

mitsubishi

CC-Link System

Low Profile Waterproof Type

Repeater Hub Module

User's Manual

AJ65FBTA-RPH

Thank you for buying the Mitsubishi general-purpose programmable logic controller MELSEC-A series.

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



MODEL	AJ65FBT-RPH-U
MODEL CODE	13JP55
IB(NA)-0800288-E(0707)MEE	

●SAFETY PRECAUTIONS●

(Read these precautions before using.)

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

The precautions given in this manual are concerned with this product. Refer to the user's manual of the network system to use for a description of the network system safety precautions.

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




DANGER

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 medium or slight personal injury or physical damage.

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]

DANGER

- Input/output could be switched on or off when a problem occurs in the repeater module.
So build an external monitoring circuit that will monitor any input/output signals that could cause a serious accident.

CAUTION

- Use the module in an environment that meets the general specifications contained in this manual. Using this module 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.
- Do not install the control wires or communication cables together with the main circuit or power wires.
Keep a distance of 100mm (3.94inch) or more between them.
Not doing so could result in malfunctions due to noise.

[INSTALLATION PRECAUTIONS]

CAUTION

- Do not directly touch the module's conductive parts.
Doing so may cause malfunctions or failure of the module.
- Fix the module securely with screws. Tighten the screws securely within the specified torque range.
Undertightening can cause a drop, short circuit or malfunction. Overtightening can cause a drop, short circuit or malfunction due to damage to the screw or module.

[WIRING PRECAUTIONS]

DANGER

- Perform installation and wiring after disconnecting the externally supplied power used in the system at all phases externally.
If the power is not disconnected at all phases an electric shock or product damage may result.

CAUTION

- Always earth the FG terminal to the protective earth conductor. Otherwise there will be an electric shock or misoperation.
- Perform correct wiring for the module according to the product's rated voltage and terminal arrangement. Connecting to a power supply different from rating or miss-wiring may cause fire and/or product failure.
- Carry out tightening of the waterproof cap and communications adapter installation screws within the specified tightening torque range.
If the screws are loose, it could cause fire or malfunction.
If the screws are overtightened, they could be damaged, and this could cause a short circuit or malfunction.
- Ensure that no foreign matter such as chips and wire-offcuts enter the module. Foreign matter can cause a fire, failure or malfunction.
- The IP67 is satisfactory only when all the waterproof plugs, waterproof caps and communications adapters are installed.
- The communication connector is identical with the power connector in shape. Do not plug the power cable into the communication connector. Doing so may cause failure of the module.
- Be sure to fix the wires or cables by ducts or clamps when connecting them to the module.
Failure to do so may cause damage of the module or the cables due to accidental pull or unintentional shifting of the cables, or malfunctions due to poor contact of the cable.
- Do not install the control lines together with the communication cables, or bring them close to each other. Failure to do so may cause malfunctions due to noise.

[WIRING PRECAUTIONS]

CAUTION

- When disconnecting the communication and power supply cables from the module, do not hold and pull the cable part. Disconnect the cables after loosening the screws in the portions connected to the module. Pulling the cables connected to the module can damage the module and cables or can cause a malfunction due to a cable connection fault.

[STARTING AND MAINTENANCE PRECAUTIONS]

CAUTION

- Do not disassemble or modify the modules.
Doing so could cause failure, erroneous operation, injury, or fire.
- Be sure to shut down all the phases of the externally supplied power used in the system before cleaning the module, retightening the module fixing screws, and attaching/removing the module.
Not doing so can cause the module to fail or malfunction.
- Before handling the module, make sure to touch a grounded metal object to discharge the static electricity from the human body.
Failure to do so can cause a failure or malfunctions of the module.

[DISPOSAL PRECAUTIONS]

CAUTION

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

REVISIONS

* The manual number is given on the bottom right of the cover.

Print Date	*Manual Number	Revision
Oct., 2004	IB(NA)-0800288-A	First edition
Dec., 2004	IB(NA)-0800288-B	Addition "Compliance with the EMC and Low Voltage Directives"
June, 2005	IB(NA)-0800288-C	Correction SATETY PRECAUTIONS
Dec., 2006	IB(NA)-0800288-D	Correction About the Manuals, Abbreviated names, generic names and terms, Section 2.2, 2.3, 3.1, 3.2, 3.4, 4.2.1, 4.4
Jul., 2007	IB(NA)-0800288-E	Correction Chapter 6

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About the Manuals

The following manuals are also related to this product.
Order them if necessary.

Related Manual

Manual name	Manual No. (Model code)
CC-Link System Master/Local Module Type AJ61BT11/ A1SJ61BT11 User's Manual	IB-66721 (13J872)
CC-Link System Master/Local Module Type AJ61QBT11/ A1SJ61QBT11 User's Manual	IB-66722 (13J873)
CC-Link System Master/Local Module User's Manual QJ61BT11N	SH-080364E (13JR64)
CC-Link System Spring Clamp Terminal Block Type Repeater Hub Module Type AJ65BTS-RPH	IB-0800346 (13JP97)
CC-Link System Repeater (T-junction) Module Type AJ65SBT-RPT User's Manual	IB-0800078 (13JQ81)
CC-Link System Optical Repeater Module Type AJ65SBT- RPS/AJ65SBT-RPG User's Manual	IB-0800089 (13JQ85)
CC-Link System Space Optical Repeater Module Type AJ65BT-RPI-10A/AJ65BT-RPI-10B User's Manual	IB-0800090 (13JQ86)

Compliance with the EMC and Low Voltage Directives

When incorporating the Mitsubishi PLC into other machinery or equipment and keeping compliance with the EMC and low voltage directives, refer to Chapter 3, "EMC Directives and Low Voltage Directives" of the User's Manual (Hardware) included with the CPU module or base unit used.

The CE logo is printed on the rating plate of the PLC, indicating compliance with the EMC and low voltage directives.

To conform this product to the EMC Directive and Low Voltage Directive, refer to the Section of "CC-Link Modules" in Chapter 3 "EMC Directive and Low Voltage Directive" of the User's Manual (Hardware) of the CPU module used.

Abbreviated names, generic names and terms

Abbreviated names, generic names and terms	Description
AJ65FBTA-RPH	Abbreviation of AJ65FBTA-RPH type CC-Link system low profile waterproof type repeater hub module.
AJ65BTS-RPH	Abbreviation of AJ65BTS-RPH type CC-Link system spring clamp terminal block type repeater hub module.
AJ65SBT-RPT	Abbreviation of AJ65SBT-RPT type CC-Link system repeater (T-junction) module.
AJ65SBT-RPS/RPG	Abbreviation of AJ65SBT-RPS/AJ65SBT-RPG type CC-Link system optical repeater module.
AJ65BT-RPI-10A/10B	Abbreviation of AJ65BT-RPI-10A/AJ65BT-RPI-10B type CC-Link system space optical repeater module.
AJ65SBT-CLB	Abbreviation of AJ65SBT-CLB CC-Link - CC-Link/LT bridge module.
Segment	System between terminating resistors connected to each other through cross-over cables. The conventional CC-Link system can be said to be configured with one segment.
Master station	Station to control the data link system. One station is required for each system.
Local station	Station which has a sequencer CPU and can communicate with the master station and the other local stations.
Remote I/O station	Remote station processing only information in unit of bit. (AJ65BTB1-16D, AJ65SBTB1-16D, etc.)
Remote device station	Remote station processing only information in unit of bit and in unit of word. (AJ65BT-64AD, AJ65BT-64DAV, AJ65BT-64DAI, etc.)
Remote station	Generic name of remote I/O station and remote device station. Controlled by the master station.
Intelligent device station	Station allowing transient transmission such as AJ65BT-R2. (Including local stations)
Repeater	Module for expanding the CC-Link system by connecting the segments to each other.
Standby master station	Backup station which inherits data link control when the master station comes off parallel due to error.
Slave station	Generic term of remote I/O station, remote device station, local station, intelligent device station, and standby master station.
Master local module	Generic name of QJ61BT11N, QJ61BT11, AJ61BT11, A1SJ61BT11, AJ61QBT11 and A1SJ61QBT11.

Abbreviated names, generic names and terms	Description
Master module	Generic name of QJ61BT11N, QJ61BT11, AJ61BT11, A1SJ61BT11, AJ61QBT11 and A1SJ61QBT11 when these are used as the master station.
Local module	Generic name of QJ61BT11N, QJ61BT11, AJ61BT11, A1SJ61BT11, AJ61QBT11 and A1SJ61QBT11 when these are used as the local station.
Intelligent device module	Module allowing transient transmission such as AJ65BT-R2.

Product structure

The product structure of AJ65FBTA-RPH is as shown below.

Product name	Quantity
AJ65FBTA-RPH module	1
Terminating resistor 110Ω 1/2W (Brown, Brown, Brown)	8

1. OVERVIEW

This User's Manual describes the specifications, names of parts, and settings of the AJ65FBTA-RPH type CC-Link system low profile waterproof type repeater hub module (hereafter abbreviated as AJ65FBTA-RPH) used in the CC-Link system.

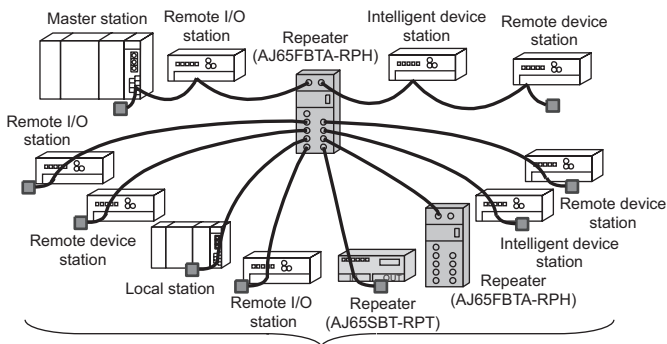
1.1 Features

The AJ65FBTA-RPH is the module designed for improving flexibility in cable wiring of the CC-Link system.

Using the AJ65FBTA-RPH allows the extension of the transmission distance and star-topology wiring (with 8 branch lines) in the CC-Link system.

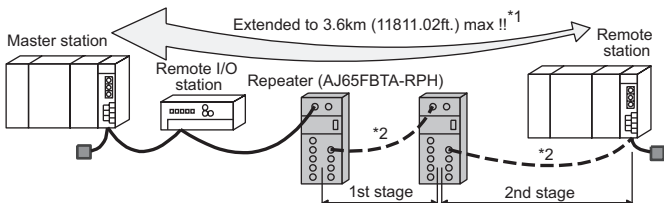
- (1) Star-topology wiring (T-branch) with 8 branch lines (segments) available in CC-Link system

By placing the AJ65FBTA-RPH between modules of the CC-Link system, star-topology wiring (T-branch) with up to 8 branch lines (segments) can be used in the CC-Link system of all transmission rates (10Mbps, 5Mbps, 2.5Mbps, 625kbps, and 156kbps).



Star-topology wiring with 8 branch lines can be used!!

- (2) Extended transmission distance in CC-Link system
 Use of AJ65FBTA-RPH enables the transmission distance of the CC-Link system to be extended.
 In addition, use of multiple modules enables the transmission distance of the CC-Link system to be extended up to 2 stages.



*1 Max. transmission distance at a transmission speed of 156kbps.

*2 Though it is not shown here, the other remote stations can be connected between the repeaters.

- (3) Mountable outside panel because of water-proof structure (compliant with IP67)
 Because a protection structure compliant with IP67 is adapted to the AJ65FBTA-RPH, it can be used at ease even at a wet work site.
- (4) Improved maintainability by system separation
 By using the AJ65FBTA-RPH, any of the systems can be separated and error location can be identified quickly.
 This prevents the whole system from being seriously affected by an error.

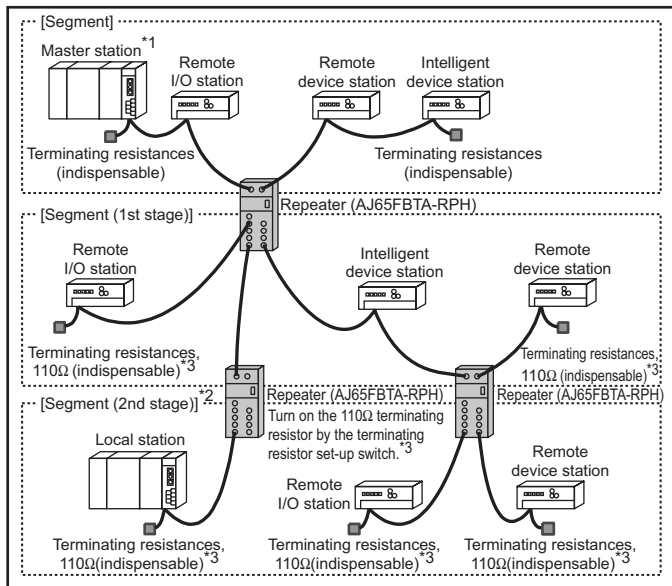
POINT

Branch lines with no error can send/receive data normally, not influenced by each other.
--

2. SYSTEM CONFIGURATION

2.1 Total configuration

The total configuration employed when the AJ65FBTA-RPH is used is as shown below.



^{*1} The transmission speed of each segment must be matched with that of the master station.

^{*2} 2 stages of segments max. are allowed to be used.

^{*3} The 130Ω terminating resistor is not usable for a segment connected on the branch line side of the AJ65FBTA-RPH. Use the 110Ω terminating resistor.

2.2 Applicable system

This section describes usable modules and cables.

(1) Modules connectable on the branch line side

The types of the modules connectable on the branch line side of the AJ65FBTA-RPH are shown below.

Category	Module types
Slave station	Remote I/O station
	Remote device station
	Intelligent device station
	Local station
Repeater	AJ65FBTA-RPH
	AJ65BTS-RPH
	AJ65SBT-RPT
	AJ65SBT-RPS/RPG
	AJ65BT-RPI-10A/10B
Bridge	AJ65SBT-CLB

(2) Applicable communication cables

The communication cables connectable to the AJ65FBTA-RPH are shown below.

Connector name	Applicable cable		Terminal resistance
	CC-Link version	Name	
Trunk line side	Ver.1.00	CC-Link dedicated high-performance cable	130Ω
		CC-Link dedicated cable	110Ω
Branch line side	Ver.1.10	CC-Link dedicated cable	
		Ver.1.00	
	Ver.1.10	CC-Link dedicated cable	

POINT

The master station and stand by master station can not be connected to the branch line side.

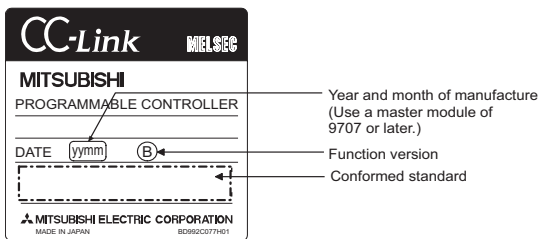
2.3 Cautions on system configuration

(1) Conditions of usable master module

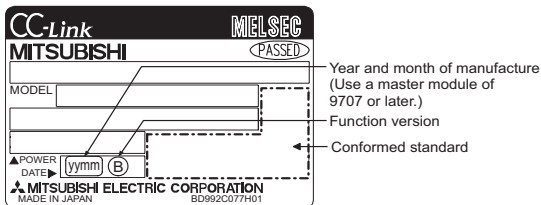
When the AJ61BT11, A1SJ61BT11, AJ61QBT11 and A1SJ61QBT11 modules are used, those of the functional version B or later must be employed. Use the master module bearing the version 9707 B or later in the DATE column of the name plate as shown in the figure below.

When the QJ61BT11N, QJ61BT11 module are used, any module can be used irrespective of the version.

(a) Rating plate of AJ61BT11 or AJ61QBT11



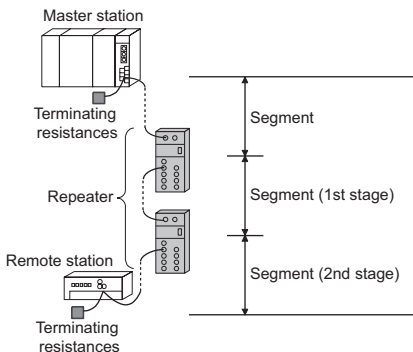
(b) Rating plate of A1SJ61BT11 or A1SJ61QBT11



- (2) Max. number of modules connected to configure CC-Link system
Up to 64 modules of repeaters can be connected in one segment.
In the CC-Link system where repeaters are used, also the number of remote stations capable of being controlled by one master station is the same as in the other systems.

For details, refer to the User's Manual of the applicable master module.

- (3) Max. number of stages connected to configure segment
Use of AJ65FBTA-RPH enables communication between the master station located in a segment and a remote station located in a segment apart by 2 stages max. from the segment where the master station exists.



- (4) Instructions for using different models of repeaters in combination
 Note that when combining the repeaters of different models, there are the following restrictions on the number of connectable repeaters and the number of connected stages.

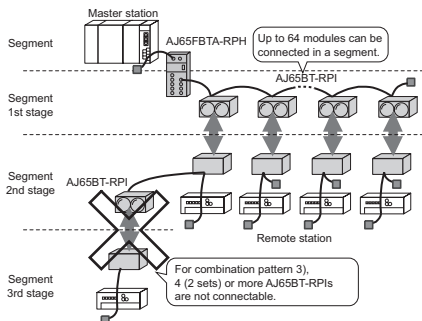
Combination pattern	Max. number of repeaters						Max. number of stages
	AJ65BTS-RPH	AJ65FBTA-RPH	AJ65SBT-RPT	AJ65SBT-RPS	AJ65SBT-RPG	AJ65BT-RPI-10A/10B	
1)	1	—	2	—	—	—	3
	—	1	2	—	—	—	
2)	1	—	—	2(1set)	-	—	2
	1	—	—	—	2(1set)	—	
	—	1	—	2(1set)	—	—	
	—	1	—	—	2(1set)	—	
3)	1	—	—	—	—	2(1set)	3
	—	1	—	—	—	2(1set)	
4)	—	—	2	4(2set)	—	—	4
5)	—	—	2	—	2(1set)	—	3
6)	—	—	2	—	—	2(1set)	
7)	—	—	—	2(1set)	2(1set)	—	2
8)	—	—	—	2(1set)	—	2(1set)	
	—	—	—	—	2(1set)	2(1set)	
9)	1	1	—	—	—	—	

POINT

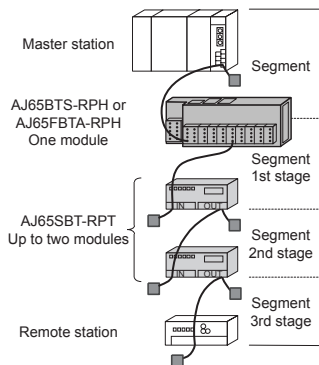
- For the CC-Link system, up to 2 repeater types can be used in combination. Using 3 models or more is not allowed.
- When repeaters are connected in the same segment by link wiring, up to 64 modules can be connected.

For details, refer to the user's manual of the master module used.

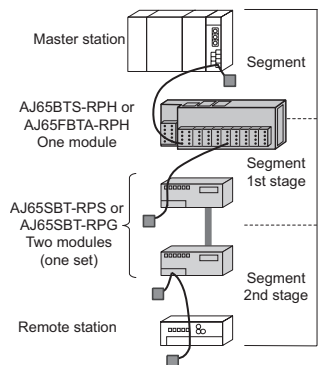
Ex.) A CC-Link system with combination pattern 3) is built



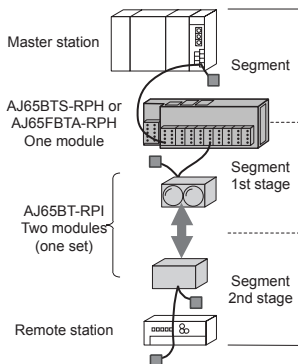
(a) Combination pattern 1)



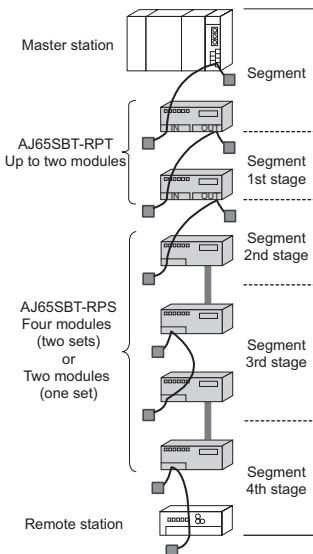
(b) Combination pattern 2)



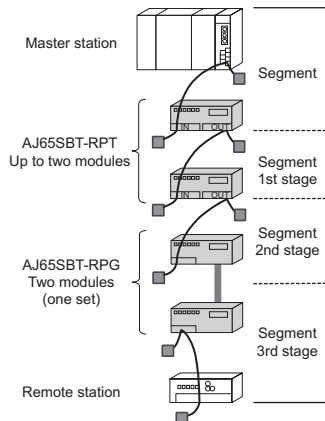
(c) Combination pattern 3)



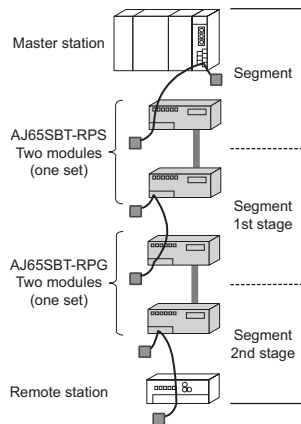
(d) Combination pattern 4)



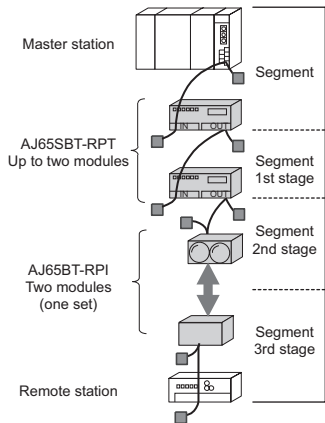
(e) Combination pattern 5)



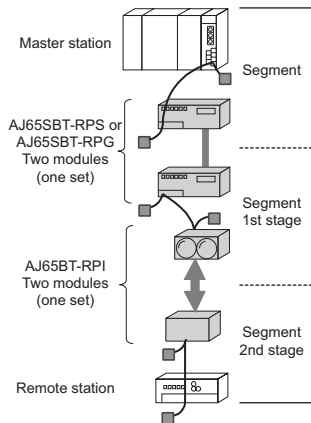
(g) Combination pattern 7)



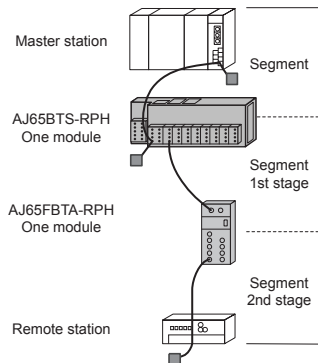
(f) Combination pattern 6)



(h) Combination pattern 8)



(i) Combination pattern 9)



3. SPECIFICATION

3.1 General specifications

The General specifications of the AJ65FBTA-RPH are shown below.

Item	Specifications					
Operating ambient temperature	0 to 45°C					
Storage ambient temperature	-20 to 75°C					
Operating ambient humidity	10 to 90%RH, non-condensing or compliant with IP67*1					
Storage ambient humidity	10 to 90%RH, non-condensing					
Vibration resistance	Conforming to JIS B 3502, IEC 61131-2	Under intermittent vibration	Frequency	Acceleration	Amplitude	Sweep count 10 times each in X, Y, Z directions (for 80min.)
			10 to 57Hz	—	0.075mm (0.003inch)	
		Under continuous vibration	57 to 150Hz	9.8m/s ²	—	
			10 to 57Hz	—	0.035mm (0.001inch)	
		57 to 150Hz	4.9m/s ²	—		
Shock resistance	Conforming to JIS B 3502, IEC 61131-2 (147m/s ² , 3 times in each of 3 directions X, Y, Z)					
Operating ambience	No corrosive gases					
Operating altitude*5	2000m (6562ft.) max.					
Installation location	Outside control panel*2					
Overvoltage category*3	II max.					
Pollution level*4	2 max.					

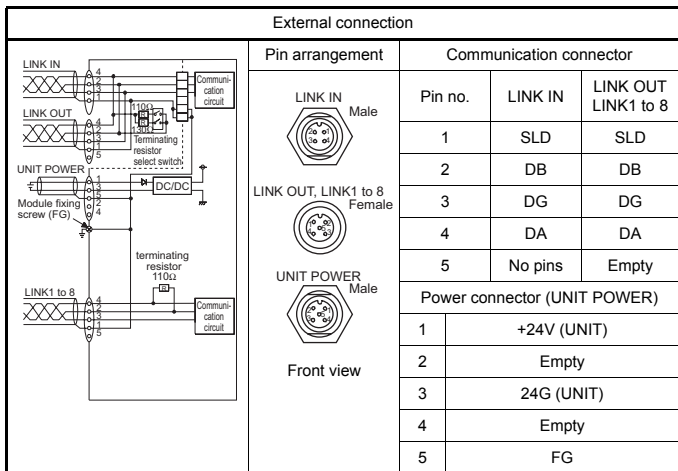
- *1 Applicable only when all waterproof connectors are being used, or when waterproof caps are installed on unused waterproof connectors or feed-through tubes.
- *2 It can also be used in an environment other than on the control panel if the conditions such as usage ambient temperature and humidity are satisfied.
- *3 Indicates the location where the device is connected from the public cable network to the device structure wiring area.
Category II applies to the devices to which the power is supplied from a fixed equipment. Surge withstand voltage for devices with up to 300V of rated voltage is 2500V.
- *4 This is an index which indicates the degree of conductive object generation in the environment Pollution level 2 is when only non-conductive pollution occurs.
A temporary conductivity caused by condensation must be expected occasionally.
- *5 Do not use or store the PLC in the environment where the pressure is higher than the atmospheric pressure at sea level.
Otherwise, malfunction may result.
To use the PLC in a high-pressure environment, contact your local Mitsubishi representative.

3.2 Performance specifications

The performance specifications of the AJ65FBTA-RPH module are shown below.

Item	Specifications	
Station number	— (none)	
CC-Link station type	— (none)	
Number of occupied stations	0 (none)	
Transmission rate	Can select from 156kbps / 625kbps / 2.5Mbps / 5Mbps / 10Mbps	
No. of connectable slave stations	The total number of modules connected to a trunk line and branch line shall conform to the maximum number of connectable modules of the master module used. For details, refer to the user's manual of the master modules used.	
Max. No. of modules connected to the trunk line	64 (Refer to Section 2.3 (2))	
Connection position	Trunk line side	No restriction (compliant with the CC-Link specifications)
	Branch line side	Connect to the end of the branch line (segment end)
Max. number of stages connected to configure segment	AJ65FBTA-RPH only (Refer to Section 2.3 (3))	2nd stage
	Combination of AJ65FBTA-RPH and AJ65SBT-RPT (Refer to Section 2.3 (4))	3rd stage
	Combination of AJ65FBTA-RPH and one of AJ65SBT-RPS/RPG, AJ65BT-RPI, or AJ65BTS-RPH. (Refer to Section 2.3 (4))	2nd stage
Max. transmission distance of each segment	Varies according to transmission rate (Refer to Section 3.5).	
Terminating resistor (built-in)	Trunk line side	No resistor, 110Ω, or 130Ω can be selected.
	Branch line side	110Ω fixed
Connection connector	M12 waterproof connector (IEC947-5-2)	
Mounting orientation	No restriction (mountable in six orientations)	
Module fixing screw	M4 mounting screw, 2-4.5x6 slot M4 mounting screw	
Power supply	Voltage	24V DC external power supply (20.4 to 26.4V, ripple within ±5%)
	Current	0.30A (TYP. 24V DC)
Noise durability	Simulator noise of 500 Vp-p, obtained by a noise simulator using noise width of 1 μs and noise frequency of 25 to 60 Hz	
Maximum voltage	500V AC for 1 minute between all DC external terminals and ground	
Insulation resistance	10MΩ or higher, measured with a 500V DC insulation resistance tester	
External dimensions	60mm (2.36in.) (W) × 200mm (7.87in.) (H) × 48mm (1.89in.) (D)	
Weight	0.31kg	

3.3 Connector specifications



3.4 Specifications of connection cable

Use the CC-Link dedicated cable for the CC-Link system. If a cable other than the CC-Link dedicated cable is used, the performance of the CC-Link system cannot be guaranteed.

For the CC-Link cable specifications and any other inquiries, refer to the following:

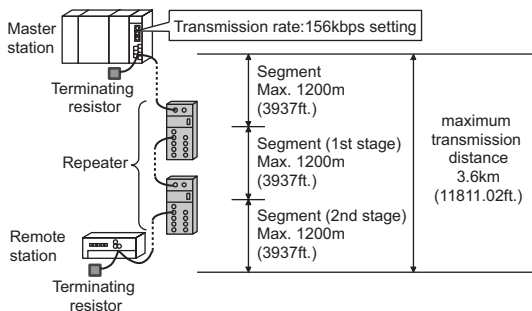
CC-Link Partner Association website: <http://www.cc-link.org/>

REMARK

For details, refer to the CC-Link cable wiring manual issued by the CC-Link Partner Association.

3.5 Maximum transmission distance

The maximum transmission distance varies depending on the set-up of transmission rate and the number of connected segments (stages).

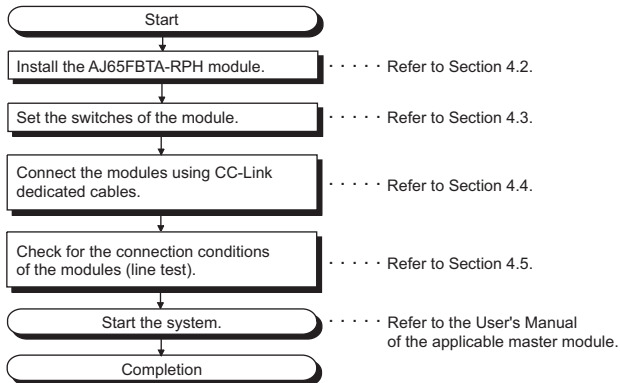


Condition	Description
Transmission rate	Maximum transmission distance in each segment is the same as that of the normal CC-Link system (the system with one segment only). It varies depending on the transmission rate. For details, refer to the user's manual of the master module used. (The station-to-station cable length for the repeater is the same as that for the remote I/O station.)
No. of stages for segment connection	Maximum transmission distance for one segment is added for each additional stage connection.

4. PROCEDURE UP TO START OF DATA LINK

4.1 Procedure up to start of data link

The procedure ranging from the installation of the AJ65FBTA-RPH module to the start of data link is described below.



POINT

The procedure described here is for the AJ65FBTA-RPH module only. In order for you to understand the procedure of the entire CC-Link system, refer to the User's Manual of the applicable master module.

4.2 Mounting and installation

4.2.1 Cautions on handling

Cautions on handling the AJ65FBTA-RPH module are described below.



DANGER

- Perform installation and wiring after disconnecting the externally supplied power used in the system at all phases externally. If the power is not disconnected at all phases an electric shock or product damage may result.



CAUTION

- Do not install the control wires or communication cables together with the main circuit or power wires. Keep a distance of 100mm (3.94inch) or more between them. Not doing so could result in malfunctions due to noise.
- Do not directly touch the module's conductive parts or electronic components. Doing so may cause malfunctions or failure of the module.
- Fix the module securely with screws. Tighten the screws securely within the specified torque range.
Undertightening can cause a drop, short circuit or malfunction. Overtightening can cause a drop, short circuit or malfunction due to damage to the screw or module.
- Always earth the FG terminal to the protective earth conductor. Otherwise there will be an electric shock or misoperation.
- Perform correct wiring for the module according to the product's rated voltage and terminal arrangement. Connecting to a power supply different from rating or miss-wiring may cause fire and/or product failure.
- Carry out tightening of the waterproof cap and communications adapter installation screws within the specified tightening torque range.
If the screws are loose, it could cause fire or malfunction.
If the screws are overtightened, they could be damaged, and this could cause a short circuit or malfunction.
- Ensure that no foreign matter such as chips and wire-offcuts enter the module. Foreign matter can cause a fire, failure or malfunction.
- The IP67 is satisfactory only when all the waterproof plugs, waterproof caps and communications adapters are installed.

 **CAUTION**

- The communication connector is identical with the power connector in shape. Do not plug the power cable into the communication connector. Doing so may cause failure of the module.
- Be sure to fix the wires or cables by ducts or clamps when connecting them to the module.
Failure to do so may cause damage of the module or the cables due to accidental pull or unintentional shifting of the cables, or malfunctions due to poor contact of the cable.
- 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.
- Do not install the control lines together with the communication cables, or bring them close to each other. Failure to do so may cause malfunctions due to noise.
- Do not disassemble or modify the modules.
Doing so could cause failure, erroneous operation, injury, or fire.
- Be sure to shut down all the phases of the externally supplied power used in the system before cleaning the module, retightening the module fixing screws, and attaching/removing the module.
Not doing so can cause the module to fail or malfunction.
- Before handling the module, make sure to touch a grounded metal object to discharge the static electricity from the human body.
Failure to do so may cause a failure or malfunctions of the module.
- When disposing of this product, treat it as industrial waste.

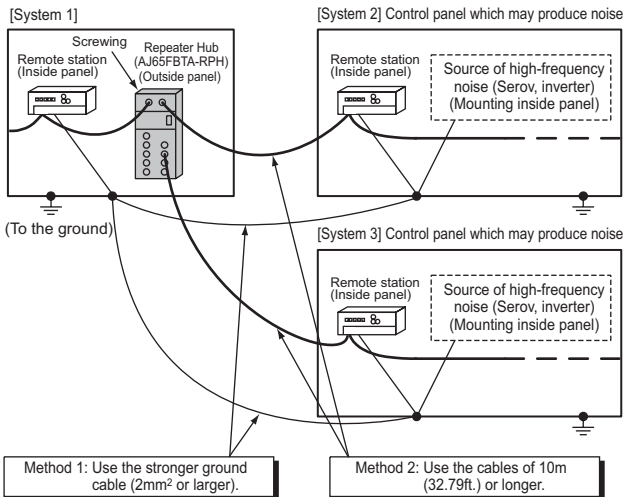
- (1) Tighten module fixing screws within the torque range below.
Do not over-tighten these screws. The screws and module case may be damaged.

Screw location	Specified torque range
Communication adapter fixing screw (M4 screws)	42 to 58N•cm
Module fixing screw (M4 screws)	78 to 118N•cm
Waterproof cap (A6CAP-WP2)	29 to 34N•cm

- (2) Install the AJ65FBTA-RPH module on a flat smooth surface.
If there are irregularities on the installation surface, undue force may be applied to the printed circuit boards, and the boards may be damaged.
- (3) Depending on the grounding condition of the system, a high-frequency noise may occur between the systems. When these systems are connected through CC-Link communication cables, a communication error may occur by the mixing of noise into the repeaters.
If the high-frequency noise occurs between the systems connected through the cables of 10 m (32.79ft.) or shorter, take either of the measures specified below.

Method1: Connect the systems through cables of 2 mm² or larger (across FG terminals of the remote station in each system, or across grounds of the control panel to which the remote station is grounded).

Method2: Use CC-Link cables of 10 m (32.79ft.) or longer between the systems.



(4) Handling of waterproof cap

(a) Applicable waterproof cap

The waterproof cap applied to the AJ65FBTA-RPH is shown below.

Product name	Model code	Remark
Waterproof cap (20 pieces, sold separately)	A6CAP-WP2	For LINK OUT connector or LINK1-8 connectors

POINT

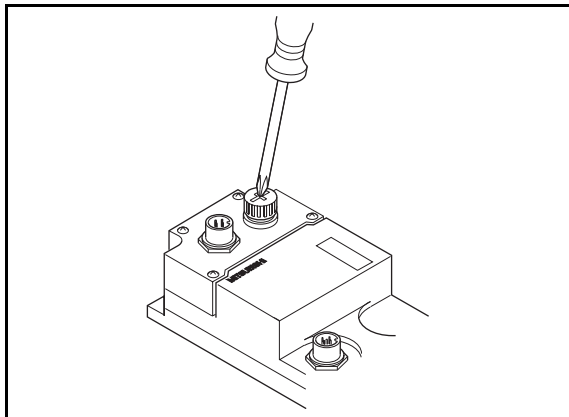
The waterproof cap of the conventional type (A6CAP-WP1) cannot be used.

(b) Waterproof plug attachment procedure

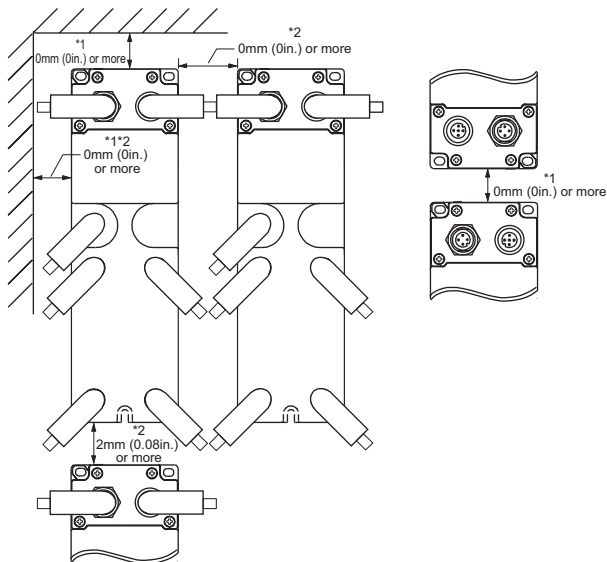
In order to prevent water from entering, attach waterproof caps onto unused LINK OUT and LINK1 to 8 connectors as shown below.

Insert the waterproof cap in the unused connector on the main module, then tighten it.

(Tightening torque range: 29 to 34N·cm)



- (5) When installing the AJ65FBTA-RPH provide the space shown in the figure below between the top and bottom of the module and other structures or parts so that good ventilation can be secured and that interference and application of load on the waterproof connector can be prevented.



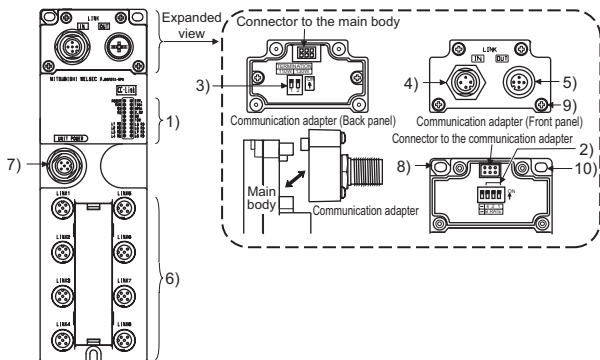
- *1 When inserting or removing the communication adapter, provide a space to operate a screwdriver and so on.
 *2 When using a right-angle type waterproof plug or Y-branch line connector, provide a distance so that no load will be applied to the cable.

4.2.2 Installation environment

For installation environment, refer to Section 3.1.

4.3 Names and settings of parts

The names of parts of the AJ65FBTA-RPH module, indication statuses of LEDs, and settings of switches are described below.



No.	Name	Application		
1)	Operation status display LED	Check for the module condition by observing the state of lighting of the LED.		
		LED Name	Application	
		POWER	ON : Power supply on OFF : Power supply off	
		RUN	ON : Module is operating normally OFF : Module is not operating normally	
		SD	ON : Data are being sent to the LINK IN or LINK OUT of the trunk line OFF : Data are not being sent to the LINK IN or LINK OUT of the trunk line	
		RD	ON : Data are being received from the LINK IN or LINK OUT of the trunk line OFF : Data are not being received from the LINK IN or LINK OUT of the trunk line	
		ERR.	ON : Transmission rate setting out-of-range error or communication error occurred Flickering : Indicates that you forgot fitting the terminating resistor or the module or CC-Link dedicated cable is affected by noise. OFF : Module is operating normally	
		156k, 625k, 2.5M, 5M, 10M	The LED of transmission rate, set by the transmission rate setting switch, is lit.	
		L1 RD to L8 RD	ON : Data are being received from the LINK1 to 8 of the branch line. OFF : Data are not being received from the LINK1 to 8 of the branch line.	

No.	Name	Application				
2)	Transmission rate setting switch	Set the transmission rate of the module (set to 0 at the time of delivery). Ensure to set the transmission rate at a speed specified below. Transmission rate of the trunk line side is identical with that of the branch line side.				
		Setting value	Setting switch status			Transmission rate (bps)
			4	2	1	
		0	OFF	OFF	OFF	156k
		1	OFF	OFF	ON	625k
		2	OFF	ON	OFF	2.5M
		3	OFF	ON	ON	5M
		4	ON	OFF	OFF	10M
5 to 7	Cannot be set. If set to 5 to 7, the ERR. LED is turned on and data are not transferred.					
3)	Terminating resistor select switch*1	Set whether or not to use the terminating resistors incorporated in the trunk line side of the module. (Settings at shipment: all OFF)				
		Setting switch status		Application		
		2	1			
		OFF	OFF	No terminating resistor		
		OFF	ON	110Ω terminating resistor ON		
		ON	OFF	130Ω terminating resistor ON		
		ON	ON	Cannot be set. If the switches are set to ON, normal data transfer is not guaranteed.		

*1 When the AJ65FBTA-RPH is located at either of the ends of the trunk line, turn on the terminating resistor in accordance with the type of the cable connected to LINK IN. For details, refer to section 2.2. The incorporated 110Ω terminating resistor is used on the branch line side. (Switch setup is not needed.)

No.	Name	Application	
		Connector name	Application
4)	Waterproof connector for transmission line ^{*2}	LINK IN	Connector for connecting the transmission line of the trunk line IN side (master station side) (male 4-pin).
5)		LINK OUT	Connector for connecting the transmission line of the trunk line OUT side (female 5-pin). If LINK OUT is not used outside the panel, be sure to attach the accessory waterproof cap. (Tightening torque range: 29 to 34N•cm)
6)		LINK1 to 8	Connector for connecting the transmission line of the branch line (female 5-pin). If LINK1 to 8 are not used outside the panel, be sure to attach the waterproof cap. (Prepare the waterproof cap separately.) (Tightening torque range: 29 to 34N•cm)
7)	Waterproof connector for power line ^{*2}	UNIT POWER	Connector for supplying power to the module (male 5-pin).
8)	FG metal fitting	For module FG terminal (tightening torque range: 78 to 118N•cm)	
9)	Communication adapter fixing screw	When replacing the main body online or changing switch settings, attach/remove the communication adapter with this screw. (Tightening torque range: 42 to 58N•cm)	
10)	Module fixing hole ^{*3}	Screw hole for fixing the module. (Tightening torque range: 78 to 118N•cm)	

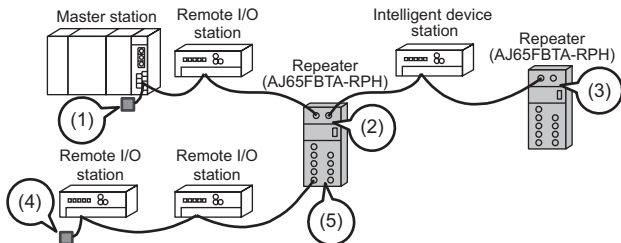
*2 For the specifications of the connector, refer to section 3.2.

*3 For the specifications of the module fixing screw, refer to section 3.2.

POINT	
Set the same transmission rate as that of the master station.	

4.4 Connection of module through CC-Link dedicated cable

The method of connecting the AJ65FBTA-RPH module to the CC-Link system through the CC-Link dedicated cable is shown below.



For (1) to (5) shown in the above, read the following cautions on connections.

- (1) For the segment connected to the trunk line side of the AJ65FBTA-RPH, connect a terminating resistor to the module connected at the end.
Select a type for terminating resistor in accordance with the type of the connected communication cable.
For details, refer to the manual of the module connected.
- (2) When connecting the trunk line side of AJ65FBTA-RPH to any other than the segment termination, turn off the terminating resistor.
In addition, connect the shielding wire of the CC-Link dedicated cable to "SLD" of each module, and ground both ends via "FG" The interval between SLD and FG is connected in the module in advance.
- (3) When connecting the trunk line side of the AJ65FBTA-RPH to the end of the segment, turn on the terminating resistor.
Select a type for terminating resistor in accordance with the type of the connected communication cable.
For details, refer to Section 2.2.
In addition, connect the shielding wire of the CC-Link dedicated cable to "SLD" of each module, and ground both ends via "FG" The interval between SLD and FG is connected in the module in advance.

- (4) Connect the included 110Ω terminating resistor to the module located at the end of a segment when the branch line side of the AJ65FBTA-RPH is connected to the segment.
For the connection of terminal resistor, refer to the manual of the module connected.
- (5) For the branch line side of the AJ65FBTA-RPH, use the incorporated 110Ω terminating resistor. (Switch settings are not necessary.)
In addition, connect the shielding wire of the CC-Link dedicated cable to “SLD” of each module, and ground both ends via “FG”.
Note that SLD and FG are connected to each other in the module.

4.5 Check for state of connection (line test)

Connect all modules including the AJ65FBTA-RPH module through the CC-Link dedicated cable. Then, check that the CC-Link system is in the state capable of performing a data link normally.

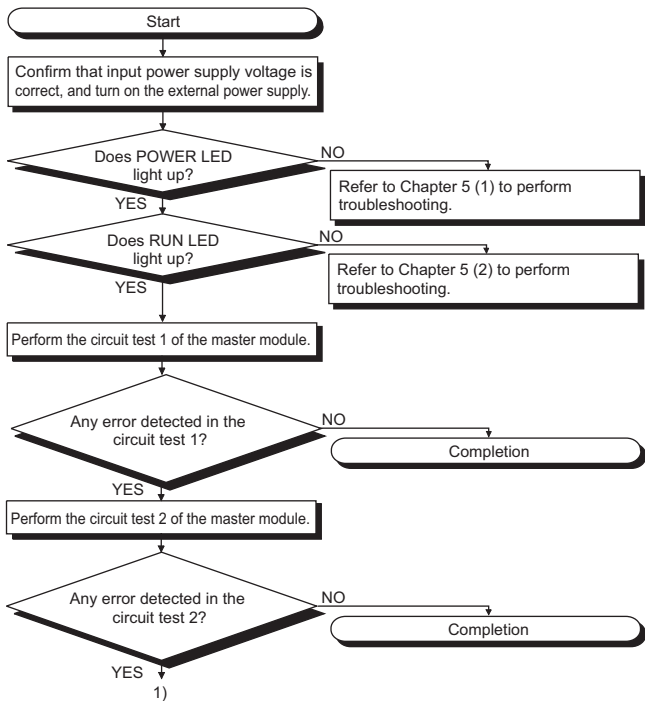
Because whether or not a master station can establish a data link with a particular slave station can be checked by the connection status check (circuit test), an error module can be identified.

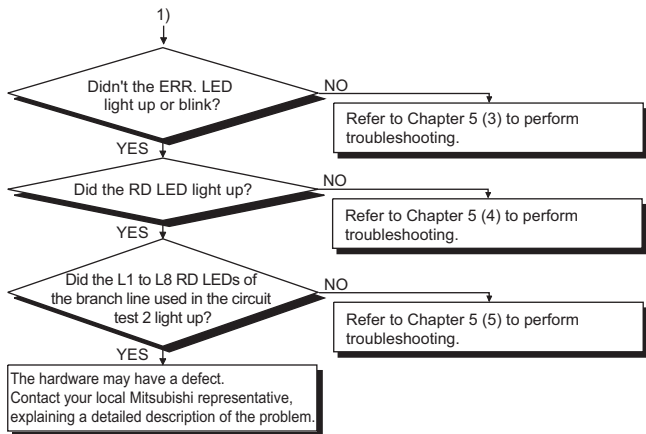
For the connection status check (circuit test), perform the circuit test 1 of the master module. If an error is detected, perform the circuit test 2 of the master module.

For the details of circuit tests 1 and 2, refer to the user's manual of the master module used.

Perform the test following the steps shown below.

POINT
<p>Perform the circuit test 2 of the master module by selecting the target stations as described in (1) to (3) below.</p> <ol style="list-style-type: none"> (1) In the segment including the master module, select slave stations in order from the nearest to the master module to the farthest. (2) In the segment (1st stage), select slave stations in order from the nearest to the AJ65FBTA-RPH to the farthest. (3) In the segment (2nd stage), select slave stations in order from the nearest to the AJ65FBTA-RPH to the farthest.





5. TROUBLESHOOTING

This section describes the measures when a trouble occurred in the AJ65FBTA-RPH.

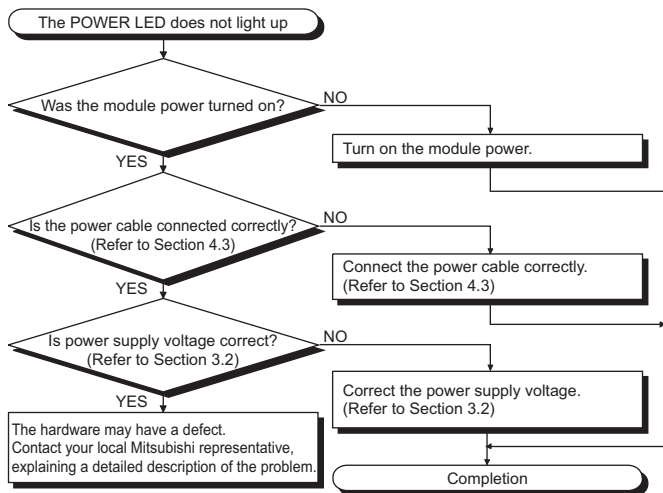
Perform the troubleshooting indicated in the reference section.

No.*1	Problem	Reference section
1	The POWER LED is not lit while the module power is ON.	(1) in this chapter
2	The RUN LED is not lit while the module power is ON.	(2) in this chapter
3	The ERR. LED lighted up or blinked.	(3) in this chapter
4	The RD LED does not light up during data link.	(4) in this chapter
5	The L1 to L8 RD LEDs corresponding to the data linking branch lines do not light up.	(5) in this chapter

*1 If more than one problem occurred simultaneously, perform the troubleshooting in order of the item numbers.

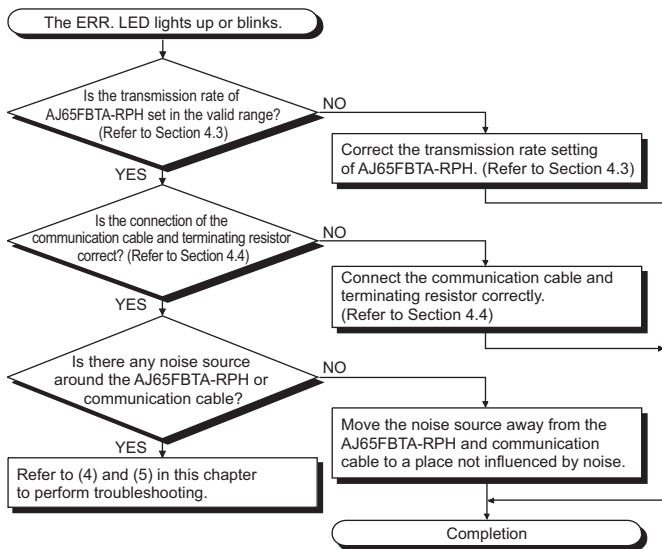
(1) The POWER LED is not lit while the module power is ON

Troubleshooting is shown below for the case that the POWER LED is not lit while the module power is ON.



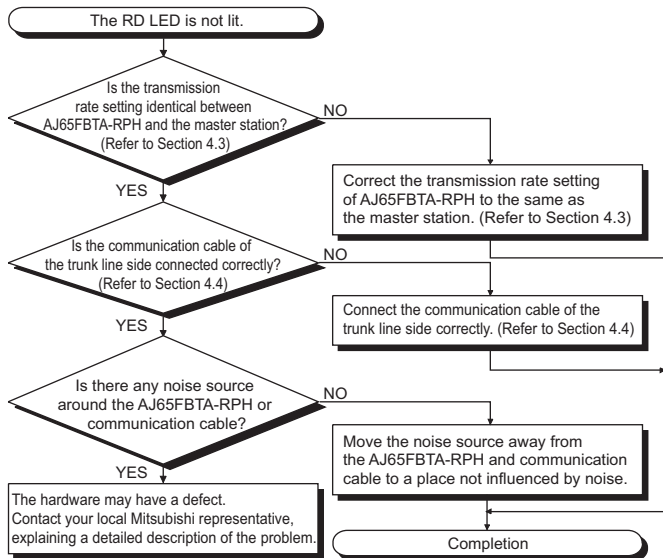
- (2) The RUN LED is not lit while the module power is ON.
If the RUN LED is not lit while the module power is ON, turn off and on the module again.
If the RUN LED is not lit after the module power is reapplied, the hardware may be faulty. Please contact your local Mitsubishi representative.

- (3) The ERR. LED lights up or blinks.
Troubleshooting is shown below for the case that the ERR. LED lights up or blinks.



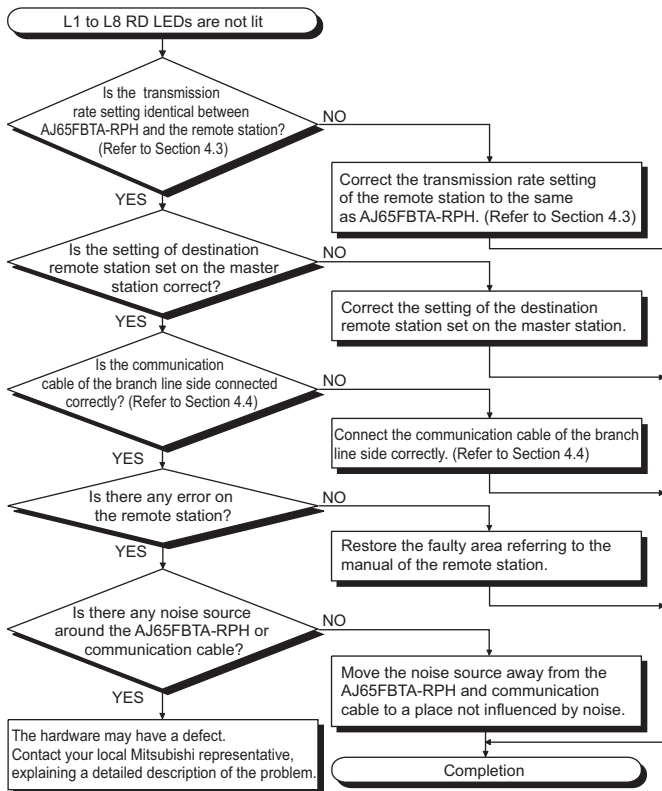
(4) The RD LED is not lit during data link.

This section describes troubleshooting for the case that the RD LED is not lit.



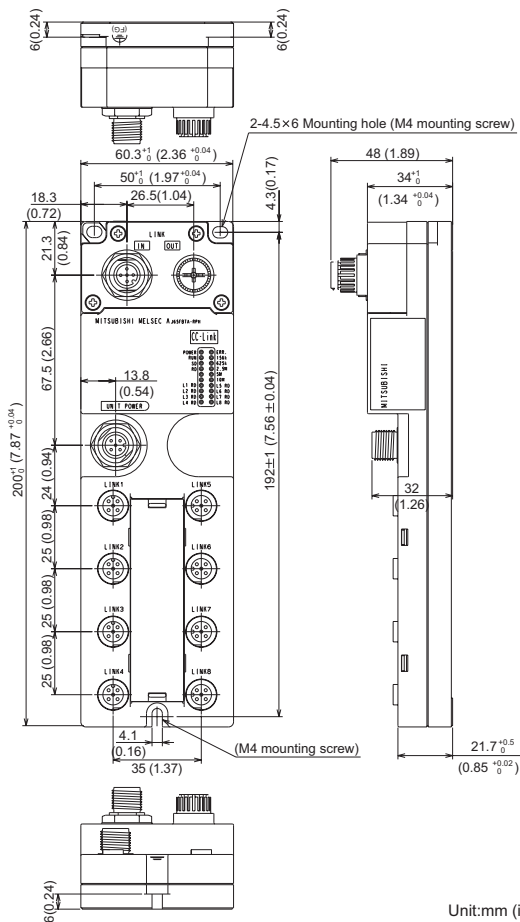
(5) The L1 to L8 RD LEDs corresponding to the data linking branch lines are not lit.

This section describes troubleshooting when the L1 to L8 RD LEDs corresponding to the data linking branch lines are not lit.



6. EXTERNAL DIMENSIONS

The external dimensions of AJ65FBTA-RPH module is shown below.



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.

For safe use

- This product has been manufactured as a general-purpose part for general industries, and has not been designed or manufactured to be incorporated in a device or system used in purposes related to human life.
- Before using the product for special purposes such as nuclear power, electric power, aerospace, medicine or passenger movement vehicles, consult with Mitsubishi.
- This product has been manufactured under strict quality control. However, when installing the product where major accidents or losses could occur if the product fails, install appropriate backup or failsafe functions in the system.

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