MITSUBISHI

RS-232C Interface Module type AJ65BT-R2

User's Manual
(Hardware)

AJ65BT-R2

Thank you for purchasing the Mitsubishi program logic controller MELSEC-A series.
Prior to use, please read this and relevant manuals thoroughly to fully understand the product.

MODEL	AJ65BT-R2-U-HW-E
MODEL CODE	13JL23
IB(NA)-66780-C(0604)MEE	

● SAFETY PRECAUTIONS ●
(Always read these instructions before using this equipment.)

Before using this product, please read this manual and the relevant manuals introduced in this manual carefully and pay full attention to safety to handle the product correctly.
The instructions given in this manual are concerned with this product.
For the safety instructions of the programmable controller system, please read the CPU module user's manual.
In this manual, the safety instructions are ranked as "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.

Note that the ⚠**CAUTION** level may lead to a serious consequence according to the circumstances.
Always follow the instructions of both levels because they are important to personal safety.

Please save this manual to make it accessible when required and always forward it to the end user.

[Design Precautions]

◇ DANGER

● If a communication error occurs in the data link, the following will occur in the station having the communication error.
Use the communication status information, and configure an interlock circuit in the sequence program so that the system will operate safely. Incorrect outputs and incorrect operations can lead to accidents.

(1) All points of the general-purpose input from this module will turn OFF.
(2) All points of the general-purpose output from this module will turn OFF.

● The input/output may turn ON or OFF depending on the module trouble. Provide a circuit that externally monitors input/output signals that could lead to serious trouble.

[Design Precautions]

⚠ CAUTION

● Do not bind the control wire or communication cable with the main circuit or power wire, or place the control wire near these.
Separate by at least 100mm or more.
Failure to observe this could lead to malfunctions caused by noise.

● Always connect the master module and CC-Link dedicated cable at the data link terminal block.
If the data link terminal block and general-purpose input/output terminal block are incorrectly inserted, module trouble could occur.
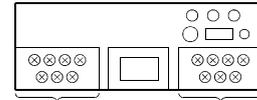
Data link terminal block   General-purpose input/output terminal block

[Mounting Precautions]

⚠ CAUTION

● Use the module in an environment that meets the general specifications given in the RS-232C Interface Module Type AJ65BT-R2 User's Manual. Using it outside the general specifications could lead to electric shocks, fires, malfunctioning, product damage or deterioration.

● Always connect the crimp, press-fit or solder the connector wire connections with the maker-designated tools, and securely connect the connector to the module.
An incomplete connection could lead to short-circuits or malfunctioning.

● Do not directly touch the conductive section of the module.
Failure to observe this could lead to module malfunctioning or trouble.

● Securely fix the module with the DIN rail or installation screw. Tighten the installation screw within the designated torque range.
A loose screw could lead to dropping, short-circuiting or malfunctioning.
If the screw is too tight, dropping or short-circuiting could occur due to screw damage.

● Securely mount the connector of each connection cable to the mounting section.
An incomplete connection could lead to malfunctioning caused by an incorrect contact.

[Wiring Precautions]

⚠ CAUTION

● Before starting installation or wiring work, be sure to shut off all phases of external power supply used by the system.
Failure to shut off all phases could lead to electric shocks, product damage or malfunctioning.

● Always install the terminal covers enclosed with the product before turning ON the power or operating the product after installation or wiring work.
Failure to install the terminal cover could lead to electric shocks.

● Always ground the FG terminal with Class D grounding (Class 3 grounding) dedicated of the PLC.
Failure to do so could lead to malfunctioning.

● Always confirm the product's rated voltage and terminal layout before wiring the module.
Connecting with a power supply other than the rated power supply, or incorrect wiring could lead to fires or trouble.

● Tighten the terminal screws within the specified torque range.
A loose terminal screw could lead to short-circuiting or malfunctioning.
If the terminal screw is too tight, dropping or short-circuiting could occur due to screw damage.

● Make sure that foreign matter, such as cutting chips or wire scraps, do not enter the module.
Failure to observe this could lead to fires, trouble or malfunctioning.

● The communication cables and power supply cable connected to the module must be placed in a conduit or fixed with a clamp.
If the cable is not placed in a conduit or fixed with a clamp, the module or cable could be damaged by the cable variation, movement or unintentional pulling leading to malfunctioning caused by an improper cable connection.

● 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 remove the communication cable or power supply cable connected to the module by pulling on the cable section.
If the cable has a connector, hold the connector at the section connected to the module, and remove.
If the cable does not have a connector, loosen the screws at the section connected to the module, and remove.
Pulling on the cable while connected to the module could lead to module or cable damage, or malfunctioning caused by an improper cable connection.

[Startup/Maintenance Precautions]

⚠ CAUTION

● When power is ON, do not touch the terminals.
Doing so can cause an electric shock or malfunction.

● Before cleaning or tightening the terminal screws and module mounting screws, be sure to shut off all phases of external power supply used by the system.
Failure to shut off all phases could lead to module trouble or malfunctioning.

[Startup/Maintenance Precautions]

⚠ CAUTION

- Do not touch the connector inside the lid at the top of the module.
  Failure to observe this could lead to module trouble or malfunctioning.
- Never disassemble or modify the module.
  Failure to observe this could lead to trouble, malfunctioning, injuries or fires.
- Do not drop or apply any strong impact to the module. Doing so may damage the module.
- Before installing or removing the module on the panel, be sure to shut off all phases of external power supply used by the system.
  Failure to shut off all phases could lead to module trouble or malfunctioning.
- Do not install/remove the terminal block more than 50 times after the first use of the product.   (IEC 61131-2 compliant)

[Disposal Precautions]

⚠ CAUTION

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

About Manuals

The following manuals are also related to this product.

In necessary, order them by quoting the details in the tables below.

Detailed manual

Manual Name	Manual Number (Model Code)
RS-232C Interface Module Type AJ65BT-R2 User's Manual	IB-66781 (13JL24)

Related Manuals

Manual Name	Manual Number (Model Code)
Control & Communication Link System Master/Local Module Type AJ61BT11/A1SJ61BT11 User's Manual	IB-66721 (13J872)
Control & Communication 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-080394E (13JR64)

Please RS-232C Interface Module Type AJ65BT-R2 User's Manual before using this module

Compliance with the EMC/Low Voltage Directive

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" in the User's Manual (Hardware) of the CPU module used or the PLC CPU supplied with the base unit.

◼ 1. Overview

This manual explains the specifications, handling instructions, wiring of the RS-232C Interface Module Type AJ65BT-R2 (hereinafter referred to as the AJ65BT-R2), which is used as an intelligent device station in the CC-Link system.

(1) Included product
    After unpacking, confirm that the following is included.

Model name	Product name	Quantity
AJ65BT-R2	RS-232C Interface Module Type AJ65BT-R2	1

◼ 2. Specifications

2.1 Performance specifications of the AJ65BT-R2

The AJ65BT-R2 performance specifications are shown below.

	Item	Performance specifications
RS-232C specifications	Interface specifications	RS-232C compliant, 1 channel (Refer to section 5.2)
	Transmission method	Full duplex communication method
	Synchronization method	Start-stop synchronization method
	Transmission speed	300, 600, 1200, 2400, 4800, 9600, 19200bps (Select with RS-232C transmission specification setting switch)
	Data format — Star bit	1
	Data bit	7/8
	Parity bit	1 (Yes)/0 (No)
	Stop bit	1/2
	Error detection	With parity check (even/odd)/None
	Communication control (flow control)	DTR/DSR (ER/DR) control
		DC1/DC3 control
	Transmission distance	15m
	OS reception area	5120 bytes

	Item	Performance specifications
Data link specifications	General-purpose input/output specifications	Input side : 24VDC (sink/source common type) 2 points Output side : Transistor output (sink type) 12/24VDC 2 points Terminal block (Refer to section 2.2)
	Transmission path	Bus (RS-485)
	EEPROM writing life	100,000 times
	CC-Link station type	Intelligent device station
	No. of occupied stations	1 station (RX/RY 32 points each, RWw/RWr 4 points each)
	Connection cable	CC-Link dedicated cable
	Withstand voltage	One minute at 500VAC between DC external terminal batch and grounding
	Insulation resistance	10MΩ or more with 500VDC insulation resistance meter between DC external terminal batch and grounding
	Noise withstand level	DC type noise voltage 500Vp-p With noise width 1 μs, noise frequency 25 to 60Hz noise simulator
	Module installation screw	M4 × 0.7mm × 16mm or more screw (Tightening torque range 0.78 to 1.18N•m) DIN rail may also be used for mounting.
	Applicable DIN rail	TH35-7.5Fe, TH35-7.5Al, TH35-15Fe (JIS C 2812 compliant)
	External Power supply	24VDC
		Current consumption: 0.11A
	Tolerable instantaneous power failure time	1ms
	Weight	0.40kg

For the general specifications, refer to the RS-232C Interface Module Type AJ65BT-R2 User's Manual.

2.2 General-purpose input/output specifications

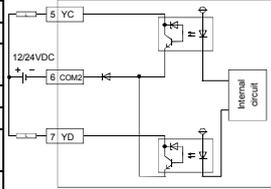The general-purpose input/output specifications of the AJ65BT-R2 are shown in Tables 2.1 and 2.2.
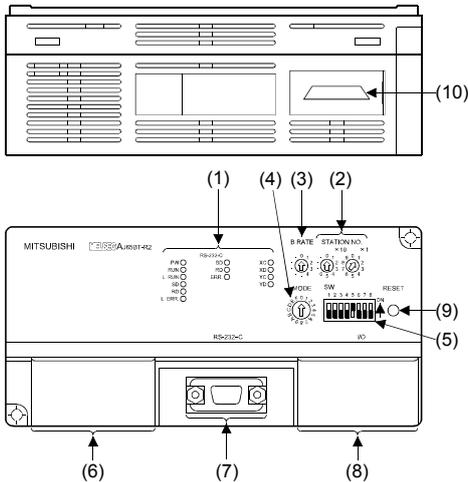
Table 2.1 General-purpose input specifications

	DC input (sink, source common type)	
	AJ65BT-R2	External connection
No. of input points	2 points	
Insulation method	Photo coupler insulation	
Rated input voltage	24VDC	
Rated input current	Approx. 7mA	
Working voltage range	19.2 to 28.8VDC (ripple rate within 5%)	
Max. No. of simultaneous input points	100%	
ON voltage/ON current	14V or more/3.5mA or more	
OFF voltage/OFF current	6V or less/1.7mA or less	
Input resistance	Approx. 3.3kΩ	
Response time — OFF→ON	10ms or less	
ON→OFF	10ms or less	
Common method	2 points/common (COM1) Sink, source common type	
External connection method	9-pin connector (I/O section) 7-point terminal block (M3.5 screw) Including transmission circuit and module power terminal	

			Terminal No.	Signal name	Terminal No.	Signal name
Applicable wire size	0.75 to 2mm²		TB1	XC	TB3	XD
Applicable crimp terminal	RAV1.25-3.5, RAV2-3.5 (JIS C 2805 compliant)		TB2	COM1	TB4	NC

Table 2.2 General-purpose output specifications

	Transistor output (sink type)	
	AJ65BT-R2	External connection
No. of output points	2 points	
Insulation method	Photo coupler insulation	
Rated load voltage	12/24VDC	
Working load voltage range	10.2 to 28.8VDC (ripple rate within 5%)	
Max. load current	0.1A/point 0.2A/common	
Max. rush current	0.4A 10ms or less	
Leakage current at OFF	0.1mA or less	
Max. voltage drop at ON	1.5VDC or less (MAX) 0.1A	
Output type	Sink type	
Response time OFF→ON	2ms or less	
Response time ON→OFF	2ms or less (resistance load)	
Output section externally supplied power Voltage	10.2 to 28.8VDC (ripple rate within 5%)	
Output section externally supplied power Current	50mA or less (TYP. 24VDC, per common) Not including external load current.	
Surge killer	Zener diode	
Common method	2 points/common (COM2)	
External connection method	9-pin connector (I/O section) 7-point terminal block (M3.5 screw) Including transmission circuit and module power terminal	
Applicable wire size	0.75 to 2mm^2	
Applicable crimp terminal	RAV1.25-3.5, RAV2-3.5 (JIS C 2805 compliant)	

Terminal No.	Signal name	Terminal No.	Signal name
TB5	YC	TB7	YD
TB6	COM2		

■ 3. Part Names and Settings

No.	Name	Details	
(1)	Operation display LEDs	LED name	Details
		PW	ON : Power is ON. OFF : Power is OFF.
	Default state	RUN	ON : Operating normally OFF: Power (24VDC) is OFF or WDT error is occurring.
		L RUN	ON : Communicating normally OFF: Communication stopped (Time over error)
	State	L ERR.	ON : Any transmission speed or station number out of range is set. Flickering at constant intervals : The transmission speed or station number has been changed after the power is turned on. Flickering not constant intervals : The terminating resistor is not connected. The module or CC-Link dedicated cable is being affected by noise. OFF: Communicating normally
	Others	SD	ON : Data link Sending data OFF: Data link Not sending data
		RD	ON : Data link Receiving data OFF: Data link Not receiving data
		XC, XD	ON : General-purpose input (XC, XD) is ON. OFF: General-purpose input (XC, XD) is OFF.
		YC, YD	ON : General-purpose output (YC, YD) is ON. OFF: General-purpose output (YC, YD) is OFF.
		RS-232-C SD	ON : Sending RS-232C data OFF: Not sending RS-232C data
		RS-232-C RD	ON : Receiving RS-232C data OFF: Not receiving RS-232C data
		RS-232-C ERR.	ON : RS-232C transmission error OFF: No error

No.	Name	Details	
(2)	Station No. setting switch	Set the module's station No. (Default setting: 0) Setting range: 1 to 64 (0: Master module) " × 10" sets the 10th place of the station No.. " × 1" sets the 1st place of the station No..	
(3)	Data link transmission speed setting switch	Setting	Transmission speed
		0	156kbps
		1	625kbps
		2	2.5Mbps
		3	5Mbps
		4	10Mbps
		5 to 9	Setting error

Set the module's transmission speed (for data link) (Default setting: 0)

(4)	Mode setting switch	Set the module's operation state. (Default setting: 0)	
		No.	Name	Setting details

No.	Name	Setting details
0	On-line mode (using transmission/ reception buffer)	Mode for on-line communication. Set when using the transmission/reception buffer.
1	On-line mode (using buffer memory automatic update function)	Mode for on-line communication. Set when using the buffer memory automatic update function.
2	Not used	Setting error ("RUN" LED turns OFF.)
3	Not used	Setting error ("RUN" LED turns OFF.)
4	Use not possible	–
5	Not used	Setting error ("RUN" LED turns OFF.)
6	Not used	Setting error ("RUN" LED turns OFF.)
7	Not used	Setting error ("RUN" LED turns OFF.)
8	Not used	Setting error ("RUN" LED turns OFF.)
9	Not used	Setting error ("RUN" LED turns OFF.)
A	Not used	Setting error ("RUN" LED turns OFF.)
B	Not used	Setting error ("RUN" LED turns OFF.)
C	Not used	Setting error ("RUN" LED turns OFF.)
D	Hardware test mode	Mode for confirming that module runs independently.
E	Not used	Setting error ("RUN" LED turns OFF.)
F	Not used	Setting error ("RUN" LED turns OFF.)

(5)	RS-232C transmission specifications setting switch	Set the RS-232C transmission specifications.					
		No.	Setting details	Setting switch state			Default setting
				ON	OFF		

No.	Setting details	SW	1	2	3		Default setting
SW1 to 3	Transmission speed		0	0	0	300bps	OFF
			1	0	0	600bps	
			0	1	0	1200bps	
			1	1	0	2400bps	
			0	0	1	4800bps	
			1	0	1	9600bps	
			0	1	1	19200bps	

0:OFF   1:ON

		ON	OFF	Default setting
SW4	Not used			
SW5	Data bit length	8	7	ON
SW6	Parity bit	Yes	No	OFF
SW7		Even	Odd	
SW8	Stop bit length	2	1	OFF

(6)	Data link terminal block	Connect a CC-Link dedicated cable for power supply and data link. (2-piece terminal block)
(7)	RS-232C interface	Connect an RS-232C cable for connection with external device.
(8)	General-purpose input/output terminal block	Connect the input/output wire.
(9)	Reset switch	Returns to the power ON status.
(10)	Connector	Use prohibited.

■ 4. Mounting and Installation

4.1 Precautions for handling

POINT
For handling instructions such as module installation/removal, read ●SAFETY PRECAUTIONS● given at the beginning of this manual.

(1) Tighten the module installation screws and terminal block screws within the following range.

Screw place	Tightening torque range
Module installation screw (M4 screw)	0.78 to 1.18N•m
Terminal block terminal screw (M3.5 screw)	0.59 to 0.88N•m
Terminal block installation screw (M4 screw)	0.98 to 1.37N•m

(2) When using the DIN rail adaptor, install the DIN rail while observing the following points.

  (a) Applicable DIN rail type (JIS C 2812 compliant)
    TH35-7.5Fe
    TH35-7.5Al
    TH35-15Fe
  (b) DIN rail installation screw pitch
    When installing the DIN rail, tighten the screws at a pitch of 200mm or less.
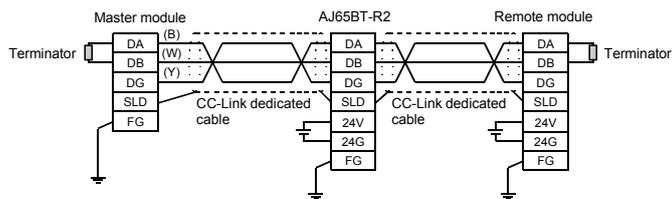
4.2 Installation environment

When installing the PLC, refer to the CC-Link system master module's User's Manual.

5.1 Data Link

The method of connecting the AJ65BT-R2, master module and remote module with a CC-Link dedicated cable is shown below.

POINT

Always connect the modules on both ends of the data link with the "terminator" enclosed with the master module. (Connect across DA-DB)

5.2 Connection with external device

The method of connecting the AJ65BT-R2 and external device with RS-232C is show below.
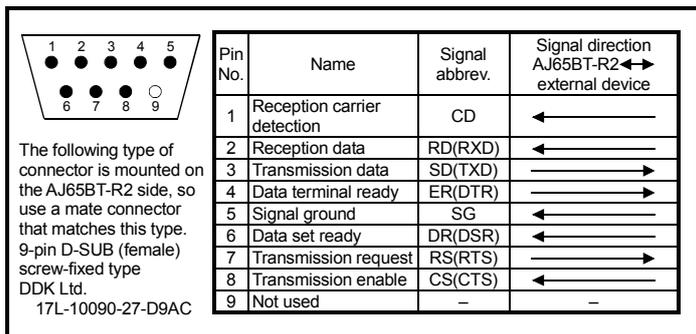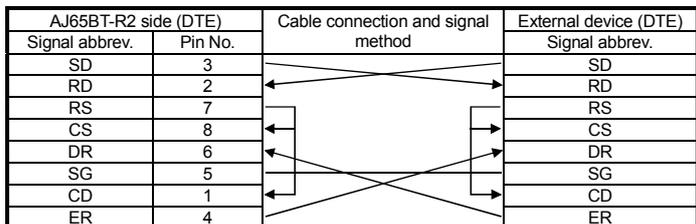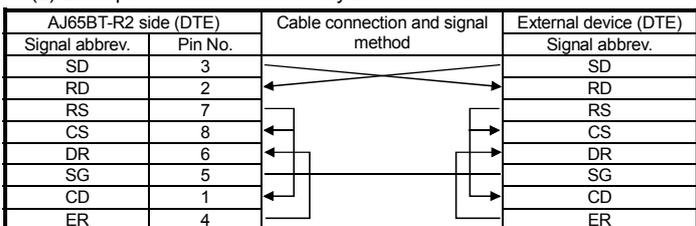

The following type of connector is mounted on the AJ65BT-R2 side, so use a mate connector that matches this type.
9-pin D-SUB (female) screw-fixed type DDK Ltd.
17L-10090-27-D9AC

Pin No.	Name	Signal abbrev.	Signal direction AJ65BT-R2 ◄—► external device
1	Reception carrier detection	CD	◄—
2	Reception data	RD(RXD)	◄—
3	Transmission data	SD(TXD)	—►
4	Data terminal ready	ER(DTR)	—►
5	Signal ground	SG	◄—
6	Data set ready	DR(DSR)	◄—
7	Transmission request	RS(RTS)	—►
8	Transmission enable	CS(CTS)	◄—
9	Not used	–	–

Figure 5.1 RS-232C interface specifications

(1) Example of connection for DC code control and DTR/DSR signal control

AJ65BT-R2 side (DTE)		Cable connection and signal method	External device (DTE)
Signal abbrev.	Pin No.		Signal abbrev.
SD	3		SD
RD	2		RD
RS	7		RS
CS	8		CS
DR	6		DR
SG	5		SG
CD	1		CD
ER	4		ER

(2) Example of connection for only DC code control

AJ65BT-R2 side (DTE)		Cable connection and signal method	External device (DTE)
Signal abbrev.	Pin No.		Signal abbrev.
SD	3		SD
RD	2		RD
RS	7		RS
CS	8		CS
DR	6		DR
SG	5		SG
CD	1		CD
ER	4		ER

Unit: mm (inch)