

MITSUBISHI

AJ65BT-D75P2-S3

Positioning Module

MITSUBISHI
General-Purpose PROGRAMMABLE LOGIC CONTROLLER

User's Manual

(Hardware)

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

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



Type	AJ65BT-D75P2-U-HE
Type Code	13JL48

IB(NA)-66829-D(0609)MEE

● SAFETY PRECAUTIONS ●

(Read these precautions before using.)

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

These precautions apply only to Mitsubishi equipment. Refer to the CPU module user's manual for a description of the PLC 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 PRECAUTIONS]

 **DANGER**

- Install a safety circuit external to the PLC that keeps the entire system safe even when there are problems with the external power supply or the PLC main module. An accident may occur by a false output or a malfunction.
 - 1) Configure interlock circuits such as an emergency stop circuit and high/low limits of positioning to prevent damages to the equipment. Configure these circuits outside of the PLC.
 - 2) The zero return action is controlled by two kinds of data: the zero return direction and zero return speed. Since the system keeps operating without decelerating if a wrong zero return direction is set, apply damage prevention measures to the equipment.
- When data link becomes faulty, the operation of communication faulty station vary depending on its data link type. Configure an interlock circuit in the sequence program using the communication status information so the safety of the entire system is always maintained. Refer to the manual of each data link for how to confirm communication faulty stations and the operation status during a communication error.

[DESIGN PRECAUTIONS]

⚠ CAUTION

- Do not bunch the control wires or communication cables with the main circuit or power wires, or install them close to each other. They should be installed 100mm (3.9 in) or more from each other. Not doing so could result in noise that would cause malfunction.

[INSTALLATION PRECAUTIONS]

⚠ CAUTION

- Use the PLC in an environment that meets the general specifications contained in this manual. Using this PLC in an environment outside the range of the general specifications could result in electric shock, fire, malfunction, and damage to or deterioration of the product.
- Tighten the module installation screws within the range of specified torque. If the module installation screws are loose, it may result in short circuits, fire or malfunction. Tightening the module installation screws too far may cause damages to the screws and /or the module, resulting in fallout, short circuits or malfunction.
- Do not directly touch the module's conductive parts. Doing so could cause malfunction or trouble in the module.
- Securely install the connectors for the drive unit and peripheral devices into the module connectors until a clicking sound comes. Improper installation may cause false contact, resulting in false input and output.
- When the drive unit and peripheral device are not connected, be sure to attach the connector cover. Failure to do so may cause malfunction.

[WIRING/CONNECTION PRECAUTIONS]

⚠ CAUTION

- Be sure to shut off all phases of the external power supply used by the system before installation or wiring. Not doing so can cause the product to be damaged or malfunction.
- Be sure to ground the FG terminal to the class-D (class-3) or higher grounding. Otherwise there will be a danger of malfunctions.
- Use applicable solderless terminals and tighten them with the specified torque. If any solderless spade terminal is used, it may be disconnected when the terminal screw comes loose, resulting in failure.
- When wiring the PLC, check the rated voltage and terminal layout of the wiring, and make sure the wiring is done correctly. Connecting a power supply that differs from the rated voltage or wiring it incorrectly may cause fire or failure.
- Be sure to confirm terminal assignments before wiring the module.
- Be sure there are no foreign substances such as sawdust or wiring debris inside the module. Such debris could cause fire, failure or malfunction.
- Tighten the terminal screws with the specified torque. Loose terminal screws may cause a short circuit, fire or erroneous operation. Tightening the terminal screws too far may cause damage to the screws and /or the module, resulting in fallout, short circuits, or malfunction.

[WIRING/CONNECTION PRECAUTIONS]

⚠ CAUTION

- Before beginning any installation or wiring work, make sure all phases of the power supply have been obstructed from the outside. Failure to completely shut off the power supply phases may cause electric shock and/or damage to the module.
- When turning on the power or operating the module after installation or wiring work, be sure the module's terminal covers are correctly attached. Failure to attach the terminal covers may result in electric shock.
- External connectors shall be correctly soldered. Imperfect connections could result in short circuit or erroneous operation.
- When connecting the communication and power supply cables to the module, always run them in conduits or clamp them.
Not doing so can damage the module and cables due to loose, moved or accidentally pulled cables or can cause a malfunction due to a cable connection fault.
- 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.
- When disconnecting the communication and power supply cables from the module, do not hold and pull the cable part.
Disconnect the cables after loosening the screws in the portions connected to the module. Pulling the cables connected to the module can damage the module and cables or can cause a malfunction due to a cable connection fault.

[STARTUP AND MAINTENANCE PRECAUTIONS]

⚠ CAUTION

- Do not touch the terminals without having the power supply shut down externally at all phases. Doing so may result in malfunctions.
- Do not disassemble or modify the modules.
Doing so could cause failure, malfunction, injury or fire.
- Do not drop the module or give it hard impact since its case is made of resin.
Doing so can damage the module.
- Make sure to switch all phases of the external power supply off before cleaning.
If you do not switch off the external power supply, it will cause failure or malfunction.
- Make sure to switch all phases of the external power supply off before mounting or removing the module. If you do not switch off the external power supply, it will cause failure or malfunction of the module.
- Before performing a test operation, set slow speed for the speed limit parameter value, and prepare to stop immediately in case any dangerous conditions occur.
- Do not install/remove the terminal block more than 50 times after the first use of the product. (IEC 61131-2 compliant)
- Before handling the module, always touch grounded metal, etc. to discharge static electricity from the human body.
Failure to do so can cause the module to fail or malfunction.

[DISPOSAL PRECAUTIONS]

⚠ CAUTION

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

ABOUT THE MANUALS

The following product are available for this equipment.
Refer to the table given below to choose suitable manuals.

Detailed manual

Manual name	Manual No. (Model Code)
AJ65BT-D75P2-S3 Positioning Module User's Manual	IB-66824 (13JL46)

Related Manual

Manual name	Manual No. (Model Code)
Positioning module software package type SW1IVD-AD75P Operating Manual	IB-66714 (13J915)
CC-Link System Master Local type AJ61BT11/A1SJ61BT11 Module User's Manual	IB-66721 (13J872)
CC-Link System Master Local Module type AJ61QBT11/A1SJ61QBT11 User's Manual	IB-66722 (13J873)
CC-Link System Master/Local type QJ61BT11N Module User's Manual	SH-080394E (13JR64)

Conformation to the EMC Directive and Low Voltage Instruction

When complying with EMC Directives and Low-Voltage Directives by assembling a Mitsubishi PLC compatible with EMC Directive and Low-Voltage Directives into the user product, refer to Chapter 3 "EMC Directives and Low-Voltage Directives" in the User's Manual (Hardware) for the CPU module being used.

The CE logo is printed on the rating plate on the main body of the PLC that conforms to the EMC directive and low voltage instruction.

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

1. OVERVIEW

This manual describes how to install AJ65BT-D75P2-S3 Positioning Module (hereafter abbreviated as D75P2) and how to wire them with external devices.

IMPORTANT
1) The following software packages will be needed if a D75P2 is to be used : For DOS/V personal computers : SW1IVD-AD75P or later
2) Software version D or later will be required for AD75TU.

After unpacking D75P2, please confirm that the following products are contained.

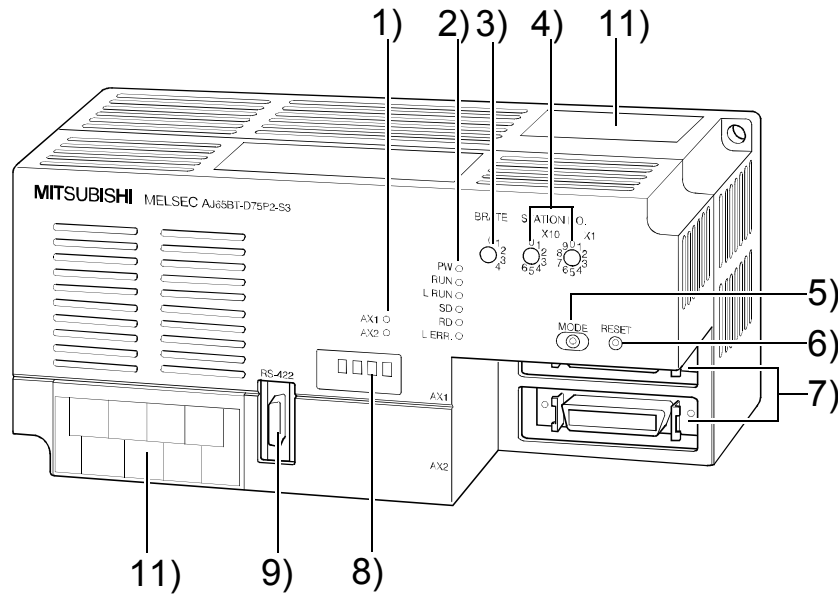
Model name	Quantity
(Main module) AJ65BT-D75P2-S3	1
(Connector for external wiring) 10136-3000VE	2
(Connector cover) 10336-52F0-008	2

2. PERFORMANCE SPECIFICATIONS

The performance specifications for the D75P2 are shown below.
Refer to CPU module User's Manual to use for D75P2 general specifications.

Item	Specifications
Maximum output pulse	When connected to a differential driver : 400kpps When connected to an open collector : 200kpps
Maximum connection distance between servos	When connected to a differential driver :10m (32.81 ft.) When connected to an open collector :2m(6.56 ft.)
Type of CC-Link station	Intelligent device station
Number of occupied station	4 stations (RX/RV each 128 points,RWw/RWw each 16 points)
External power supply	24 V DC (20.4 to 26.4 V DC)
Applicable wire size	0.75 to 2.00 mm ²
Module installation screws	Over M4 × 0.7 mm(0.03 in) × 16 mm(0.6 in) DIN rail attachment is possible
Applicable DIN rails	TH35-7.5Fe, TH35-7.5Al, TH35-15Fe (conforms to JIS-C2B12)
Applicable solderless terminal	RAV 1.25-3.5, RAV 2-3.5
24 V DC internal current consumption (A)	0.30 A
Noise durability	Noise voltage 500 Vp-p, noise width 1 μs (by the noise simulator with the noise frequency 25 to 60 Hz)
Dielectric withstand voltage	Batch power supply/communication type-batch external I/O, 500 V AC for 1 minute
Insulation resistor	Batch power supply /communication type batch external I/O, 500 V DC 10 m Ω or more by the insulation resistance tester.
External dimensions (mm)[inch]	63.5[2.5](H) × 170[6.7](W) × 80[3.1](D)
Weight(kg)[lb]	0.50 [1.1]

3. NAME OF EACH PART



No.	Name	Description																
1)	Corresponding axis LED display	Indicates the axis for the "8)17 segment LED" message.																
2)	CC-Link status LED display	Shows the power supply and data communication conditions.																
3)	Transmission speed setting switch	Sets the data communication speed.																
4)	Station number setting switch	Sets the D75P2 station number.																
5)	LED display mode select switch	Display information is switched between "1) Corresponding axis LED display" and "8) 17 segment LED" each time the switch is pressed.																
6)	Reset switch	When pressed, it initializes input signals, remote registers and operation processing.																
7)	Drive unit connectors (AX1, AX2)	For connection to the drive unit, mechanical system input and manual pulse generator.																
8)	17 segment LED	Displays messages indicating the operation status according to the mode.																
9)	RS-422 peripheral connector	For connection to peripheral devices.																
10)	Terminal block	For connection to the master module. Terminal block assignment diagram <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>1</td> <td>3</td> <td>5</td> <td>7</td> </tr> <tr> <td>DA</td> <td>DG</td> <td>+24V</td> <td>24G</td> </tr> <tr> <td>2</td> <td>4</td> <td>6</td> <td></td> </tr> <tr> <td>DB</td> <td>SLD</td> <td>(FG)</td> <td></td> </tr> </table>	1	3	5	7	DA	DG	+24V	24G	2	4	6		DB	SLD	(FG)	
1	3	5	7															
DA	DG	+24V	24G															
2	4	6																
DB	SLD	(FG)																
11)	Maintenance connector for manufacturer	This connector is for manufacturer use only. Do not open the cover.																

4. LOADING AND INSTALLATION

The following is explanations of the handling precautions and installation environment which is common to modules when handling D75P2 from unpacking to installation.

For the details of loading and installation of the module, refer to User's Manual of PLC CPU module to be used.

4.1 Handling precautions

- 1) The module case is made of plastic. Be sure not to drop it or subject it to strong vibration.
- 2) Do not remove the printed circuit board of the module from the case. This may cause malfunctions.
- 3) Be careful not to let foreign matters such as filings or wire chips get inside the module during wiring. When such matters do enter, be sure to remove them.
- 4) Tighten the module installation screws and terminal screws within the following tightening torque range.

Screw	Tightening Torque Range
Module installation screws (M4 screws)	78 to 118N · cm (6.9 to 10.4lb · inch)
Terminal screws	59 to 88N · cm (5.2 to 7.8lb · inch)
Terminal block installation screws (M4 screws)	78 to 118N · cm (6.9 to 10.4lb · inch)

4.2 Installation environment

Do not install the A series PLC in the following environments.

- 1) Where the ambient temperature exceeds the 0 to 55°C range.
- 2) Where the ambient humidity exceeds the 10 to 90 % RH range.
- 3) Where condensation is produced by sudden temperature changes.
- 4) Where corrosive or combustible gas is present.
- 5) Where dust, iron powder and other conductive powder, oil mist, salt, or organic solvents are prevalent.
- 6) In direct sunlight.
- 7) Where a strong electric or magnetic field is generated.
- 8) Where vibration and shock may be transmitted directly to the module.

5. WIRING DATA-LINK CABLES

This section describes the method for wiring a twisted cable between the D75P2 and master module.

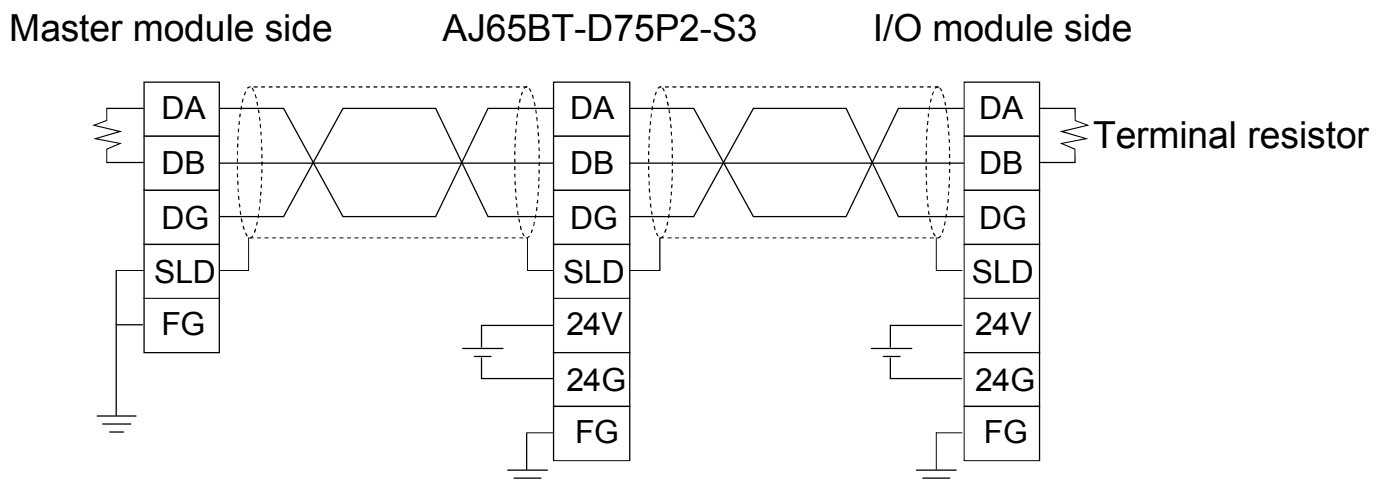
5.1 Precautionary items when handling twisted cables

Do not handle the twisted cables in the following manner. These extreme activities will damage the cables.

- 1) Applying pressure using a sharp object.
- 2) Twisting the cable extensively.
- 3) Pulling the cable with an extremely large force (more than tolerable tension).
- 4) Stepping on the cable.
- 5) Placing any object atop.
- 6) Scratching the cable cover.

5.2 Wiring a twisted cable

Wire the twisted cable between the D75P2 and master module in the following manner:



6. EXTERNAL WIRING

Precautionary notes when wiring as well as the I/O interface are described below.

6.1 Precautionary notes when wiring

This section describes the precautionary notes for the wiring process between the D75P2 and outside (drive unit).

1) Length of connection cable between the D75P2 and drive unit

- a) When an open collector is used, the maximum cable length is 2 m (6.56 ft.). However, this value might change according to the drive unit specifications.

Perform wiring after verifying the specifications for the drive unit to be used.

- b) When a differential driver is used, the maximum cable length is 10 m (32.81 ft.).

To extend the distance between the D75P2 and drive unit, use a differential driver.

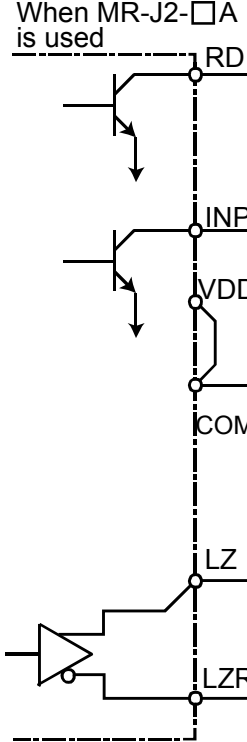
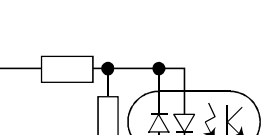
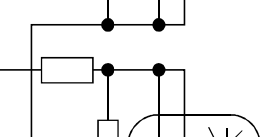
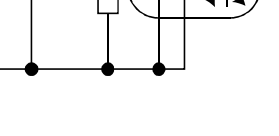
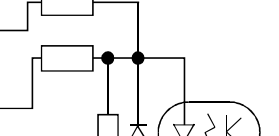
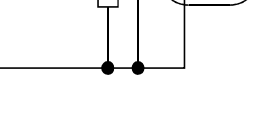
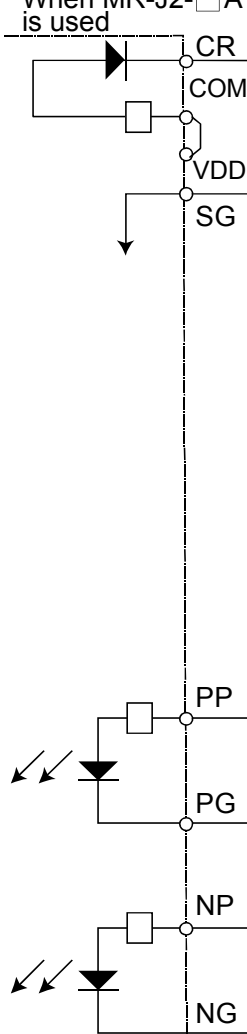
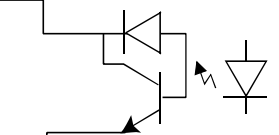

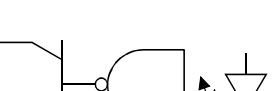




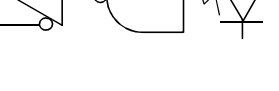

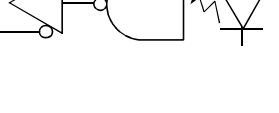
2) Wiring for I/O signals

- a) Avoid bundling with or installing near the proximity of power wires or main circuit wires.
- b) When installing near the proximity of power wires or main circuit wires, use separate ducts or piping.
- c) If bundling cannot be avoided, use a batch shielded cable and ground it on the PLC side.
- d) When wiring is done via piping, be sure to ground the pipe.
- e) If the connection cable is long or the main circuit wiring is in the proximity, operation error may occur due to noise.

6.2 I/O Interface

○ : Wiring required △ : Wiring performed as required

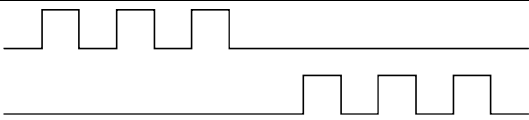
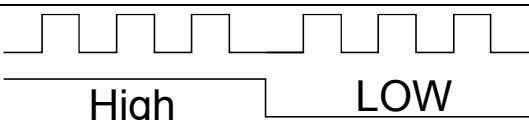
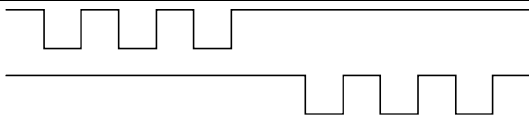
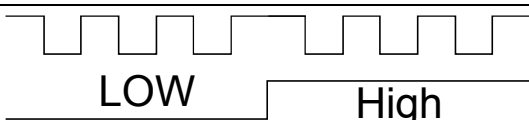
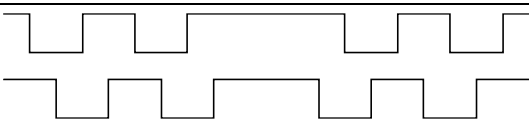

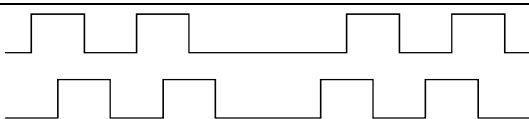





I/O classification	External wiring	Pin number	Internal circuit	Signal name	Wiring requirement		
Input		11		Near-point signal DOG	△		
		12		High limit LS FLS	○		
		13		Low limit LS RLS	○		
		14		Stop signal STOP	△		
		15		Speed/ position switch signal CHG	△		
		16		External start STRT	△		
		35		36	Common COM	○	
		36					
			(+) 9		Manual pulser phase A	PULSER A+	△
			(-) 27			PULSER A-	
			(+) 10		Manual pulser phase B	PULSER B+	
			(-) 28			PULSER B-	

I/O classification	External wiring	Pin number	Internal circuit	Signal name		Wiring requirement
Input	When MR-J2-□A is used 	7		Drive unit ready	READY	○
		8		In-position signal	INPS	△
		26		Common	COM	○
		6		Zero-point signal	PGO	△
		24		Common	PGO COM	
		Output	When MR-J2-□A is used 	5		Deviation counter clear
23		Common	CLEAR COM	○*1		
1		CW Phase A PULSE	PULSE F			
19		PULSE COM	PULSE COM			
2		CCW Phase B SIGN	PULSE R			
20		PULSE COM	PULSE COM	○*1		
3(+)		CW Phase A PULSE	PULSE F +			
21(-)		PULSE F -	PULSE F -	○*1		
4(+)		CCW Phase B SIGN	PULSE R +			
22(-)		PULSE R -	PULSE R -			

*1 Select open collector output or differential output, according to the drive unit used.

Remark

The following shows the relationship between the pulse output mode selected via the parameter and the pulse output according to "positive logic/negative logic selection."

Mode selection	Positive logic		Negative logic	
	Forward rotation	Reverse rotation	Forward rotation	Reverse rotation
CW CCW				
PULSE SIGN				
Aφ Bφ				

* To construct an absolute position detection system, perform wiring as shown below:

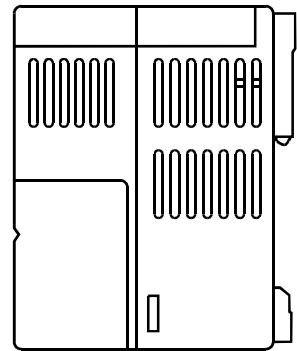
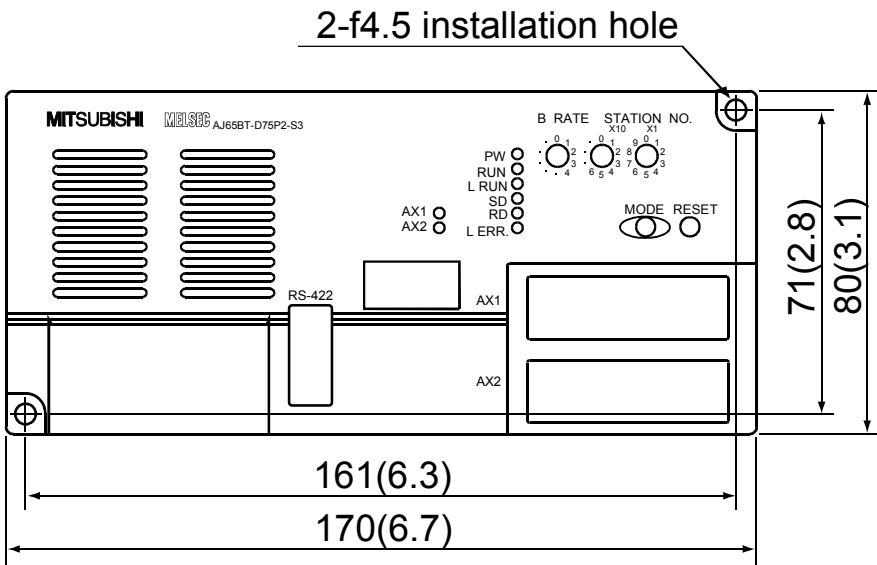
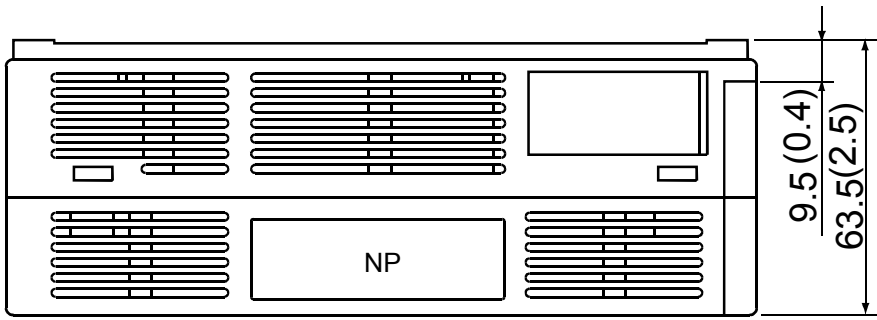
I/O classification	External wiring	Pin No.	Internal circuit	Signal name [abbreviation]	
				When ABS transfer mode ON *2	When ABS transfer mode OFF *3 Upper level: MR-H Lower level: MR-J2
Input		17		ABS data bit0 [DO1]	Positioning complete [PF] Positioning complete [D01]
		18		ABS data bit1 [ZSP]	Zero speed [ZSP]
		34		ABS transmission data preparation complete [TLC]	During torque control [TLC]
		33		Common [COM]	Common [COM]
		COM		Common [COM]	Common [COM]
Output		29		Servo ON [SON]	Servo ON [SON]
		30		ABS transfer mode [ABSM]	— [DI3] Proportional control [PC]
		31		ABS request [ABSR]	— [DI4] During torque control [TL]
		32		Common [COM]	Common [COM]
		SG		Common [COM]	Common [COM]

Remarks

*2: Signals in the ABS transfer mode are shown.

*3: Signals in the normal state (not in the ABS transfer mode) are shown. For details, refer to the specification/instruction manual for the servo amplifier used.

7. EXTERNAL DIMENSIONS



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, U.S.A. Tel : +1-847-478-2100	Hong Kong	Mitsubishi Electric Automation (Hong Kong) Ltd. 10th Floor, Manulife Tower, 169 Electric Road, North Point, Hong Kong Tel : +852-2887-8870
Brazil	MELCO-TEC Rep. Com.e Assessoria Tecnica Ltda. Rua Correia Dias, 184, Edificio Paraiso Trade Center-8 andar Paraiso, Sao Paulo, SP Brazil Tel : +55-11-5908-8331	China	Mitsubishi Electric Automation (Shanghai) Ltd. 4/F Zhi Fu Plazz, No.80 Xin Chang Road, Shanghai 200003, China Tel : +86-21-6120-0808
Germany	Mitsubishi Electric Europe B.V. German Branch Gothaer Strasse 8 D-40880 Ratingen, GERMANY Tel : +49-2102-486-0	Taiwan	Setsuyo Enterprise Co., Ltd. 6F No.105 Wu-Kung 3rd.Rd, Wu-Ku Hsiang, Taipei Hsine, Taiwan Tel : +886-2-2299-2499
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