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Country/Region	Sales office	Tel/Fax
USA	Mitsubishi Electric Automation Inc. 500 Corporate Woods Parkway, Vernon Hills, IL 60061, USA	Tel : +1-847-478-2100 Fax : +1-847-478-0327
Germany	Mitsubishi Electric Europe B.V. German Branch Gothaer Strasse 8, D-40880 Ratingen, Germany	Tel : +49-2102-486-0 Fax : +49-2102-486-1120
Italy	Mitsubishi Electric Europe B.V. Italian Branch Viale Colonnari 7 1-20041 Agrate Brianza (Milano), Italy	Tel : +39-39-60531 Fax : +39-39-605312
China	Mitsubishi Electric Automation (China) Ltd. 4F Zhi Fu Plaza, No. 80 Xin Chang Road Shanghai 200003, China	Tel : +86-21-6120-0808 Fax : +86-21-6121-2444
Taiwan	Setsuyo Enterprise Co., Ltd. 6F, No.105 Wu-Kung 3rd Rd, Wu-Ku Hsiang, Taipei Hsine, Taiwan	Tel : +886-2-2299-2499 Fax : +886-2-2299-2509
Korea	Mitsubishi Electric Automation Korea Co., Ltd. 3F, 1480-6, Gayang-dong, Gangseo-gu, Seoul 157-200, Korea	Tel : +82-2-3660-9552 Fax : +82-2-3664-8372
Singapore	Mitsubishi Electric Asia Pte. Ltd. 307 Alexandra Road #05-01/02, Mitsubishi Electric Building Singapore 159943	Tel : +65-6470-2460 Fax : +65-6476-7439

MITSUBISHI ELECTRIC CORPORATION

HEAD OFFICE: TOKYO BLDG MARUNOUCHI TOKYO 100-8310

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1. INTRODUCTION

1.1 Summary
MR-J3-D05 is a unit used for setting a delay time until the servo amplifier STO function starts.

1.2 Contents of the package

Open packing, and confirm the content of packing.

Contents	Quantity
MR-J3-D05 Safety logic unit	1
Connector for CN9 1-1871940-4 (TE Connectivity)	1
Connector for CN10 1-1871940-8 (TE Connectivity)	1
MR-J3-D05 Safety Logic Unit Installation Guide (This guide)	1

2. TERMS RELATED TO SAFETY

2.1 Stop function for IEC/EN 61800-5-2

(1) STO function (Refer to IEC/EN 61800-5-2: 2007 4.2.2.2 STO.)
This function is integrated into the servo amplifier with the built-in STO function. The STO function shuts down energy to servo motors, thus removing torque. This function electronically cuts off power supply in servo amplifier with the built-in STO function. The purpose of this safety function is as follows.

- Uncontrolled stop according to stop category 0 of IEC/EN 60204-1
- Preventing unexpected start-up

(2) SS1 function (Refer to IEC 61800-5-2: 2007 4.2.2.3C Safe stop 1 temporal delay.)

SS1 is a function which initiates the STO function when the previously set delay time has passed after the servo motor starts decelerating. The delay time can be set with MR-J3-D05. The purpose of this safety function is as follows. This function is available by using a servo amplifier with the built-in STO function with MR-J3-D05.

- Controlled stop according to stop category 1 of IEC/EN 60204-1

2.2 Emergency operation for IEC/EN 60204-1

(1) Emergency stop (Refer to IEC/EN 60204-1: 2005 9.2.5.4.2 Emergency Stop.)
Emergency stop must override all other functions and actuation in all operation modes. Power to the machine driving part which may cause a hazardous state must be either removed immediately (stop category 0) or must be controlled to stop such hazardous state as soon as possible (stop category 1). Restart must not be allowed even after the cause of the emergency state has been removed.

(2) Emergency switching off (Refer to IEC/EN 60204-1: 2005 9.2.5.4.3 Emergency Switching Off.)
Removal of input power to driving device to remove electrical risk and to meet above mentioned safety standards.

3. CAUTIONS

The following basic safety notes must be read carefully and fully in order to prevent injury to persons or damage to property. Only qualified personnel are authorized to install, start-up, repair or service the machines in which these components are installed. They must be familiar with all applicable local safety regulations and laws in which machines with these components are installed, particularly the standards and guidelines mentioned in this guide and the requirements mentioned in ISO/EN ISO 13849-1, IEC/EN 61508, IEC/EN 61800-5-2, and IEC/EN 60204-1. The staff responsible for this work must be given express permission from the company to perform start-up, programming, configuration, and maintenance of the machine in accordance with the safety standards.

WARNING Improper installation of the safety related components or systems may cause improper operation in which safety is not assured, and may result in severe injuries or even death.

Protective Measures

As described in IEC/EN 61800-5-2, the Safe Torque Off (STO) function only prevents the servo amplifier with the built-in STO function from supplying energy to the servo motor. Therefore, if an external force acts upon the drive axis, additional safety measures, such as brakes or counter-weights must be used.

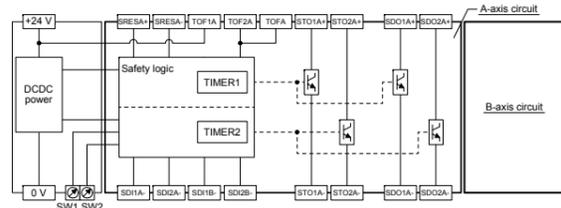
4. RESIDUAL RISK

Machine manufacturers are responsible for all risk evaluations and all associated residual risks. Below are residual risks associated with the STO/EMG function. Mitsubishi is not liable for any damages or injuries caused by the residual risks.

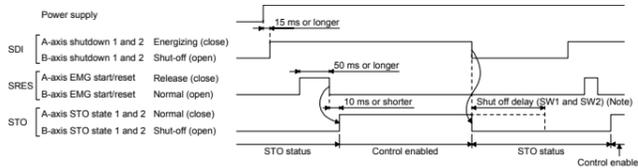
- The SS1 function only guarantees the delay time before STO/EMG is engaged. Proper setting of this delay time is the full responsibility of the company and/or individuals responsible for installation and commissioning of the safety related system. The system, as a whole, must pass safety standards certification.
- When the SS1 delay time is shorter than the required servo motor deceleration time, if the forced stop function is malfunctioning, or if STO/EMG is engaged while the servo motor is still rotating, the servo motor will stop with the dynamic brake or freewheeling.
- For proper installation, wiring, and adjustment, thoroughly read the manual of each individual safety related component.
- Be sure that all safety related switches, relays, sensors, etc., meet the required safety standards. The Mitsubishi Electric safety related components mentioned in this manual are certified by Certification Body as meeting the requirements of ISO/EN ISO 13849-1 Category 3, PL d and IEC/EN 61508 SIL 2.
- Safety is not assured until safety-related components of the system are completely installed or adjusted.
- When replacing a servo amplifier with the built-in STO function etc. or MR-J3-D05, confirm that the new equipment is exactly the same as those being replaced. Once installed, be sure to verify the performance of the safety functions before commissioning the system.
- Perform all risk assessments and safety level certification to the machine or the system as a whole. It is recommended that a Certification Body final safety certification of the system be used.
- To prevent accumulation of multiple malfunctions, perform a malfunction check at regular intervals as deemed necessary by the applicable safety standard. Regardless of the system safety level, malfunction checks should be performed at least once per year.
- If the upper and lower power module in the servo amplifier with the built-in STO function are shorted and damaged simultaneously, the servo motor may make a half revolution at a maximum.

5. BLOCK DIAGRAM AND TIMING CHART

(1) Function block diagram



(2) Operation sequence



Note. Refer to chapter 10.

6. MAINTENANCE AND DISPOSAL

MR-J3-D05 is equipped with LED displays to check errors for maintenance. Please dispose this unit according to your local laws and regulations.

7. FUNCTIONS AND CONFIGURATION

7.1 Summary

MR-J3-D05 has two systems in which the each system has SS1 function (delay time) and output of STO function.

7.2 Specifications

Safety logic unit model		MR-J3-D05
Control circuit power supply	Voltage	24 V DC
	Permissible voltage fluctuation	24 V DC ± 10%
	Power supply capacity [A]	0.5 (Note 1, 2)
Compatible system		2 systems (A-axis, B-axis independent)
Shut-off input	4 points (2 point × 2 systems)	SDI_ : (source/sink compatible) (Note 3)
Shut-off release input	2 points (1 point × 2 systems)	SRES_ : (source/sink compatible) (Note 3)
Feedback input	2 points (1 point × 2 systems)	TOF_ : (source compatible) (Note 3)
Input type		Photocoupler insulation, 24 V DC (external supply), internal limited resistance 5.4 kΩ
Shut-off output	8 points (4 point × 2 systems)	STO_ : (source compatible) (Note 3) SDO_ : (source/sink compatible) (Note 3)
Output type		Photocoupler insulation, open-collector type Permissible current: 40 mA/1 output, Inrush current: 100 mA/1 output A-axis: Select from 0 s, 1.4 s, 2.8 s, 5.6 s, 9.8 s, or 30.8 s. B-axis: Select from 0 s, 1.4 s, 2.8 s, 9.8 s, or 30.8 s. Accuracy: ±2%
Delay time setting		
Safety function		STO, SS1 (IEC/EN 61800-5-2) EMG STOP, EMG OFF IEC/EN 60204-1
Safety performance	Standards certified by CB	EN ISO 13849-1 category 3 PL d, EN 61508 SIL 2, EN 62061 SIL CL 2, and EN 61800-5-2 SIL 2
	Response performance (when delay time is set to 0 s)	10 ms or less (STO input off → shut-off output off)
	Test pulse input (STO) (Note 4)	Test pulse interval: 1 Hz to 25 Hz Test pulse off time: Up to 1 ms
	Mean time to dangerous failure (MTTFd)	516 years
Compliance to standards	Diagnosis converge (DC avg)	93.1%
	Average probability of dangerous failures per hour (PFH)	4.75 × 10 ⁻⁸ [1/h]
Structure	CE marking	LVD: EN 61800-5-1 EMC: EN 61800-3 MD: EN ISO 13849-1, EN 61800-5-2, EN 62061
	Natural-cooling, open (IP rating: IP 00)	
	Ambient temperature	0 °C to 55 °C (non-freezing), storage: -20 °C to 65 °C (non-freezing)
	Ambient humidity	90 %RH or less (non-condensing), storage: 90 %RH or less (non-condensing)
	Ambience	Indoors (no direct sunlight), free from corrosive gas, flammable gas, oil mist, dust, and dirt
Environment	Altitude	Max. 1000 m above sea level
	Vibration resistance	5.9 m/s ² at 10 Hz to 55 Hz (directions of X, Y, and Z axes)
Mass	[kg]	0.2 (including CN9 and CN10 connectors)

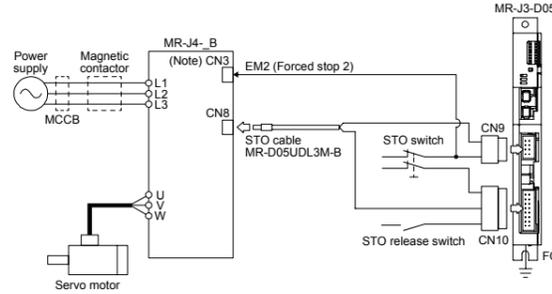
- Note
- Inrush current of approximately 1.5 A flows instantaneously when turning the control circuit power supply on. Select an appropriate capacity of power supply considering the inrush current.
 - Power-on duration of the safety logic unit is 100,000 times.
 - _ in signal name indicates a number or axis name.
 - This function diagnoses malfunction of contacts including an external circuit by shortly turning off signals from a controller to the servo amplifier with the built-in STO function at a constant period while input signals of the servo amplifier with the built-in STO function are on.

7.3 When using MR-J3-D05 with a servo amplifier with the built-in STO function

7.3.1 System configuration diagram

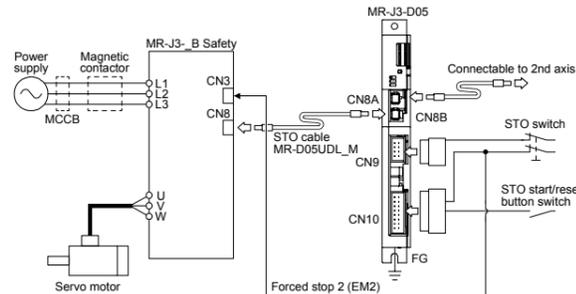
The following shows the connection targets of the STO switch and STO release switch.

(1) When the servo amplifier with the built-in STO function is MR-J4 series



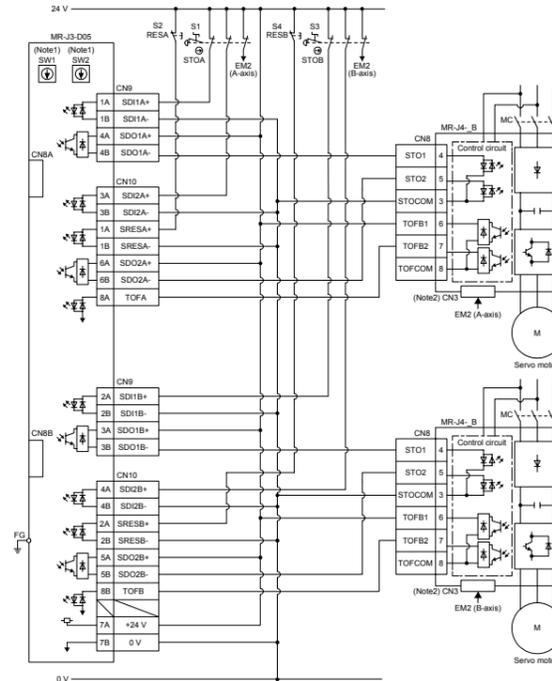
Note. It will be CN1 for MR-J4_A.

(2) When the servo amplifier with the built-in STO function is MR-J3_B Safety



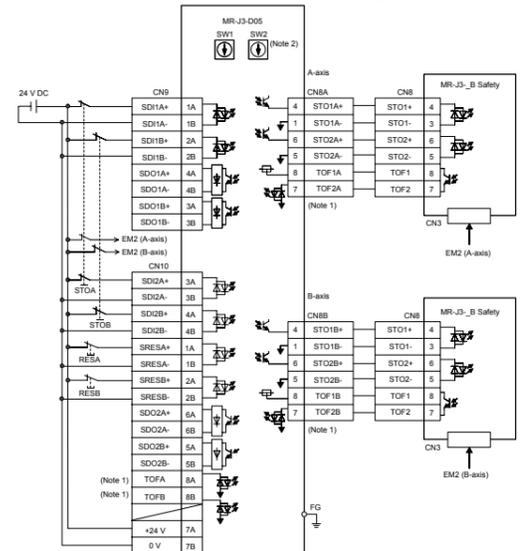
7.3.2 Connection example

(1) When the servo amplifier with the built-in STO function is MR-J4 series



- Note
- Set the delay time of STO output with SW1 and SW2. These switches are located where dented from the front panel.
 - It will be CN1 for MR-J4_A.

(2) When the servo amplifier with the built-in STO function is MR-J3_B Safety



- Note
- CN8A-7 pin (TOF2A) and CN10-8A pin (TOFA) are same input signals. CN8B-7 pin (TOF2B) and CN10-8B pin (TOFB) are same input signals as well.
 - Set the delay time of STO output with SW1 and SW2. These switches are located where dented from the front panel.

8. SIGNAL

8.1 Connector/pin assignment

(1) CN8A

Device	Symbol	Pin No.	Function/application	I/O division
A-axis STO1	STO1A- STO1A+	1	Outputs STO1 to A-axis driving device.	O
		4	Outputs the same signal as A-axis STO2. STO state (base shutdown): Between STO1A+ and STO1A- is opened. STO release state (in driving): Between STO1A+ and STO1A- is closed.	
A-axis STO2	STO2A- STO2A+	5	Outputs the same signal as A-axis STO1. STO state (base shutdown): Between STO2A+ and STO2A- is opened. STO release state (in driving): Between STO2A+ and STO2A- is closed.	O
		6	Outputs the same signal as A-axis STO1. STO state (base shutdown): Between STO2A+ and STO2A- is opened. STO release state (in driving): Between STO2A+ and STO2A- is closed.	
A-axis STO state	TOF2A TOF1A	7	Inputs STO state of A-axis driving device. STO state (base shutdown): Open between TOF2A and TOF1A. STO release state (in driving): Close between TOF2A and TOF1A.	I
		8	Inputs STO state of A-axis driving device. STO state (base shutdown): Open between TOF2A and TOF1A. STO release state (in driving): Close between TOF2A and TOF1A.	

(2) CN8B

Device	Symbol	Pin No.	Function/application	I/O division
B-axis STO1	STO1B- STO1B+	1	Outputs STO1 to B-axis driving device. STO state (base shutdown): Between STO1B+ and STO1B- is opened. STO release state (in driving): Between STO1B+ and STO1B- is closed.	O
		4	Outputs the same signal as B-axis STO2. STO state (base shutdown): Between STO1B+ and STO1B- is opened. STO release state (in driving): Between STO1B+ and STO1B- is closed.	
B-axis STO2	STO2B- STO2B+	5	Outputs STO2 to B-axis driving device. STO state (base shutdown): Between STO2B+ and STO2B- is opened. STO release state (in driving): Between STO2B+ and STO2B- is closed.	O
		6	Outputs the same signal as B-axis STO1. STO state (base shutdown): Between STO2B+ and STO2B- is opened. STO release state (in driving): Between STO2B+ and STO2B- is closed.	
B-axis STO state	TOF2B TOF1B	7	Inputs STO state of B-axis driving device. STO state (base shutdown): Open between TOF2B and TOF1B. STO release state (in driving): Close between TOF2B and TOF1B.	I
		8	Inputs STO state of B-axis driving device. STO state (base shutdown): Open between TOF2B and TOF1B. STO release state (in driving): Close between TOF2B and TOF1B.	

(3) CN9

Device	Symbol	Pin No.	Function/application	I/O division
A-axis shutdown 1	SDI2A+ SDI2A-	3A	Connect this device to a safety switch for A-axis driving device. Input the same signal as A-axis shutdown 1. STO state (base shutdown): Open between SDI2A+ and SDI2A-. STO release state (in driving): Close between SDI2A+ and SDI2A-.	DI-1
		3B	Connect this device to a safety switch for A-axis driving device. Input the same signal as A-axis shutdown 1. STO state (base shutdown): Open between SDI2A+ and SDI2A-. STO release state (in driving): Close between SDI2A+ and SDI2A-.	
B-axis shutdown 1	SDI2B+ SDI2B-	4A	Connect this device to a safety switch for B-axis driving device. Input the same signal as B-axis shutdown 1. STO state (base shutdown): Open between SDI2B+ and SDI2B-. STO release state (in driving): Close between SDI2B+ and SDI2B-.	DI-1
		4B	Connect this device to a safety switch for B-axis driving device. Input the same signal as B-axis shutdown 1. STO state (base shutdown): Open between SDI2B+ and SDI2B-. STO release state (in driving): Close between SDI2B+ and SDI2B-.	
A-axis SDO1	SDO1A+ SDO1A-	4A	Outputs STO1 to A-axis driving device. STO state (base shutdown): Between SDO1A+ and SDO1A- is opened. STO release state (in driving): Between SDO1A+ and SDO1A- is closed.	DO-1
		4B	Outputs the same signal as A-axis SDO2. STO state (base shutdown): Between SDO1A+ and SDO1A- is opened. STO release state (in driving): Between SDO1A+ and SDO1A- is closed.	
B-axis SDO1	SDO1B+ SDO1B-	3A	Outputs STO1 to B-axis driving device. STO state (base shutdown): Between SDO1B+ and SDO1B- is opened. STO release state (in driving): Between SDO1B+ and SDO1B- is closed.	DO-1
		3B	Outputs the same signal as B-axis SDO2. STO state (base shutdown): Between SDO1B+ and SDO1B- is opened. STO release state (in driving): Between SDO1B+ and SDO1B- is closed.	

(4) CN10

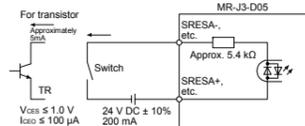
Device	Symbol	Pin No.	Function/application	I/O division
A-axis shutdown 2	SDI2A+ SDI2A-	3A	Connect this device to a safety switch for A-axis driving device. Input the same signal as A-axis shutdown 1. STO state (base shutdown): Open between SDI2A+ and SDI2A-. STO release state (in driving): Close between SDI2A+ and SDI2A-.	DI-1
		3B	Connect this device to a safety switch for A-axis driving device. Input the same signal as A-axis shutdown 1. STO state (base shutdown): Open between SDI2A+ and SDI2A-. STO release state (in driving): Close between SDI2A+ and SDI2A-.	
B-axis shutdown 2	SDI2B+ SDI2B-	4A	Connect this device to a safety switch for B-axis driving device. Input the same signal as B-axis shutdown 1. STO state (base shutdown): Open between SDI2B+ and SDI2B-. STO release state (in driving): Close between SDI2B+ and SDI2B-.	DI-1
		4B	Connect this device to a safety switch for B-axis driving device. Input the same signal as B-axis shutdown 1. STO state (base shutdown): Open between SDI2B+ and SDI2B-. STO release state (in driving): Close between SDI2B+ and SDI2B-.	
A-axis EMG start/reset	SRESA+ SRESA-	1A	Signal for releasing STO state (base shutdown) on A-axis driving device. Releases STO state (base shutdown) on A-axis driving device by switching between SRESA+ and SRESA- from on (connected) to off (opened).	DI-1
		1B	Signal for releasing STO state (base shutdown) on A-axis driving device. Releases STO state (base shutdown) on A-axis driving device by switching between SRESA+ and SRESA- from on (connected) to off (opened).	
B-axis EMG start/reset	SRESB+ SRESB-	2A	Signal for releasing STO state (base shutdown) on B-axis driving device. Releases STO state (base shutdown) on B-axis driving device by switching between SRESB+ and SRESB- from on (connected) to off (opened).	DI-1
		2B	Signal for releasing STO state (base shutdown) on B-axis driving device. Releases STO state (base shutdown) on B-axis driving device by switching between SRESB+ and SRESB- from on (connected) to off (opened).	
A-axis SDO2	SDO2A+ SDO2A-	6A	Outputs STO2 to A-axis driving device. STO state (base shutdown): Between SDO2A+ and SDO2A- is opened. STO release state (in driving): Between SDO2A+ and SDO2A- is closed.	DO-1
		6B	Outputs the same signal as A-axis STO1. STO state (base shutdown): Between SDO2A+ and SDO2A- is opened. STO release state (in driving): Between SDO2A+ and SDO2A- is closed.	
B-axis SDO2	SDO2B+ SDO2B-	5A	Outputs STO2 to B-axis driving device. STO state (base shutdown): Between SDO2B+ and SDO2B- is opened. STO release state (in driving): Between SDO2B+ and SDO2B- is closed.	DO-1
		5B	Outputs the same signal as B-axis SDO1. STO state (base shutdown): Between SDO2B+ and SDO2B- is opened. STO release state (in driving): Between SDO2B+ and SDO2B- is closed.	
Control circuit power supply	+24 V	7A	Connect + side of 24 V DC.	
Control circuit power GND	0 V	7B	Connect - side of 24 V DC.	
A-axis STO state	TOFA	8A	TOFA is internally connected with TOF2A.	
B-axis STO state	TOFB	8B	TOFB is internally connected with TOF2B.	

8.2 Interfaces

In the MR-J3-D05, source type I/O interfaces can be used.

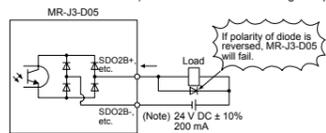
(1) Sink I/O interface (CN9, CN10 connector)

- (a) Digital input interface DI-1
This is an input circuit whose photocoupler cathode side is input terminal. Transmit signals from sink (open-collector) type transistor output, relay switch, etc.



(b) Digital output interface DO-1

This is a circuit of collector output terminal of the output transistor. When the output transistor is turned on, collector terminal current will be applied for the output. A lamp, relay or photocoupler can be driven. Install a diode (D) for an inductive load, or install an inrush current suppressing resistor (R) for a lamp load. (Rated current: 40 mA or less, maximum current: 50 mA or less, inrush current: 100 mA or less) A maximum of 2.6 V voltage drop occurs in the MR-J3-D05.

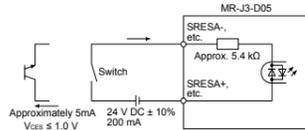


Note. If the voltage drop (maximum of 2.6 V) interferes with the relay operation, apply high voltage (maximum of 26.4 V) from external source.

(2) Source I/O interfaces (CN9, CN10 connector)

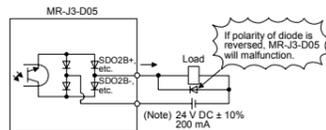
(a) Digital input interface DI-1

This is an input circuit whose photocoupler anode side is input terminal. Transmit signals from source (open-collector) type transistor output, relay switch, etc.



(b) Digital output interface DO-1

This is a circuit of emitter output terminal of the output transistor. When the output transistor is turned on, current will be applied from the output to a load. A maximum of 2.6 V voltage drop occurs in the MR-J3-D05.



Note. If the voltage drop (maximum of 2.6 V) interferes with the relay operation, apply high voltage (maximum of 26.4 V) from external source.

8.3 Wiring CN9 and CN10 connectors

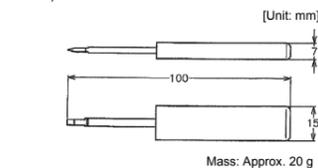
Handle with the tool with care when connecting wires.

- (1) Wire strip
(a) Use wires with size of AWG 24 to 20 (0.22 mm² to 0.5 mm²) (recommended electric wire: UL1007) and strip the wires to make the stripped length 7.0 mm ± 0.3 mm. Confirm the stripped length with gauge, etc. before using the wires.
(b) If the stripped wires are bent, feazed or too thick due to twisting too much, fix the wires by twisting lightly, etc. Then, confirm the stripped length before using the wires. Do not use excessively deformed wires.
(c) Smooth out the wire surface and stripped insulator surface.

(2) Connecting wires

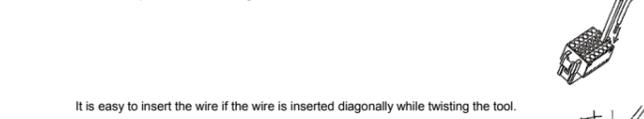
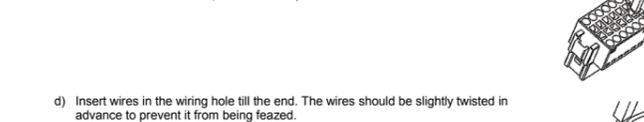
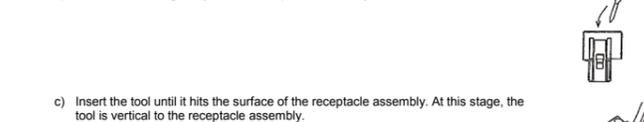
Before connecting wires, be sure to pull out the receptacle assembly from the header connector. If wires are connected with inserted connector, the connector and the printed board may malfunction.

- (a) Using extraction tool (1891348-1 or 2040798-1)



(b) Connecting wires

- (a) Confirm the model number of the housing, contact and tool to be used.
(b) Insert the tool diagonally into the receptacle assembly.



e) Remove the tool.

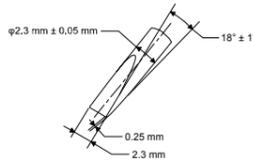


(b) Using a screwdriver

To avoid damaging housings and springs when wiring with screwdriver, do not put excessive force. Be cautious when connecting.

1) Adjusting screw driver

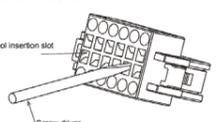
- Diameter: 2.3 mm ± 0.05 mm
Length: 120 mm or less
Width: 2.3 mm
Blade thickness: 0.25 mm
Angle in tip of the blade: 18 ± 1 degrees



Screwdriver diameter: φ2.3 mm

2) Connecting wires

- (a) Insert a screwdriver in the front slot a little diagonally, and depress the spring. While depressing the spring, insert the wires until they hit the end. Note that the housing and spring may be damaged if the screwdriver is inserted strongly. Never insert the screwdriver in the wire hole. Otherwise, the connector will be damaged.
(b) Pull the screwdriver out while pressing the wires. Connecting wires is completed.
(c) Pull the wire lightly to confirm that the wire is surely connected.
(d) To remove the wires, depress the spring by the screwdriver in the same way as connecting wires, and then pull the wires out.



(3) Connector insertion

Insert the connector all the way straight until you hear or feel clicking. When removing the connector, depress the lock part completely before pulling out. If the connector is pulled out without depressing the lock part completely, the housing, contact and/or wires may be damaged.

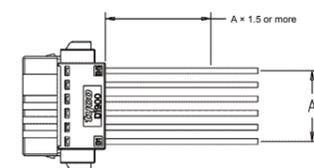
(4) Compatible wire

Compatible wire size is listed below.

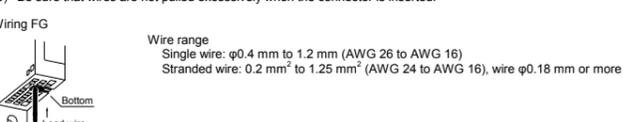
Wire size	
mm ²	AWG
0.22	24
0.34	22
0.50	20

(5) Others

- (a) Fix a wire tie at least distance of "A" × 1.5 away from the end of the connector.



(b) Be sure that wires are not pulled excessively when the connector is inserted.

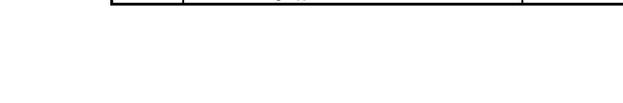


8.4 Wiring FG

I/O status, malfunction and power on/off are displayed with LED for each A-axis and B-axis.

LED

LED	Description	LED Column A	LED Column B
SRES	Monitor LED for start/reset Off: The start/reset is off. (The switch contact is opened.) On: The start/reset is on. (The switch contact is closed.)		
SDI1	Monitor LED for shut-off 1 Off: The shut-off 1 is off. (The switch contact is closed.) On: The shut-off 1 is on. (The switch contact is opened.)		
SDI2	Monitor LED for shut-off 2 Off: The shut-off 2 is off. (The switch contact is closed.) On: The shut-off 2 is on. (The switch contact is opened.)		
TOF	Monitor LED for STO state Off: Not in STO state On: In STO state		
SDO1	Monitor LED for SDO1 Off: Not in STO state On: In STO state		
SDO2	Monitor LED for SDO2 Off: Not in STO state On: In STO state		
SW	Monitor LED for confirming shutdown delay setting Off: The settings of SW1 and SW2 do not match. On: The settings of SW1 and SW2 match.		
FAULT	FAULT LED Off: Normal operation (STO monitoring state) On: Fault has occurred.		
POWER	Power supply Off: Power is not supplied to MR-J3-D05. On: Power is being supplied to MR-J3-D05.		



10. ROTARY SWITCH SETTING

Rotary switch is used to shut off the power after control stop by SS1 function. Set the delay time for STO output after STO shut off switch is pressed. Set same setting for SW1 and SW2, and set the rotary switch setting according to the delay time in the table below. Setting cannot be changed while power is on. Notify users that setting cannot be changed by putting a seal or by another method so that end users will not change the setting after the shipment. 0 to F in the following table is the set value of the rotary switches (SW1 and SW2).

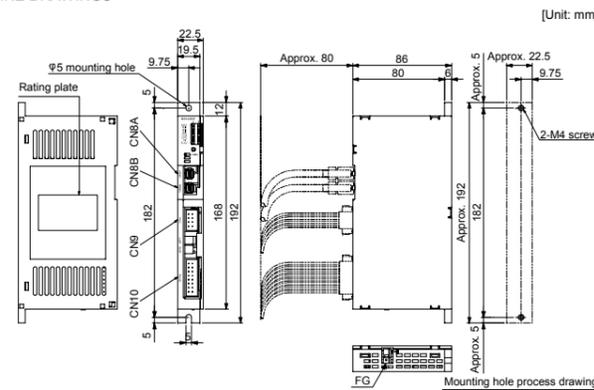
		Rotary switch setting and delay time at A/B-axis [s]						
		0 s	1.4 s	2.8 s	5.6 s	9.8 s	30.8 s	
A-axis	0 s	0	1	2	-	3	4	
	1.4 s	-	5	-	6	7		
	2.8 s	-	8	-	9	A		
	5.6 s	-	-	-	B	C		
	9.8 s	-	-	-	-	D	E	
	30.8 s	-	-	-	-	-	F	

11. TROUBLESHOOTING

When power is not supplied or FAULT LED turns on, refer the following table and take the appropriate action.

Event	Description	Cause	Action
Power is not supplied.	Power LED does not turn on although power is supplied.	1. 24 V DC power supply is malfunctioning. 2. Wires between MR-J3-D05 and 24 V DC power supply are disconnected or are in contact with other wires. 3. MR-J3-D05 is malfunctioning.	Replace the 24 V DC power supply. Check the wiring. Replace the MR-J3-D05.
FAULT LED is on.	FAULT LED of A-axis or B-axis is on, and will not turn off.	1. The delay time settings are not matched. 2. Switch input error 3. TOF signal error 4. MR-J3-D05 is malfunctioning.	Check the settings of the rotary switch. Check the wiring or sequence of the input signals. Check the connection with the servo amplifier with the built-in STO function. Replace the MR-J3-D05.

12. OUTLINE DRAWINGS



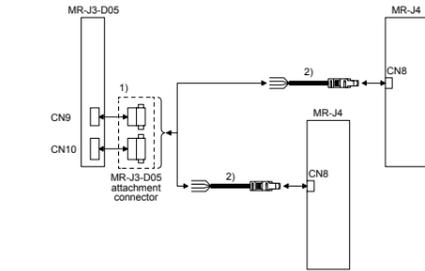
CN8A		CN8B	
7 TOF2A	8 TOF1A	5 TOF2B	6 TOF1B
5 STO2A	6 STO2A+	5 STO2B	6 STO2B+
3 STO1A	4 STO1A+	3 STO1B	4 STO1B+
1 STOT1A	2	1 STOT1B	2

CN9		CN10	
1A SDO1A+	1B SDO1A-	1A SRESA+	1B SRESA-
2A SDO1B+	2B SDO1B-	2A SRESB+	2B SRESB-
3A SDO2A+	3B SDO2A-	3A SDO2B+	3B SDO2B-
4A SDO2A+	4B SDO2A-	4A SDO2B+	4B SDO2B-
6A SDO2A+	6B SDO2A-	6A SDO2B+	6B SDO2B-
7A +24 V	7B 0 V		
8A TOFA	8B TOFB		

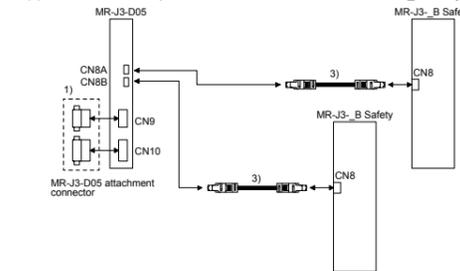
Mounting screw
Screw size: M4
Tightening torque: 1.2 [N·m]
Mass: 0.2 [kg]

14. COMBINATIONS OF CABLE/CONNECTOR

(1) When the servo amplifier with the built-in STO function is MR-J4 series



(2) When the servo amplifier with the built-in STO function is MR-J3-B Safety



No.	Name	Model	Description
1)	Connector	MR-J3-D05 attachment connector	Connector for CN9: 1-1871940-4 (TE Connectivity) Connector for CN10: 1-1871940-8 (TE Connectivity)
2)	STO cable	MR-D05UDL3M-B Cable length: 3 m	Connector set: 2069250-1 (TE Connectivity)
3)	STO cable for MR-J3-B safety	MR-D05UDL_M Cable length: 0.3/1/3 m	Connector set: 2069250-1 (TE Connectivity)

COMPLIANCE WITH THE MACHINERY DIRECTIVES

The MR-J3-D05 complies with the safety components laid down in the directive 2006/42/EC (Machinery).

Warranty

1. Warranty period and coverage
We will repair any failure or defect hereinafter referred to as "failure" in our FA equipment hereinafter referred to as the "Product" arisen during warranty period at no charge due to causes for which we are responsible through the distributor from which you purchased the Product or our service provider. However, we will charge the actual cost of dispatching our engineer for an on-site repair work on request by customer in Japan or overseas countries. We are not responsible for any on-site readjustment and/or trial run that may be required after a defective unit are repaired or replaced.

[Term]
The term of warranty for Product is twelve (12) months after your purchase or delivery of the Product to a place designated by you or eighteen (18) months from the date of manufacture whichever comes first ("Warranty Period"). Warranty period for repaired Product cannot exceed beyond the original warranty period before any repair work.

[Limitations]

- (1) You are requested to conduct an initial failure diagnosis by yourself, as a general rule. It can also be carried out by us or our service company upon your request and the actual cost will be charged.
(2) This limited warranty applies only when the condition, method, environment, etc. of use are in compliance with the terms and conditions and instructions that are set forth in the instruction manual and user manual for the Product and the caution label affixed to the Product.
(3) Even during the term of warranty, the repair cost will be charged on you in the following cases.
(i) a failure caused by your improper storing or handling, carelessness or negligence, etc., and a failure caused by your hardware or software problem
(ii) a failure caused by any alteration, etc. to the Product made on your side without our approval
(iii) a failure which may be regarded as avoidable, if your equipment in which the Product is incorporated is equipped with a safety device required by applicable laws and has any function or structure considered to be indispensable according to a common sense in the industry
(iv) a failure which may be regarded as avoidable if consumable parts designated in the instruction manual, etc. are duly maintained and replaced
(v) any replacement of consumable parts (battery, fan, smoothing capacitor, etc.)
(vi) a failure caused by external factors such as inevitable accidents, including without limitation fire and abnormal fluctuation of voltage, and acts of God, including without limitation earthquake, lightning and natural disasters
(vii) a failure generated by an unforeseeable cause with a scientific technology that was not available at the time of the shipment of the Product from our company
(viii) any other failures which we are not responsible for or which you acknowledge we are not responsible for

2. Term of warranty after the stop of production

- (1) We may accept the repair at charge for another seven (7) years after the production of the product is discontinued. The announcement of the stop of production for each model can be seen in our Sales and Service, etc.
(2) Please note that the Product (including its spare parts) cannot be ordered after its stop of production.

3. Service in overseas countries

Our regional FA Center in overseas countries will accept the repair work of the Product. However, the terms and conditions of the repair work may differ depending on each FA Center. Please ask your local FA center for details.
4. Exclusion of responsibility for compensation against loss of opportunity, secondary loss, etc.
Whether under or after the term of warranty, we assume no responsibility for any damages arisen from causes for which we are not responsible, any losses of opportunity and/or profit incurred by you due to a failure of the Product, any damages, secondary damages or compensation for accidents arisen under a specific circumstance that are foreseen or unforeseen by our company, any damages to products other than the Product, and also compensation for any replacement work, readjustment, start-up test run of local machines and the Product and any other operations conducted by you.

5. Change of Product specifications

Specifications listed in our catalogs, manuals or technical documents may be changed without notice.

6. Application and use of the Product

- (1) For the use of our General-Purpose AC Servo, its applications should be those that may not result in a serious damage even if any failure or malfunction occurs in General-Purpose AC Servo, and a backup or fail-safe function should operate on an external system to General-Purpose AC Servo when any failure or malfunction occurs.
(2) Our General-Purpose AC Servo is designed and manufactured as a general purpose product for use at general industries. Therefore, applications substantially influential on the public interest for such as atomic power plants and other power plants of electric power companies, and also which require a special quality assurance system, including applications for railway companies and government or public offices are not recommended, and we assume no responsibility for any failure caused by these applications when used.
In addition, applications which may be substantially influential to human lives or properties for such as airlines, medical treatments, railway service, incineration and fuel systems, man-operated material handling equipment, entertainment machines, safety machines, etc. are not recommended, and we assume no responsibility for any failure caused by these applications when used.
We will review the acceptability of the abovementioned applications, if you agree not to require a specific quality for a specific application. Please contact us for consultation.