MITSUBISHI

A Series Ethernet Interface Module

User's Manual

(Hardware)

AJ71E71N3-T, A1SJ71E71N3-T
AJ71E71N-B5, A1SJ71E71N-B5
AJ71E71N-B2, A1SJ71E71N-B2

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	AJ71E71N-U-HW
MODEL CODE	13JP67
IB (NA)-0800308-C(1112)MEE	

● SAFETY PRECAUTIONS ●

(Read these precautions before using this product.)

Before using this product, please read this manual and the relevant manuals carefully and pay full attention to safety to handle the product correctly.

In this manual, the safety precautions are classified into two levels: "⚠ WARNING" and "⚠ CAUTION".

⚠WARNING	Indicates that incorrect handling may cause hazardous conditions, resulting in death or severe injury.
⚠CAUTION	Indicates that incorrect handling may cause hazardous conditions, resulting in minor or moderate injury or property damage.

Under some circumstances, failure to observe the precautions given under "⚠ CAUTION" may lead to serious consequences.
Observe the precautions of both levels because they are important for personal and system safety.
Make sure that the end users read this manual and then keep the manual in a safe place for future reference.

[Design Precautions]

⚠WARNING

- When controlling (changing data, program or operation status (remote RUN/STOP) in particular) a PLC while it is running via a device such as a personal computer connected to the special function module, configure an interlock circuit in the sequence program so that the safety of the overall system is always maintained.
  Especially, when performing the above control for a remote PLC from an external device, troubles occurring on the PLC side due to data communication error may not be handled immediately.
  Determine error handling methods between the external device and the PLC CPU for when data communication errors occur, in addition to configuring a interlock circuit in the sequence program.

[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.
- Make sure to switch all phases of the external power supply off when installing or placing wiring. If you do not switch off the external power supply, it will cause electric shock or damage to the product.
- 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 may result in electric shock, or may damage 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.
- Do not touch the electronic parts or the module conducting area directly.
  It may cause erroneous operation or failure.

[Wiring Precautions]

⚠ CAUTION

- Do not connect the AUI cable when the module installation station's power is turned on.
- 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, alllowing 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.

[Startup and Maintenance Precautions]

⚠WARNING

- Do not touch the terminals while the electricity is on.
  Doing so could cause erroneous operation.
- Make sure to switch all phases of the external power supply off before cleaning or re-tightening screws.
  If you do not switch off the external power supply, it will cause failure or erroneous operation of the module.
  If the screws are loose, it may result in fallout, short circuits, or erroneous operation.
  Tightening the screws too far may cause damage to the screws and/or the module, resulting in fallout, short circuits, or erroneous operation.

⚠CAUTION

- Do not disassemble or rebuild the module.
  It may cause failure, erroneous operation, injury, or fire.
- 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 failure or erroneous operation of the module.
- 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.

[Operating Precautions]

⚠WARNING

- Do not write data in the “system area” in the buffer memory of the special function module.
  Also, of the output signals directed to the special function module from the PLC CPU, do not output (switch on) the signals that are “use-prohibited”.
  If data is written to the ”system area” or output is performed with respect to a “use-prohibited” signal, it may result in the malfunction of the PLC system.

⚠CAUTION

- Before performing the control of the PLC in operation (especially changing data, program, and operation status (remote RUN/STOP)) by connecting a personal computer, etc. to the special function module, read the manual carefully and confirm if the overall safety is maintained.
  Failure to perform correct operations to change data, program, or the operation status may result in system malfunction, machine damage, or an accident.
- Remote RUN/STOP for the module installation station’s PLC/CPU is recommended to use the “Data Exchange during PLC CPU STOP” function after throughly reading the manual.
  If the remote RUN/STOP is executed without using the “Data Exchange during PLC CPU STOP” function, the output signal from the PLC CPU to the module goes OFF and the communication line is disconnected (close processing).
  As a result, all data transmission from other nodes, including status control of the PLC CPU, becomes impossible.

[Disposal Precautions]

⚠CAUTION

- When disposing of this product, handle it as industrial waste.

● CONDITIONS OF USE FOR THE PRODUCT ●

(1) Mitsubishi programmable controller ("the PRODUCT") shall be used in conditions;
i) where any problem, fault or failure occurring in the PRODUCT, if any, shall not lead to any major or serious accident; and
ii) where the backup and fail-safe function are systematically or automatically provided outside of the PRODUCT for the case of any problem, fault or failure occurring in the PRODUCT.

(2) The PRODUCT has been designed and manufactured for the purpose of being used in general industries.
MITSUBISHI SHALL HAVE NO RESPONSIBILITY OR LIABILITY (INCLUDING, BUT NOT LIMITED TO ANY AND ALL RESPONSIBILITY OR LIABILITY BASED ON CONTRACT, WARRANTY, TORT, PRODUCT LIABILITY) FOR ANY INJURY OR DEATH TO PERSONS OR LOSS OR DAMAGE TO PROPERTY CAUSED BY the PRODUCT THAT ARE OPERATED OR USED IN APPLICATION NOT INTENDED OR EXCLUDED BY INSTRUCTIONS, PRECAUTIONS, OR WARNING CONTAINED IN MITSUBISHI'S USER, INSTRUCTION AND/OR SAFETY MANUALS, TECHNICAL BULLETINS AND GUIDELINES FOR the PRODUCT.
("Prohibited Application")
Prohibited Applications include, but not limited to, the use of the PRODUCT in;
- Nuclear Power Plants and any other power plants operated by Power companies, and/or any other cases in which the public could be affected if any problem or fault occurs in the PRODUCT.
- Railway companies or Public service purposes, and/or any other cases in which establishment of a special quality assurance system is required by the Purchaser or End User.
- Aircraft or Aerospace, Medical applications, Train equipment, transport equipment such as Elevator and Escalator, Incineration and Fuel devices, Vehicles, Manned transportation, Equipment for Recreation and Amusement, and Safety devices, handling of Nuclear or Hazardous Materials or Chemicals, Mining and Drilling, and/or other applications where there is a significant risk of injury to the public or property.

Notwithstanding the above, restrictions Mitsubishi may in its sole discretion, authorize use of the PRODUCT in one or more of the Prohibited Applications, provided that the usage of the PRODUCT is limited only for the specific applications agreed to by Mitsubishi and provided further that no special quality assurance or fail-safe, redundant or other safety features which exceed the general specifications of the PRODUCTs are required. For details, please contact the Mitsubishi representative in your region.

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	Additional model AJ71E71N3-T, A1SJ71E71N3-T Deleted model AJ71E71N-T, A1SJ71E71N-T
Dec., 2011	IB(NA)-0800308-C	Correction SAFETY PRECAUTIONS, COMPLIANCE WITH EMC AND LOW VOLTAGE DIRECTIVES Addition SAFETY PRECAUTIONS (Chinese), CONDITIONS OF USE FOR THE PRODUCT

CONTENTS

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)

COMPLIANCE WITH EMC AND LOW VOLTAGE DIRECTIVES

(1) Method of ensuring compliance
To ensure that Mitsubishi programmable controllers maintain EMC and Low Voltage Directives when incorporated into other machinery or equipment, certain measures may be necessary. Please refer to one of the following manuals.
- User's manual for the CPU module used
- User's manual (hardware) for the CPU module or base unit used

The CE mark on the side of the programmable controller indicates compliance with EMC and Low Voltage Directives.

(2) Additional measures
To ensure that this product maintains EMC and Low Voltage Directives, please refer to one of the manuals listed under (1).

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.) (*4)

*1 Length between hub and node.

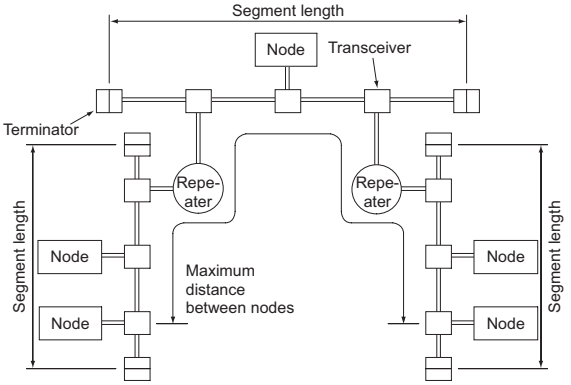
*2 It is required to use the one that satisfies the specifications of the transceiver and the AUI cable. Also, for the AJ71E71N-B5, the voltage drop (Max. 0.8V) must be taken into account.

*3 The weight of the A1SJ71E71N-B5 is 0.19kg (0.42lb.) when the hardware version is "A".

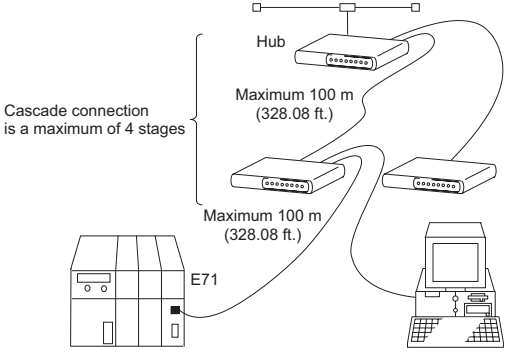
*4 The weight of the A1SJ71E71N-B2 is 0.20kg (0.44lb.) when the hardware version is "B" or earlier.

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

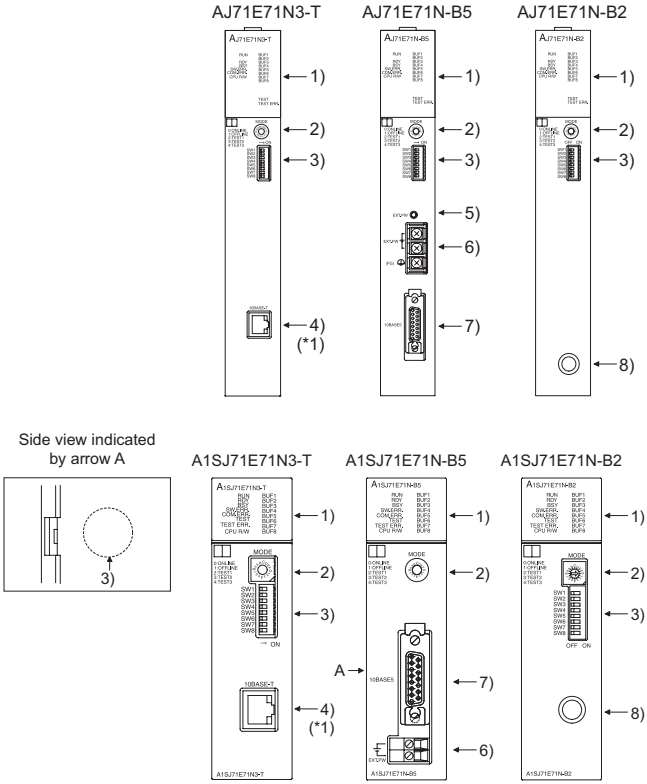
- When connected by 10BASE2, 10BASE5



- When connected by 10BASE-T



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



*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.

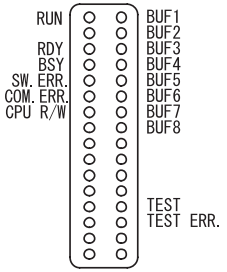
(1) Display LED display contents

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

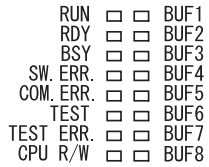
Remarks

The order of the display LEDs is shown below.

AJ71E71N3-T,AJ71E71N-B5,
AJ71E71N-B2



A1SJ71E71N3-T,A1SJ71E71N-B5,
A1SJ71E71N-B2

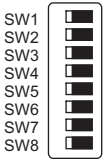


(2) Operation mode setting switch setting
Set the E71 operation mode. (Usually set to on-line)

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	
 (*3)	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.

(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

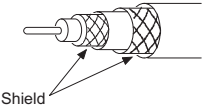
The following is an explanation of the connection method of the E71 to the 10BASE-T, 10BASE5 or the 10BASE2.

Point

(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.

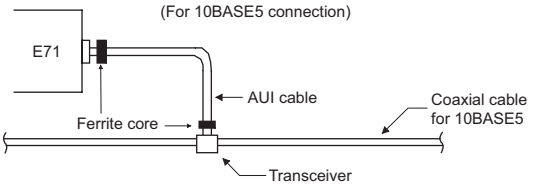
(2) When the customer's products match the EMC instructions and the low voltage instructions for connecting E71, use the method in (4) below to install the ferrite core.

(3) When there is a communication error caused by high frequency noise due to the installation environment, take the following steps.
- The ferrite core can be installed using the steps in (4) below.
- When communicating with TCP/IP, increase the count of communication retries.
- When connecting to 10BASE-T, use a shielded twisted pair cable (STP) rated in category 3, 4 or 5.
- When connecting to 10BASE2, use a double shielded coaxial cable.



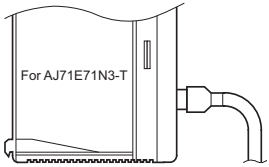
- When connecting to 10BASE5 or 10BASE2, ground the shield of the coaxial cable at both the local station and companion connected device. (Ground at a place near the connector.)

(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.



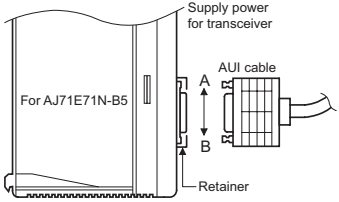
(5) When using A1SJ71E71N-B5, when the FG signal is regulated on the side of the external power supply of the original power supply for the transceiver, ground the FG signal at the original power supply.

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)

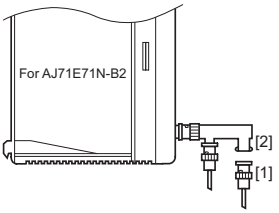


<Connection procedure> (*1)
1) Slide the retainer toward the direction A as shown in the figure.
2) Push in the AUI cable connector all the way.
3) Slide the retainer toward the direction B as shown in the figure.
4) Confirm that the AUI cable is locked.
5) Supply power to the transceiver (*2). (Refer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

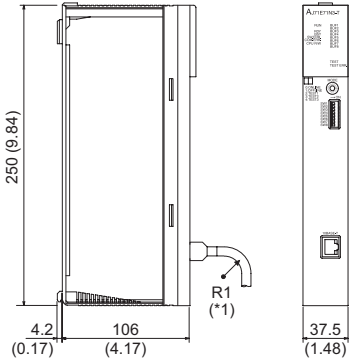
5.3 Connecting to the 10BASE2 (AJ71E71N-B2, A1SJ71E71N-B2)



<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.

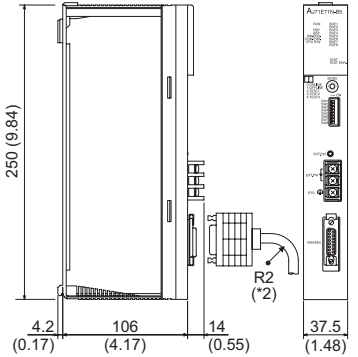
6. EXTERNAL DIMENSIONS

(1) AJ71E71N3-T



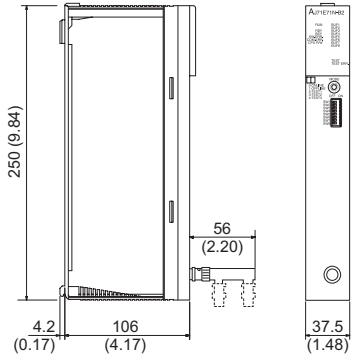
*1 When connecting the twisted pair cable, make the bend radius (R1: scale value) in the vicinity of the connector to (cable outside diameter × 4) or more.

(2) AJ71E71N-B5



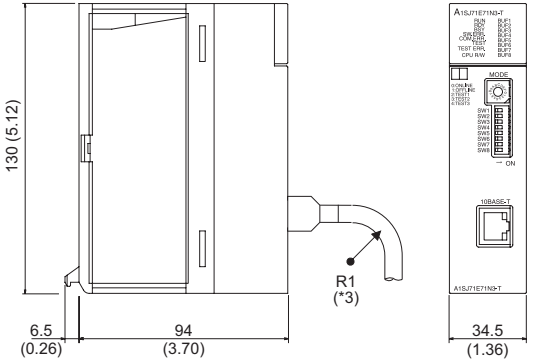
*2 When connecting the AUI cable, make the bend radius (R2: scale value) in the vicinity of the connector to (cable outside diameter × 4) or more.

(3) AJ71E71N-B2



(Unit: mm (in.))

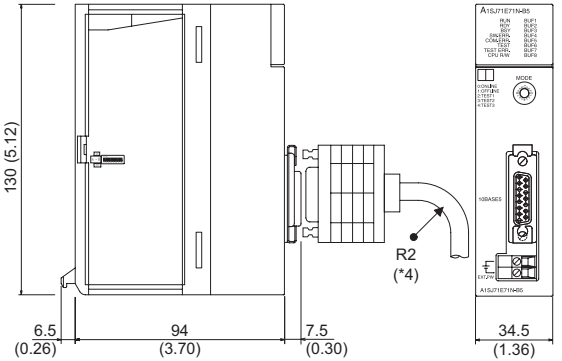
(4) A1SJ71E71N3-T



(Unit: mm (in.))

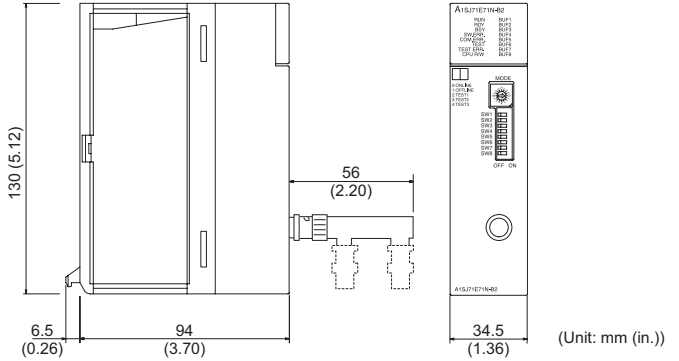
*3 When connecting the twisted pair cable, make the bend radius (R1: scale value) in the vicinity of the connector to (cable outside diameter × 4) or more.

(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.

MEMO

MEMO

MEMO

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