

MITSUBISHI

CC-Link System Repeater Optical Repeater Module

User's Manual

AJ65SBT-RPS/AJ65SBT-RPG

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

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

MELSEC

Mitsubishi Programmable
Logic Controller

MODEL	AJ65SBT-RPS/RPG-U
MODEL CODE	13JQ85
IB(NA)-0800089-C(0101)MEE	

© 1999 MITSUBISHI ELECTRIC CORPORATION

● SAFETY PRECAUTIONS ●

(Read these precautions before using.)

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

These precautions apply only to this equipment.

Refer to the CPU module User's Manual for a description of the PC system safety precautions.


These "Safety Precautions" classify the safety precautions into two categories: "DANGER" and "CAUTION".

 **DANGER**

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

 **CAUTION**

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 PRECATUIONS]

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 each module in an environment as specified in the "general specification" in the CPU module User's Manual.
Usage of the module outside the general specification range may cause electric shock, fire, malfunction, product damage or deterioration.
- Do not have control cables and communication cables bundled with or placed near by the main circuit and/or power cables. It may cause malfunction due to noise interference. Wire those cables at least 100mm(3.94 inch) away from the main circuit and/or power cables.

[INSTALLATION PRECAUTIONS]

CAUTION

- Do not directly touch the module's conductive parts.
Doing so could cause malfunction or trouble in the module.
- Tighten the module securely using DIN rail or installation screws within the specified torque range.
Loose terminal screws may cause falling, short circuit or erroneous operation.
If the terminal screws are too tight, it may cause falling or short circuit due to damage of the screws.

[WIRING PRECAUTIONS]

DANGER

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

CAUTION

- Be sure to ground the FG terminal to the class-D (class 3) or higher sequencer dedicated grounding conductor.
Otherwise there will be an electric shock or misoperation.
- Terminal screws which are not to be used must be tightened always.
Otherwise there will be a danger of short circuit against the bare solderless terminals.
- Perform correct wiring for the module according to the product's rated voltage and terminal arrangement. Connecting to a power supply different from the rating or mis-wiring may cause fire and/or trouble.

[WIRING PRECAUTIONS]

CAUTION

- Fix terminal screws securely with the specified torque.
Loose terminal screws may cause short circuit or malfunction.
If the terminal screws are too tight, it may cause falling, short circuit or erroneous operation due to damage of the screws or module.
- Make sure foreign objects do not get inside the module, such as dirt and wire chips.
It may cause fire, trouble or malfunction.
- Be sure to fix the communication and power cables that are connected to the module in place, either by running them through a duct or by using clamps.
If the cables are not fixed in one of these ways, dispersion, movement, or careless pulling of the cables may cause damage to the module or cables, or malfunction due to cable contact faults.
- When removing the communication cable or power supply cable from the module, do not pull the cable. When removing the cable with a connector, hold the connector on the side that is connected to the module.
When removing the cable connected to the terminal block, first loosen the screws on the part that is connected to the terminal block.
Pulling the cable that is still connected to the module may cause malfunction or damage to the module or cable.

[STARTUP AND MAINTENANCE PRECAUTIONS]

DANGER

- Do not touch terminals when the power is on.
It may cause an electric shock or malfunction.
- Perform cleaning the module or re-tightening of terminal screws after making sure to turn off the external power supply. If you do not switch off the external power supply, it will cause trouble or malfunction of the module.

CAUTION

- Never try to disassemble or modify module.
It may cause trouble, malfunction, injury or fire.
- The module case is made of resin; do not drop it or subject it to strong shock. Module damage may result.
- Make sure to switch all phases of the external power supply off before installing or removing the module to/from the panel.
If you do not switch off the external power supply, it will cause trouble or malfunction 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 left of the back cover.

Print Date	* Manual Number	Revision
Nov.,1999	IB (NA)-0800089-A	First edition
Jun.,2000	IB (NA)-0800089-B	Correction Section 2.2(5)
Jan.,2001	IB (NA)-0800089-C	Correction Section 3.3.2(3)

This manual confers no industrial property rights or any rights of any other kind, nor dose it confer any patent licenses. Mitsubishi Electric Corporation cannot be held responsible for any problems involving industrial property rights which may occur as a result of using the contents noted in this manual.

CONTENTS

1. OVERVIEW	1
1.1 Features	1
1.2 Packaged parts.....	2
1.3 Abbreviated names, generic names and terms.....	2
2. SYSTEM CONFIGURATION.....	3
2.1 Total configuration	3
2.2 Cautions on system configuration	4
3. SPECIFICATIONS.....	7
3.1 General specifications	7
3.2 Performance specifications.....	7
3.3 Specifications of connection cables	8
3.4 Max. transmission distance	12
4. PROCEDURE UP TO START OF DATA LINK.....	13
4.1 Procedure up to start of data link	13
4.2 Mounting and installation	13
4.2.1 Cautions on handling.....	13
4.2.2 Installation environment.....	16
4.3 Names and settings of parts	17
4.4 Check of module state (Hardware test).....	19
4.5 Setting of switches.....	20
4.6 Installation and removal of protective cover	21
4.7 Connection of module through CC-Link dedicated cable	22
4.8 Check for state of connection (Line test).....	23
5. TROUBLESHOOTING	24
6. EXTERNAL DIMENSIONS DIAGRAM.....	24

About the Manuals

The following manuals are related to this product.
Referring to this list, please request the necessary manuals.

Related manuals

Manual Name	Manual Number (Model Code)
AJ61BT11, A1SJ61BT11 CC-Link System Master Local Module User's Manual (Detail version)	IB(NA)66721 (13J872)
AJ61QBT11, A1SJ61QBT11 CC-Link System Master Local Module User's Manual (Detail version)	IB(NA)66722 (13J873)
QJ61BT11 CC-Link System Master Local Module User's Manual (Detail version)	SH(NA)080016 (13JL91)
CC-Link System Small Type Remote I/O Module User's Manual (Detail version)	SH(NA)4007 (13JL72)
AJ65SBT-RPT Type CC-Link system Repeater (T-junction) Module User's Manual	IB(NA)0800078 (13JQ81)
AJ65BT-RPI-10A/ AJ65BT-RPI-10B Type CC-Link System Space Optical Repeater Module User's Manual	IB(NA)0800090 (13JQ86)

1. OVERVIEW

This User's Manual describes the specifications, part names, settings and others of the AJ65SBT-RPS type CC-Link system optical repeater module (for SI/QSI fiber-optic cables) and the AJ65SBT-RPG type CC-Link system optical repeater module (for GI fiber-optic cables) used in the Control & Communication Link (hereafter abbreviated to CC-Link).

1.1 Features

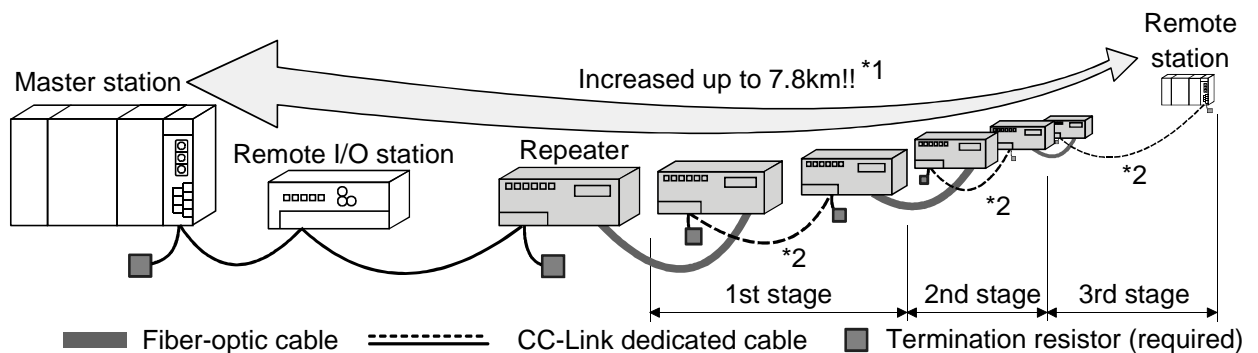
The AJ65SBT-RPS/RPG module is used to increase the flexibility of laying the cables of the CC-Link system.

Using two the same product of AJ65SBT-RPS/RPG enables a transmission distance increase and T-junction wiring using fiber-optic cables in all CC-Link systems.

In addition, using fiber-optic cables facilitates avoiding the noise trouble of the transmission path, improving system stability.

(1) Extended transmission distance in CC-Link system

Use of this module increases the transmission distance of the CC-Link system. In addition, use of multiple modules enables the transmission distance to be increased up to 3 stages (up to 2 stages when the AJ65SBT-RPGs are used).

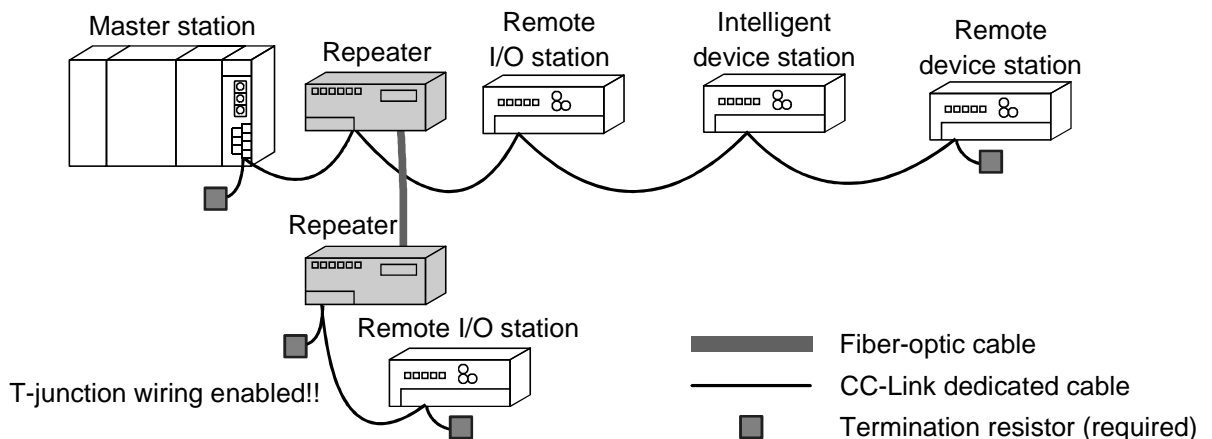


*1 The maximum transmission distance on the assumption that the transmission speed setting is 156kbps in a system only the AJ65SBT-RPSs are used as repeaters.

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

(2) Enabled T-junction wiring in CC-Link system

Arrangement of these modules between the CC-Link system modules enables the CC-Link system to be wired in the form of T-junction.



(3) Noise-resistant stable system

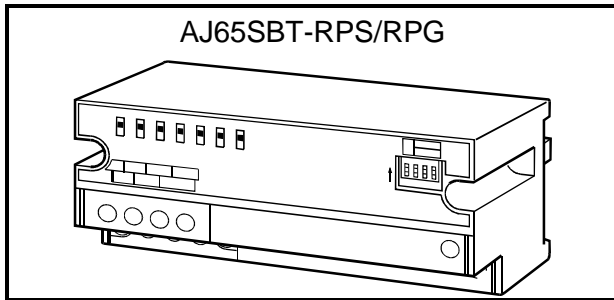
Fiber-optic cables used for junction and extension make it easy to avoid trouble caused by noise, improving system stability.

(4) Mountable to control panel with either screws or DIN rail

This module can be mounted onto the control panel with either screws or DIN rail.

(5) Compact module size

The module size has been reduced to the same one as that of AJ65SBTC4-16 □ / AJ65SBTC1-32 □ type small remote I/O module.



Item	Size mm (inch)
Height	50.0 (1.97)
Width	118.0 (4.65)
Depth	40.0 (1.58)

1.2 Packaged parts

After unpacking, make sure that those parts listed below are packaged.

Part name	Quantity
AJ65SBT-RPS/RPG module	1
Terminating resistances 110 Ω 1/2W (Brown, Brown, Brown)	1
Terminating resistances 130 Ω 1/2W (Brown, Orange, Brown)	1

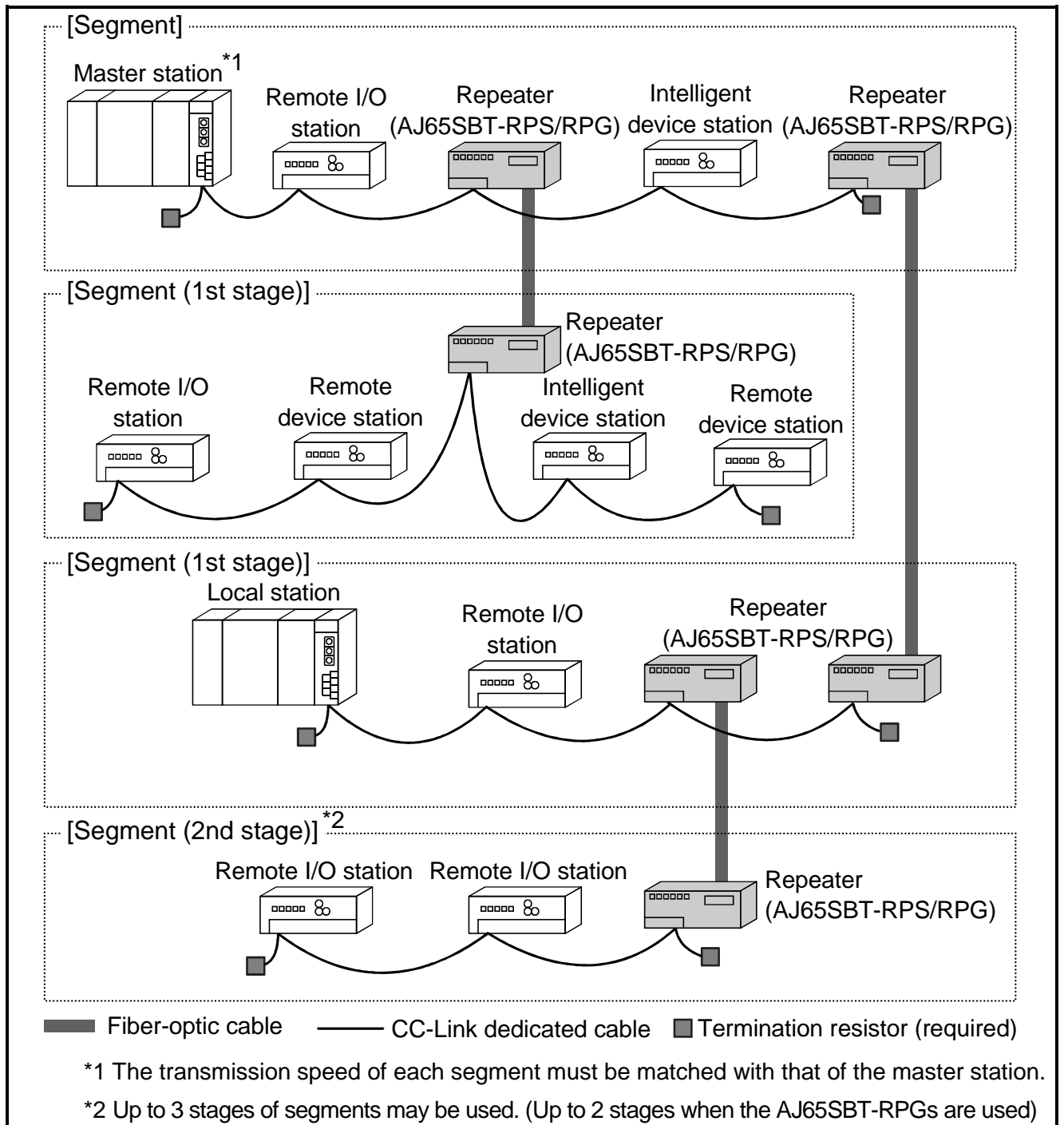
1.3 Abbreviated names, generic names and terms

Abbreviated names, generic names and terms	Description
AJ65SBT-RPS/RPG	Abbreviation of AJ65SBT-RPS/AJ65SBT-RPG type CC-Link system optical repeater module.
Segment	System between terminating resistances connected to each other through cross-over cables. The conventional CC-Link system can be said to be configured with one segment (See Section 2.1.).
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, AJ65SBTB1-8□, 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.
Ready master station	Backup station which inherits data link control when the master station comes off parallel due to error.
Master local module	Generic name of QJ61BT11, AJ61BT11, A1SJ61BT11, AJ61QBT11 and A1SJ61QBT11.
Master module	Generic name of QJ61BT11, AJ61BT11, A1SJ61BT11, AJ61QBT11 and A1SJ61QBT11 when these are used as the master station.
Local module	Generic name of QJ61BT11, AJ61BT11, A1SJ61BT11, AJ61QBT11 and A1SJ61QBT11 when these are used as the local station.
Remote module	Generic name of AJ65BTB1-16D, AJ65SBTB1-16D, AJ65BT-64AD, AJ65BT-64DAV, AJ65BT-64DAI and A852GOT.
Intelligent device module	Module allowing transient transmission such as AJ65BT-R2.

2. SYSTEM CONFIGURATION

2.1 Total configuration

The total configuration employed when the AJ65SBT-RPS/RPG module is used is as shown below.



(1) What is a repeater?

This is the module for expanding the CC-Link system by connecting the segments to each other.

(2) What is a segment?

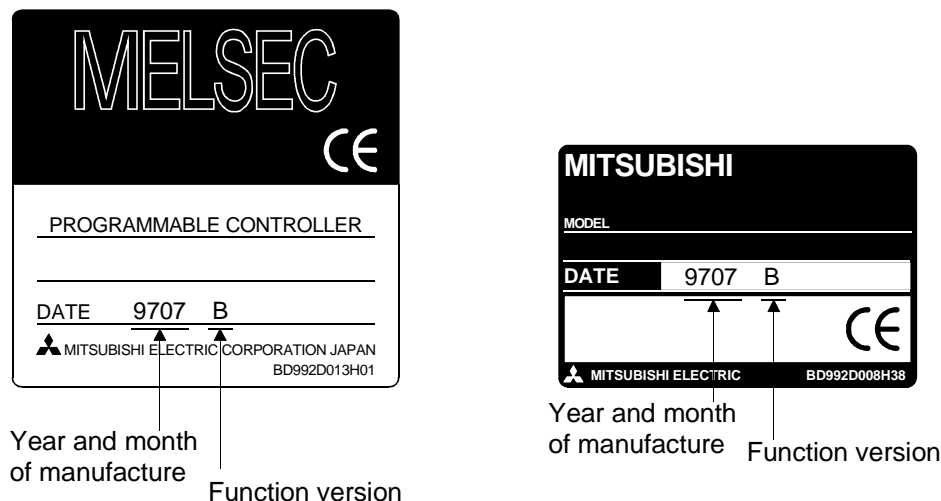
In the CC-Link system where repeaters are used, the equipment included between terminating resistances connected to each other through cross-over cables is generally called the segment.

2.2 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 QJ61BT11 module is used, any module can be used irrespective of the version.



(2) Max. number of modules connected to configure CC-Link system

Remote I/O stations, remote device stations, local stations, ready master stations, intelligent device stations and repeaters of 64 modules max. 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.

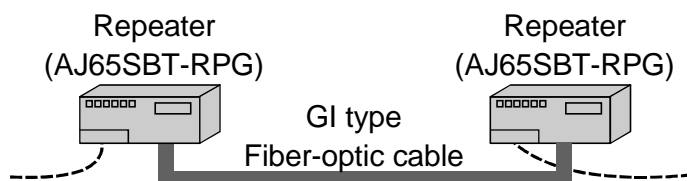
For details, refer to the User's Manual of the applicable master module.

(3) Combination of optical repeater modules and fiber-optic cable used

Use the optical repeater modules and fiber-optic cable in the following combination.

Module	Fiber-Optic Cable
AJ65SBT-RPS	SI type fiber-optic cable (max. extension distance of cable: 500m (1639.34ft.))
	QSI type fiber-optic cable (max. extension distance of cable: 1000m (3278.69ft.))
AJ65SBT-RPG	GI type fiber-optic cable (max. extension distance of cable: 2000m (6557.38ft.))

Example: Combination for use of AJ65SBT-RPG

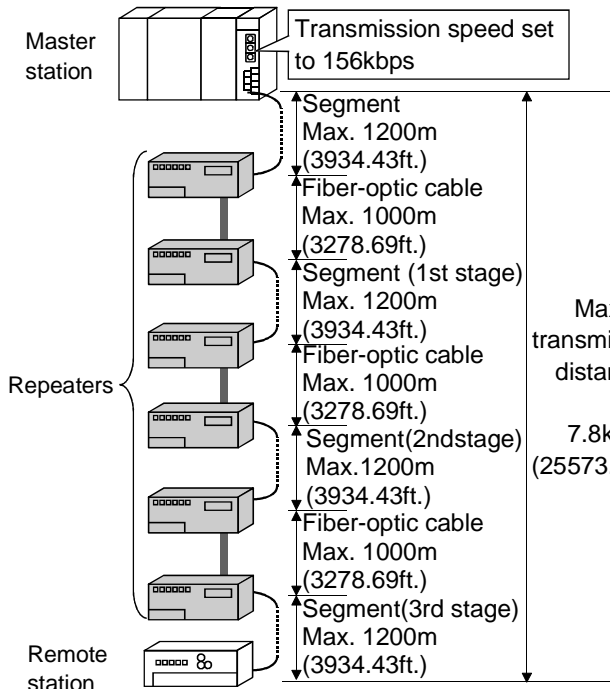


(4) Max. number of stages connected to configure segment

Use of the AJ65SBT-RPS enables communication between the master station and a remote station located up to three segments away from the master station segment, and use of the AJ65SBT-RPG enables communication between the master station and a remote station located up to two segments away from the master station segment.

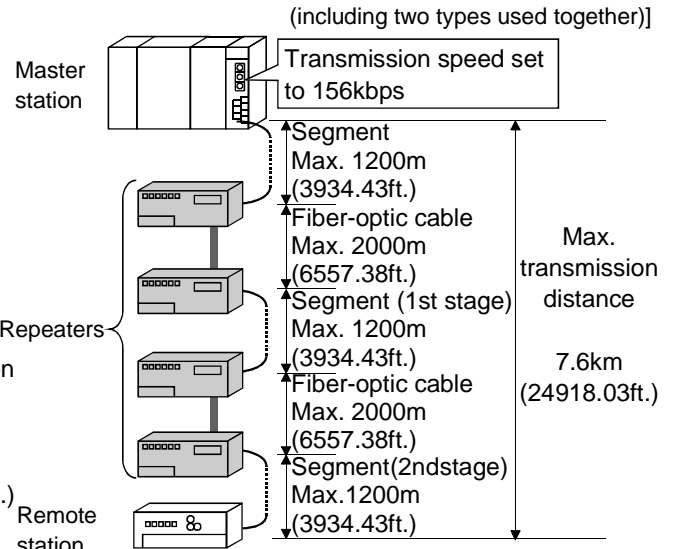
However, in a system where the AJ65SBT-RPS and AJ65SBT-RPG are used together, communication may be made with a remote station located up to two stages away as in the case of the AJ65SBT-RPG.

[System using only AJ65SBT-RPSs]



*When QSI type fiber-optic cables are used

[System using only AJ65SBT-RPGs



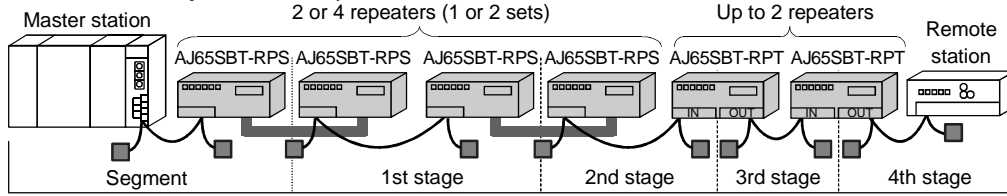
(including two types used together)

(5) Instructions for using different models of repeaters in combination

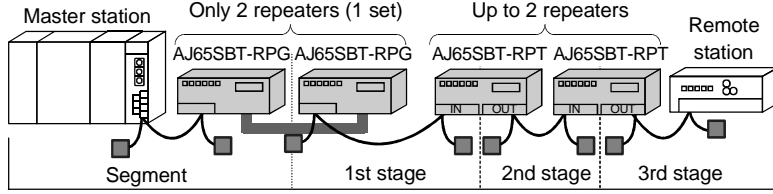
Note that when combining the repeaters of different models, there are the following restrictions on the number of connectable repeaters and the number of connected stages.

Combination pattern		Max. number of repeaters (repeaters(sets))				Max. number of stages (stages)
		AJ65SBT-RPT	AJ65SBT-RPS	AJ65SBT-RPG	AJ65SBT-RPI-10A/10B	
Pattern of using two kind models	1)	2	4(2)	—	—	4
	2)	2	—	2(1)	—	3
	3)	2	—	—	2(1)	3
	4)	—	2(1)	2(1)	—	2
	5)	—	2(1)	—	2(1)	2
	6)	—	—	2(1)	2(1)	2
Pattern of using three kind models		Must not be used.				

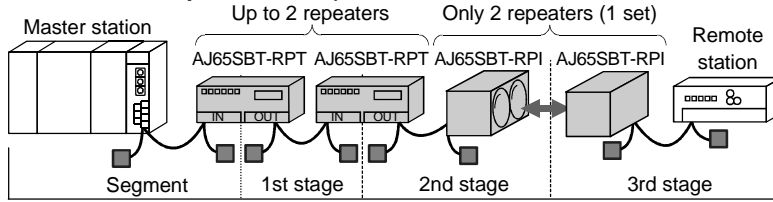
(a) Combination pattern 1)



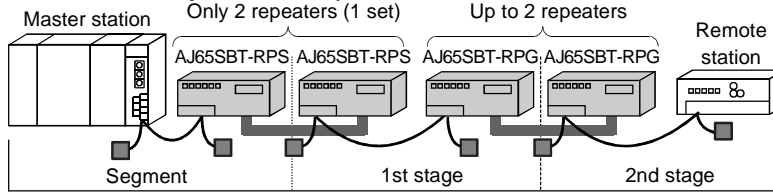
(b) Combination pattern 2)



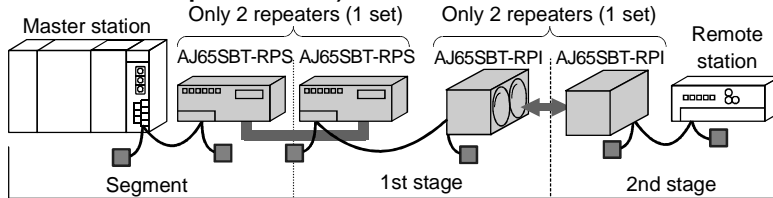
(c) Combination pattern 3)



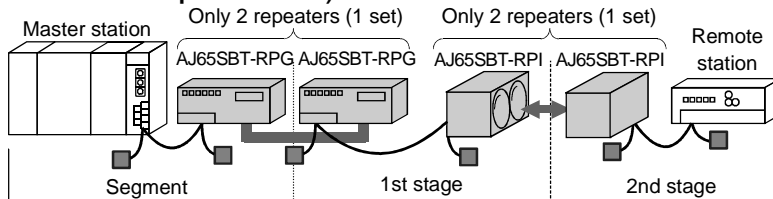
(d) Combination pattern 4)



(e) Combination pattern 5)



(f) Combination pattern 6)



POINT

For details of the AJ65SBT-RPT explained here, refer to the AJ65SBT-RPT type CC-Link System Repeater (T-junction) Module User's Manual.

3. SPECIFICATIONS

3.1 General specifications

For the general specifications of the AJ65SBT-RPS/RPG module, refer to the User's Manual of the small remote I/O module.

3.2 Performance specifications

The performance specifications of the AJ65SBT-RPS/RPG are shown below.

Item		Specifications		
		AJ65SBT-RPS		AJ65SBT-RPG
Common specifications	Power supply	Voltage (V)	DC20.4 to DC26.4	
		Current (mA)	0.06 (at TYP. 24VDC)	
	Noise immunity	Simulator noise of 1500Vp-p First transient/burst noise IEC801-4: 1kV, obtained by a noise simulator of 1 μ s noise width and 25 to 60Hz noise frequency		
	Dielectric withstand voltage	500VAC for 1 minute between all DC external terminals and ground		
	Insulation resistance	10M Ω or higher, measured with a 500VDC insulation resistance tester		
	Weight (kg)	0.2		
CC-Link communication specifications	Transmission speed (bps)	Selectable from among 156k, 625k, 2.5M, 5M and 10M		
	Max. number of stages connected to configure segment (stages)	3	2	
	Max. transmission distance of each segment	Varies according to transmission speed. (Refer to the User's Manual of the applicable master module.)		
	Max. number of modules connected	64 (See Section 2.2 for the conditions for the number of modules connected)		
	Number of stations occupied (stations)	0 (none)		
	Settable station number	No station numbers		
Optical communication specifications	Connection cable	SI-200/220	QSI-185/230	GI-50/125
	Applicable connector	CA7003		CA9103S
	Max. transmission distance of fiber-optic cable between repeaters (m (ft.))	500 (1639.34)	1000 (3278.69)	2000 (6557.38)

3.3 Specifications of connection cables

3.3.1 CC-Link dedicated 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.

If you have any questions regarding the CC-Link dedicated cable, or if you wish to see its specifications, see the CC-Link Catalog L (NA) 74108143E.

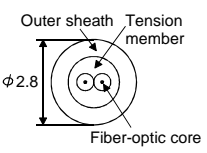
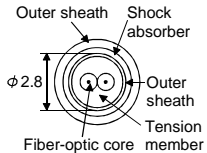
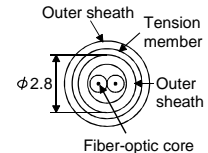
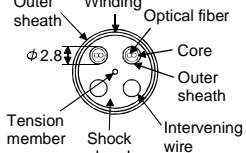
3.3.2 Fiber-optic cables

This section provides the specifications of the fiber-optic cables used in a CC-Link system using the AJ65SBT-RPS/RPG.

Fiber-optic cables require the expertise and special tools for fitting the connector plugs to the cable. When purchasing connector plugs, make sure that they are compatible with the sockets.

(1) SI-type fiber-optic cables

The following table gives the specifications of the SI-type fiber-optic cables.

Item	Standard Cable for Indoor Cabling	Reinforced Cable for Indoor Cabling	Standard Cable for Outdoor Cabling	Reinforced Cable for Outdoor Cabling	
Construction					
Cable diameter	2.8mm (0.11inch)	6mm (0.24inch)	6mm (0.24inch)	11mm (0.43inch)	
Allowable bending radius	50mm (1.97inch) or more	60mm (2.36inch) or more	60mm (2.36inch) or more	110mm (4.33inch) or more	
	2.8mm (0.11inch) dia. When cable is laid	50mm (1.97inch) or more	50mm (1.97inch) or more	50mm (1.97inch) or more	
Allowable tension	100mm (3.94inch) or more	120mm (4.73inch) or more	120mm (4.73inch) or more	220mm (8.67inch) or more	
	Cable	147N	147N	147N	784N
	2.8mm (0.11inch) dia. Connector	147N	147N	147N	147N
Ambient temperature	-10 to 70°C		-20 to 70°C		
Transmission loss	Maximum 12dB/km				
Transmission band	Minimum 5MHz • km				
Core diameter/clad diameter	200/220 μm (SI type multi-component glass fiber)				
Primary sheath diameter	250 μm (UV setting resin)				
Number of cores	2 cores			2 cores × (1 to 4) pcs.	
Weight	7kg/km	30kg/km	30kg/km	100kg/km	
Applicable connector	2-core optical connector plug (CA 7003)				
Purchase order type	AN-2P-□ M-A	AN-2P-□ M-B	AN-2P-□ M-C	AN-2P-□ M-□ D	

REMARKS

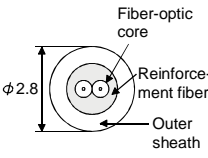
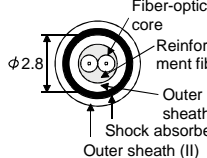
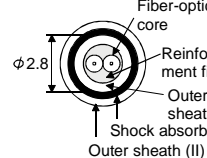
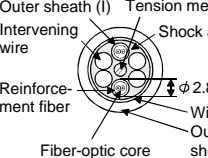
Enter the following values in of the purchase order type.

- AN-2P-M-A → Specify length. (Unit: m)
<Example>
20m (65.57ft.) → AN-2P-20M-A
- AN-2P-M-B
- AN-2P-M-C → Specify the number of 2-core cords.
<Example>
Two 2-core cords of 30m (98.36ft.) length
AN-2P-30M-2D
- AN-2P-M-D

The conventional fiber-optic cable (A-2P-) of L type can be used over the distance of 500m (152.40ft.) between stations, and the H type over the distance of 300m (91.44ft.) between stations.

(2) QSI-type fiber-optic cables

The following table gives the specifications of the QSI-type fiber-optic cables.

Item	Standard Cable for Indoor Cabling	Reinforced Cable for Indoor Cabling	Standard Cable for Outdoor Cabling	Reinforced Cable for Outdoor Cabling	
Construction					
Cable diameter	2.8mm (0.11inch) 50mm (1.97inch) or more	6mm (0.24inch) 60mm (2.36inch) or more	6mm (0.24inch) 60mm (2.36inch) or more	14mm (0.55inch) 140mm (5.52inch) or more	
Allowable bending radius	2.8mm (0.11inch) dia. When cable is laid	50mm (1.97inch) or more 120mm (4.73inch) or more	50mm (1.97inch) or more 120mm (4.73inch) or more	50mm (1.97inch) or more 280mm (11.03inch) or more	
	Cable	147N	147N	147N	1568N
Allowable tension	2.8mm (0.11inch) dia.	147N	147N	147N	147N
	Connector	29.4N			
Ambient temperature	-10 to 70°C		-10 to 70°C	-20 to 70°C	-20 to 70°C
Transmission loss	5.5dB/km		5.5dB/km	10dB/km	5.5dB/km
Transmission band	200MHz • km or more				
Core diameter/clad diameter	185 μm / 220 μm (QSI type quartz glass fiber)				
Primary sheath diameter	250 μm (UV setting resin)				
Number of cores	2 cores			2 cores × (1 to 4) pcs.	
Weight	7kg/km	30kg/km	30kg/km	180kg/km	
Applicable connector	2-core optical connector plug (CA 7003)				
Outer sheath (I)	2.8mm (0.11inch) dia., green	2.8mm (0.11inch) dia., green	2.8mm (0.11inch) dia., green	2.8mm (0.11inch) dia., green	
Outer sheath (II)	6mm (0.24inch) dia., green	6mm (0.24inch) dia., green	6mm (0.24inch) dia., black	14mm (0.55inch) dia., black	
Purchase order type	AQ-2P- <input type="checkbox"/> M-A	AQ-2P- <input type="checkbox"/> M-B	AQ-2P- <input type="checkbox"/> M-C	AQ-2P- <input type="checkbox"/> M- <input type="checkbox"/> D	

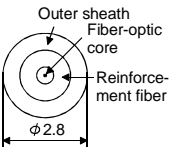
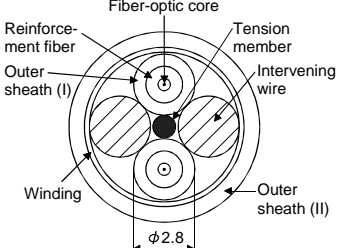
REMARKS

Enter the following values in of the purchase order type.

- AQ-2P-M-A → Specify length. (Unit: m)
<Example>
20m (65.57ft.) → AQ-2P-20M-A
- AQ-2P-M-B
- AQ-2P-M-C → Specify the number of 2-core cords.
<Example>
Two 2-core cords of 30m (98.36ft.) length
AQ-2P-30M-2D
- AQ-2P-M-D

(3) GI-type fiber-optic cables

The following table gives the specifications of the GI-type fiber-optic cables.

Item	1 Core	
	Standard Cable for Indoor Cabling	Reinforced Cable for Outdoor Cabling
Construction		
Cable diameter	2.8mm (0.11inch)	11mm (0.43inch)
Transmission loss	Maximum 3dB/km	
Transmission band	200MHz•km or more	
Core diameter	50μm GI type quartz fiber	
Clad diameter	125μm GI type quartz fiber	
Number of cores	1 core	1 core × (1 to 4) pcs.
Applicable connector	1-core optical connector plug (CA9103S)	
Allowable bending radius	40mm (1.58inch) or more	110mm (4.33inch) or more
Allowable tension	20kgf or less	30kgf or less
Approx. weight	8kg/km	110kg/km
Purchase order type*1	AGS-2P- <input type="checkbox"/> M-A	AGS-2P- <input type="checkbox"/> M- <input type="checkbox"/> D
Compression strength	10kgf/cm	
Max. cable length*2	1200m (3934.43ft.)	

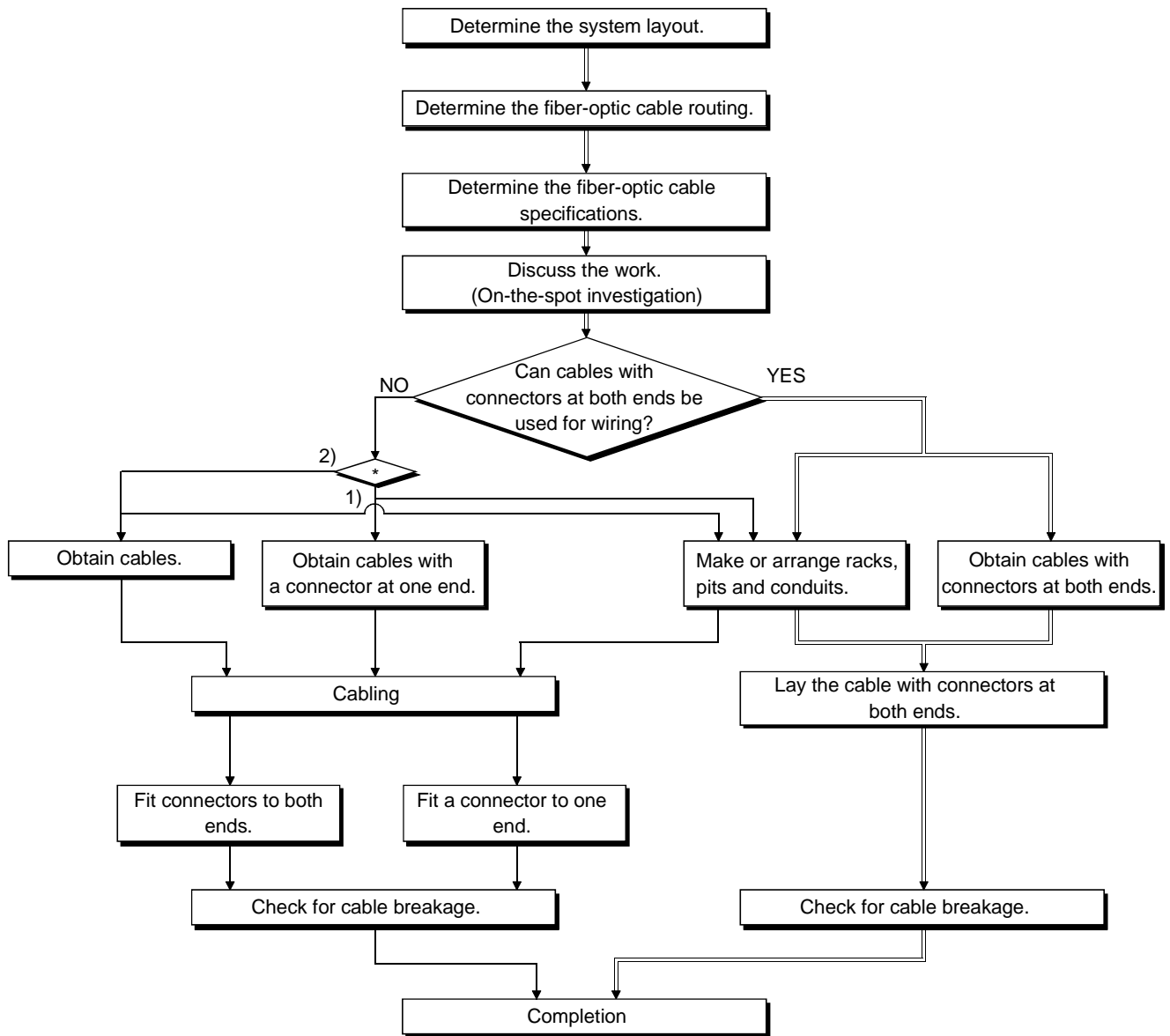
*1 Enter the following values in of the purchase order type.

- Standard cable for indoor cabling Specify the cable length. (Unit: m)
- Reinforced cable for outdoor cabling ... Specify the cable length (unit: m) and the number of 1-core cords.
 - Two 1-core cords of 30m (98.36ft.) length: AGS-2P-30M-2D

*2 Since the max. cable length is 1.2km (3934.43ft.), use the adaptor (PA7003) for a longer than 1.2km (3934.43ft.) distance to connect two cables.

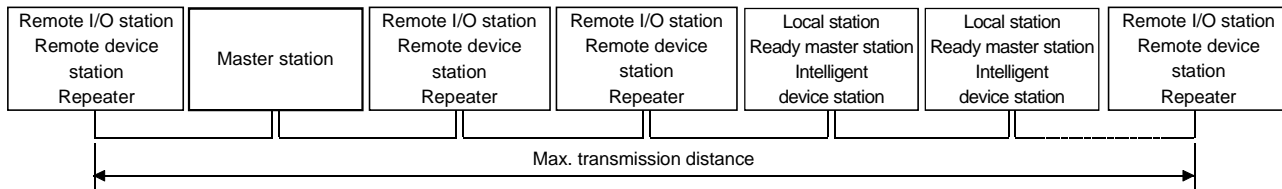
(4) How to order fiber-optic cables

- 1) Order fiber-optic cables from your nearest Mitsubishi representative.
Also consult your sales representative when fitting connectors after cabling work according to the worksite conditions.
- 2) Flowchart for cabling work and fiber-optic cable connections



- * 1) Connectors must be fitted to only one end at the worksite.
2) Connectors must be fitted to both ends at the worksite.

3.4 Max. transmission distance

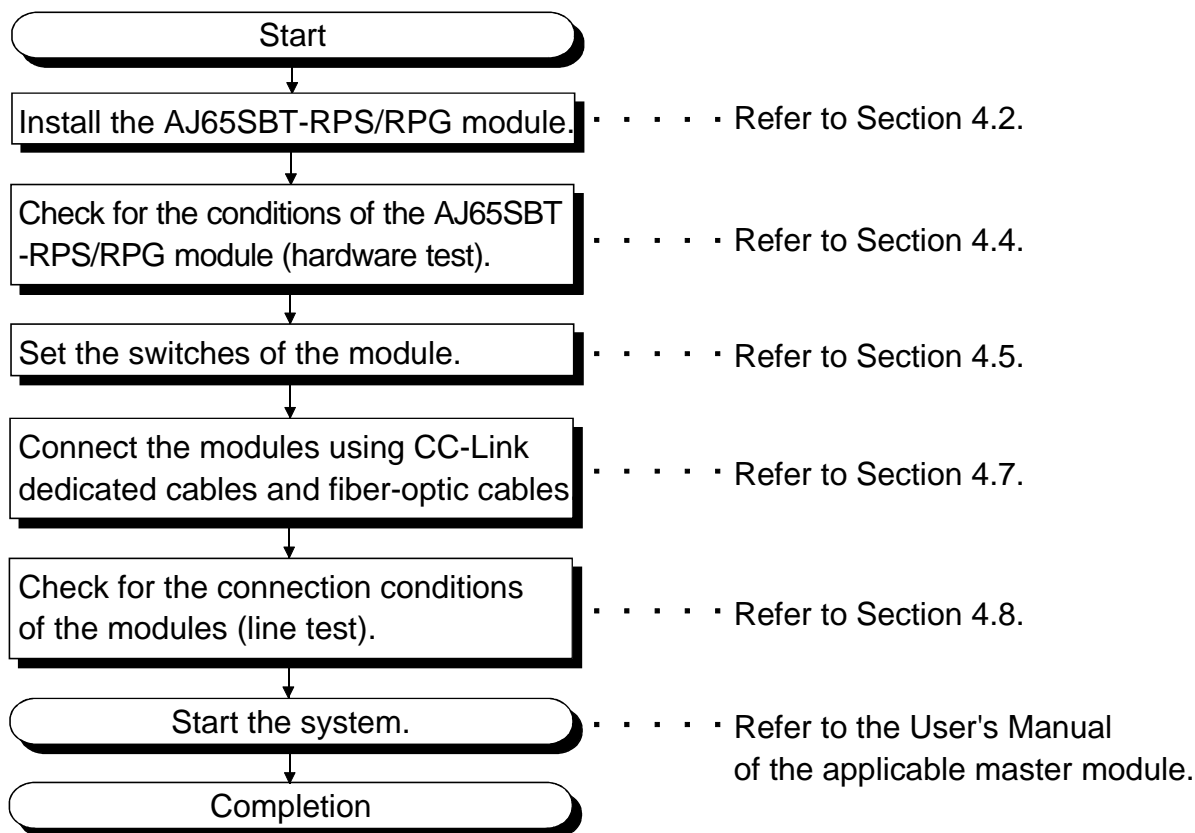


Conditions	Description
Transmission speed	<p>The maximum transmission distance in each segment is the same as that in normal CC-Link system (system configured with one segment only).</p> <p>The maximum transmission distance in each segment varies according to the transmission speed.</p> <p>For details, refer to the User's Manual of the applicable master module. (The length of the cables between repeater stations is treated in the same manner as in the remote I/O station.)</p>
Max. number of stages connected to configure segment	<p>When one connection stage is added, the maximum transmission distance is added by an amount equivalent to one segment.</p>

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 AJ65SBT-RPS/RPG module to the start of data link is described below.



POINT

The procedure described here is for the AJ65SBT-RPS/RPG 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 AJ65SBT-RPS/RPG module are described below.

DANGER

- Do not directly touch the module's conductive parts. Doing so could cause malfunction or trouble in the module.
- Perform installation and wiring after disconnecting the power supply at all phases externally. If the power is not disconnected at all phases an electric shock or product damage may result.
- Do not touch terminals when the power is on. It may cause an electric shock or malfunction.
- Perform cleaning the module or re-tightening of terminal screws after making sure to turn off the external power supply. If you do not switch off the external power supply, it will cause trouble or malfunction of the module.

 CAUTION

- Use each module in an environment as specified in the "general specification" in the CPU module User's Manual. Usage of the module outside the general specification range may cause electric shock, fire, malfunction, product damage or deterioration.
- Do not have control cables and communication cables bundled with or placed near by the main circuit and/or power cables. It may cause malfunction due to noise interference. Wire those cables at least 100mm(3.94 inch) away from the main circuit and/or power cables.
- Do not directly touch the module's conductive parts.
Doing so could cause malfunction or trouble in the module.
- Tighten the module securely using DIN rail or installation screws within the specified torque range.
Loose terminal screws may cause falling, short circuit or erroneous operation.
If the terminal screws are too tight, it may cause falling or short circuit due to damage of the screws.
- Fix terminal screws securely with the specified torque.
Loose terminal screws may cause short circuit or erroneous operation.
If the terminal screws are too tight, it may cause falling, short circuit or erroneous operation due to damage of the screws or module.
- Be sure to ground the FG terminal to the class-D (class 3) or higher sequencer dedicated grounding conductor.
Otherwise there will be an electric shock or misoperation.
- Terminal screws which are not to be used must be tightened always.
Otherwise there will be a danger of short circuit against the bare solderless terminals.
- Perform correct wiring for the module according to the product's rated voltage and terminal arrangement. Connecting to a power supply different from the rating or mis-wiring may cause fire and/or trouble.
- Make sure foreign objects do not get inside the module, such as dirt and wire chips.
It may cause fire, trouble or malfunction.
- Be sure to fix the communication and power cables that are connected to the module in place, either by running them through a duct or by using clamps.
If the cables are not fixed in one of these ways, dispersion, movement, or careless pulling of the cables may cause damage to the module or cables, or malfunction due to cable contact faults.
- When removing the communication cable or power supply cable from the module, do not pull the cable. When removing the cable with a connector, hold the connector on the side that is connected to the module.
When removing the cable connected to the terminal block, first loosen the screws on the part that is connected to the terminal block.
Pulling the cable that is still connected to the module may cause malfunction or damage to the module or cable.

! CAUTION

- Never try to disassemble or modify the module. It may cause trouble, malfunction, injury or fire.
- The module case is made of resin; do not drop it or subject it to strong shock. A module damage may result.
- Make sure to switch all phases of the external power supply off before installing or removing the module to/from the panel. If you do not switch off the external power supply, it will cause trouble or malfunction of the module.
- When disposing of this product, treat it as industrial waste.

(1) Tighten the module fixing screws and terminal block screws to those torques specified below.

Do not over-tighten these screws. The screws and module case may be damaged.

Screw location	Specified torque range (N/cm)
Module mounting screw (M4 thread with finished circular flat washer)	78 to 108
Terminal block screw (M3 thread)	59 to 88
Terminal block mounting screw (M3.5 thread)	68 to 98

(2) When a DIN rail is used, install it taking care with the following.

(a) Applicable DIN rail type (conforming to JIS-C2B12)

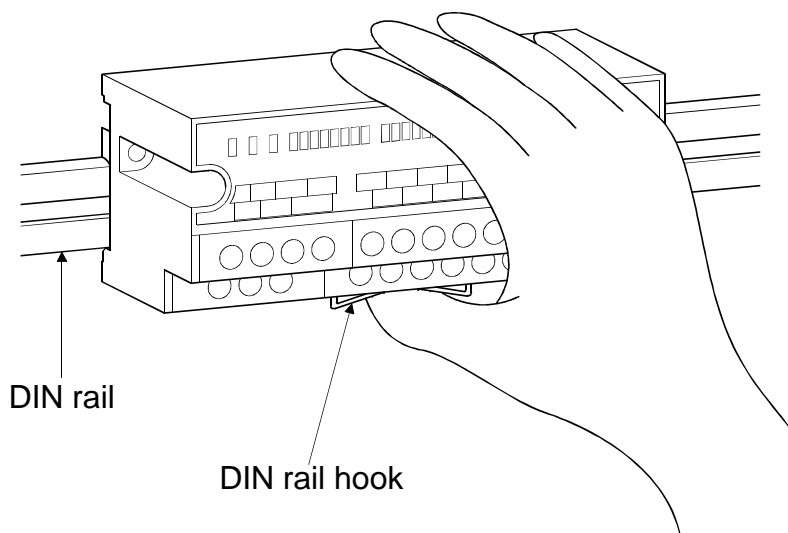
TH35-7.5Fe

TH35-7.5A1

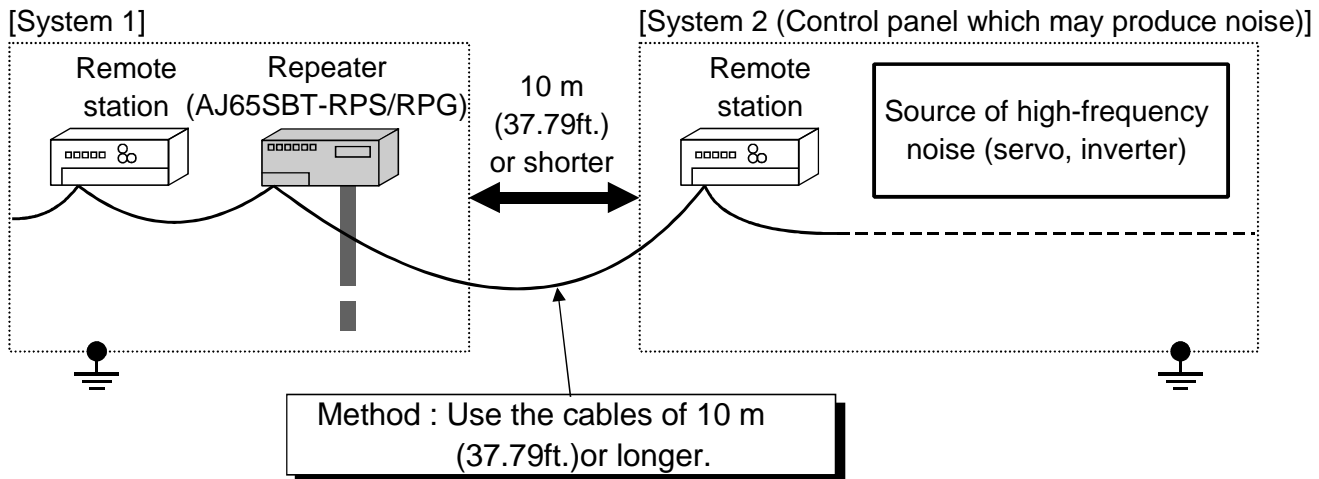
(b) Intervals of DIN rail mounting screws

Mount the DIN rail by fixing it with mounting screws at intervals of 200 mm (7.87inch) or shorter.

(3) To install the AJ65SBT-RPS/RPG module on the DIN rail, press, by the finger, the DIN rail hook located on the underside of the module at the centerline until you hear it click.



- (4) When installing the AJ65SBT-RPS/RPG module on the control panel, to improve the ventilation and facilitate the replacement of the module, provide a distance of 60 mm (2.36inch) or longer between the upper and lower surfaces of the module and the structural members or parts.
- (5) Install the AJ65SBT-RPS/RPG 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.
- (6) 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 the measure which uses CC-Link cables of 10 m (32.79ft.) or longer between the systems.

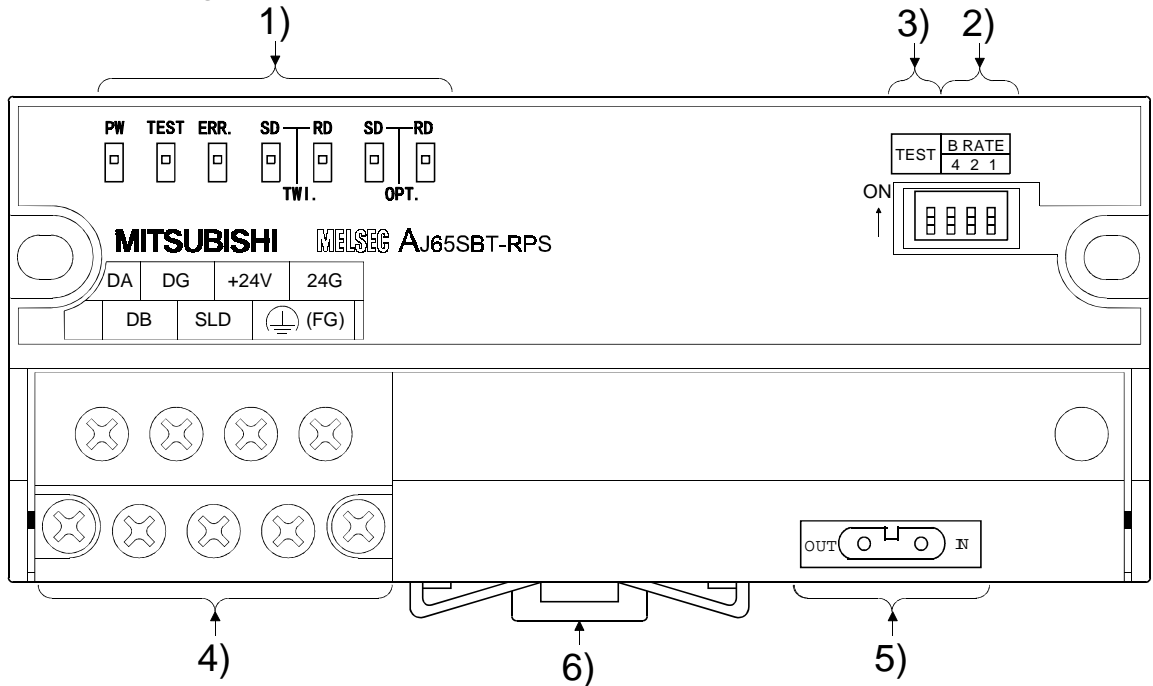


4.2.2 Installation environment

For the installation environment, refer to the User's Manual of the applicable small type remote I/O module.

4.3 Names and settings of parts

The names of parts of the AJ65SBT-RPS/RPG module, indication statuses of LEDs, and settings of switches are described below.



No.	Name	Application		
1)	Power LED	Check for the module condition by observing the state of lighting of the LED.		
		LED Name	Application	
			For hardware test	For normal operation
		PW	Goes on: At power-on. Goes off: At power-off.	
		TEST	Goes on: Hardware test is under operation. Goes off: Communication is under operation.	
		ERR.	Goes on: Hardware is faulty. Switch set value is faulty. Flashes: Switch set value was changed during operation. Goes off: Normal	Goes on: Communication is faulty. Switch set value is faulty. Flashes: Switch set value was changed during operation. Goes off: Communication is normal.
		SD1	Flashes: Circuit is normal. Goes off: Circuit is faulty.	Goes on: Data is being transmitted to CC-Link side. Goes off: Data is not transmitted to CC-Link side.
		RD1	Flashes: CC-Link side circuit is normal. Goes off: Optical communication side circuit is faulty.	Goes on: Data is being received from CC-Link side. Goes off: Data is not received from CC-Link side.
SD2	Flashes: Circuit is normal. Goes off: Circuit is faulty.	Goes on: Data is being transmitted to optical communication side. Goes off: Data is not transmitted to optical communication side.		
RD2	Flashes: CC-Link side circuit is normal. Goes off: Optical communication side circuit is faulty.	Goes on: Data is being received from optical communication side. Goes off: Data is not received from optical communication side.		

No.	Name	Application				
2)	Transmission speed setting switch	Set the transmission speed of the module (set to 0 at the time of delivery). Ensure to set the transmission speed at a speed specified below. Unless the speed is set at a speed specified below, the LED "ERR." will light up.				
		Setting value	Setting switch status			Transmission speed (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		
3)	Test switch	Set the operating condition of the module (set to OFF at the time of delivery).				
		State of switch		Operating state		
		ON		Hardware test		
		OFF		Normal operation		
4)	Terminal block	Terminal block for connecting the power supply and CC-Link dedicated cables.				
5)	Optical interface	Terminal block for connecting the CC-Link dedicated cable on the side where the master station is not located.				
6)	Hook for DIN rail	Hook for installing the module on the DIN rail.				
		To install the module, press the DIN rail hook at the centerline until you hear it click.				

POINT	<p>The setting of the test switch is made valid when the module power is turned from OFF to ON. If the setting is changed with the module power ON, perform the above operation again.</p>
--------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

4.4 Check of module state (Hardware test)

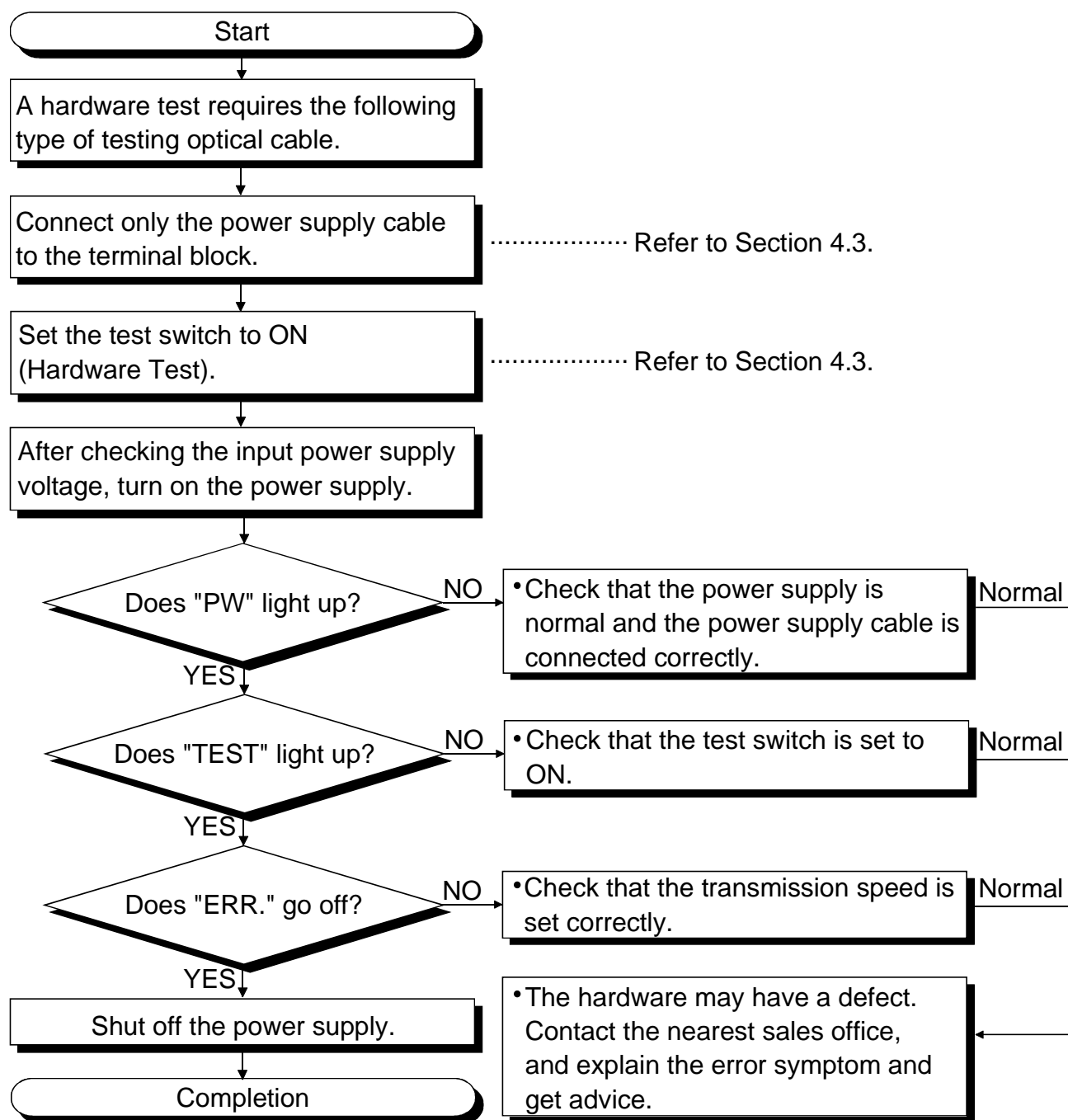
Check that the module operates normally using the module proper. Ensure to perform this check before configuring the system.

A hardware test requires the following type of testing optical cable.

Obtain this optional testing optical cable from your nearest Mitsubishi representative.

Item	Type	Description	Remarks
Testing optical cable	AN-CCLT	Optical cable for loopback self-test for CC-Link system optical repeater module (0.5m (1.64ft.))	Optional

Perform the test in accordance with the steps shown below.



4.5 Setting of switches

The setting of the switches on the AJ65SBT-RPS/RPG module is described below.

(1) Test switch

This switch is used to set the operating condition of the AJ65SBT-RPS/RPG module.

In normal operation, set it to OFF.

For detail of the setting, see Section 4.3.

POINT
The setting of the test switch is made valid when the module power is turned from OFF to ON. If the setting is changed with the module power ON, perform the above operation again.

(2) Transmission speed setting switch

This switch is used to set the transmission speed of the AJ65SBT-RPS/RPG module.

For detail of the setting, see Section 4.3.

POINT
<ul style="list-style-type: none">• Set to the same state of setting as set in the master station.• The setting of the transmission speed setting switches is made valid when the module power is turned from OFF to ON. If the setting is changed with the module power ON, perform the above operation again.

4.6 Installation and removal of protective cover

A protective cover can be installed on the front surface of the AJ65SBT-RPS/RPG module to prevent foreign matter from entering the terminal blocks. The protective cover applicable to the AJ65SBT-RPS/RPG module is specified below.

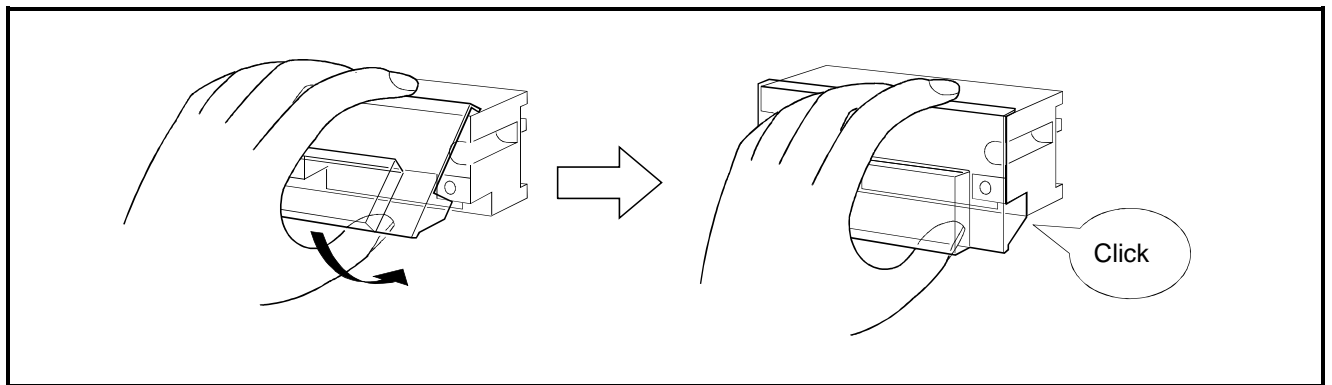
Procure it as necessary.

Item	Type	Description	Remarks
Protective cover	A6CVR-8	Cover for prevention of entry of foreign matter into terminal blocks (sold in batches of 10).	Optional

To dismount and mount the protective cover on and from the AJ65SBT-RPS/RPG module, follow the steps below.

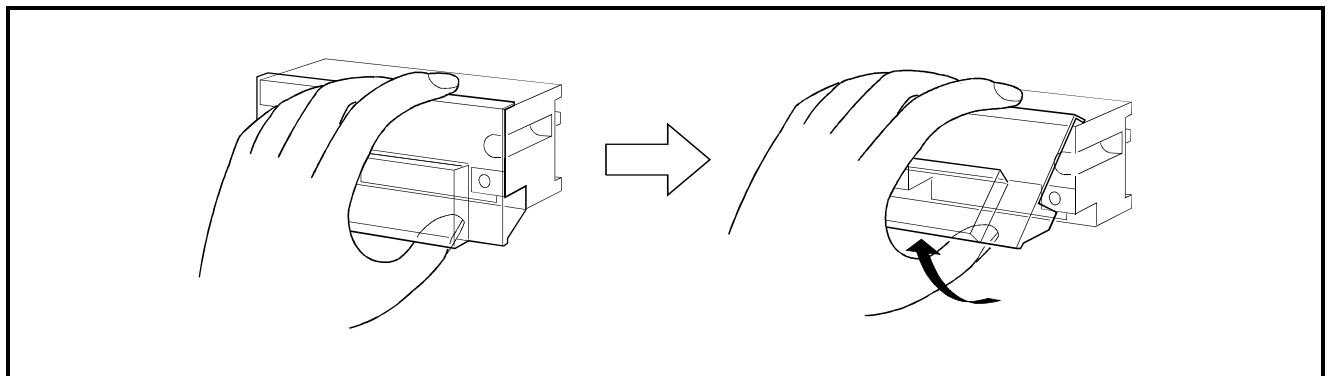
(1) Mounting

With the upper section of the protective cover hooked to the upper end section of the module, press the lower section of the cover until you hear it click.



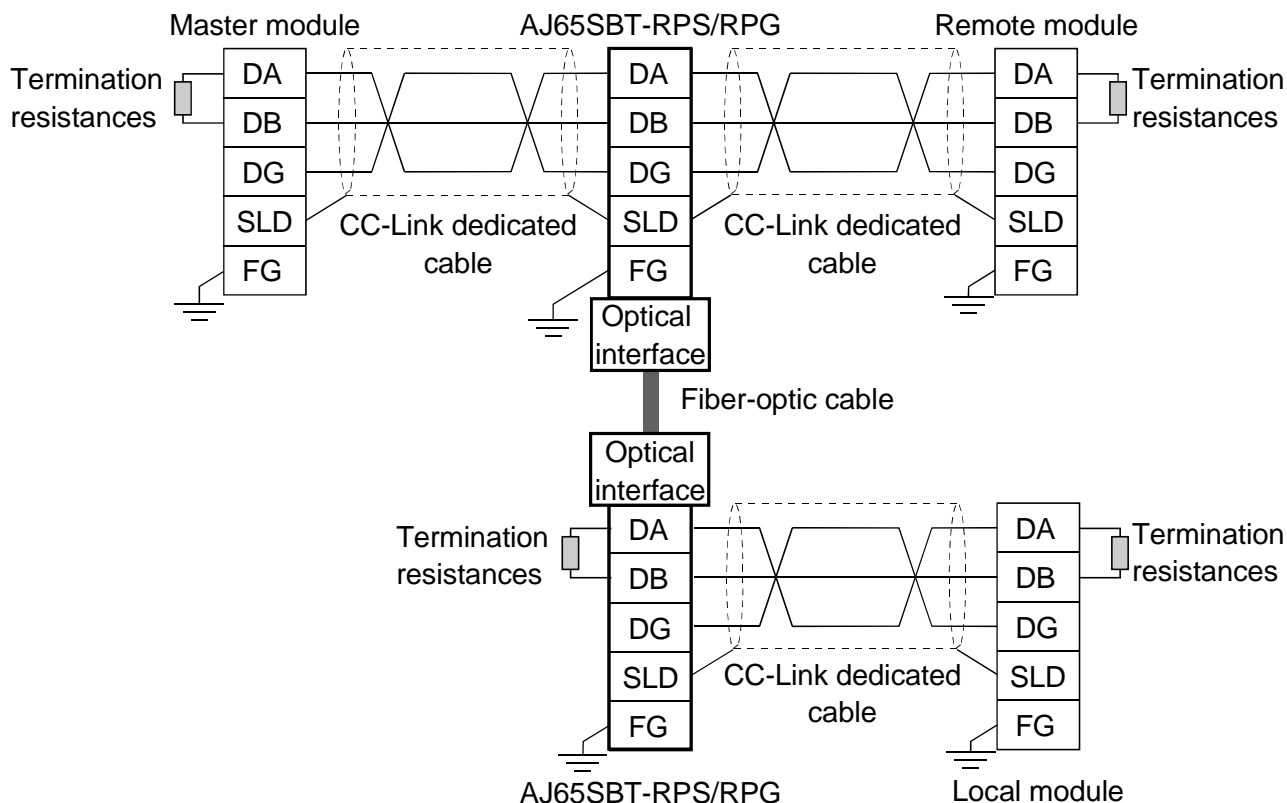
(2) Dismounting

With the finger applied to the lower section of the protective cover, raise the cover upward.



4.7 Connection of module through cable

The method of connecting the AJ65SBT-RPS/RPG module to the CC-Link system through the cable is shown below.



Important

In each segment, ensure to use the same type of CC-Link dedicated cables.
If different types of cables are used, normal data transmission will not be assured.

POINT

- Ensure to connect the terminating resistances to both end modules of each segment.
In addition, connect them between DA and.
(The terminating resistances are furnished with the module.)
- The terminating resistances vary according to the type of cables in use.
For detail, refer to the User's Manual of the applicable master module.
- Connect the shield cable of the CC-Link dedicated cable to "SLD" of each module, and ground both ends of the cable through "FG" to a class-D (class 3) ground.
SLD and FG are wired to each other inside the module.

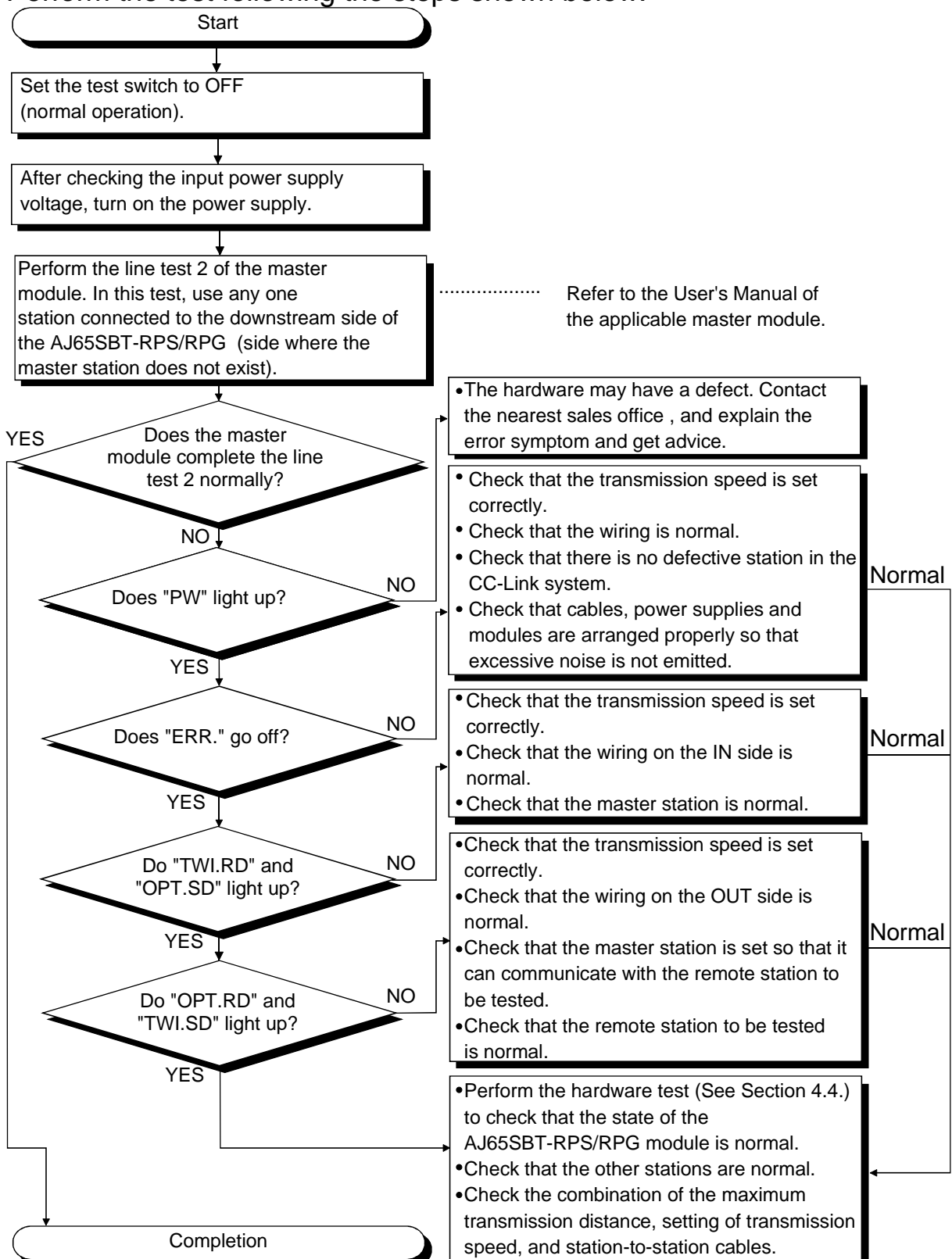
4.8 Check for state of connection (line test)

Connect all modules including the AJ65SBT-RPS/RPG 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.

To perform the line test of the AJ65SBT-RPS/RPG module, use the line test 2 of the master module.

For the line test 2 of the master module, refer to the User's Manual of the applicable master module.

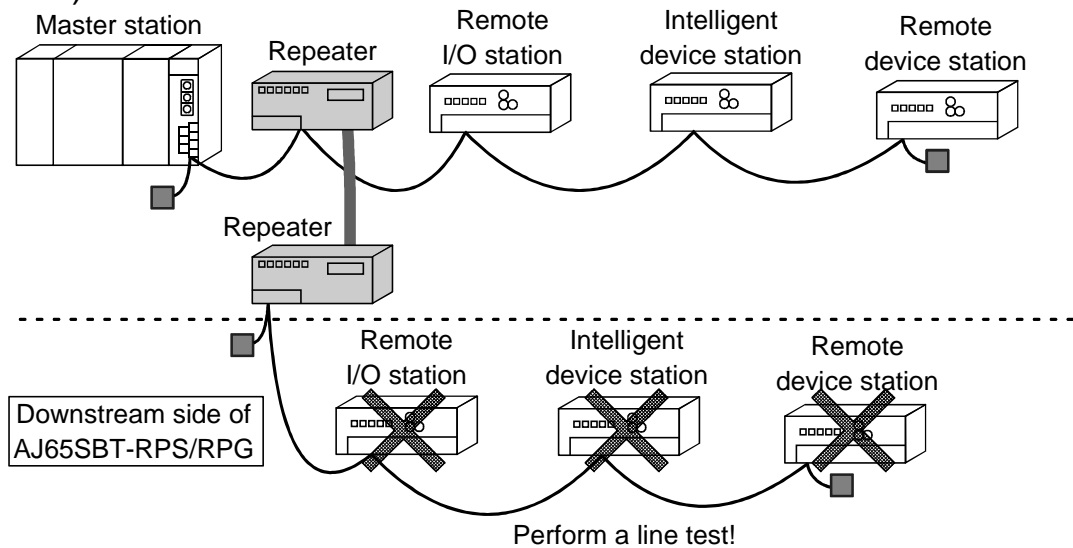
Perform the test following the steps shown below.



5. TROUBLESHOOTING

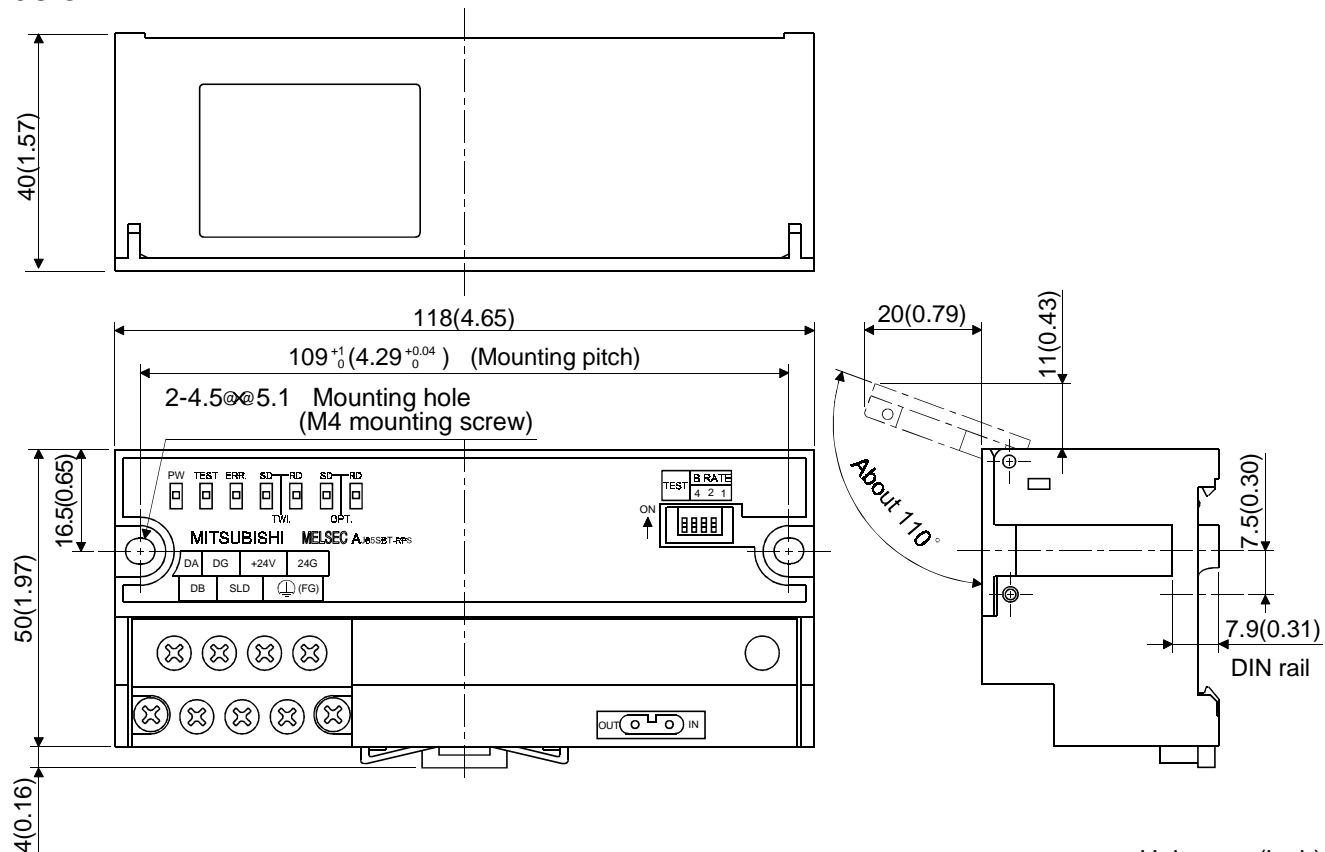
Any error during data link can be checked by the ERR. LED of the master station. If the ERR. LED of the master station is lit or flickers due to a data link error, first refer to the user's manual of the master module used and check the data link states of the other stations in the CC-Link system.

If there are many stations in data link error on the downstream side of the AJ65SBT-RPS/RPG (the side on which the master station does not exist), the AJ65SBT-RPS/RPG may be faulty. Therefore, make a line test again (refer to Section 4.8).



6. EXTERNAL DIMENSIONS DIAGRAM

The external dimensions diagram of the AJ65SBT-RPS/RPG module is shown below.



Unit : mm (inch)

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.

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	Indonesia	P.T. Autoteknindo SUMBER MAKMUR Kompleks Agung Sedayu Propertindo (Harco Mangga Dua) Blok H No.4 JI Mangga Dua Raya Jakarta Pusat 10730-Indonesia. Tel : 62-21-336292
Brazil	MELCO-TEC Rep. Com.e Assessoria Tecnica Ltda. Av. Rio Branco, 123-15 ,and S/1507, Rio de Janeiro, RJ CEP 20040-005, Brazil Tel : 55-21-221-8343	Thailand	F. A. Tech Co.,Ltd. 1138/33-34 Rama 3 Road, Yannawa, Bangkok 10120, Thailand Tel : 66-2-295-2861
U.K	Mitsubishi Electric Europe B.V. UK Branch Travellers Lane, Hatfield, Herts., AL10 8XB,UK Tel : 44-1707-276100	Hong Kong	Ryoden International Ltd. 10th Floor, Manulife Tower, 169 Electric Road, North Point, HongKong Tel : 852-2887-8870
Germany	Mitsubishi Electric Europe B.V. German Branch Gothaer Strasse 8 D-40880 Ratingen, GERMANY Tel : 49-2102-486-0	China	Ryoden International Shanghai Ltd. 3F Block5 Building Automation Instrumentation Plaza 103 Cao Bao Rd. Shanghai 200233 China Tel : 86-21-6475-3228
South Africa	MSA Manufacturing (Pty) Ltd. P O Box 39733 Bramley 201 8 Johannesburg, South Africa Tel : 27-11-444-8080	Taiwan	Setsuyo Enterprise Co., Ltd. 6F., No.105 Wu-Kung 3rd.RD, Wu-Ku Hsiang, Taipei Hsine, Taiwan R.O.C. Tel : 886-2-2299-2499
India	Messung Systems Put,Ltd. Electronic Sadan NO:111 Unit No15, M.I.D.C BHOSARI,PUNE-411026 Tel : 91-212-793130	Australia	Mitsubishi Electric Australia Pty. Ltd. 348 Victoria Road, PostalBag, No 2, Rydalmere, N.S.W 2116, Australia Tel : 61-2-9684-7777
Singapore	Mitsubishi Electric Asia Pte, Ltd. 307 ALEXANDRA ROAD #05-01/02, MITSUBISHI ELECTRIC BUILDING SINGAPORE 159943 Tel : 65-470-2480		

MITSUBISHI ELECTRIC CORPORATION

HEAD OFFICE:MITSUBISHI DENKI BLDG MARUNOUCHI TOKYO 100-8310 TELEX:J24532 CABLE MELCO TOKYO
NAGOYA WORKS:1-14, YADA-MINAMI 5, HIGASHI-KU, NAGOYA, JAPAN

When exported from Japan, this manual does not require application to the Ministry of International Trade and Industry for service transaction permission.

Specifications subject to change without notice.
Printed in Japan on recycled paper.