specifications for Network Modules are indicated as follows.

(1) A1SJ71LP21

| Item | | Specifications AJ71LP21 | | |
|---------------------------|-----------------------|---|--|--|
| Maximum | X/Y | | | |
| Maximum | | 8192 points | | |
| link points | B | 8192 points | | |
| per network | W | 8192 points | | |
| Maximum link points | PLC to PLC network | $\left\{\frac{Y+B}{8} + (2\timesW)\right\} \leq 2000 \text{ bytes}$ | | |
| per station | Remote I/O | • Remote master station \rightarrow remote I/O station | | |
| | network | $\left\{\frac{Y+B}{8} + (2 \times W)\right\} \leq 1600 \text{ bytes}$ | | |
| | | • Remote I/O station \rightarrow remote master station | | |
| | | $\left\{\frac{X+B}{8} + (2\times W)\right\} \le 1600 \text{ bytes}$ | | |
| Communicatio | on speed | 10Mbps (equivalent to 20Mbps for multiple transmission) | | |
| Communicatio | on method | Token ring | | |
| Synchronizati | on method | Frame synchronization | | |
| Encoding met | | NRZI encoding (Non Return to Zero Inverted) | | |
| Transmission | | Duplex optical loop | | |
| Transmission | | Conform to HDLC (frame format) | | |
| Maximum nur | | 255 | | |
| networks | | (The sum total of PLC to PLC network and remote I/O network) | | |
| Maximum nur | nber of | 9 (Only for PLC to PLC network) | | |
| groups | | | | |
| Number of stations for | PLC to PLC network | 64 stations (Control station: 1 Normal stations: 63) | | |
| connection per network | Remote I/O network | 65 stations (Remote master station: 1 Remote I/O stations: 64) | | |
| Overall distan | | 30km | | |
| Station-to-stat | | SI optical cable : 500m | | |
| *1 | | H-PCF optical cable : 1km | | |
| | | Broad-band H-PCF optical cable : 1km | | |
| | | QSI optical cable : 1km | | |
| Error control r | nethod | Retry by CRC ($X^{16}+X^{12}+X^5+1$) and overtime | | |
| RAS function | | • Loop back function due to abnormality detection and cable | | |
| | | disconnection | | |
| | | Diagnostic function for local link circuit check | | |
| | | Prevention of system down due to shifting to control station | | |
| | | (Only for PLC to PLC networks) | | |
| | | Abnormality detection by link special relay, resistor | | |
| | | Abnormality detection by link special relay, resistor Network monitor, each type of diagnostic function | | |
| Transient tran | smission | N: N communication (Monitor, program upload/download, etc.) | | |
| Transient transmission | | N. N communication (Monitor, program upload/download, etc.) ZNRD/ZNWR instructions (N: N): AnUCPU dedicated instructions | | |
| | | Instructions | | |

| Item | Specifications | |
|----------------------------|---|--|
| ltem | AJ71LP21 | |
| Connection cable | Optical fiber cable (Arranged by user *2) | |
| Applicable connector | 2-core optical connector plug (Arranged by user *2) | |
| 5VDC current consumption | 0.65 A | |
| Weight | 0.31 kg *3 | |
| No. of occupied I/O points | 32 points (I/O assignment: 32 points as special) | |

*1: There are restrictions to the distance between stations, being determined according to the type of cable and number of stations. See sections 5.1.

*2: Specialised training 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 items.

*3: The weight for the hardware version P or earlier is 0.45kg.

For general specifications of the network module, refer to the user's manual for the programmable controller CPU that is to be used.

(2) AJ71LR21, AJ71BR11

| Item | | Specifications | | | | |
|-------------------------|-----------------------|---|---|---|--|--|
| | | | AJ71LR21 | | AJ71BR11 | |
| Maximum link | X/Y | 8192 point | S | | | |
| points per | В | 8192 point | S | | | |
| network | W | 8192 point | S | | | |
| Maximum link points per | PLC to PLC network | $\left\{\frac{Y+B}{8}\right\} + (2)$ | $(\times W) $ \leq 2000 bytes | | | |
| station | Remote I/O network | $\left\{\frac{Y+B}{8}\right\} + (2)$ • Remote I | master station \rightarrow rem (2×W) ≤ 1600 bytes /O station \rightarrow remote (2×W) ≤ 1600 bytes | | | |
| Communicatio | n speed | 10Mbps (e | quivalent to 20Mbps transmission) | 10Mbps | | |
| Communicatio | n method | Token ring | | Token bus | | |
| Synchronizatio | | · · · · · · · · · · · · · · · · · · · | chronization | | | |
| Encoding meth | | Mancheste | | | | |
| Transmission r | | Duplex coa | V | Single coa | ixial bus | |
| Transmission f | | | HDLC (frame forma | | | |
| Maximum num | | 255 | | -/ | | |
| networks | | (The sum total of PLC to PLC network and remote I/O network) | | | | |
| Maximum num groups | iber of | | PLC to PLC network | | | |
| Number of | PLC to PLC | 64 stations | | 32 stations | 6 | |
| stations for connection | network | Control s | station: 1 stations: 63 | Control station: 1 Normal stations: 31 | | |
| per network | network | | 65 stations [Remote master station: 1] Remote I/O stations: 64 | | 33 stations [Remote master station: 1] Remote I/O stations: 32 | |
| Overall distance | e | 3C-2V | 19.2km (300m) | 3C-2V | 300m (300m) | |
| (Station-to-stat | tion | 5C-2V | 30km (500m) | 5C-2V | 500m (500m) | |
| distance) *1 | | | | used with a | tended to 2.5km when a repeater module A6BR10-DC) | |
| Error control m | nethod | Retry by CRC ($X^{16}+X^{12}+X^5+1$) and overtime | | | | |
| RAS function | | Loop back function due to abnormality detection and cable disconnection (AJ71LR21) Diagnostic function for local link circuit check Prevention of system down due to shifting to control station (Only for PLC to PLC networks) Abnormality detection by link special relay, resistor Network monitor, each type of diagnostic function | | | | |
| Transient transmission | | • N: N com | munication (Monitor, JWR instructions (N: | program u | pload/download, etc.) | |

| Item | Specifications | | |
|----------------------------|---|----------|--|
| lteni | AJ71LR21 | AJ71BR11 | |
| Connection cable | Equivalent to 3C-2V, 5C-2V cables (Arranged by user) | | |
| Applicable connector | Equivalent to BNC-P-3-NiCAu (For 3C-2V), BNC-P-5-NiCAu (For | | |
| | 5C-2V) (DDK) (Arranged by user) | | |
| 5VDC current consumption | 1.20 A | 0.80 A | |
| Weight | 0.45 kg | 0.45 kg | |
| No. of occupied I/O points | 32 points (I/O assignment: 32 points as special) | | |

*1: There are restrictions to the distance between stations, being determined according to the type of cable and number of stations. See sections 5.2.1 and 5.2.2.
For general specifications of the network module, refer to the user's manual for the programmable controller CPU that is to be used.

[INSTALLATION PRECAUTIONS]

| | Use the programmable controller in an environment that meets the general specifications contained in CPU module user's manual. Using this |
|---|--|
| | programmable controller in an environment outside the range of the general specifications could result in electric shock, fire, erroneous operation, and |
| | damage to or deterioration of the product. |
| • | Fully insert the protection on the bottom of the module into the hole in the |
| | base unit and press the module into position. |
| | Not installing the module correctly could result in malfunction, damage, or drop of some pieces of the product. |
| | If using the product in a vibratory environment, tighten the module with the screws. |
| | Always tighten the module fixing screws within the specified torque range. |
| | Loose tightening could result in drop of some pieces of the product, short- circuit, and malfunction. |
| | Tightening the screws too much could result in drop of some pieces of the |
| | product, short- circuit, or malfunction due to the breakage of a screw or the module. |
| | Do not directly touch the printed circuit board, the conducting parts and |
| | electronic parts of the module. |
| | It may cause damage or erroneous operation. |
| | Before handling the module, touch a grounded metal object to discharge the |
| | static electricity from the human body. Failure to do so may cause |
| | malfunction or failure of the module. |

• Completely turn off the externally supplied power used in the system before mounting or removing the module.

Not doing so could result in damage to the product.

3.1 Cable length restrictions between stations

- (1) The main modules case is made of plastic, so do not drop it or subject it to strong impacts.
- (2) Do not dismount the printed wiring board from the case. It may damage the module.
- (3) When wiring, be careful never to let foreign matter from the above module such as wiring scraps get inside the module. If something goes in, get rid of it.
- (4) The module installation screw should be kept within the following range.

| Screw Locations | Tightening Torque Range |
|--|-------------------------|
| Module installation screws (M4 screws) | 78 to 118N•cm |

4. The Name and Setting of Each Part

Indicates the name and setting of each part of Network Modules.



| No. | Name | | | Contents |
|-----|---|---------|--------|---|
| 1) | LED | Name | Status | Contents |
| | | RUN | ON | Normal state |
| | AJ71LP21 | | OFF | WDT error, SP.UNIT ERROR |
| | AJ71LR21 | PC | | Set as PLC to PLC network (SW1 turned OFF) |
| | AJ71LP21 | REMOTE | | Set as remote I/O network (SW1 turned ON) |
| | | DUAL | | Multiplex transfer in execution |
| | RUNPOWER PCMNG | | | (OFF: Multiplex transfer not executed) |
| | DUAL D.LINK | SW.E. | | Incorrect setting of switches 2) to 6) |
| | 10SW.ET.PASS M/S.E 100PRM.ECPUR/W | M/S.E. | | Station number or control/remote master station status |
| | CRC - CRC | | | is duplicated on the same network. |
| | R AB.IF – AB.IF R R TIME – TIME R | PRM.E. | | Duplication of network refreshes parameters when |
| | | | | multiple modules are mounted. |
| | LOOPLOOP SDSD RDRD | | | Inconsistency between the common and station |
| | F.LOOP R.LOOP | | | specific parameters |
| | | | | Difference between parameter received from sub-control station and the one of the host (received |
| | | | | from control station). |
| | AJ71BR11 | POWER | | Power being supplied (OFF: No power being supplied) |
| | Δ | MNG | | Operating as control station or remote master station |
| | A J71BR11 | | | (OFF: Normal station) |
| | RUNPOWER PCMNG | S.MNG | | Operating as sub-control station |
| | REMOTE S.MNG DUAL D.LINK | D.LINK | | Data link being performed (OFF: Data link stopped) |
| | 10SW.ET.PASS M/S.E 100PRM.ECPUBAW | T.PASS. | | Participating in token passing |
| | CRC- | | | (Transient transmission is available.) |
| | R AB.IF – R TIME – | CPU R/W | | Communicating with CPU |
| | O DATA_ R UNDER_ | CRC | ON | Error detected in code check of receive data |
| | SD_ RD_ | | UN | <cause> Timing at which station sending data to target</cause> |
| | | | | station is disconnected from network, hardware failure, |
| | | | | cable fault, noise, etc. |
| | | OVER | | Error occurred when receive data processing is |
| | | | | delayed |
| | | | | <cause> Hardware failure, cable fault, noise, etc.</cause> |
| | | AB.IF | | Consecutive 1s exceeding the specified number were |
| | | | | received. |
| | | | | Length of received data is too short. <cause> Timing at which station sending data to target</cause> |
| | | | | station is disconnected from network, too short |
| | | | | monitoring time, cable fault, noise, etc. |
| | | TIME | | Data link WDT times out. |
| | | | | <cause> Monitoring time too short, cable fault, noise,</cause> |
| | | | | etc. |
| | | DATA | | Abnormal data larger than 2 kbytes are received. |
| | | | | <cause> Cable fault, noise, etc.</cause> |
| | | UNDER | | Internal send data processing is not done at fixed |
| | | | | intervals. |
| | | | | <cause> Hardware failure</cause> |
| | | LOOP | | Forward/reverse loop (F.LOOP/R.LOOP) is faulty. |
| | | | | <cause> Power-off of adjacent station, cable</cause> |
| | | 00 | Direct | disconnection, no connection, etc. |
| | | SD | Dimly | Data being sent |
| | | RD | ON | Data being received |

| No. | Name | | Contents | | |
|----------|---|---|---|--|--|
| 2) *1 | Network number setting switch NETWORK NO. X100 $+$ the third X10 $+$ the second X10 $+$ the first X1 $+$ the first X1 $+$ the first X1 | <setting rang<br="">1 to 255</setting> | ber setting (factory setting at time of shipping: 1) e> : Network number to 255 : Setting error (The SW.E. LED turns ON) Becomes off-line condition | | |
| 3) *1 | Group number setting Switch | Group number setting (factory setting at time of shipping: 0) <setting range=""> 0 : No specified group 1 to 9 : Group number Group number</setting> | | | |
| 4) | Station number setting switch | Station numb | er setting (factory setting at time of shipping: 1) | | |
| *1 | \frown | Туре | Setting | | |
| | STATION NO. | PLC to PLC | 1 to 64 : Station number | | |
| | X10 (⊖) ← the second dight | network *2 | Other than 1 to 64 :Setting error | | |
| | | | (The SW.E. LED turns ON) | | |
| | L X1 ((≦)) ← the first dight | Remote I/O | 0 : Remote master station | | |
| | | network | Other than 0 to 64 :Setting error | | |
| +4 1 | | | (The SW.E. LED turns ON) | | |

*1: When the setting has been changed with the CPU module powered ON, reset the CPU module (Shift the RUN/STOP key switch from RESET to any other than RESET.) *2: The setting range for the AJ71BR11 is shown below.

<Setting range> 1 to 32

: Station number

Other than 1 to 32 : Setting error (The SW.E. LED turns ON. Note that it does not turn ON when set to any of 33 to 64.)

| No. | Name | Contents | | | | | | | | | | |
|-----|--|---------------|-------------------------------------|-------------------------------|---------------|---|---------------------------------|----------------------------------|------------------|--------------------|--------|-------------------|
| 5) | Mode setting switch | Мос | Mode setting (factory setting at ti | | | | time of shipping: 0) | | | | | |
| *3 | | Mo | ode | Na | ame | | | | Cor | ntents | | |
| | MODE | | 0 | Online (autonomic online retu | | | Data effec | | th aut | omatic | online | e return |
| | 0: ONLINE(A.R) | | 1 | Not used (| Settin | g to thi | s turn | s on the | e SW. | .E. LEC |).) | |
| | 2: OFFLINE | | 2 | Offline | | | Disc | onnects | s the I | host sta | ation. | |
| | | | 3 | Forward lo | op tes | st | | cks the /ork sys | | ird loop | of the | e whole |
| | | | 4 | Reverse lo | op tes | st | | cks the /ork sys | | se loop | of the | e whole |
| | | ; | 5 | Station-to- (master sta | | n test | | mode f stations | | | | tween ion with |
| | | | 6 | Station-to- (slave stati | | n test | the r | smaller naster : | statio | n and tl | he oth | |
| | | | - | ` | | . 1 | | sidered | | | | |
| | | | 7 | Self-loopba | аск те | st | isola com | ck the h ition, ind munica | cludin tion c | g the ircuit ar | nd ca | |
| | | | _ | 1.1 | | 11 | | ransmi | | | | |
| | | | 8 | Internal se | it-loop | рраск | | ck the h | | | a moc | iule in |
| | | | | test | | isolation, including the communication circuit of the | | | | | | |
| | | | | | | transmission system. | | | | | | |
| | | | 9 | Hardware | test | | | | | | ide th | e |
| | | | | | | Check the hardware inside the network module. | | | | | | |
| | | | o C | Not used | | | (Do not set the mode.) | | | | | |
| | | | D | Test mode | 8 | | Netv | vork No | . che | ck (LÉC |) disp | olay) |
| | | | E | Test mode | 9 | | Grou | up No. d | check | (LED o | displa | y) |
| | | | F | Test mode | | | Station No. check (LED display) | | | | ay) | |
| 6) | Conditions setting switch | | | n condition s | | | | | | | | |
| *3 | OFF ON OFF ON SW PC REMOTE 1 | (fac | tory s | etting at the | time | of ship | pping: all off) | | | | | |
| | N.ST MNG 2 | SW | С | ontents | | 0 | FF | | | C | N | |
| | PRM D.PRM 3 STATION SIZE 4 4 (8.16.32.64) 5 5 I.B/I.W.SIZE 6 6 | 1 | | ork type | | to PLC | | vork | | ote I/O | | ork |
| | (2.4.6.8K) | | | on type | Normal statio | | | | | | | |
| | | 3 Use para | | meters | Para | meters | in co | mmon | Defa | ult Para | | ers |
| | 4 | | statio | | OFF | 8 stati- | ON | 16 stati- | OFF | 32 stati- | ON | 64 stati- |
| | *4 < | 5 | lsv | llid when V3 is ON | OFF | | OFF | | ON | ons | ON | ons |
| | | 6 | gene | number of eral point | OFF | ZK | ON | 4k | OFF | ок | ON | 8k |
| | | 7 | lsv | llid when V3 is ON | OFF | points | OFF | points | ON | points | ON | points |
| | - | 8 | Not | used (alwa | ys off |) | | | | | (1 4 | |

*3: When the setting has been changed with the CPU module powered ON, reset the CPU module (Shift the RUN/STOP key switch from RESET to any other than RESET.) Note that resetting the CPU module is not needed for mode "D" to "F".
 *4: The settings are enabled when the module is a control station in the PLC to PLC network.



5. Wiring

 Before wiring, be sure to shut off all phases of the external power supply used by the system.

Failure to do so may cause electric shocks or damage the product.

- Be sure there are no foreign substances such as sawdust or wiring debris inside the module. Such debris could cause fires, damage, or erroneous operation.
- Solder the coaxial cable connector properly. Incomplete soldering may cause a malfunction.
- Make sure to place the communication and power cables into a duct or fasten them using a clamp.

Cables not placed in the duct or not clamped may hang or shift, allowing them to be accidentally pulled, which may cause a module malfunction and cable damage.

• When removing the communication cable or power cables from the module, do not pull the cable. When removing the cable with a connector, hold the connector on the side that is connected to the module.

When removing the cable connected to the terminal block, first loosen the screws on the terminal block.

Pulling the cable that is still connected to the module may cause malfunction or damage to the module or cable.

5.1 Precautions for Laying Optical Fiber Cables

(1) The optical fiber cable type that can be used differs depending on the station to station distance.

| Туре | Distance between stations |
|--------------------------------------|---------------------------|
| SI optical fiber cable | 500 m (1640.5 ft.) |
| H-PCF optical fiber cable | 1000 m (3281 ft.) |
| Broad-band H-PCF optical fiber cable | 1000 m (3281 ft.) |
| QSI optical fiber cable | 1000 m (3281 ft.) |

(2) When connecting an optical fiber cable, the following restrictions on the bending radius must be observed.

Make sure of the specifications of the cable to be used.

(3) The optical fiber cable is wired in the following manner. There is no problem even if not wiring in order of the station number. There is no problem even if station how many become control station.



- (4) When laying the optical fiber cable, do not touch the fiber core of the cable connector or module connector, or let dirt or dust collect on it. If oil from the hands, dirt or dust should adhere to the core, the transmission loss will increase, causing a malfunction in the data link. Also, do not remove the cover from the module connector until an optical fiber cable is connected.
- (5) When attaching or detaching the optical fiber cable to/from the module, hold the cable connector securely with the hands.
- (6) Connect the cable connector and module connector securely until you hear a "click" sound.
- (7) Please wire IN/OUT of the connector for the cable correctly. Please do loopback test, the set confirmation test, and the bureau order confirmation test after wiring. It might be generated that a baton abnormal passing cannot be generated when miswiring and the downed bureau which cannot do the loopback of an arbitrary bureau do the row again even by the reclosing of the power supply.
- (8) Completely turn off the externally supplied power used in the system when connecting or disconnecting the cable.

5.2 Precautions when Installing the Coaxial Cables

5.2.1 For the Coaxial Loop Type

(1) For connection between network modules, use the cable length given in the following table depending on the cable type.

| Cable type | Interstation cable length | Overall distance |
|------------|---------------------------|----------------------|
| 3C-2V | 300 m (984.3 ft.) | 19.2 km (62995.2ft.) |
| 5C-2V | 500 m (1640.5 ft.) | 30 km (98430 ft.) |

(2) When connecting a coaxial cable, the following restrictions on the bending radius must be observed.



(3) The Coaxial cable is wired in the following manner.

There is no problem even if not wiring in order of the station number. There is no problem even if station how many become control station.



- (4) Install the coaxial cables at least 100 mm (3.94 in.) away from other power cables and control cables.
- (5) Consider wiring using double-shielded coaxial cable in places that are subject to large amounts of noise.



The 5C-2V connector plug is applicable to double-shielded coaxial cable. Connect the 5C-2V connector plug to the coaxial cable inside a doubleshielded coaxial cable. Ground the shielded part outside a double-shielded coaxial cable as shown in the above figure. (6) Do not pull any of the connected cables.

This will cause a faulty contact, cable disconnection, or damage to the module.

(7) Please wire SD/RD of the connector for the cable correctly.

Please do loopback test, the set confirmation test, and the bureau order confirmation test after wiring. It might be generated that a baton abnormal passing cannot be generated when miswiring and the downed bureau which cannot do the loopback of an arbitrary bureau do the row again even by the reclosing of the power supply.

(8) Completely turn off the externally supplied power used in the system when connecting or disconnecting the cable.

5.2.2 For the Coaxial Bus Type

(1) The cable to connect between network modules must be the following according to the number of stations connected.

When a cable length other than those specified in the table below is used, a communication error may result.

| Number of stations connected Station-to-station cable length | 2 to 9 s | stations | 10 to 33 stations | | |
|---|------------|--------------------------|-------------------|------------|--|
| Cable type | 3C - 2V | 5C - 2V | 3C - 2V | 5C - 2V | |
| 0 to 1 m (3.28 ft.) | • | le less tha ngth cann | • | , | |
| 1 (3.28 ft.) to 5 m (16.41 ft.) | \bigcirc | \bigcirc | \bigcirc | \bigcirc | |
| 5 (16.41 ft.) to 13 m (42.65 ft.) | \bigcirc | \bigcirc | × | × | |
| 13 (42.65 ft.) to 17 m (55.78 ft.) | \bigcirc | \bigcirc | \bigcirc | \bigcirc | |
| 17 (55.78 ft.) to 25 m (82.03 ft.) | \bigcirc | \bigcirc | × | × | |
| 25 (82.03 ft.) to 300 m (984.3 ft.) | 0 | 0 | 0 | Ó | |
| 300 (984.3 ft.) to 500 m (1640.5 ft.) | × | \bigcirc | × | \bigcirc | |

 \bigcirc : Allowed \times : Not allowed

- (2) If there is the possibility of an increase in the number of stations due to system expansion, install the cables with advance consideration of the restrictions.
- (3) When using a repeater module (models A6BR10 or A6BR10-DC), use the station-to-station cable length indicated by "10 to 33" stations, regardless of the number of stations connected or the number of repeater modules.
- (4) When connecting a coaxial cable, the following restrictions on the bending radius must be observed.

| Cable | Allowable bending radius | Connector |
|-------|--------------------------|--------------|
| type | r [mm (in.)] | A [mm (in.)] |
| 3C-2V | 23 (0.91) | 50 (1.97) |
| 5C-2V | 30 (1.18) | 50 (1.97) |



 (5) The coaxial cable is wired in the following manner. There is no program even if not wiring in order of the station number. There is no program even if station how many become control station.



- (6) Install the coaxial cables at least 100 mm (3.94 in.) away from other power cables and control cables.
- (7) Consider wiring using double-shielded coaxial cable in places that are subject to large amounts of noise.



The 5C-2V connector plug is applicable to double-shielded coaxial cable. Connect the 5C-2V connector plug to the coaxial cable inside a double-shielded coaxial cable. Ground the shielded part outside a double-shielded coaxial cable as shown in the above figure.

- (8) Do not pull any of the connected coaxial cables. This will cause a faulty contact, cable disconnection, or damage to the module.
- (9) Make sure to connect a terminal resistor to both terminal stations of the coaxial bus type network system.
- (10) A white oxide, which may be deposited on the F-type connector depending on the operating environment, is not producted in the fitting portion, posing no functional problems.
- (11) Completely turn off the externally supplied power used in the system when connecting or disconnecting the cable.

(12)There are integral type and separate F-type connectors. In the case of the separate F-type connector, tighten the ring of the connector until the ring is tight before connecting the connector to the network module. If the ring is loose, a communication error may occur.



After connecting the F-type connector to the network module, retighten its ring periodically.

Retighten it with both hands as shown below.



5.2.3 Connecting the Connector for the Coaxial Cables

The following section explains how to connect the BNC connector (connector plug for the coaxial cable) to the cable.

(1) Structure of the BNC connector and coaxial cable

The structure of the BNC connector and coaxial cable are shown in the figure below.



- (2) How to connect the BNC connector and the coaxial cable
 - (a) Cut off the outer sheath of the coaxial cable to the length shown in the diagram below.



Cut this portion of the outer sheath

(b) Feed the nut, washer, gasket and clamp on the coaxial cable through, as shown below, then unfasten the external conductor.



(c) Cut the external conductor, insulation material and internal conductor to the dimensions shown below. However, cut the external conductor to the same dimension as the tapered section of the clamp and smooth it down to the clamp.



(d) Solder the contact to the internal conductor.



(e) Insert the connector assembly in (d) into the plug shell and screw the nut into the plug shell.



Important

- (1) Note the following precautions when soldering the internal conductor and contact.
 - Make sure that the solder does not bead up at the soldered section.
 - Make sure there are no gaps between the connector and cable insulator or they do not cut into each other.
 - Perform soldering quickly so the insulation material does not become deformed.
- (2) Before connecting or disconnecting the coaxial connector, touch a grounded metal object to discharge the static electricity from the human body. Failure to do so may result in a module malfunction.

6. External Dimensions

6.1 AJ71LP21



Unit: mm (in.)

*1: Please confirm details to Mitsubishi Electric System Service Corporation.



Unit: mm (in.)



Unit: mm (in.)

MEMO

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