

# **MELSEC A Series**

Programmable Logic Controller

User's Manual  
(Hardware)

**A(1S)J71E71N3-T,  
A(1S)J71E71N-B5,  
A(1S)J71E71N-B2  
Ethernet Interface Module**

# ● SAFETY PRECAUTIONS ●

(Always read before starting use)

When using Mitsubishi equipment, thoroughly read this manual and the associated manuals introduced in the manual. Also pay careful attention to safety and handle the module properly.

These precautions apply only to the installation of Mitsubishi equipment and the wiring with the external device. Refer to the user's manual of the CPU module to be used for a description of the PLC system safety precautions.


These ● SAFETY PRECAUTIONS ● classify the safety precautions into two categories: "DANGER" and "CAUTION".



Procedures which may lead to a dangerous condition and cause death or serious injury if not carried out properly.



Procedures which may lead to a dangerous condition and cause superficial to medium injury, or physical damage only, if not carried out properly.

Depending on circumstances, procedures indicated by  **CAUTION** may also be linked to serious results.

In any case, it is important to follow the directions for usage.

Store this manual in a safe place so that you can take it out and read it whenever necessary.

Always forward it to the end user.

## [DESIGN PRECAUTIONS]

### CAUTION

- When laying the control wire or communication cable, do not bundle with or place near main circuit or power line.  
Keep them at least 100 mm (3.94 in.) away from such cables.  
Noise may cause erroneous operation.

## [INSTALLATION PRECAUTIONS]

### CAUTION

- Use the PLC in the environment given in the general specifications section of the user's manual to be used. Using the PLC outside the range of the general specifications may result in electric shock, fire, or erroneous operation or may damage or degrade the product.
- Insert the fixing latch on the bottom of the module into the fixing hole in the base unit and install the module using the hole point as a fulcrum. (The AnS series module shall be fastened by screws in the base unit at the specified torque.)  
Not installing the module correctly could result in erroneous operation, damage, or pieces of the product falling.
- Tighten the screw within the range of specified torque.  
If the screws are loose, it may result in fallout, short circuits or malfunction.  
Tightening the screws to far may cause damage to the screw and/or the module, resulting in fallout, short circuits or malfunction.
- Make sure to switch all phases of the external power supply off before mounting or removing the module.  
If you do not switch off the external power supply, it will cause electric shock or damage to the product.
- Do not touch the electronic parts or the module conducting area directly.  
It may cause erroneous operation or failure.

## [WIRING PRECAUTIONS]

### CAUTION

- Perform correct pressure-displacement, crimp-contact or soldering for external wire connections using the tools specified by the manufactures. Incorrect connection may cause short circuits, fire or malfunction.
- Attach connector to the module securely.
- Be sure to fix communication cables or power supply cables leading from the module by placing them in the duct or clamping them. Cables not placed in the duct or without clamping may hang or shift, allowing them to be accidentally pulled, which may cause a module malfunction and cable damage.
- Tighten the screw within the range of specified torque.  
If the screws are loose, it may result in short circuits or malfunction.  
Tightening the screws to far may cause damage to the screw and/or the module, resulting in fallout, short circuits or malfunction.
- Do not grab on the cable when removing the communication cable connected to the module.  
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 part that is connected to the terminal block.  
Pulling the cable that is still connected to the module may cause a malfunction or damage to the module or cable.
- Solder coaxial cable connectors properly.  
Insufficient soldering may cause malfunction.
- Be sure that cuttings, wire chips, or other foreign matter do not enter the module.  
Foreign matter may start a fire or cause an accident or erroneous operation.

# Revisions

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

Print Date	* Manual Number	Revision
Sep., 2004	IB(NA)-0800308-A	First printing
Dec., 2004	IB(NA)-0800308-B	<div data-bbox="772 315 1015 349" style="border: 1px solid black; padding: 2px;">Additional model</div> AJ71E71N3-T, A1SJ71E71N3-T <div data-bbox="772 396 986 430" style="border: 1px solid black; padding: 2px;">Deleted model</div> AJ71E71N-T, A1SJ71E71N-T

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### **About the Manuals**

The following product are available for this equipment.  
Refer to the table given below to choose suitable manuals.

#### **Related Manual**

Manual name	Manual No. (Model code)
For A Ethernet Interface Module User's Manual	SH-080192 (13JR45)

### **Conformation to the EMC Directive and Low Voltage Instruction**

For details on making Mitsubishi PLC conform to the EMC directive and low voltage instruction when installing it in your product, please refer to Chapter 3, "EMC Directive and Low Voltage Instruction" of the User's Manual (Hardware) for the CPU module to use.

The CE logo is printed on the rating plate on the main body of the PLC that conforms to the EMC directive and low voltage instruction.

For information about conforming this product to the EMC directive and low voltage instruction, please refer to Chapter 3 "EMC Directive and low Voltage Instruction," section "3.1.3. Cable" of the User's Manual (Hardware) for the CPU module to use.

# 1. Overview

This manual explains how to install the following Ethernet interface modules (abbreviated as E71 hereafter) for A series PLC CPU and how to wire them with external devices.

After unpacking E71, verify that the following parts are contained.

Model name	Product name	No. of items
AJ71E71N3-T	AJ71E71N3-T type Ethernet Interface Module	1
AJ71E71N-B5	AJ71E71N-B5 type Ethernet Interface Module	1
AJ71E71N-B2	AJ71E71N-B2 type Ethernet Interface Module	1
	F type Connector (A6RCON-F)	1
A1SJ71E71N3-T	A1SJ71E71N3-T type Ethernet Interface Module	1
A1SJ71E71N-B5	A1SJ71E71N-B5 type Ethernet Interface Module	1
A1SJ71E71N-B2	A1SJ71E71N-B2 type Ethernet Interface Module	1
	F type Connector (A6RCON-F)	1



## 2. Performance Specifications

The performance specifications of E71 is shown below. See CPU module user's manual to be used for E71 general specifications.

Item		Specifications
		AJ71E71N3-T A1SJ71E71N3-T
		10BASE-T
Transmission specifications	Data transmission speed	10 Mbps
	Communication mode	Half-duplex
	Transmission method	Base band
	Maximum distance between nodes	—
	Maximum segment length	100 m (328.08 ft.) (*1)
	Maximum number of nodes/connection	Cascade connection is a maximum 4 stages
	Minimum node interval	—
Transmission data storage memory	Number of allowable simultaneously open connectors	8 connections
	Fixed buffer	1 k word × 8
	Random access buffer	3 k word × 2
Number of remote nodes that can be communicated in a single initial processing		No restrictions
Number of occupied I/O points		32 points/1 slot (I/O assignments: special 32 points)
5 V DC internal current consumption		AJ71E71N3-T : 0.69A A1SJ71E71N3-T : 0.69A
Connector		Modular jack (RJ45)
Connection cable		Unshielded twisted pair cable (UTP), or shielded twisted pair cable (STP) rated in category 3, 4 or 5
12 V DC external power supply capacity (for transceiver)		—
External dimensions		AJ71E71N3-T: 250 (9.84) (H) × 37.5 (1.48) (W) × 106 (4.17) (D) [mm (in.)] A1SJ71E71N3-T: 130 (5.12) (H) × 34.5 (1.36) (W) × 94 (3.70) (D) [mm (in.)] • All do not include the protruded section on the front surface.
Weight		AJ71E71N3-T : 0.30 kg (0.66lb.) A1SJ71E71N3-T : 0.17 kg (0.37lb.)

Item		Specifications	
		AJ71E71N-B5 A1SJ71E71N-B5	AJ71E71N-B2 A1SJ71E71N-B2
		10BASE5	10BASE2
Transmission specifications	Data transmission speed	10 Mbps	
	Communication mode	Half-duplex	
	Transmission method	Base band	
	Maximum distance between nodes	2500 m (8202.10 ft.)	925 m (3034.77 ft.)
	Maximum segment length	500 m (1640.42 ft.)	185 m (606.96 ft.)
	Maximum number of nodes/connection	100 nodes per segment	30 nodes per segment
	Minimum node interval	2.5 m (8.20 ft.)	0.5 m (1.64 ft.)
Transmission data storage memory	Number of allowable simultaneously open connectors	8 connections	
	Fixed buffer	1 k word × 8	
	Random access buffer	3 k word × 2	
Number of remote nodes that can be communicated in a single initial processing		No restrictions	
Number of occupied I/O points		32 points/1 slot (I/O assignments: special 32 points)	
5 V DC internal current consumption		AJ71E71N-B5 : 0.55A A1SJ71E71N-B5 : 0.57A	AJ71E71N-B2 : 0.67A A1SJ71E71N-B2 : 0.66A
Connector		D-sub connector (Male 15-pin)	BCN connector
Connection cable		AUI cable (Twisted pair cable)	Coaxial cable (RG58A/U, RG58C/U)
12 V DC external power supply capacity (for transceiver)		(*2)	—
External dimensions		AJ71E71N-B5, AJ71E71N-B2: 250 (9.84) (H) × 37.5 (1.48) (W) × 106 (4.17) (D) [mm (in.)] A1SJ71E71N-B5, A1SJ71E71N-B2: 130 (5.12) (H) × 34.5 (1.36) (W) × 94 (3.70) (D) [mm (in.)] • All do not include the protruded section on the front surface.	
Weight		AJ71E71N-B5: 0.33 kg (0.73lb.) A1SJ71E71N-B5: 0.20 kg (0.44lb.) (*3)	AJ71E71N-B2: 0.35 kg (0.77lb.) A1SJ71E71N-B2: 0.21 kg (0.46lb.) (*3)

\*1 Length between hub and node.

\*2 It is required to use the one that satisfies the specifications of the transceiver and the AUI cable. Also, for the AJ71E71N-B5, the voltage drop (Max. 0.8V) must be taken into account.

\*3 When the hardware version is "A", the weight is as follows:

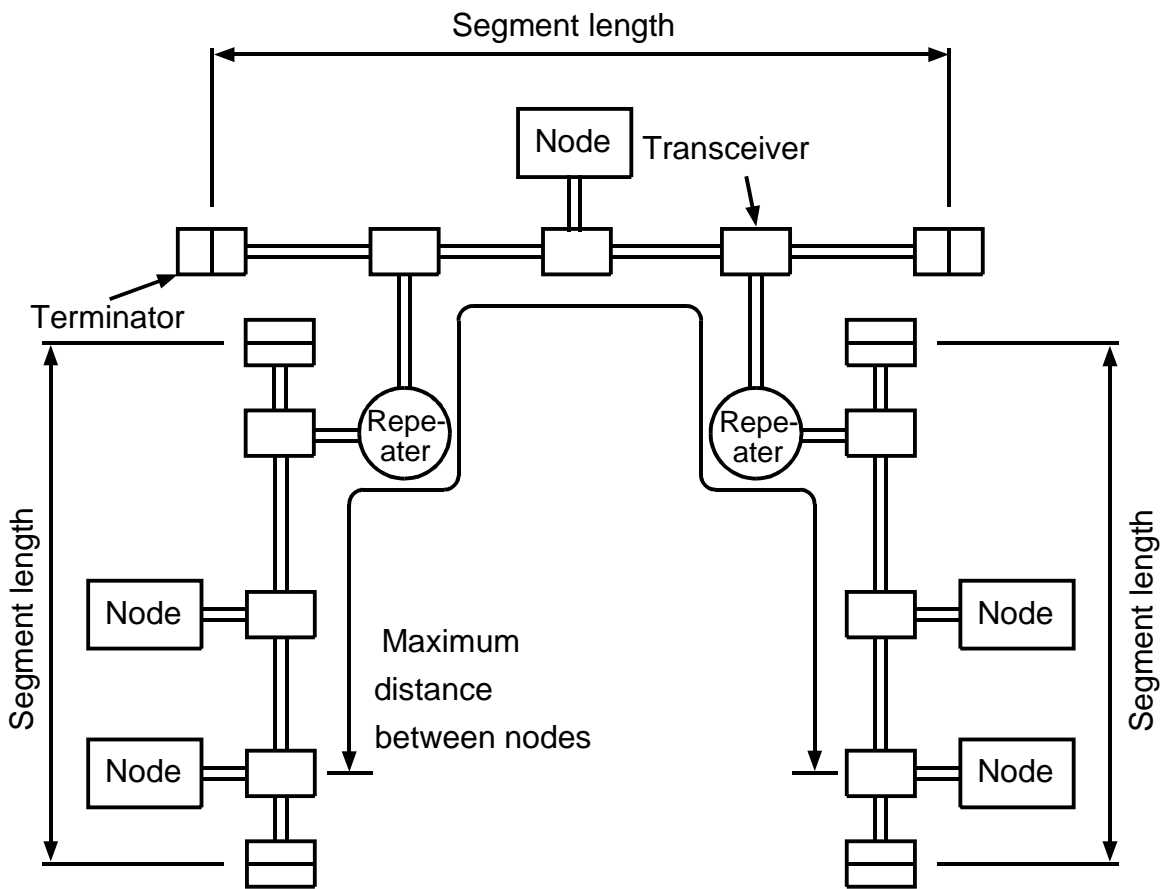
A1SJ71E71N-B5: 0.19kg (0.42lb.)

A1SJ71E71N-B2: 0.20kg (0.44lb.)

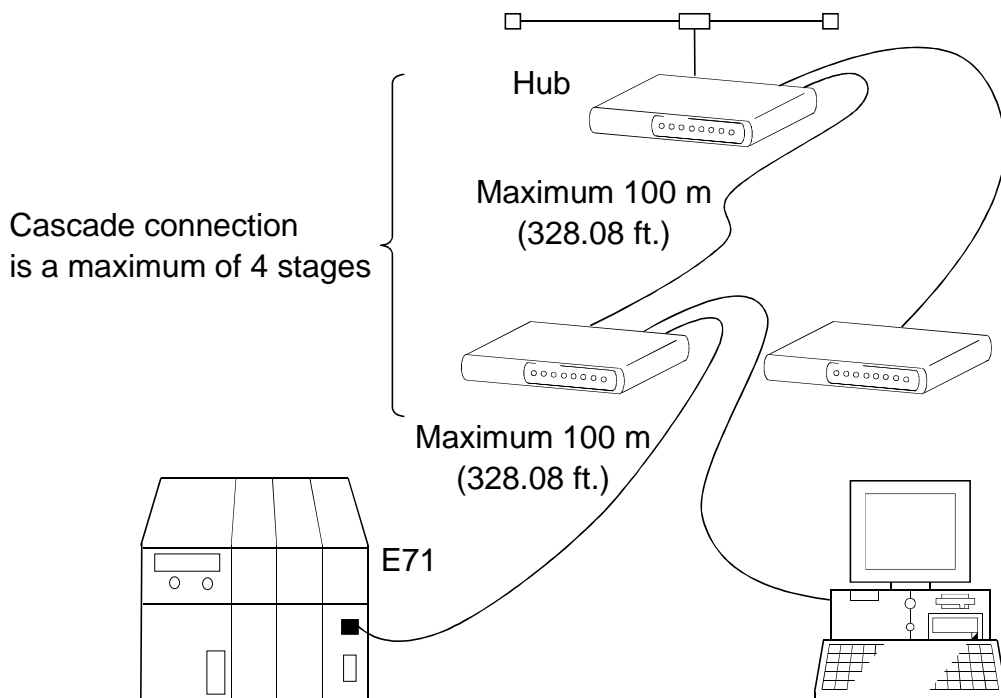
**Notes**

(1) Each item in the transmission specifications gives supplementary explanation.

- When connected by 10BASE2, 10BASE5



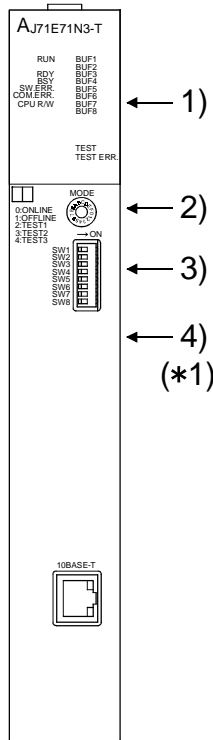
- When connected by 10BASE-T



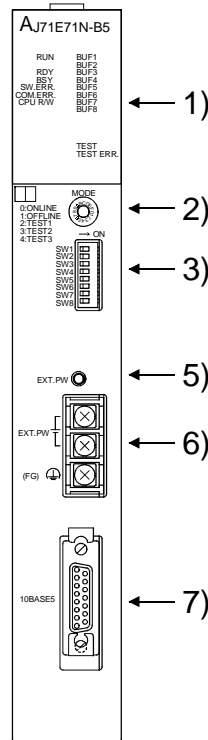
(2) Hardware specifications for E71 are based on IEEE802.3.

### 3. Settings and Names of Each Part

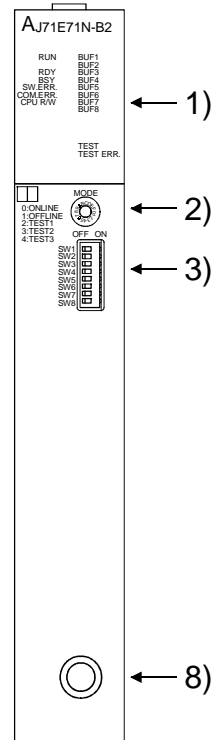
AJ71E71N3-T



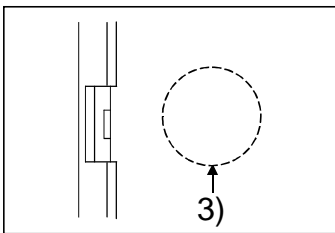
AJ71E71N-B5



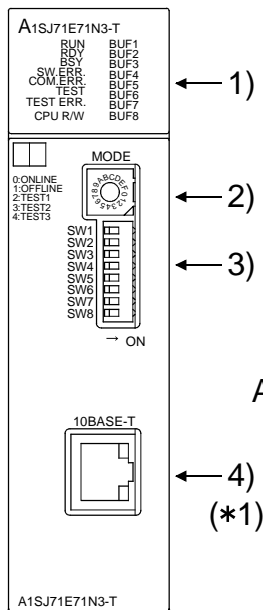
AJ71E71N-B2



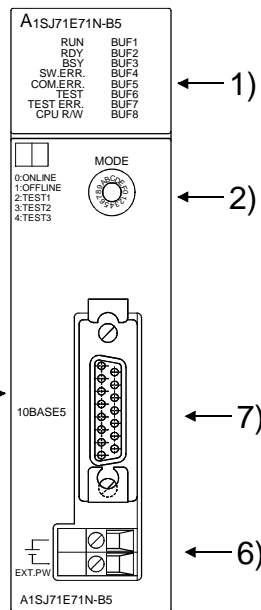
Side view indicated by arrow A



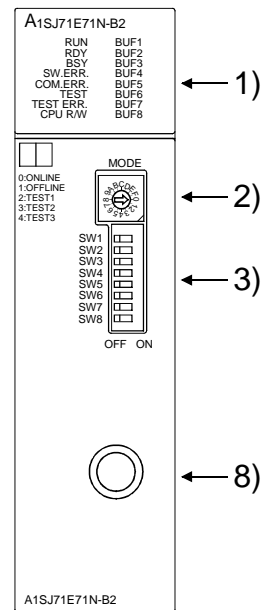
A1SJ71E71N3-T



A1SJ71E71N-B5



A1SJ71E71N-B2



\*1 The LED provided on the connector does not light up.

No.	Designation	Contents
1)	Display LED	Refer to (1)
2)	Operation mode setting switch	Refer to (2)
3)	Exchange condition setting switch	Refer to (3)
4)	10BASE-T connector (RJ45)	Connector for connecting the E71 to the 10BASE-T.
5)	External power supply indicator lamp	Lamp for verifying if power is being supplied to the transceiver. ON: Power supplying OFF: Power not supplied
6)	External power supply terminal	Power source terminals for power source supply to the transceiver. AJ71E71N-B5 : 14.08 V to 15.75 V A1SJ71E71N-B5: 13.28 V to 15.75 V
7)	AUI cable connector	Connector for connecting the E71 to the 10BASE5. (For connection of 10BASE5-use AUI cable (transceiver cable))
8)	10BASE2 connector	Connector for connecting the E71 to the 10BASE2.

(1) Display LED display contents

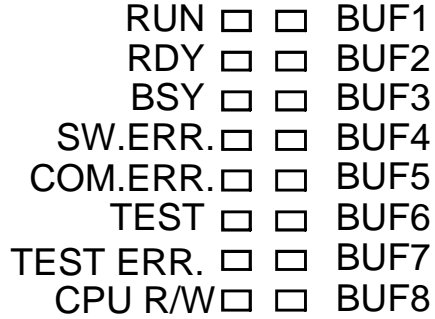
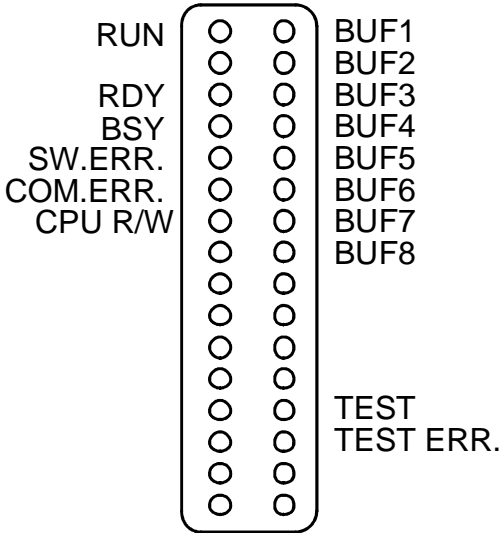
Display LED	Display contents	When lamp is lit	Lamp is not lit
RUN	Normal operation display	Normal	Error
RDY	Exchange ready end display	Starts flashing when On-line Operations begin	
BSY	Exchange processing executing display	Turns on when exchange processing with remote node is being executed.	
SW.ERR.	(For system)	—	—
COM.ERR.	Exchange error detection display	Exchange error	Normal
CPU R/W	Exchange processing executing with PLC CPU display	Exchanging	Not exchanging
BUF1 to BUF8	Display of communication line connection status of connection No.n corresponding to BUFn.	Open completed	Closed status
TEST	Self diagnostic executing display	Self diagnosis executing	Self diagnosis completed
TEST ERR.	Self diagnosis results display	Error	Normal

Remark

The order of the display LEDs is shown below.

AJ71E71N3-T,AJ71E71N-B5,  
AJ71E71N-B2

A1SJ71E71N3-T,A1SJ71E71N-B5,  
A1SJ71E71N-B2



(2) Operation mode setting switch setting  
Set the E71 operation mode. (Usually set to on-line)

Operation mode setting switch	Setting number	Setting designation	Setting contents
	0	On-line	Performs exchange with remote node in the normal operation mode.
	1	Off-line	Disconnects the local station from the network.
	2	Test 1	Performs a self diagnosis test using a self loopback test.
	3	Test 2	Performs a RAM test.
	4	Test 3	Performs a ROM test.
	5 to F	Usage not impossible	

(This is set at "0 (on-line) " at the time of shipping from factory.)

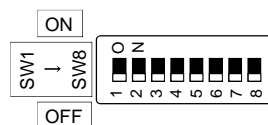
(3) Communications exchange condition setting switch setting  
Set the conditions for data communication with other nodes.

Communications exchange condition setting switch	Switch	Setting designation	Setting contents
<div style="display: flex; align-items: center;"> <div style="margin-right: 10px;">OFF ON</div> <div style="border: 1px solid black; padding: 5px;"> <div style="display: flex; justify-content: space-between; width: 100%;"> <span>SW1</span><input type="checkbox"/></div> <div style="display: flex; justify-content: space-between; width: 100%;"> <span>SW2</span><input type="checkbox"/></div> <div style="display: flex; justify-content: space-between; width: 100%;"> <span>SW3</span><input type="checkbox"/></div> <div style="display: flex; justify-content: space-between; width: 100%;"> <span>SW4</span><input type="checkbox"/></div> <div style="display: flex; justify-content: space-between; width: 100%;"> <span>SW5</span><input type="checkbox"/></div> <div style="display: flex; justify-content: space-between; width: 100%;"> <span>SW6</span><input type="checkbox"/></div> <div style="display: flex; justify-content: space-between; width: 100%;"> <span>SW7</span><input type="checkbox"/></div> <div style="display: flex; justify-content: space-between; width: 100%;"> <span>SW8</span><input type="checkbox"/></div> </div> </div>	SW1	Line processing selection during TCP timeout error	Selects the line processing when the TCP ULP time out error occurrence. (*1) OFF   Close the circuit. ON   Do not close the circuit.
	SW2	Data code setting	Selects the type of data code for exchanging data with the remote node. OFF   Conducts exchange in binary code. ON   Conducts exchange in ASCII code.
	SW3 to SW6	—	Usage not possible (Fixed to OFF)
	SW7	CPU exchange timing setting	Selects whether to approve or forbid data arriving from the remote node when a PLC CPU is running. OFF   Writing prohibited. ON   Writing approved.
	SW8	Initial timing setting	Selects the initial processing starts up timing. (*2) OFF   Quick start (starts without a delay time)---Set when one network is used for the entire configuration. ON   Normal start (start after a delay of 20 seconds)---Use when the entire configurations is made up of multiple networks.

(\*3)

(This is set at "OFF" at the time of shipping from factory.)

- \*1 Set to OFF for normal use.  
When a TCP ULP time out error (error code: 9059H) occurs due to data transfer from remote node while this switch is set to ON, run the close and open operations with the sequence program.
- \*2 Set to OFF for normal use.
- \*3 When the hardware version is "B" or later, the communications exchange condition setting switches for the A1SJ71E71N-B5 are as shown below.



## 4. Loading and Installation

The following is explanations of the handling precautions and installation environment which is common to modules when handling E71 from unpacking to installation. For the details of loading and installation of the module, refer to User's Manual of CPU module to be used.

### 4.1 Handling Precautions

The following is an explanation of handling precautions of the module.

- (1) Because the case of the module is made of resin, be careful not to drop it or expose it to strong impact.
- (2) Always make sure to touch the grounded metal to discharge the electricity charged in the body, etc., before touching the module.  
Failure to do so may cause a failure or malfunctions of the module.
- (3) Execute tightening of the module's installation screws within the range indicated below.

Screw position	Tightening torque range
External power supply terminal screw (*1)	AJ71E71N-B5 : 98 to 137 N·cm (M4 screw) A1SJ71E71N-B5 : 40 N·cm (M2.5 screw)
Module fixing screw	78 to 118 N·cm (M4 screw)

\*1: This terminal is used as an external power input terminal for supplying power to the transceiver when being connected to a 10BASE5.

### 4.2 Installation Environment

Refer to User's Manual of CPU module to be used.

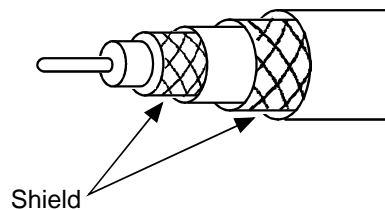


## 5. Connection to a Network

The following is an explanation of the connection method of the E71 to the 10BASE-T, 10BASE5 or the 10BASE2.

Point
-------

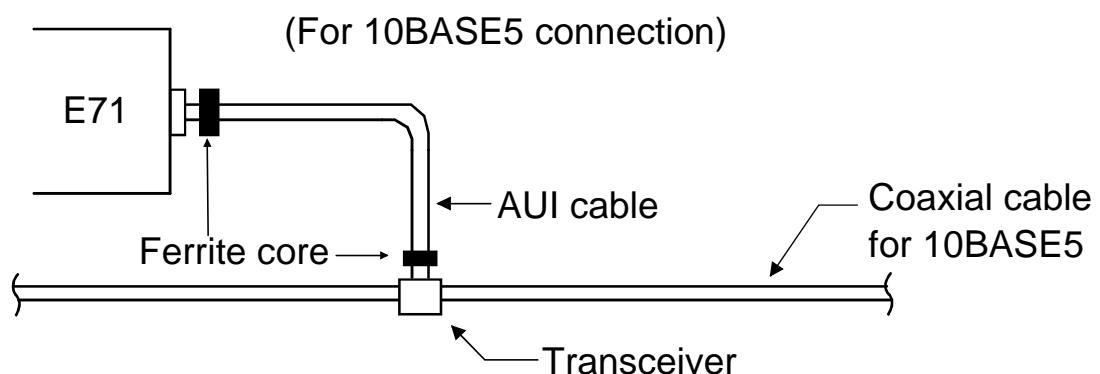
- |   |
|---|
| <p>(1) Installation procedures of the network require sufficient safety measures. For the execution of such operations as terminal processing of connection cable, trunk line cable etc., please consult with a trained professional.</p> <p>(2) When the customer's products match the EMC instructions and the low voltage instructions for connecting E71, use the method in (4) below to install the ferrite core.</p> <p>(3) When there is a communication error caused by high frequency noise due to the installation environment, take the following steps.</p> <ul style="list-style-type: none"><li>• The ferrite core can be installed using the steps in (4) below.</li><li>• When communicating with TCP/IP, increase the count of communication retries.</li><li>• When connecting to 10BASE-T, use a shielded twisted pair cable (STP) rated in category 3, 4 or 5.</li><li>• When connecting to 10BASE2, use a double shielded coaxial cable.</li></ul> |
|---|



- When connecting to 10BASE5 or 10BASE2, ground the shield of the coaxial cable at both the local station and companion connected device. (Ground at a place near the connector.)
- (4) Below are the steps for installing the ferrite core based on connection to the 10BASE5 network.

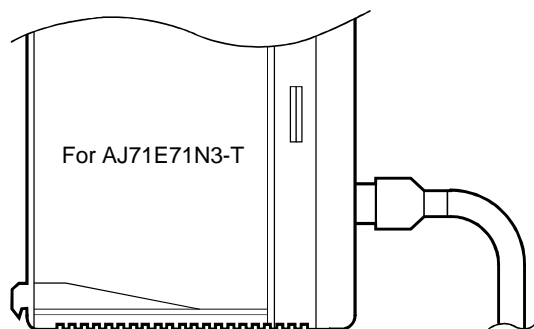
Please install the ferrite core (\*1) on the side of the E71 or external devices / the AUI cables transceiver.

\*1 It is possible to use a TDK Corporation style ZCAT 2032-0930.



- (5) When using A1SJ71E71N-B5, when the FG signal is regulated on the side of the external power supply of the original power supply for the transceiver, ground the FG signal at the original power supply.

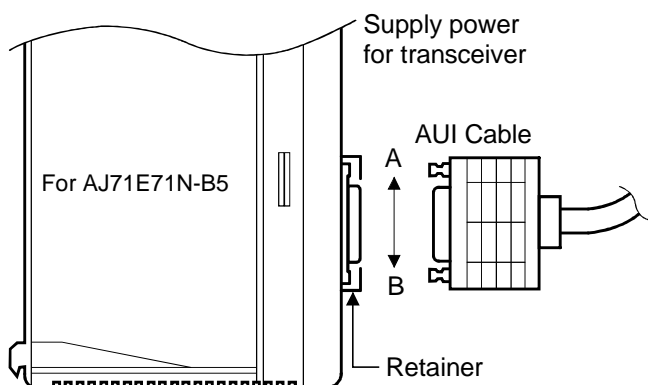
### 5.1 Connecting to the 10BASE-T (AJ71E71N3-T, A1SJ71E71N3-T)



<Connection procedure>

- 1) Connect the twisted pair cable and the hub.
- 2) Connect the twisted pair cable to the E71.

### 5.2 Connecting to the 10BASE5 (AJ71E71N-B5, A1SJ71E71N-B5)



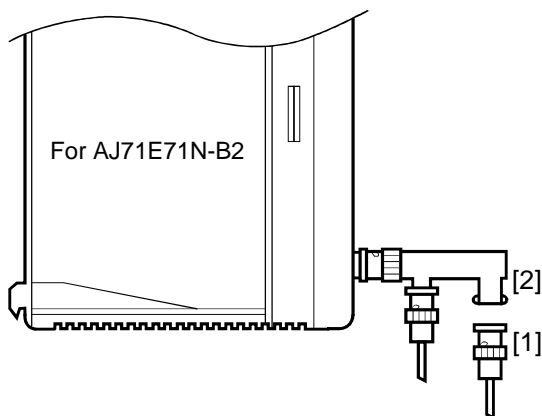
<Connection procedure> (\*1)

- 1) Slide the retainer toward the direction A as shown in the figure.
- 2) Push in the AUI cable connector all the way.
- 3) Slide the retainer toward the direction B as shown in the figure.
- 4) Confirm that the AUI cable is locked.
- 5) Supply power to the transceiver (\*2). (Refer to \*2 in Chapter 2)

\*1 Connect the AUI cable while the power to the module mounting station is turned off.

\*2 Use a transceiver with a function that is generally called SQETEST or heart beat (a transceiver function that emits signals to notify whether the transceiver is operating normally at the end of communication).

### 5.3 Connecting to the 10BASE2 (AJ71E71N-B2, A1SJ71E71N-B2)

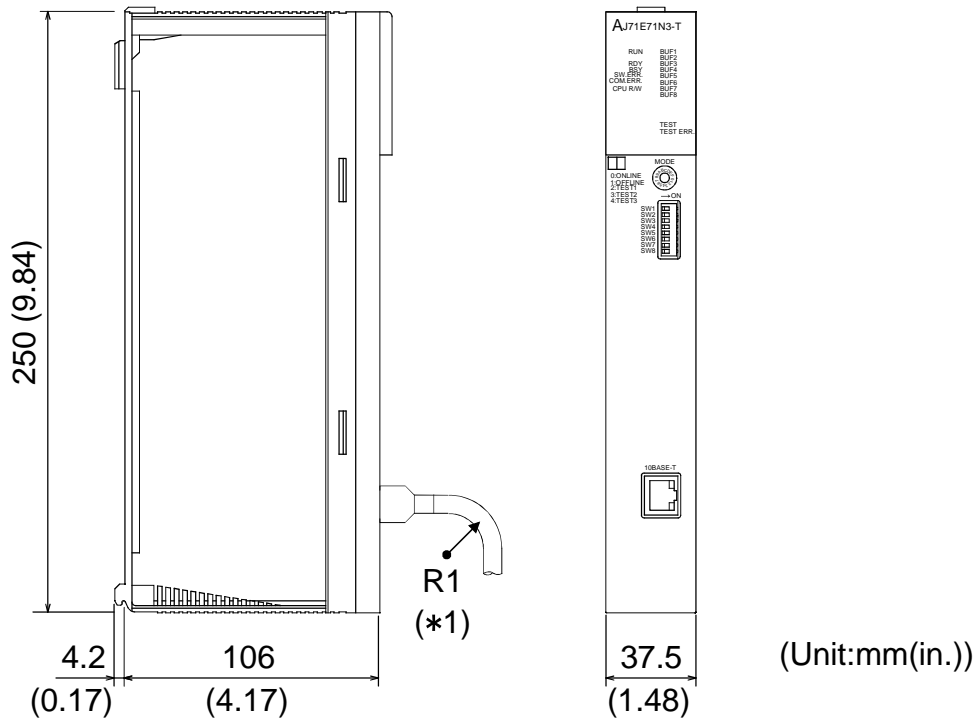


<Connection procedure> (\*2)

- 1) Push in the connector by aligning the groove [1] and tab [2] as shown in the figure.
- 2) While pushing in the connector, rotate it clockwise by a 1/4 turn.
- 3) Turn until the connector locks.
- 4) Confirm that the connector is locked.

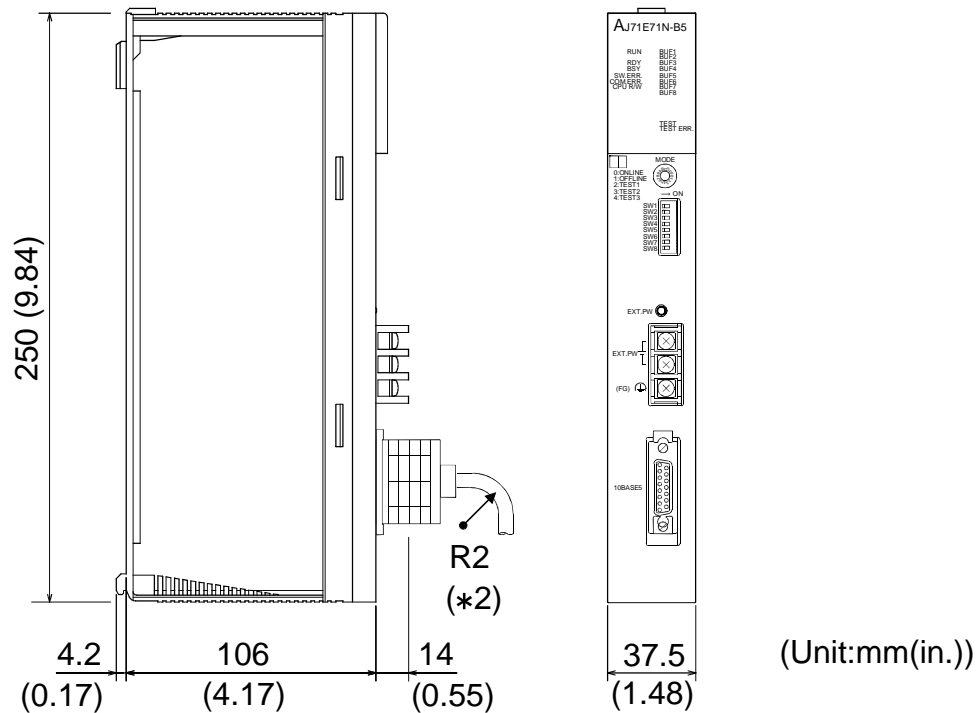
## 6. External Dimensions

### (1) AJ71E71N3-T



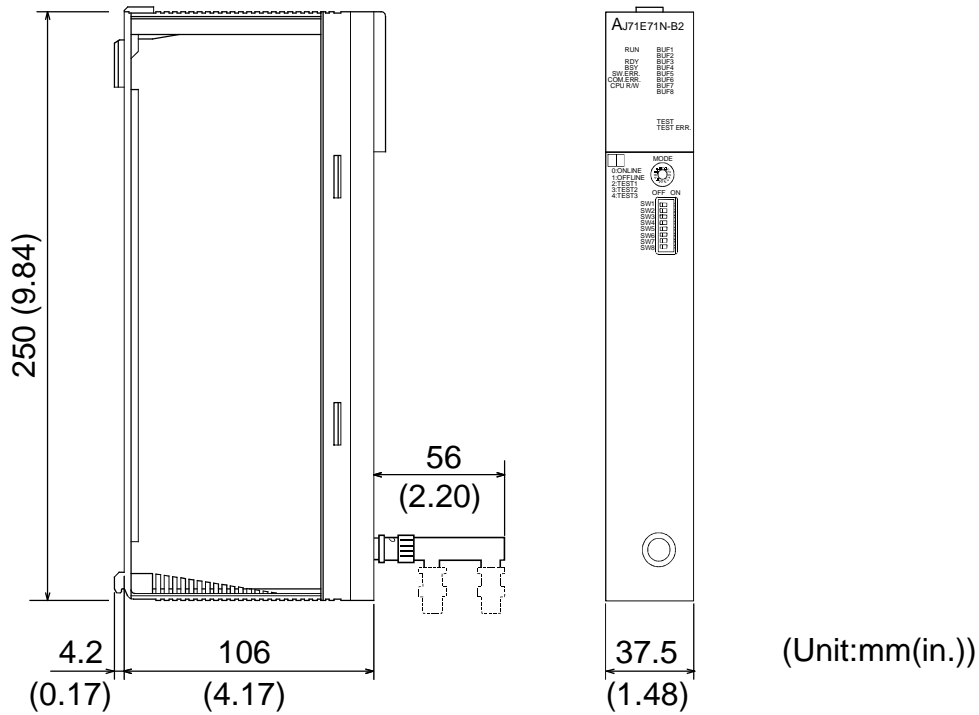
\*1 When connecting the twisted pair cable, make the bend radius (R1: scale value) in the vicinity of the connector to (cable outside diameter × 4) or more.

### (2) AJ71E71N-B5

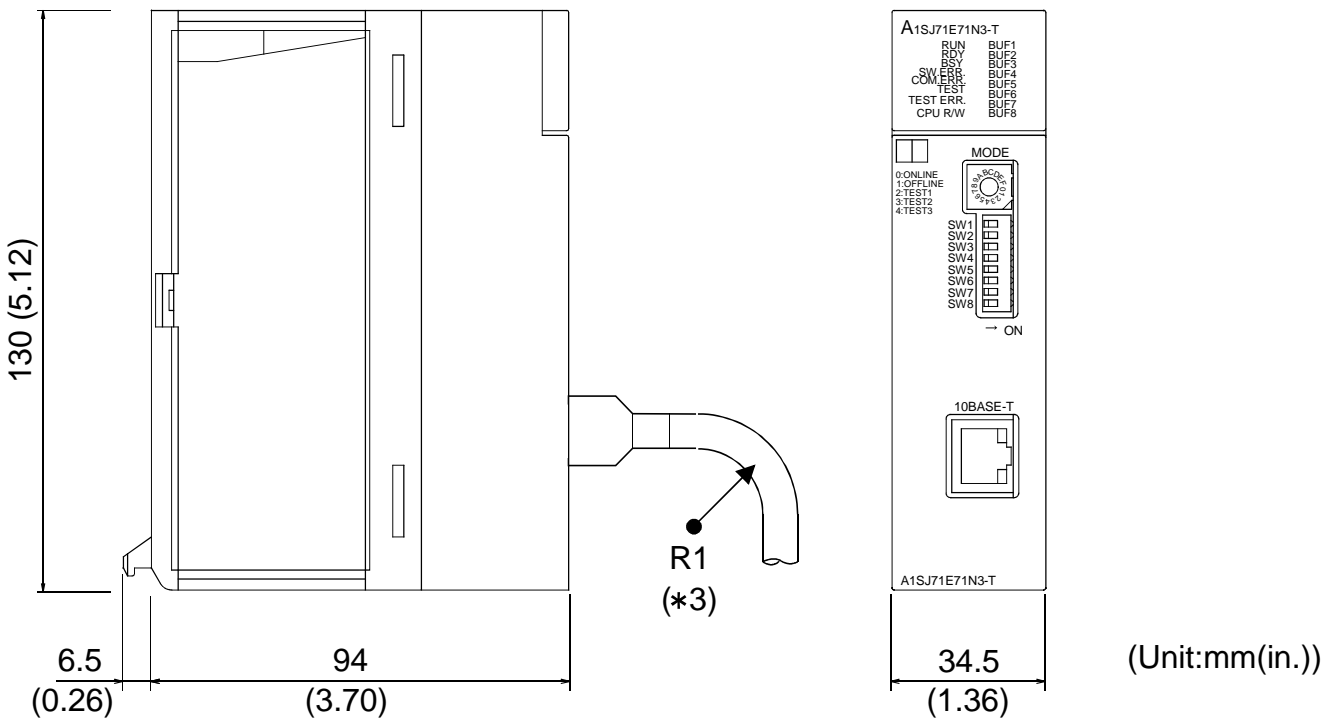


\*2 When connecting the AUI cable, make the bend radius (R2: scale value) in the vicinity of the connector to (cable outside diameter × 4) or more.

(3) AJ71E71N-B2

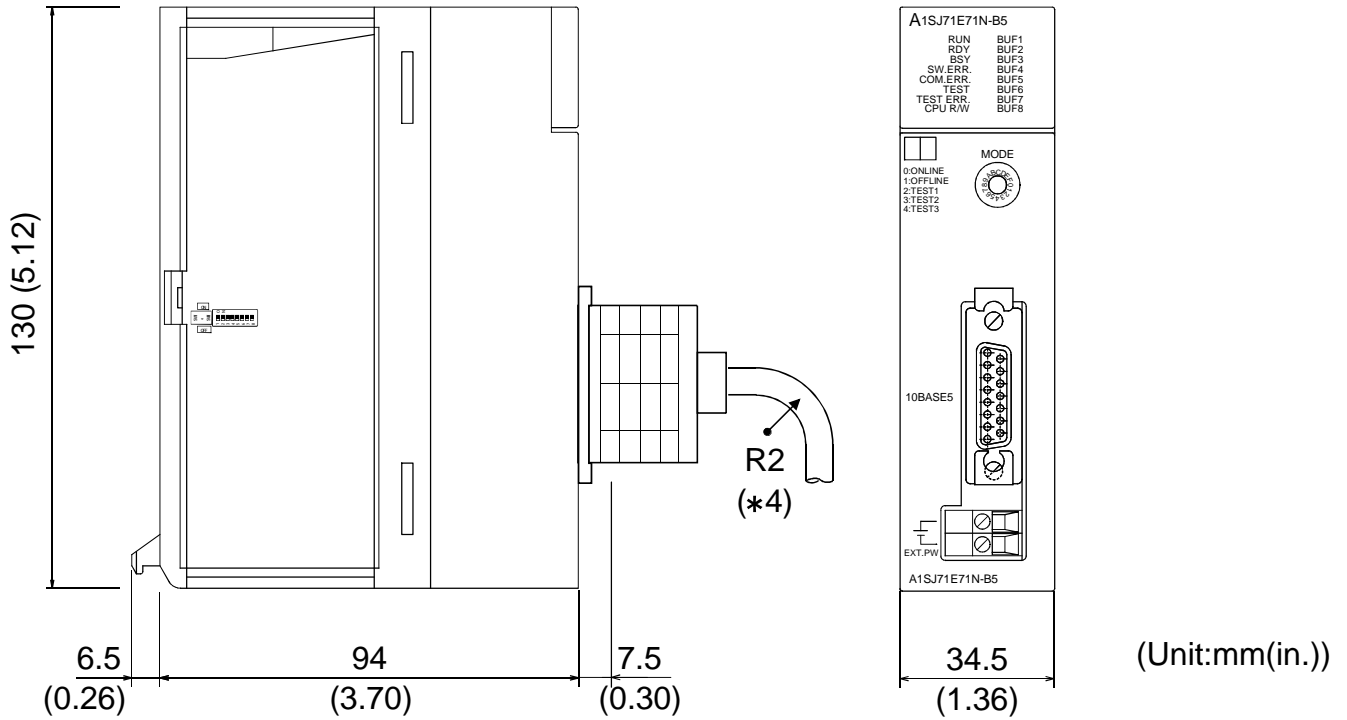


(4) A1SJ71E71N3-T



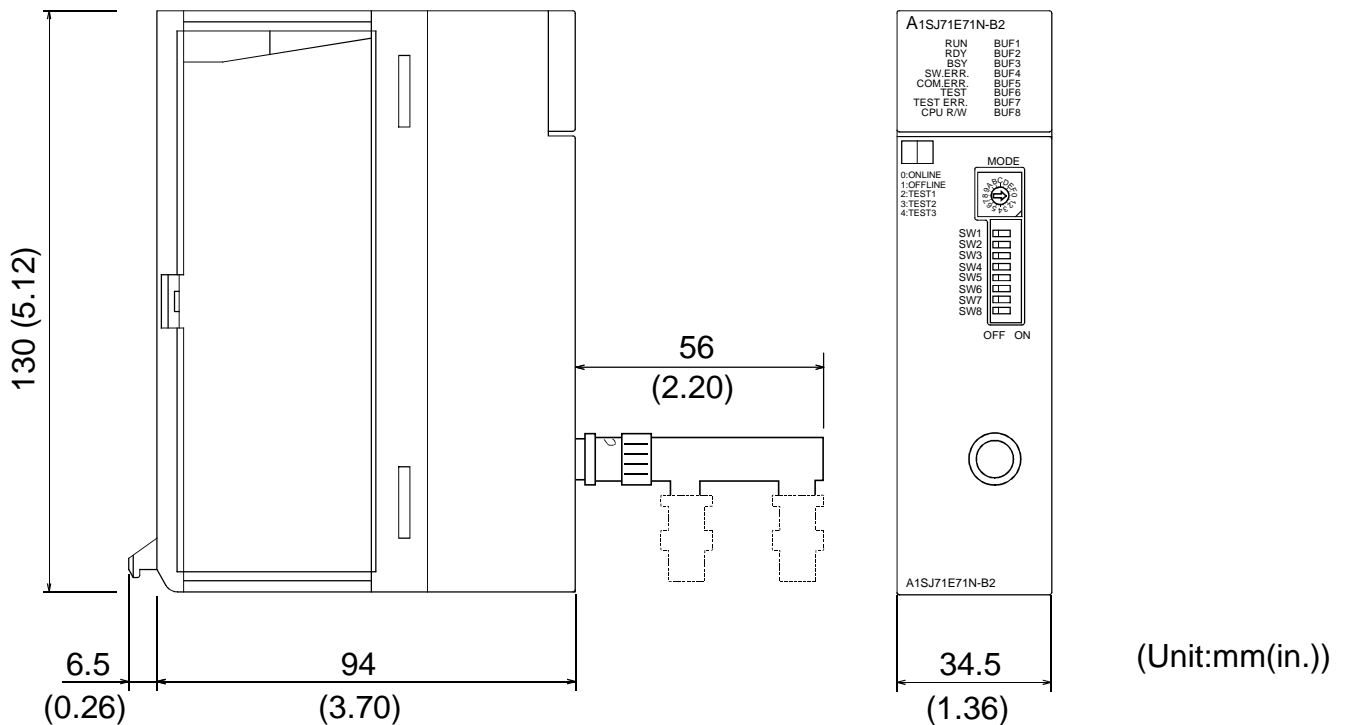
\*3 When connecting the twisted pair cable, make the bend radius (R1: scale value) in the vicinity of the connector to (cable outside diameter × 4) or more.

(5) A1SJ71E71N-B5



\*4 When connecting the AUI cable, make the bend radius (R2: scale value) in the vicinity of the connector to (cable outside diameter × 4) or more.

(6) A1SJ71E71N-B2



Ethernet is the registered trademark of XEROX CO., LTD.  
 10BASE2 is the formal way to say Cheapernet.  
 There is no registered trademark for Cheapernet.

## Warranty

Mitsubishi will not be held liable for damage caused by factors found not to be the cause of Mitsubishi; machine damage or lost profits caused by faults in the Mitsubishi products; damage, secondary damage, accident compensation caused by special factors unpredictable by Mitsubishi; damages to products other than Mitsubishi products; and to other duties.

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- Before using the product for special purposes such as nuclear power, electric power, aerospace, medicine or passenger movement vehicles, consult with Mitsubishi.
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Country/Region	Sales office/Tel	Country/Region	Sales office/Tel
U.S.A	Mitsubishi Electric Automation Inc. 500 Corporate Woods Parkway Vernon Hills, IL 60061 Tel : +1-847-478-2100	Hong Kong	Ryoden Automation Ltd. 10th Floor, Manulife Tower, 169 Electric Road, North Point, HongKong Tel : +852-2887-8870
Brazil	MELCO-TEC Rep. Com.e Assessoria Tecnica Ltda. AV. Paulista 1471, Conj. 308, Sao Paulo City, Sao Paulo State, Brazil Tel : +55-11-283-2423	China	Ryoden Automation Shanghai Ltd. 3F Block5 Building Automation Instrumentation Plaza 103 Cao Bao Rd. Shanghai 200233 China Tel : +86-21-6475-3228
Germany	Mitsubishi Electric Europe B.V. German Branch Gothaer Strasse 8 D-40880 Ratingen, GERMANY Tel : +49-2102-486-0	Taiwan	Setsuyo Enterprise Co., Ltd. 6F., No.105 Wu-Kung 3rd.RD, Wu-Ku Hsiang, Taipei Hsine, Taiwan Tel : +886-2-2299-2499
U.K	Mitsubishi Electric Europe B.V. UK Branch Travellers Lane, Hatfield, Herts., AL10 8XB,UK Tel : +44-1707-276100	Korea	HAN NEUNG TECHNO CO.,LTD. 1F Dong Seo Game Channel Bldg., 660-11, Deungchon-dong Kangsec-ku, Seoul, Korea Tel : +82-2-3660-9552
Italy	Mitsubishi Electric Europe B.V. Italian Branch Centro Dir. Colleoni, Pal. Perseo-Ingr.2 Via Paracelso 12, 20041 Agrate B., Milano, Italy Tel : +39-039-6053344	Singapore	Mitsubishi Electric Asia Pte, Ltd. 307 ALEXANDRA ROAD #05-01/02, MITSUBISHI ELECTRIC BUILDING SINGAPORE 159943 Tel : +65-6473-2308
Spain	Mitsubishi Electric Europe B.V. Spanish Branch Carretera de Rubi 76-80 08190 - Sant Cugat del Valles, Barcelona, Spain Tel : +34-93-565-3131	Thailand	F. A. Tech Co.,Ltd. 898/28,29,30 S.V.City Building,Office Tower 2,Floor 17-18 Rama 3 Road, Bangkokpong, Yannawa, Bangkok 10120 Tel : +66-2-682-6522
France	Mitsubishi Electric Europe B.V. French Branch 25 Boulevard des Bouvets, F-92741 Nanterre Cedex, France TEL: +33-1-5568-5568	Indonesia	P.T. Autoteknindo SUMBER MAKMUR Jl. Muara Karang Selatan Block A Utara No.1 Kav. No.11 Kawasan Industri/ Pergudangan Jakarta - Utara 14440 Tel : +62-21-663-0833
South Africa	Circuit Breaker Industries LTD. Tripswitch Drive, Elandsfontein Gauteng, South Africa Tel : +27-11-928-2000	India	Messung Systems Put,Ltd. Electronic Sadan NO:111 Unit No15, M.I.D.C BHOSARI,PUNE-411026 Tel : +91-20-712-2807
		Australia	Mitsubishi Electric Australia Pty. Ltd. 348 Victoria Road, PostalBag, No 2, Rydalmere, N.S.W 2116, Australia Tel : +61-2-9684-7777

## MITSUBISHI ELECTRIC CORPORATION

HEAD OFFICE : 1-8-12, OFFICE TOWER Z 14F HARUMI CHUO-KU 104-6212, JAPAN  
NAGOYA WORKS : 1-14, YADA-MINAMI 5-CHOME, HIGASHI-KU, NAGOYA, JAPAN

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**HEADQUARTERS**

MITSUBISHI ELECTRIC EUROPE B.V. **EUROPE**  
 German Branch  
 Gothaer Straße 8  
**D-40880 Ratingen**  
 Phone: +49 (0)2102 / 486-0  
 Fax: +49 (0)2102 / 486-1120

MITSUBISHI ELECTRIC EUROPE B.V.-org.sl. **CZECH REP.**  
 Czech Branch  
 Avenir Business Park, Radlická 714/113a  
**CZ-158 00 Praha 5**  
 Phone: +420 - 251 551 470  
 Fax: +420 - 251-551-471

MITSUBISHI ELECTRIC EUROPE B.V. **FRANCE**  
 French Branch  
 25, Boulevard des Bouvets  
**F-92741 Nanterre Cedex**  
 Phone: +33 (0)1 / 55 68 55 68  
 Fax: +33 (0)1 / 55 68 57 57

MITSUBISHI ELECTRIC EUROPE B.V. **IRELAND**  
 Irish Branch  
 Westgate Business Park, Ballymount  
**IRL-Dublin 24**  
 Phone: +353 (0)1 4198800  
 Fax: +353 (0)1 4198890

MITSUBISHI ELECTRIC EUROPE B.V. **ITALY**  
 Italian Branch  
 Viale Colleoni 7  
**I-20041 Agrate Brianza (MB)**  
 Phone: +39 039 / 60 53 1  
 Fax: +39 039 / 60 53 312

MITSUBISHI ELECTRIC EUROPE B.V. **POLAND**  
 Poland Branch  
 Krakowska 50  
**PL-32-083 Balice**  
 Phone: +48 (0)12 / 630 47 00  
 Fax: +48 (0)12 / 630 47 01

MITSUBISHI ELECTRIC EUROPE B.V. **RUSSIA**  
 52, bid. 3 Kosmodamianskaya nab 8 floor  
**RU-115054 Moscow**  
 Phone: +7 495 721-2070  
 Fax: +7 495 721-2071

MITSUBISHI ELECTRIC EUROPE B.V. **SPAIN**  
 Spanish Branch  
 Carretera de Rubí 76-80  
**E-08190 Sant Cugat del Vallés (Barcelona)**  
 Phone: 902 131121 // +34 935653131  
 Fax: +34 935891579

MITSUBISHI ELECTRIC EUROPE B.V. **UK**  
 UK Branch  
 Travellers Lane  
**UK-Hatfield, Herts. AL10 8XB**  
 Phone: +44 (0)1707 / 27 61 00  
 Fax: +44 (0)1707 / 27 86 95

MITSUBISHI ELECTRIC CORPORATION **JAPAN**  
 Office Tower "Z" 14 F  
 8-12,1 chome, Harumi Chuo-Ku  
**Tokyo 104-6212**  
 Phone: +81 3 622 160 60  
 Fax: +81 3 622 160 75

MITSUBISHI ELECTRIC AUTOMATION, Inc. **USA**  
 500 Corporate Woods Parkway  
**Vernon Hills, IL 60061**  
 Phone: +1 847 478 21 00  
 Fax: +1 847 478 22 53

**EUROPEAN REPRESENTATIVES**

GEVA **AUSTRIA**  
 Wiener Straße 89  
**AT-2500 Baden**  
 Phone: +43 (0)2252 / 85 55 20  
 Fax: +43 (0)2252 / 488 60

TEHNIKON **BELARUS**  
 Oktyabrskaya 16/5, Off. 703-711  
**BY-220030 Minsk**  
 Phone: +375 (0)17 / 210 46 26  
 Fax: +375 (0)17 / 210 46 26

ESCO DRIVES & AUTOMATION **BELGIUM**  
 Culliganlaan 3  
**BE-1831 Diegem**  
 Phone: +32 (0)2 / 717 64 30  
 Fax: +32 (0)2 / 717 64 31

Koning & Hartman b.v. **BELGIUM**  
 Woluwelaan 31  
**BE-1800 Vilvoorde**  
 Phone: +32 (0)2 / 257 02 40  
 Fax: +32 (0)2 / 257 02 49

INEA BH d.o.o. **BOSNIA AND HERZEGOVINA**  
 Aleja Lipa 56  
**BA-71000 Sarajevo**  
 Phone: +387 (0)33 / 921 164  
 Fax: +387 (0)33 / 524 539

AKHNATON **BULGARIA**  
 4 Andrej Ljapchev Blvd. Pb 21  
**BG-1756 Sofia**  
 Phone: +359 (0)2 / 817 6044  
 Fax: +359 (0)2 / 97 44 06 1

INEA CR d.o.o. **CROATIA**  
 Losinjska 4 a  
**HR-10000 Zagreb**  
 Phone: +385 (0)1 / 36 940 -01 / -02 / -03  
 Fax: +385 (0)1 / 36 940 -03

AutoCont C.S. s.r.o. **CZECH REPUBLIC**  
 Technologická 374/6  
**CZ-708 00 Ostrava-Pustkovec**  
 Phone: +420 595 691 150  
 Fax: +420 595 691 199

Beijer Electronics A/S **DENMARK**  
 Lykkegårdsvej 17  
**DK-4000 Roskilde**  
 Phone: +45 (0)46 / 75 76 66  
 Fax: +45 (0)46 / 75 56 26

Beijer Electronics Eesti OÜ **ESTONIA**  
 Pärnu mnt.160i  
**EE-11317 Tallinn**  
 Phone: +372 (0)6 / 51 81 40  
 Fax: +372 (0)6 / 51 81 49

Beijer Electronics OY **FINLAND**  
 Peltoie 37  
**FIN-28400 Ulvila**  
 Phone: +358 (0)207 / 463 540  
 Fax: +358 (0)207 / 463 541

UTEKO **GREECE**  
 5, Mavrogenous Str.  
**GR-18542 Piraeus**  
 Phone: +30 211 / 1206 900  
 Fax: +30 211 / 1206 999

MELTRADE Kft. **HUNGARY**  
 Fertő utca 14.  
**HU-1107 Budapest**  
 Phone: +36 (0)1 / 431-9726  
 Fax: +36 (0)1 / 431-9727

Beijer Electronics SIA **LATVIA**  
 Rītausmas iela 23  
**LV-1058 Rīga**  
 Phone: +371 (0)784 / 2280  
 Fax: +371 (0)784 / 2281

Beijer Electronics UAB **LITHUANIA**  
 Savanorių Pr. 187  
**LT-02300 Vilnius**  
 Phone: +370 (0)5 / 232 3101  
 Fax: +370 (0)5 / 232 2980

**EUROPEAN REPRESENTATIVES**

ALFATRADE Ltd. **MALTA**  
 99, Paola Hill  
**Malta- Paola PLA 1702**  
 Phone: +356 (0)21 / 697 816  
 Fax: +356 (0)21 / 697 817

INTEHSIS srl **MOLDOVA**  
 bld. Traian 23/1  
**MD-2060 Kishinev**  
 Phone: +373 (0)22 / 66 4242  
 Fax: +373 (0)22 / 66 4280

HIFLEX AUTOM.TECHNIEK B.V. **NETHERLANDS**  
 Wolweverstraat 22  
**NL-2984 CD Ridderkerk**  
 Phone: +31 (0)180 - 46 60 04  
 Fax: +31 (0)180 - 44 23 55

Koning & Hartman b.v. **NETHERLANDS**  
 Haarderbergweg 21-23  
**NL-1101 CH Amsterdam**  
 Phone: +31 (0)20 / 587 76 00  
 Fax: +31 (0)20 / 587 76 05

Beijer Electronics AS **NORWAY**  
 Postboks 487  
**NO-3002 Drammen**  
 Phone: +47 (0)32 / 24 30 00  
 Fax: +47 (0)32 / 84 85 77

Fonseca S.A. **PORTUGAL**  
 R. João Francisco do Casal 87/89  
**PT - 3801-997 Aveiro, Esgueira**  
 Phone: +351 (0)234 / 303 900  
 Fax: +351 (0)234 / 303 910

Sirius Trading & Services srl **ROMANIA**  
 Aleea Lacul Morii Nr. 3  
**RO-060841 Bucuresti, Sector 6**  
 Phone: +40 (0)21 / 430 40 06  
 Fax: +40 (0)21 / 430 40 02

Craft Con. & Engineering d.o.o. **SERBIA**  
 Bulevar Svetog Cara Konstantina 80-86  
**SER-18106 Nis**  
 Phone: +381 (0)18 / 292-24-4/5  
 Fax: +381 (0)18 / 292-24-4/5

INEA SR d.o.o. **SERBIA**  
 Izletnicka 10  
**SER-113000 Smederevo**  
 Phone: +381 (0)26 / 617 163  
 Fax: +381 (0)26 / 617 163

SIMAP s.r.o. **SLOVAKIA**  
 Jána Derku 1671  
**SK-911 01 Trenčín**  
 Phone: +421 (0)32 743 04 72  
 Fax: +421 (0)32 743 75 20

PROCONT, spol. s r.o. Prešov **SLOVAKIA**  
 Kúpeľná 1/A  
**SK-080 01 Prešov**  
 Phone: +421 (0)51 7580 611  
 Fax: +421 (0)51 7580 650

INEA d.o.o. **SLOVENIA**  
 Stegne 11  
**SI-1000 Ljubljana**  
 Phone: +386 (0)1 / 513 8100  
 Fax: +386 (0)1 / 513 8170

Beijer Electronics AB **SWEDEN**  
 Box 426  
**SE-20124 Malmö**  
 Phone: +46 (0)40 / 35 86 00  
 Fax: +46 (0)40 / 93 23 01

Omni Ray AG **SWITZERLAND**  
 Im Schörl 5  
**CH-8600 Dübendorf**  
 Phone: +41 (0)44 / 802 28 80  
 Fax: +41 (0)44 / 802 28 28

GTS **TURKEY**  
 Bayraktar Bulvarı Nutuk Sok. No:5  
**TR-34775 Yukarı Dudullu-Ümraniye-İSTANBUL**  
 Phone: +90 (0)216 526 39 90  
 Fax: +90 (0)216 526 39 95

CSC Automation Ltd. **UKRAINE**  
 4-B, M. Raskovoyi St.  
**UA-02660 Kiev**  
 Phone: +380 (0)44 / 494 33 55  
 Fax: +380 (0)44 / 494-33-66

**EURASIAN REPRESENTATIVES**

TOO Kazpromavtomatika **KAZAKHSTAN**  
 Ul. Zhambyla 28  
**KAZ-100017 Karaganda**  
 Phone: +7 7212 / 50 10 00  
 Fax: +7 7212 / 50 11 50

**MIDDLE EAST REPRESENTATIVES**

ILAN & GAVISH Ltd. **ISRAEL**  
 24 Shenkar St., Kiryat Arie  
**IL-49001 Petah-Tiqva**  
 Phone: +972 (0)3 / 922 18 24  
 Fax: +972 (0)3 / 924 0761

TEXEL ELECTRONICS Ltd. **ISRAEL**  
 2 Ha'umanut, P.O.B. 6272  
**IL-42160 Netanya**  
 Phone: +972 (0)9 / 863 39 80  
 Fax: +972 (0)9 / 885 24 30

CEG INTERNATIONAL **LEBANON**  
 Cebaco Center/Block A Autostrade DORA  
**Lebanon - Beirut**  
 Phone: +961 (0)1 / 240 430  
 Fax: +961 (0)1 / 240 438

**AFRICAN REPRESENTATIVE**

CBI Ltd. **SOUTH AFRICA**  
 Private Bag 2016  
**ZA-1600 Isando**  
 Phone: +27 (0)11 / 977 0770  
 Fax: +27 (0)11 / 977 0761