MITSUBISHI ELECTRIC

Repeater Unit for the MELSECNET/10 Coaxial Bus System type A6BR10/A6BR10-DC

Mitsubishi Programmable Controller

User's Manual

Thank you for purchasing the Mitsubishi MELSEC-A series programmable controllers.

Before using this product, please read this manual carefully to handle the product correctly.

Model	A6BR10-U-E
Model code	13JE65
IB(NA)-66499-C(1806)MEE	

SAFETY PRECAUTIONS

(Read these precautions before using this product.)
Before using this product, please read this manual and the relevant manuals carefully and pay full attention to safety to handle the product correctly.
The precautions given in this manual are concerned with this product only. For the safety precautions of the programmable controller system, refer to the user's manual for the CPU module used.
In this manual, the safety precautions are classified into two levels: " ⚠ WARNING" and " ⚠ CAUTION".

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

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

[Design Precautions]

⚠ WARNING

- When a communication error occurs in the data link system, the communication error station will go into the following status. Check the communication status information and configure an interlock circuit in the sequence program to ensure that the entire system will operate safely.
  Failure to do so may result in an accident due to an incorrect output or malfunction.
  (1) The station holds data link data before the occurrence of the communication error.
  (2) The remote I/O station of MELSECNET (Ⅱ, /B, /10) turns off all outputs.
  (3) The remote I/O station of MELSECNET/MINI-S3 holds outputs or turns off all outputs depending on the E.C. mode setting.
  For how to check the communication error station and the operating status of the communication error station, refer to the manual for each data link.

⚠ CAUTION

- Do not install the control lines or communication cables together with the main circuit lines or power cables.
  Keep a distance of 100mm or more between them.
  Failure to do so may result in malfunction due to noise.

[Installation Precautions]

⚠ WARNING

- When wiring connectors, crimp, press, or solder the connectors with the tool specified by the manufacturers and securely connect the connectors to the unit.

⚠ CAUTION

- Use the programmable controller in an environment that meets the general specifications described in the user's manual for the CPU module used.
  Failure to do so may result in electric shock, fire, malfunction, or damage to or deterioration of the product.
- Securely connect cables to the connectors of the unit.
  Check the connection for looseness.
  Poor contact may cause incorrect input or output.

[Wiring Precautions]

⚠ WARNING

- Shut off the power supply (all phases) externally before installation and wiring.
  Failure to do so may result in electric shock or damage to the product.
- After installation and wiring, attach the included terminal cover to the unit before turning it on for operation. Failure to do so may result in electric shock.

⚠ CAUTION

- Individually ground the FG and LG terminals of the programmable controller with a ground resistance of 100 ohms or less. Failure to do so may result in electric shock or malfunction.
- Check the rated voltage and terminal layout before wiring to the programmable controller, and connect the cables correctly. Connecting a power supply with a different voltage rating or incorrect wiring may cause a fire or failure.
- Tighten the terminal screws with the specified torque. Undertightening can cause short circuit, fire, or malfunction.
- Prevent foreign matter such as dust or wire chips from entering the unit. Such foreign matter can cause a fire, failure, or malfunction.
- Shut off the external power supply (all phases) used in the system before wiring cables.

[Startup and Maintenance Precautions]

⚠ WARNING

- Do not touch any terminal while power is on. Doing so will cause electric shock or malfunction.
- Turn off the power before cleaning. Failure to do so may result in electric shock.

⚠ CAUTION

- Do not disassemble or modify each unit. Doing so may cause failure, malfunction, injury, or a fire.
- Turn off the power before connecting/disconnecting cables. Failure to do so may cause the unit to fail or malfunction.

[Disposal Precautions]

⚠ CAUTION

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

CONDITIONS OF USE FOR THE PRODUCT

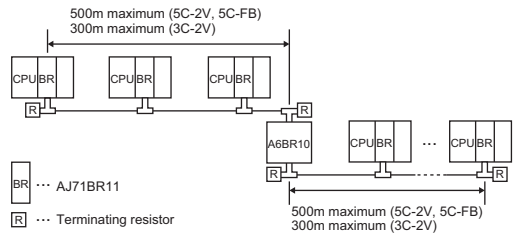
(1) Mitsubishi programmable controller ("the PRODUCT") shall be used in conditions;
i) where any problem, fault or failure occurring in the PRODUCT, if any, shall not lead to any major or serious accident; and
ii) where the backup and fail-safe function are systematically or automatically provided outside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

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

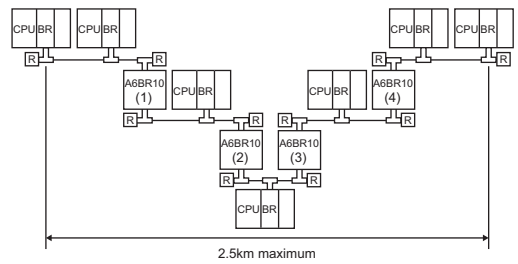
1. OVERVIEW

The repeater unit for the MELSECNET/10 coaxial bus system type A6BR10/A6BR10-DC (hereinafter referred to as A6BR10) is used to extend the station-to-station distance and overall cable distance of the coaxial bus system in a MELSECNET/10 network system.
This section describes the specifications of the A6BR10 and how to connect it.

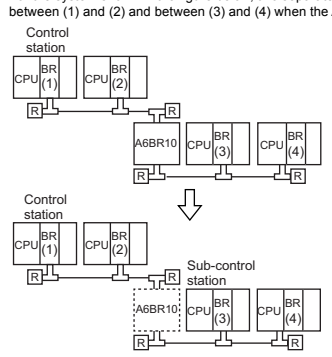
■ **One A6BR10 unit extends the distance by 500m (5C-2V, 5C-FB) or 300m (3C-2V).**



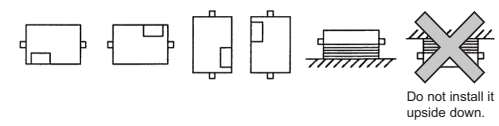
■ **Up to four A6BR10 units can be connected in one network.**
The overall cable distance can be extended to 2.5km a maximum with A6BR10 units.



■ **When the A6BR10 unit goes down, the system is divided at the A6BR10 unit by terminating resistors.**
For the system shown in the figure below, two separate data links will be established between (1) and (2) and between (3) and (4) when the A6BR10 unit goes down.



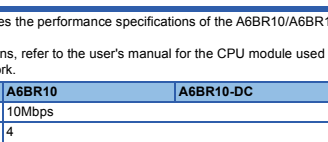
■ **The A6BR10 unit can be installed in any direction.**
It can also be mounted on a DIN rail (when a DIN rail adapter (A6DIN2C) is used).



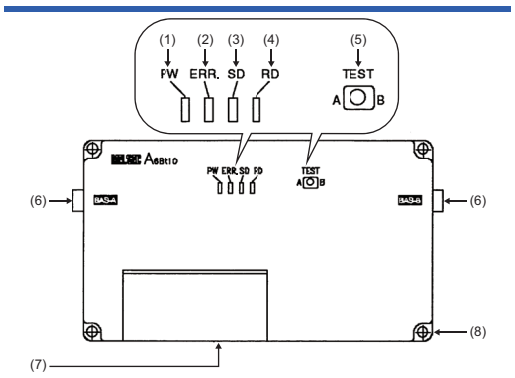
[Accessories]
Two T-type connectors
[Items to be prepared by users]
Terminating resistor: A6RCON-R75

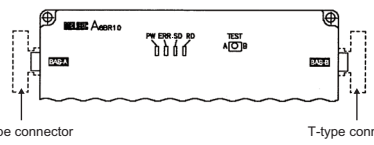
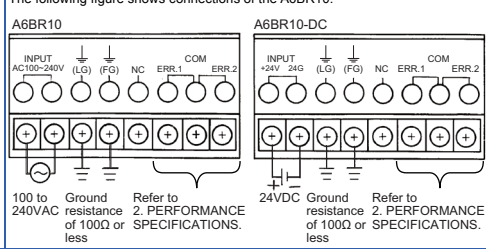
2. PERFORMANCE SPECIFICATIONS

The following table describes the performance specifications of the A6BR10/A6BR10-DC.
For the general specifications, refer to the user's manual for the CPU module used in the MELSECNET/10 network.

Item		A6BR10	A6BR10-DC
Communication speed		10Mbps	
No. of connectable units/network		4	
Extension distance/unit		300m (3C-2V), 500m (5C-2V, 5C-FB)	
Overall cable distance		300m × 5 = 1.5km (3C-2V), 500m × 5 = 2.5km (5C-2V, 5C-FB)	
No. of connectable stations		Up to 32 stations	
Input power supply		—	
Voltage		100 to 240VAC +10% -15% (85 to 264VAC)	24VDC +30% -35% (15.6 to 31.2VDC)
Frequency		50/60Hz ±5%	—
Maximum apparent power		21VA	—
Maximum power		—	9W
Inrush current		40A, within 8ms	17A, within 1ms
Efficiency		65% or more	65% or more
Allowable momentary power failure time		20ms	10ms
Current consumption		0.2A	0.6A
Warning output for abnormal continuous transmission		ERR.1: Turns on when the A6BR10 is abnormal (when the power is off or an error has occurred). ERR.2: Turns on when the A6BR10 is normal.	
Isolation method		Relay isolation	
Rated switching voltage/current		24VDC 2A (Resistive load) 240VAC 2A (COSϕ = 1)	
Minimum switching load		5VDC 1mA	
Maximum switching voltage		264VAC 125VDC	
Response time	OFF → ON	10ms or less	
	ON → OFF	12ms or less	
Life	Mechanical	10 million times or more	
	Electrical (Rated switching voltage/current load)	200VAC 1.5A, 240VAC 1A (COSϕ = 0.7): Switching life is 100 thousand times or more.	
		200VAC 1A, 240VAC 0.5A (COSϕ = 0.35): Switching life is 100 thousand times or more.	
		24VDC 1A, 100VDC 0.1A (L/R = 7ms): Switching life is 100 thousand times or more.	
Surge suppressor		None	
External connection			
Output status		The following figure shows the output status of ERR.1/ERR.2 corresponding to the LED status of PW (power)/ERR. (error). 	
Weight		1.0kg	

3. PART NAMES AND SETTINGS



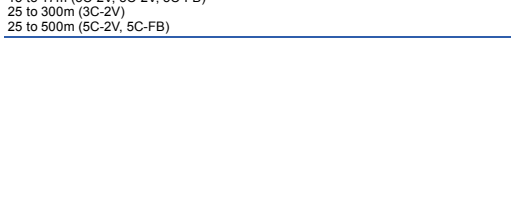
	Description
(1)	■ PW LED Turns on when the power (A6BR10: 100 to 240VAC, A6BR10-DC: 24VDC) is supplied.
(2)	■ ERR. LED Turns on in the event of an abnormal continuous transmission (the system is divided at the A6BR10.). To reset this status (to turn off the ERR. LED), turn off and on the power. If this LED is still on, the unit has a failure. Replace the unit.
(3)	■SD LED Turns on when data is sent.
(4)	■RD LED Turns on when data is received.
(5)	■TEST switch Used to conduct a hardware test for the BUS-A/BUS-B of the A6BR10. (Always conduct a hardware test before starting a data link (operation).) Refer to "5. HARDWARE TEST" for details.
(6)	■Connectors Used to connect T-type connectors. T-type connectors can be connect to both BUS-A and BUS-B. There are no T-type connectors exclusive to BUS-A or BUS-B.  T-type connector T-type connector
(7)	■Terminal block The following figure shows connections of the A6BR10. 
(8)	■Unit mounting holes Holes (for M4 screw) for mounting the A6BR10 on a panel.

4. CONNECTION METHODS

The following describes two connection methods with the A6BR10.

Series connection

The A6BR10 is connected at the end of the network to extend the distance.



Multipoint connection

The A6BR10 is connected in the middle of the network to extend the distance.

■ **Connection precautions**
Some restrictions are applied for the lengths of cables between stations (including the cables between the A6BR10 and its adjacent stations) irrespective of connection methods. (Refer to the following table.)
[System example]

The restrictions are applied to all the cables from (1) to (9) in the figure.
A communication error may occur if cables whose lengths are other than those specified in the table below are used.

Station-to-station cable length
1 to 5m (3C-2V, 5C-2V, 5C-FB)
13 to 17m (3C-2V, 5C-2V, 5C-FB)
25 to 300m (3C-2V)
25 to 500m (5C-2V, 5C-FB)

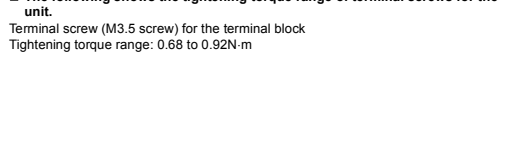
5. HARDWARE TEST

The purpose of a hardware test is to check the reception/transmission circuits of BUS-A and BUS-B of the A6BR10.

■ **Precautions**
Do not conduct a hardware test during data link (operation).

Test configuration

Connect terminating resistors to both the BUS-A and BUS-B.



Test procedure

Set the TEST switch to either the BUS-A or BUS-B to be tested.

Test result

Check the LEDs of the SD and RD.

LED status		Test result
SD	RD	
On	On	The hardware is normal.
On	Off	Hardware failure*1
Off	On	

*1 When a hardware failure has occurred, replace the unit.

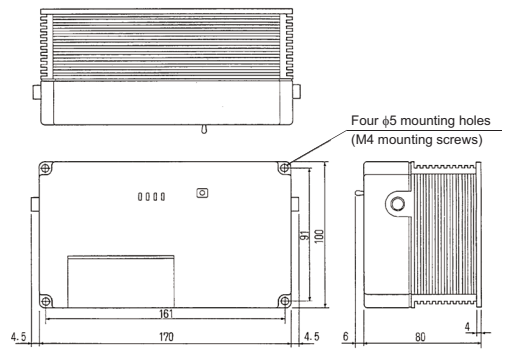
6. Installation

■ **When installing the A6BR10 on a control panel, fix coaxial cables not to apply stress on connectors.**

■ **When the A6BR10 is installed in a network, always connect terminating resistors to both the BUS-A and BUS-B.**
Otherwise, normal data link cannot be established.

■ **The following shows the tightening torque range of terminal screws for the unit.**
Terminal screw (M3.5 screw) for the terminal block
Tightening torque range: 0.68 to 0.92N·m

7. EXTERNAL DIMENSIONS



Unit: mm

8. Information for the Chinese Standardized Low

基于中国标准法的参考规格：GB/T15969.2

WARRANTY

Please confirm the following product warranty details before using this product.

1. Gratis Warranty Term and Gratis Warranty Range

If any faults or defects (hereinafter "Failure") found to be the responsibility of Mitsubishi occurs during use of the product within the gratis warranty term, the product shall be repaired at no cost via the sales representative or Mitsubishi Service Company.
However, if repairs are required onsite at domestic or overseas location, expenses to send an engineer will be solely at the customer's discretion. Mitsubishi shall not be held responsible for any re-commissioning, maintenance, or testing on-site that involves replacement of the failed module.
[Gratis Warranty Term]
The gratis warranty term of the product shall be for one year after the date of purchase or delivery to a designated place.
Note that after manufacture and shipment from Mitsubishi, the maximum distribution period shall be six (6) months, and the longest gratis warranty term after manufacturing shall be eighteen (18) months. The gratis warranty term of repair parts shall not exceed the gratis warranty term before repairs.
[Gratis Warranty Range]

(1) The range shall be limited to normal use within the usage state, usage methods and usage environment, etc., which follow the conditions and precautions, etc., given in the instruction manual, user's manual and caution labels on the product.
(2) Even within the gratis warranty term, repairs shall be charged for in the following cases.
   1. Failure occurring from inappropriate storage or handling, carelessness or negligence by the user. Failure caused by the user's hardware or software design.
   2. Failure caused by unapproved modifications, etc., to the product by the user.
   3. When the Mitsubishi product is assembled into a user's device, Failure that could have been avoided if functions or structures, judged as necessary in the legal safety measures the user's device is subject to or as necessary by industry standards, had been provided.
   4. Failure that could have been avoided if consumable parts (battery, backlight, fuse, etc.) designated in the instruction manual had been correctly serviced or replaced.
   5. Failure caused by external irresistible forces such as fires or abnormal voltages, and Failure caused by force majeure such as earthquakes, lightning, wind and water damage.
   6. Failure caused by reasons unpredictable by scientific technology standards at time of shipment from Mitsubishi.
   7. Any other failure found not to be the responsibility of Mitsubishi or that admitted not to be so by the user.

2. Onerous repair term after discontinuation of production

(1) Mitsubishi shall accept onerous product repairs for seven (7) years after production of the product is discontinued. Discontinuation of production shall be notified with Mitsubishi Technical Bulletins, etc.
(2) Product supply (including repair parts) is not available after production is discontinued.

3. Overseas service

Overseas, repairs shall be accepted by Mitsubishi's local overseas FA Center. Note that the repair conditions at each FA Center may differ.

4. Exclusion of loss in opportunity and secondary loss from warranty liability

Regardless of the gratis warranty term, Mitsubishi shall not be liable for compensation to:

(1) Damages caused by any cause found not to be the responsibility of Mitsubishi.
(2) Loss in opportunity, lost profits incurred to the user by Failures of Mitsubishi products.
(3) Special damages and secondary damages whether foreseeable or not, compensation for accidents, and compensation for damages to products other than Mitsubishi products.
(4) Replacement by the user, maintenance of on-site equipment, start-up test run and other tasks.

5. Changes in product specifications

The specifications given in the catalogs, manuals or technical documents are subject to change without prior notice.

Country/Region	Sales office/Tel
USA	MITSUBISHI ELECTRIC AUTOMATION, INC. 500 Corporate Woods Parkway, Vernon Hills, IL 60061, U.S.A. Tel : +1-847-478-2100
Mexico	MITSUBISHI ELECTRIC AUTOMATION, INC. Mexico Branch Mariano Escobedo #69, Col. Zona Industrial, Tlalnepantla Edo. Mexico, C.P.54030 Tel : +52-55-3067-7500
Brazil	MITSUBISHI ELECTRIC DO BRASIL COMÉRCIO E SERVIÇOS LTDA. Avenida Adelino Cardana, 293, 21 andar, Bethaville, Barueri SP, Brazil Tel : +55-11-4689-3000
Germany	MITSUBISHI ELECTRIC EUROPE B.V. German Branch Mitsubishi-Electric-Platz 1, 40882 Ratingen, Germany Tel : +49-2102-486-0
UK	MITSUBISHI ELECTRIC EUROPE B.V. UK Branch Travellers Lane, Hatfield, Hertfordshire, AL10 8XB, U.K. Tel : +44-1707-28-8780
Ireland	MITSUBISHI ELECTRIC EUROPE B.V. Irish Branch Westgate Business Park, Ballymount, Dublin 24, Ireland Tel : +353-1-4198800
Italy	MITSUBISHI ELECTRIC EUROPE B.V. Italian Branch Centro Direzionale Colleoni-Palazzo Sirio Viale Colleoni 7, 20864 Agrate Brianza(Milano) Italy Tel : +39-039-60531
Spain	MITSUBISHI ELECTRIC EUROPE, B.V. Spanish Branch Carretera de Rubí, 76-80-Apdo. 420, 08190 Sant Cugat del Vallés (Barcelona), Spain Tel : +34-935-65-3131
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Singapore	MITSUBISHI ELECTRIC ASIA PTE. LTD. 307, Alexandra Road, Mitsubishi Electric Building, Singapore 159943 Tel : +65-6473-2308
Thailand	MITSUBISHI ELECTRIC FACTORY AUTOMATION (THAILAND) CO., LTD. 12th Floor, SV.City Building, Office Tower 1, No. 896/19 and 20 Rama 3 Road, Kwaeng Bangpongpang, Khet Yannawa, Bangkok 10120, Thailand Tel : +66-2682-6522
Vietnam	MITSUBISHI ELECTRIC VIETNAM COMPANY LIMITED Hanoi Branch 6th Floor, Detech Tower, 8 Ton That Thuyet Street, My Dinh 2 Ward, Nam Tu Liem District, Hanoi, Vietnam Tel : +84-4-3937-8075
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India	MITSUBISHI ELECTRIC INDIA PVT. LTD. Pune Branch Emerald House, EL-3, J Block, M.I.D.C., Bhosari, Pune-411026, Maharashtra, India Tel : +91-20-2710-2000
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