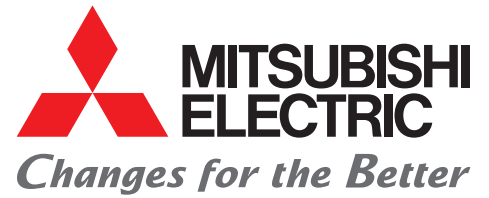




for a greener tomorrow



General-Purpose AC Servo MELSERVO-JE Series Servo Amplifier MR-JE-BF

March 2017

New Product Release
SV1703-3E

High Performance, Integrated Safety with Simple Configuration



Corresponding to Category 3 PL e, SIL 3

- Integrated STO (Safe torque off) as standard
- Corresponds to SS1 (Safe stop 1) when combined with a safety equipment such as MR-J3-D05



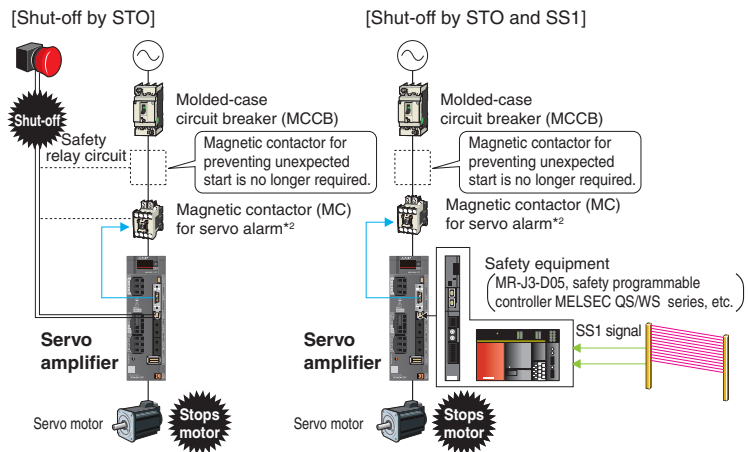
A Cost Effective Solution with Integrated Safety

Corresponding to Category 3 PL e, SIL 3

Functions According to IEC/EN 61800-5-2

STO (Safe torque off) and SS1*1 (Safe stop 1) are integrated as standard, enabling the safety system to be configured easily in a machine.

- By using STO, it is not necessary to turn off the control circuit power supply of the servo amplifier, resulting in shorter restart time, and eliminating the necessity of home position return.
- Magnetic contactor for preventing unexpected motor start is not needed.*2
- MR-J3-D05 safety logic unit is supported.



IEC/EN 61800-5-2:2007 function	Safety level
STO (Safe torque off)	Category 3 PL e, SIL 3 *3
SS1 (Safe stop 1) *1	

*1. Safety equipment (MR-J3-D05, safety programmable controller MELSEC QS/WS series, etc.) is required.

*2. Magnetic contactors are not required to meet the STO requirements. However, this illustration has a magnetic contactor installed to prevent servo alarms and electric shock.

*3. Parameter setting is necessary to comply with Category 3 PL e, SIL 3. The safety level would be Category 3 PL d, SIL 2 when MR-J3-D05 is used.

Functions Shutting Off Power to Motor

- STO: with MR-JE-BF

IEC 61800-5-2 Safety standard

Safe torque off (STO)

The STO function shuts off power to the motor electronically using the internal circuit by responding to the input signal from external equipment (shuts off through secondary-side output). This function corresponds to the Stop category 0 of IEC/EN 60204-1.

Speed

Time

Stop category 0

(Uncontrolled stop)

Speed

STO signal (Normally closed)

V0: zero speed

* Execute the STO function after the motor is stopped in servo off state.

- SS1: with a combination of MR-JE-BF and MR-J3-D05

IEC 61800-5-2 Safety standard

Safe stop 1 (SS1)

Responding to the input signal from external equipment, the motor starts to decelerate. After the set delay time for motor stop is passed, the STO function starts. This function corresponds to the Stop category 1 of IEC 60204-1.

Speed

Time

Stop category 1

(Controlled stop)

Speed

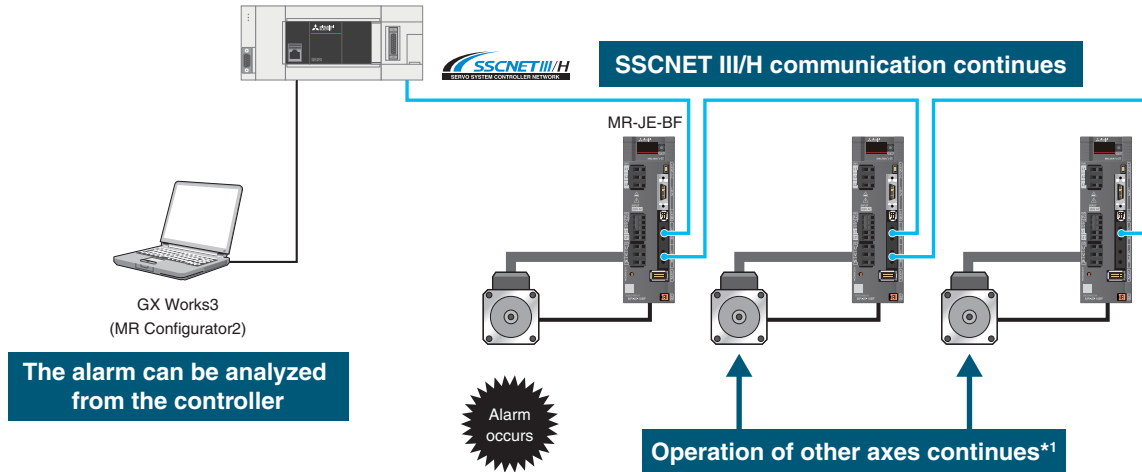
SS1 signal (Normally closed)

STO signal (Normally closed)

Ensured safety range

Alarm Analysis and Continuous Operation of Normally-Driven Axes

Main circuit and control circuit power supplies are separated, and only the main circuit power supply is shut off when an alarm occurs, keeping the SSCNET III/H communication and enabling other axes to continue the operation even during the alarm. The alarm can be analyzed from the controller.



*1. The continuous operation is enabled when ALM (Malfunction) is assigned to a device with a parameter and when only the main circuit power supply is shut off. Take measures to prevent collisions of the continued axes.

Compatible with SEMI-F47

MR-JE-BF servo amplifiers comply with SEMI-F47 standard *1 corresponding to semiconductors and LCD manufacturing systems. Use a 3-phase power supply for the input to the servo amplifier.

*1. The control power supply of the servo amplifier complies with SEMI-F47. Note that the backup capacitor may be required depending on the power impedance and operating situation for the instantaneous power failure of the main circuit power supply. Be sure to perform a test on your machine to meet the SEMI-F47 Voltage Sag Immunity Standard.

Compliance with Global Standards and Regulations

Use the MR-JE-BF servo amplifiers globally. The servo amplifiers comply with global standards as standard.

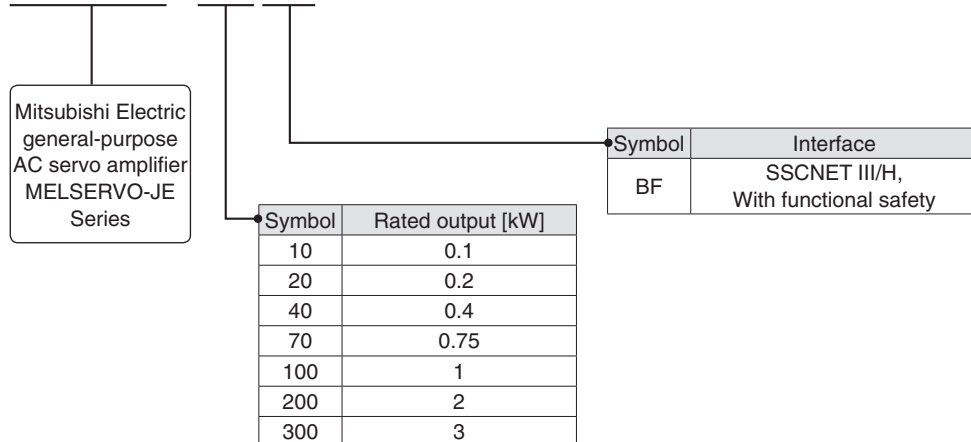


Servo Amplifiers

European EC directive	Low voltage directive	EN 61800-5-1
	EMC directive	EN 61800-3 Category C3
	Machinery directive	EN ISO 13849-1 Category 3 PL e / EN 62061 SIL CL 3 / EN 61800-5-2
	RoHS directive	Compliant
UL standard		UL 508C
CSA standard		CSA C22.2 No.14
Measures for Administration of the Pollution Control of Electronic Information Products (Chinese RoHS)		Compliant
China Compulsory Certification (CCC)		N/A
Korea Radio Wave Law (KC)		Compliant
Certification system of the Eurasian Economic Union (EAC)		Compliant

Model Designation for Servo Amplifier

M R - J E - 1 0 B F

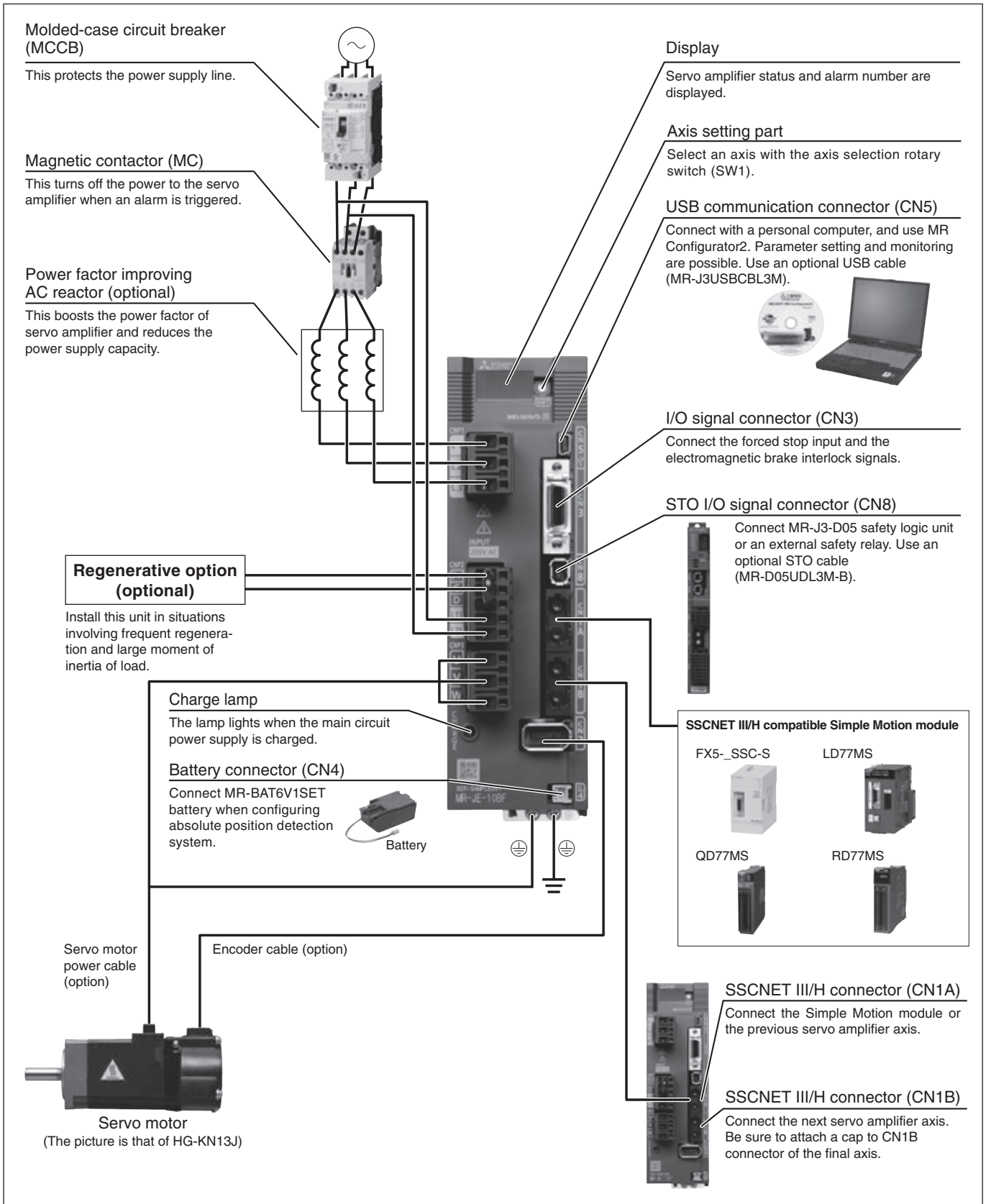


Combinations of Servo Amplifier and Servo Motor

Servo amplifier	Servo motor	
	HG-KN series	HG-SN series
MR-JE-10BF	HG-KN13(B)J	-
MR-JE-20BF	HG-KN23(B)J	-
MR-JE-40BF	HG-KN43(B)J	-
MR-JE-70BF	HG-KN73(B)J	HG-SN52(B)J
MR-JE-100BF	-	HG-SN102(B)J
MR-JE-200BF	-	HG-SN152(B)J, HG-SN202(B)J
MR-JE-300BF	-	HG-SN302(B)J

MR-JE-BF Connections with Peripheral Equipment ^(Note 1)

Peripheral equipment is connected to MR-JE-BF as described below. Connectors, cables, options, and other necessary equipment are available so that users can set up the servo amplifier easily and start using it right away.



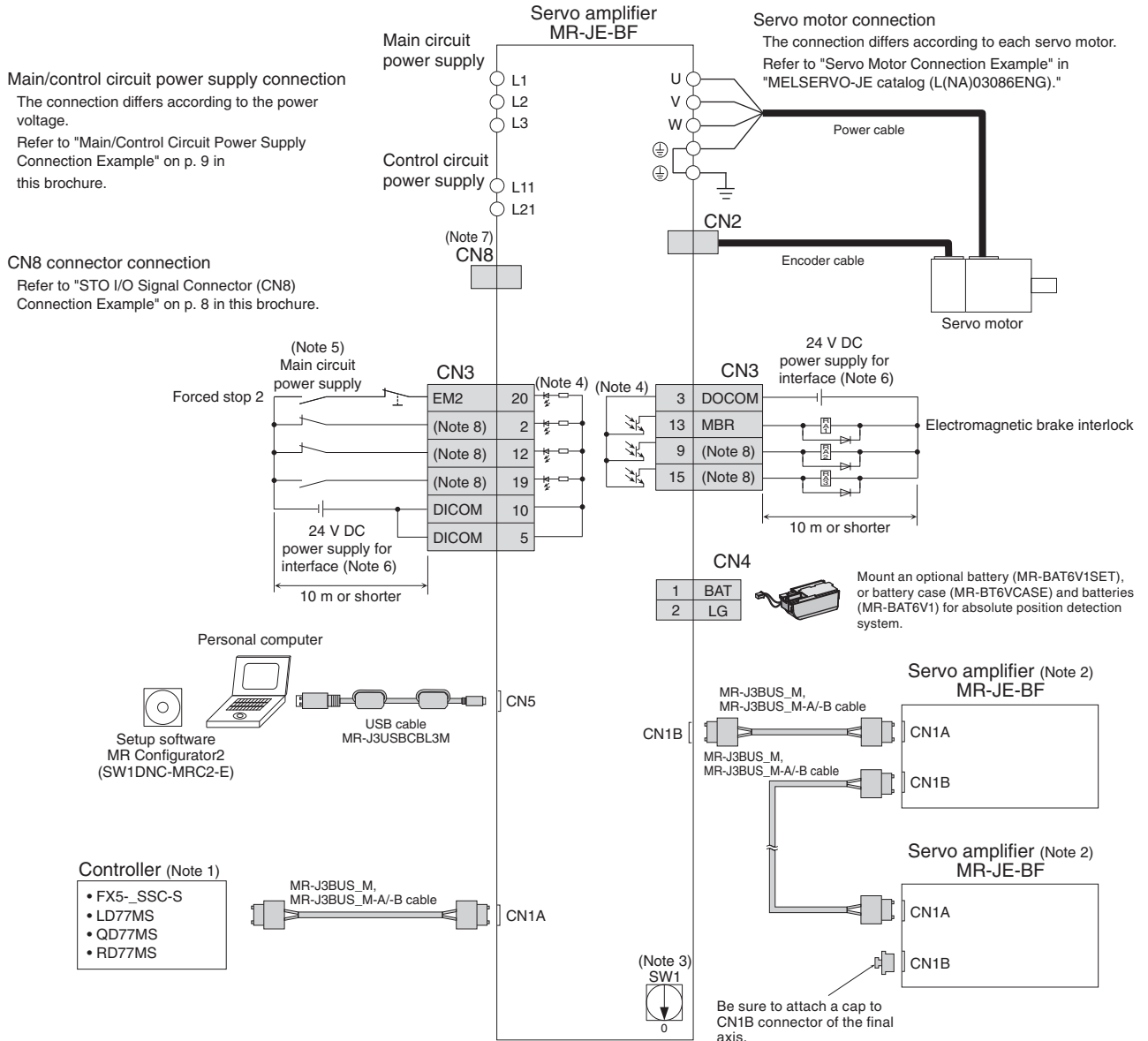
Notes: 1. Refer to "MR-JE-_BF Servo Amplifier Instruction Manual" for the actual connections.

MR-JE-BF (SSCNET III/H Interface) Specifications

Servo amplifier model MR-JE-		10BF	20BF	40BF	70BF	100BF	200BF	300BF	
Output	Rated voltage	3-phase 170 V AC							
	Rated current [A]	1.1	1.5	2.8	5.8	6.0	11.0	11.0	
Main circuit power supply input	Voltage/frequency ^(Note 1)	3-phase or 1-phase 200 V AC to 240 V AC, 50 Hz/60 Hz				3-phase or 1-phase 200 V AC to 240 V AC, 50 Hz/60 Hz ^(Note 8)		3-phase 200 V AC to 240 V AC, 50 Hz/60 Hz	
	Rated current ^(Note 7) [A]	0.9	1.5	2.6	3.8	5.0	10.5	14.0	
	Permissible voltage fluctuation	3-phase or 1-phase 170 V AC to 264 V AC				3-phase or 1-phase 170 V AC to 264 V AC ^(Note 8)		3-phase 170 V AC to 264 V AC	
	Permissible frequency fluctuation	±5% maximum							
Control circuit power supply input	Voltage/frequency	1-phase 200 V AC to 240 V AC, 50 Hz/60 Hz							
	Rated current [A]	0.2							
	Permissible voltage fluctuation	1-phase 170 V AC to 264 V AC							
	Permissible frequency fluctuation	±5% maximum							
	Power consumption [W]	30							
Interface power supply		24 V DC ± 10% (required current capacity: 0.3 A (including CN8 connector signals))							
Control method		Sine-wave PWM control/current control method							
Permissible regenerative power of the built-in regenerative resistor ^(Note 2, 3) [W]		-	-	10	20	20	100	100	
Dynamic Brake ^(Note 4)		Built-in							
SSCNET III/H command communication cycle ^(Note 6)		0.444 ms, 0.888 ms							
Communication function		USB: Connect a personal computer (MR Configurator2 compatible)							
Servo functions		Advanced vibration suppression control II, adaptive filter II, robust filter, auto tuning, one-touch tuning, tough drive function, drive recorder function, tightening & press-fit control, machine diagnosis function, power monitoring function, lost motion compensation function							
Protective functions		Overcurrent shut-off, regenerative overvoltage shut-off, overload shut-off (electronic thermal), servo motor overheat protection, encoder error protection, regenerative error protection, undervoltage protection, instantaneous power failure protection, overspeed protection, error excessive protection							
Functional safety		STO (IEC/EN 61800-5-2)							
Safety performance	Standards certified by CB ^(Note 9)	EN ISO 13849-1 Category 3 PL e, IEC 61508 SIL 3, EN 62061 SIL CL 3, EN 61800-5-2							
	Response performance	8 ms or less (STO input OFF → energy shut-off)							
	Test pulse input (STO) ^(Note 10)	Test pulse interval: 1 Hz to 25 Hz, test pulse off time: 1 ms maximum							
	Mean time to dangerous failure (MTTFd)	MTTFd ≥ 100 [years] (314a)							
	Diagnostic coverage (DC)	DC = Medium, 97.6 [%]							
Probability of dangerous Failure per Hour (PFH)		PFH = 6.4×10^{-9} [1/h]							
Compliance with global standards		Refer to "Compliance with Global Standards and Regulations" on p. 3 in this brochure.							
Structure (IP rating)		Natural cooling, open (IP20)					Force cooling, open (IP20)		
Close mounting ^(Note 5)	3-phase power supply input	Possible							
	1-phase power supply input	Possible				Not possible		-	
Environment	Ambient temperature	Operation: 0 °C to 55 °C (non-freezing), storage: -20 °C to 65 °C (non-freezing)							
	Ambient humidity	Operation/storage: 5 %RH to 90 %RH (non-condensing)							
	Ambience	Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust							
	Altitude	1000 m or less 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]		0.9	0.9	0.9	1.6	1.6	2.1	2.1	

- Notes: 1. Rated output and speed of a servo motor are applicable when the servo amplifier is operated within the specified power supply voltage and frequency.
2. Select the most suitable regenerative option for your system with our capacity selection software.
3. Refer to "Regenerative Option" on p. 16 in this brochure for the permissible regenerative power [W] when a regenerative option is used.
4. When using the dynamic brake, refer to "MR-JE- _BF Servo Amplifier Instruction Manual" for the permissible load to motor inertia ratio.
5. When the servo amplifiers are closely mounted, keep the ambient temperature within 0 °C to 45 °C, or use the servo amplifiers with 75% or less of the effective load ratio.
6. The command communication cycle depends on the controller specifications and the number of axes connected.
7. This value is applicable when a 3-phase power supply is used.
8. When a 1-phase 200 V AC to 240 V AC power supply is used, use the servo amplifiers with 75% or less of the effective load ratio.
9. The safety level depends on the setting value of [Pr. PF18 STO diagnosis error detection time] and whether or not STO input diagnosis is performed by TOFB output. Refer to "MR-JE- _BF Servo Amplifier Instruction Manual" for details.
10. The test pulse is a signal for the external circuit to perform self-diagnosis by turning off the signals to the servo amplifier instantaneously at regular intervals.

MR-JE-BF Standard Wiring Diagram Example



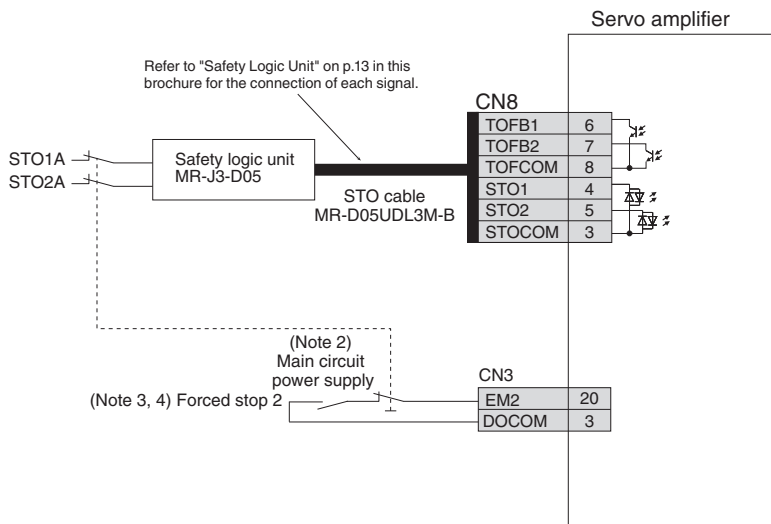
- Notes: 1. For details such as setting the controllers, refer to programming manual or user's manual for the controllers.
 2. Connections for the second and following axes are omitted.
 3. Up to 16 axes are set with the axis selection rotary switch (SW1). Note that the number of the connectable axes depends on the controller specifications.
 4. This is for sink wiring. Source wiring is also possible.
 5. To prevent an unexpected restart of the servo amplifier, create a circuit to turn off EM2 (Forced stop 2) when the main circuit power is turned off.
 6. For convenience of illustration, the diagram shows separate 24 V DC power supplies for input and output signals. However, the input and output signals can share a common power supply.
 7. Be sure to attach a short-circuit connector supplied with the servo amplifier when the STO function is not used.
 8. CN3-2, CN3-12 and CN3-19 pins for input and CN3-9 and CN3-15 pins for output are not assigned in the initial setting. ALM (Malfunction), etc., can be assigned with parameters.



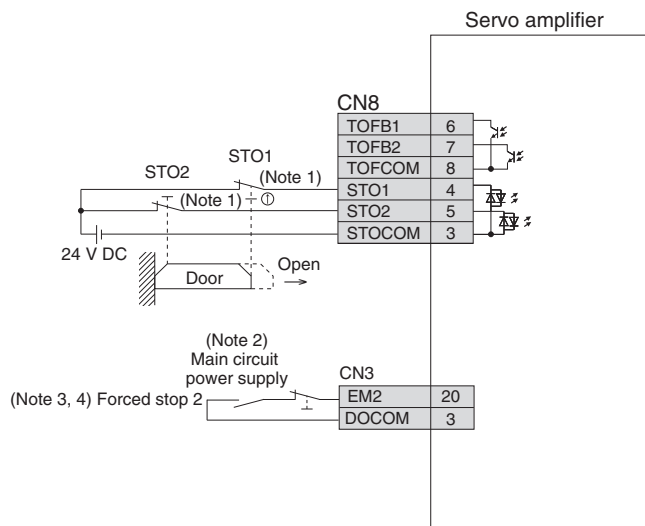
Be sure to read through Instruction Manual for the actual wiring and use. Use the equipment after you have a full knowledge of the equipment, safety information and instructions.

STO I/O Signal Connector (CN8) Connection Example

- When used with MR-J3-D05



- When using a safety door



- Notes:
1. When using the STO function, turn off STO1 and STO2 at the same time. Be sure to turn off STO1 and STO2 after the servo motor stops in servo-off state or after the servo motor stops with deceleration by turning off EM2 (Forced stop 2).
 2. To prevent an unexpected restart of the servo amplifier, create a circuit to turn off EM2 (Forced stop 2) when the main circuit power is turned off.
 3. If the controller does not have a forced stop function, install a forced stop 2 switch (normally closed contact).
 4. Turn on EM2 (Forced stop 2) before starting the operation.

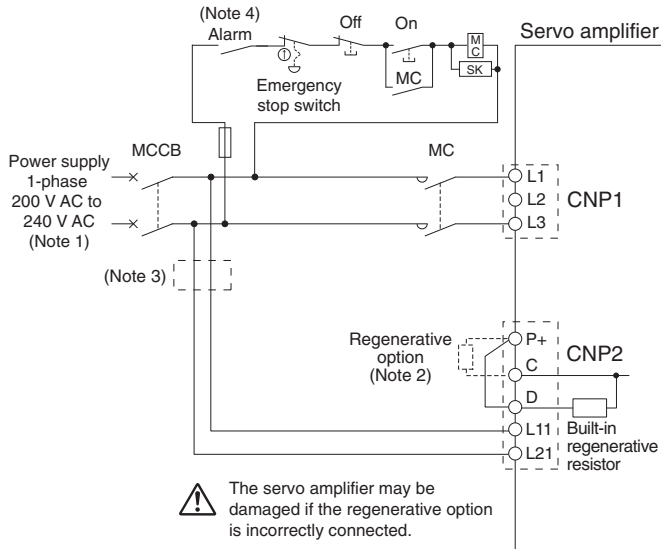


Be sure to read through Instruction Manual for the actual wiring and use. Use the equipment after you have a full knowledge of the equipment, safety information and instructions.

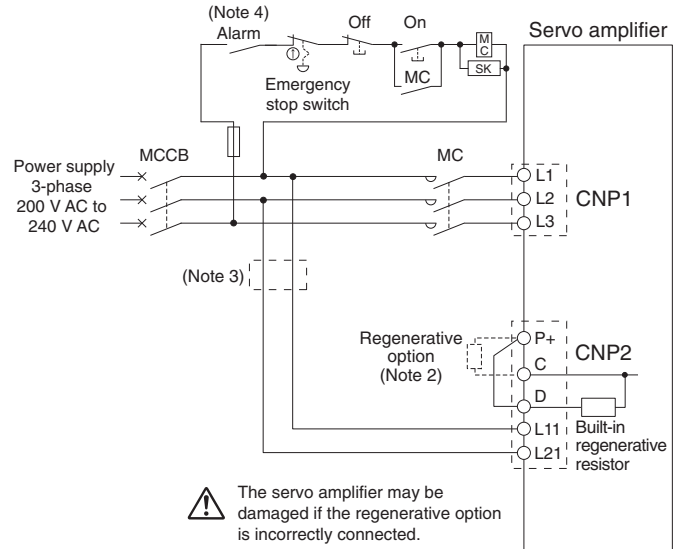
Main/Control Circuit Power Supply Connection Example

●When not using ALM (Malfunction)

For 1-phase 200 V AC

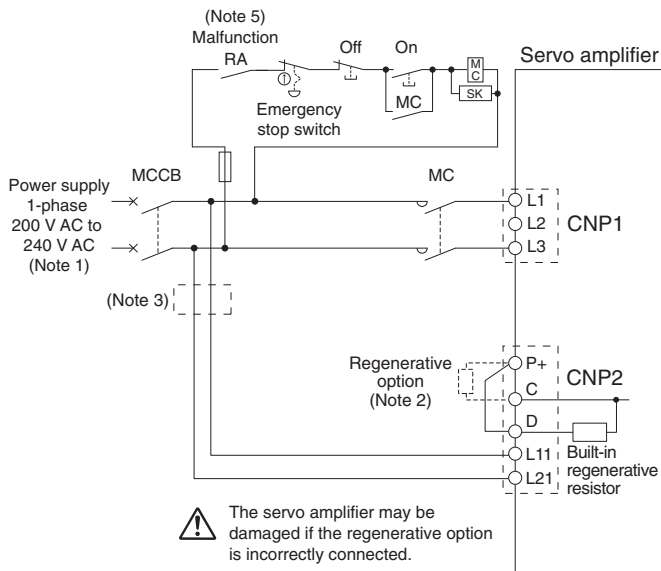


For 3-phase 200 V AC

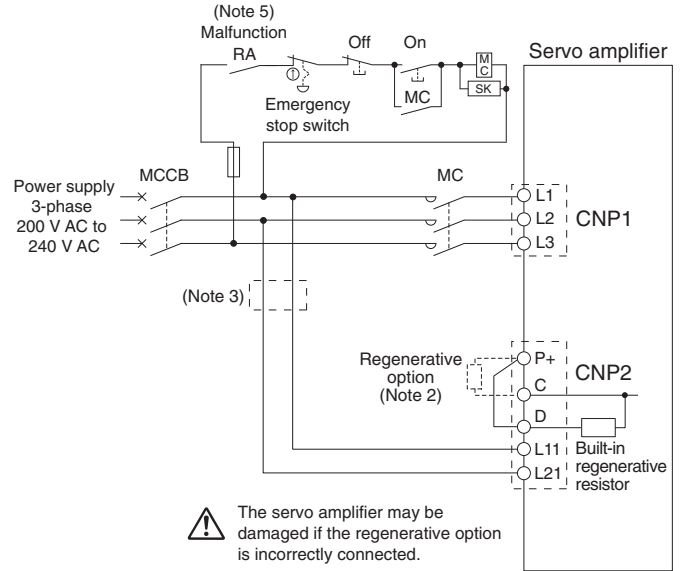


●When using ALM (Malfunction)

For 1-phase 200 V AC



For 3-phase 200 V AC



- Notes: 1. For 1-phase 200 V AC to 240 V AC, connect the power supply to L1 and L3 terminals. Do not connect anything to L2.
 2. Disconnect a short-circuit bar between P+ and D when connecting the regenerative option externally.
 3. When wires used for L11 and L21 are thinner than those for L1, L2, and L3, use a molded-case circuit breaker.
 4. For when an alarm occurs, create a power supply circuit that shuts off the magnetic contactor after the alarm is detected by a controller.
 5. ALM (Malfunction) is not assigned in the initial setting. Assign with [Pr. PD07] to [Pr. PD09].



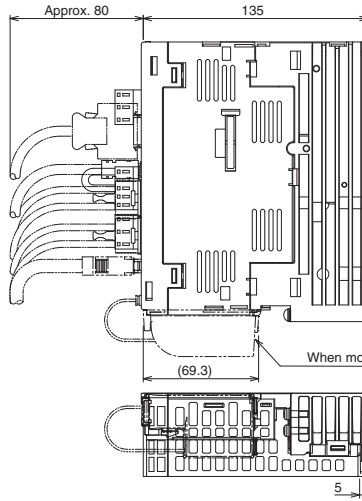
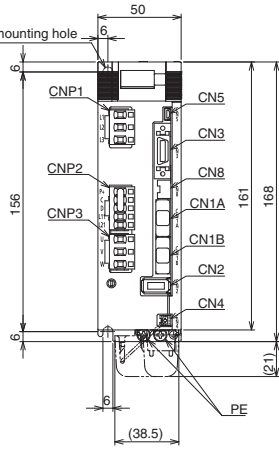
Be sure to read through Instruction Manual for the actual wiring and use. Use the equipment after you have a full knowledge of the equipment, safety information and instructions.

MR-JE-BF Dimensions

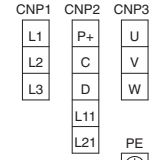
● MR-JE-10BF (Note 1)

● MR-JE-20BF (Note 1)

● MR-JE-40BF (Note 1)



Terminal arrangement



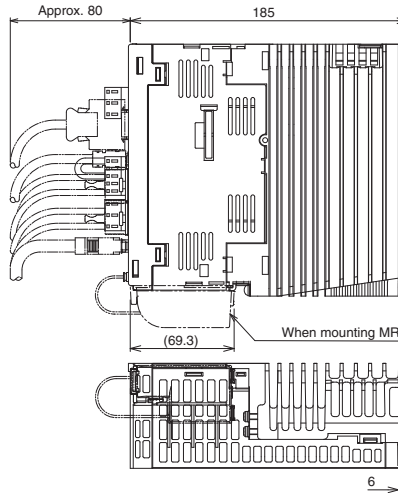
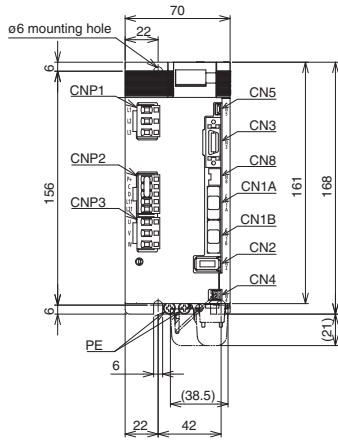
Screw size: M4

Mounting screw size: M5

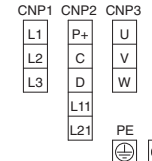
[Unit: mm]

● MR-JE-70BF (Note 1)

● MR-JE-100BF (Note 1)



Terminal arrangement



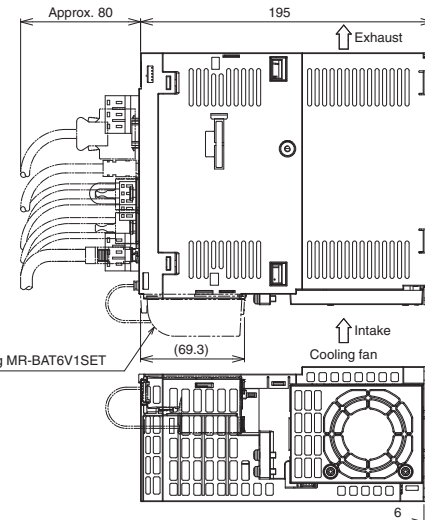
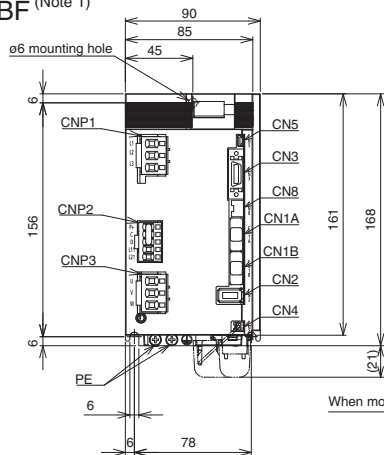
Screw size: M4

Mounting screw size: M5

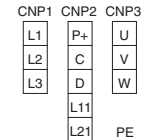
[Unit: mm]

● MR-JE-200BF (Note 1)

● MR-JE-300BF (Note 1)



Terminal arrangement



Screw size: M4

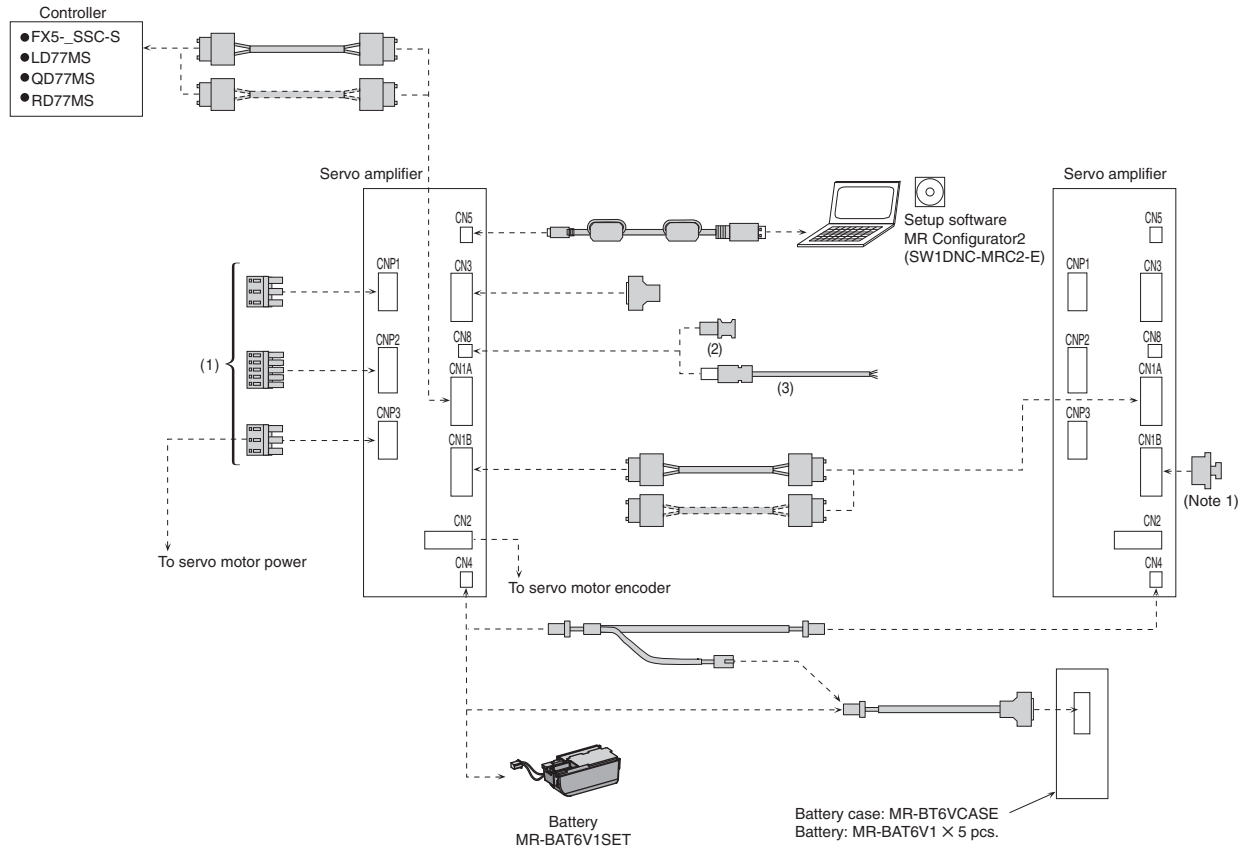
Mounting screw size: M5

[Unit: mm]

Notes: 1. CNP1, CNP2 and CNP3 connectors (insertion type) are supplied with the servo amplifier.

Configuration Example for MR-JE-BF











For connections for other than the servo amplifier power connectors (CNP1, CNP2, and CNP3) and CN8 connector, refer to "MELSERVO-JE catalog (L(NA)03086ENG)."



Notes: 1. Be sure to attach a cap to CN1B connector of the final axis.

Cables and Connectors for MR-JE-BF

Refer to "Details of Optional Connectors for Servo Amplifiers" on p.15 in this brochure for the detailed models.

	Item	Model	Cable length	IP rating	Application	Description
For CNP1/CNP2/CNP3	(1) Servo amplifier power connector set (insertion type)	(Standard accessory)	-	-	For MR-JE-100BF or smaller	CNP1 connector CNP2 connector CNP3 connector Open tool     Applicable wire size (Note 1): AWG 18 to 14 Insulator OD: up to 3.9 mm
					For MR-JE-200BF/ MR-JE-300BF	CNP1 connector CNP2 connector CNP3 connector Open tool     CNP1/CNP3 connector Applicable wire size (Note 1): AWG 16 to 10 Insulator OD: up to 4.7 mm CNP2 connector Applicable wire size (Note 1): AWG 18 to 14 Insulator OD: up to 3.9 mm
For CN8	(2) Short-circuit connector	(Standard accessory)	-	-	For MR-JE- _BF	 This connector is required when the STO function is not used.
	(3) STO cable	MR-D05UDL3M-B	3 m	-	For connecting MR-J3-D05 or other safety control device with MR-JE- _BF	Servo amplifier connector 

Notes: 1. The wire size shows wiring specification of the connector. Refer to "Selection Example in HIV Wires for Servo Motors" on p.18 in this brochure for examples of wire size selection.

Safety Logic Unit (MR-J3-D05)

The safety logic unit has SS1 and STO functions. The servo amplifier achieves Safe stop1 (SS1) when combined with MR-J3-D05 safety logic unit.

Specifications

Safety logic unit model		MR-J3-D05
Control circuit power supply	Voltage	24 V DC
	Permissible voltage fluctuation	24 V DC \pm 10%
	Required current capacity [A]	0.5 ^(Note 1, 2)
Compatible system		2 systems (A-axis, B-axis independent)
Shut-off input		4 points (2 point \times 2 systems) SDI_ : source/sink compatible ^(Note 3)
Shut-off release input		2 points (1 point \times 2 systems) SRES_ : source/sink compatible ^(Note 3)
Feedback input		2 points (1 point \times 2 systems) TOF_ : source compatible ^(Note 3)
Input type		Photocoupler insulation, 24 V DC (external supply), internal limited resistance 5.4 k Ω
Shut-off output		8 points (4 point \times 2 systems) STO_ : source compatible ^(Note 3) SDO_ : source/sink compatible ^(Note 3)
Output type		Photocoupler insulation, open-collector type Permissible current: 40 mA or less per output, Inrush current: 100 mA or less per output
Delay time setting		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: \pm 2%
Functional safety		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, IEC 61508 SIL 2, EN 62061 SIL CL 2, EN 61800-5-2 SIL 2
	Response performance (when delay time is set to 0 s) ^(Note 4)	10 ms or less (STO input OFF \rightarrow shut-off output OFF)
	Mean time to dangerous failure (MTTFd)	MTTFd \geq 100 [years] (516a)
	Average diagnostic coverage (DC _{avg})	DC = Medium, 93.1 [%]
	Probability of dangerous Failure per Hour (PFH)	4.75×10^{-9} [1/h]
Compliance with global standards	CE marking	LVD: EN 61800-5-1 EMC: EN 61800-3 MD: EN ISO 13849-1, EN 61800-5-2, EN 62061
Structure (IP rating)		Natural cooling, open (IP00)
Environment	Ambient temperature	Operation: 0 °C to 55 °C (non-freezing), storage: -20 °C to 65 °C (non-freezing)
	Ambient humidity	Operation/storage: 5 %RH to 90 %RH (non-condensing)
	Ambience	Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust
	Altitude	1000 m or less 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)

Notes: 1. Inrush current of approximately 1.5 A flows instantaneously when the power is switched on. Select an appropriate capacity of a power supply considering the inrush current.

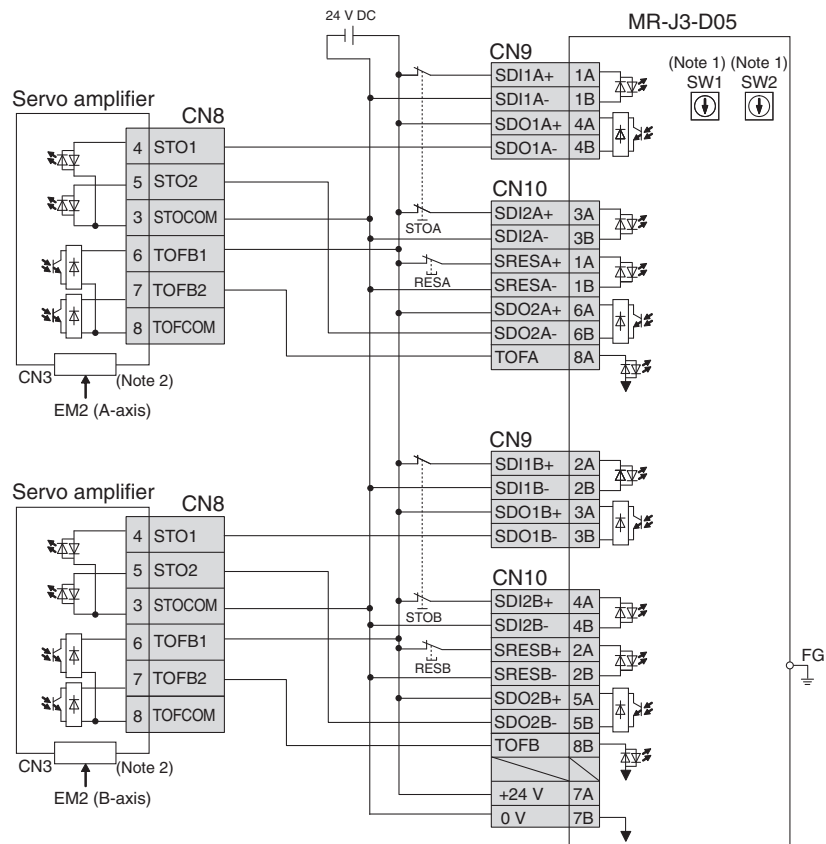
2. Power-on duration of the safety logic unit is 100,000 times.

3. _ in signal name represents a symbol which indicates a number and axis name.

4. Contact your local sales office for test pulse input.

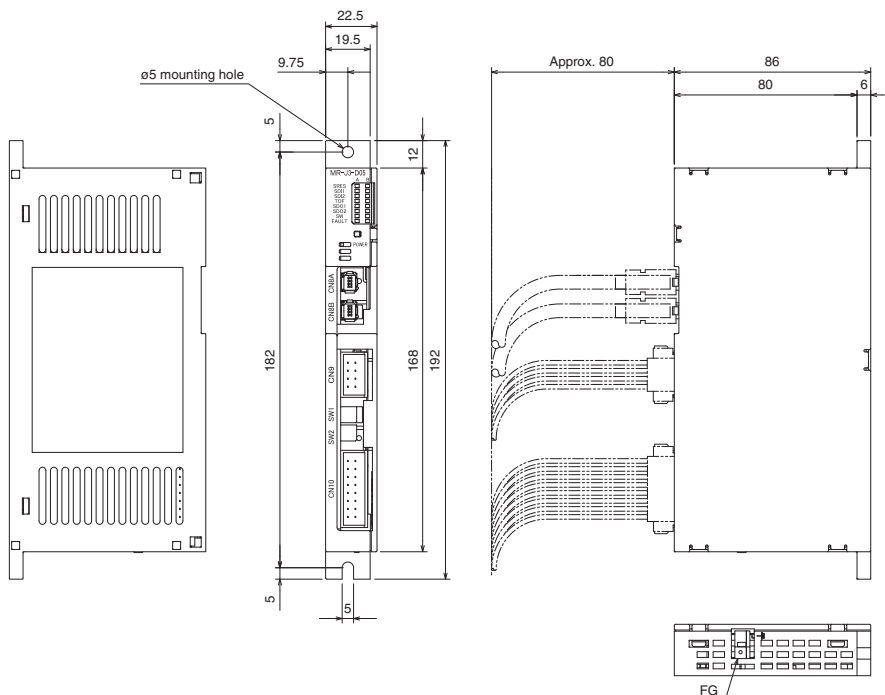
Safety Logic Unit (MR-J3-D05)

Connection Example



- Notes: 1. Set delay time of STO output with SW1 and SW2.
 2. This connection is for source interface.

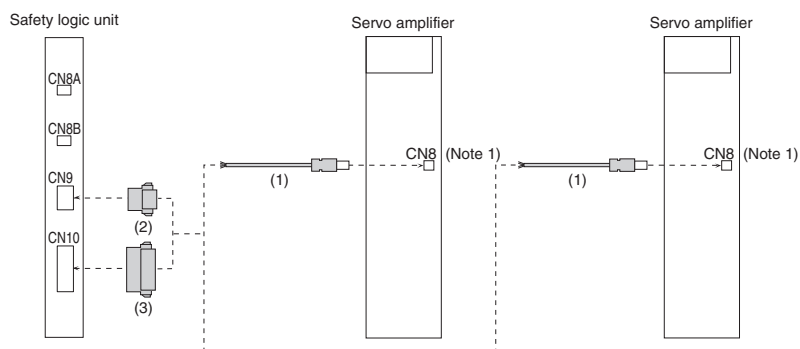
Dimensions



Mounting screw size: M4

[Unit: mm]




Configuration Example for MR-J3-D05







Notes: 1. Be sure to attach a short-circuit connector supplied with the servo amplifier when the STO function is not used.





Cables and Connectors for MR-J3-D05

Refer to "Details of Optional Connectors for MR-J3-D05" on p.15 in this brochure for the detailed models.


	Item	Model	Cable length	IP rating	Application	Description
For CN8	(1) STO cable	MR-D05UDL3M-B	3 m	-	For connecting MR-J3-D05 or other safety control device with MR-JE-_BF	 Servo amplifier connector
For CN9	(2) Connector	(Standard accessory of MR-J3-D05)	-	-	For MR-J3-D05	 Safety logic unit connector
For CN10	(3) Connector	(Standard accessory of MR-J3-D05)	-	-	For MR-J3-D05	 Safety logic unit connector


Details of Optional Connectors for Servo Amplifiers


Model	CNP1 connector	CNP2 connector	CNP3 connector	Open tool
Servo amplifier power connector set For MR-JE-100BF or smaller (Standard accessory)	 03JFAT-SAYGDK-H7.5 (J.S.T. Mfg. Co., Ltd.)	 05JFAT-SAXGDK-H5.0 (J.S.T. Mfg. Co., Ltd.)	 03JFAT-SAXGDK-H7.5 (J.S.T. Mfg. Co., Ltd.)	 J-FAT-OT (N) (J.S.T. Mfg. Co., Ltd.)

Model	CNP1 connector	CNP2 connector	CNP3 connector	Open tool
Servo amplifier power connector set For MR-JE-200BF/MR-JE-300BF (Standard accessory)	 03JFAT-SAYGFK-XL (J.S.T. Mfg. Co., Ltd.)	 05JFAT-SAXGDK-H5.0 (J.S.T. Mfg. Co., Ltd.)	 03JFAT-SAXGFK-XL (J.S.T. Mfg. Co., Ltd.)	 J-FAT-OT-EXL (J.S.T. Mfg. Co., Ltd.)

Details of Optional Connectors for MR-J3-D05

Model	Servo amplifier connector
MR-D05UDL3M-B	 Connector set: 2069250-1 (TE Connectivity Ltd. Company)

Model	Safety logic unit connector
Connector for CN9 of safety logic unit (Standard accessory of MR-J3-D05)	 Connector: 1-1871940-4 (TE Connectivity Ltd. Company)

Model	Safety logic unit connector
Connector for CN10 of safety logic unit (Standard accessory of MR-J3-D05)	 Connector: 1-1871940-8 (TE Connectivity Ltd. Company)

Regenerative Option

Servo amplifier model	Permissible regenerative power [W] ^(Note 2)				
	Built-in regenerative resistor	Regenerative option ^(Note 3)			
		MR-RB032	MR-RB12	MR-RB30	MR-RB50 ^(Note 1)
MR-JE-10BF	-	40 Ω	40 Ω	13 Ω	13 Ω
MR-JE-20BF	-	30	-	-	-
MR-JE-20BF	-	30	100	-	-
MR-JE-40BF	10	30	100	-	-
MR-JE-70BF	20	30	100	-	-
MR-JE-100BF	20	30	100	-	-
MR-JE-200BF	100	-	-	300	500
MR-JE-300BF	100	-	-	300	500

Notes: 1. Be sure to cool the unit forcibly with a cooling fan (92 mm × 92 mm, minimum air flow: 1.0 m³/min). The cooling fan must be prepared by user.

2. The power values in this table are resistor-generated powers, not rated powers.

3. For dimensions and connections, refer to "MELSERVO-JE catalog (L(NA)03086ENG)."

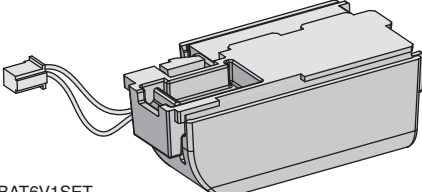
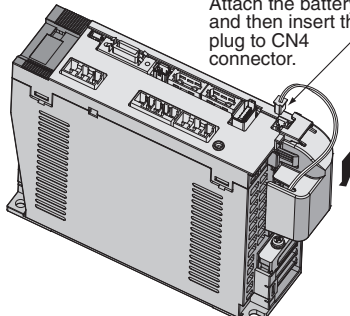
* Cautions when connecting the regenerative option

1. The regenerative option causes a temperature rise of 100 °C or higher relative to the ambient temperature. Fully examine heat dissipation, installation position, wires used before installing the unit. Use flame-retardant wires or apply flame retardant on wires, and keep the wires clear of the unit.
2. Use twisted wires for connecting the regenerative option to the servo amplifier, and keep the wire length to a maximum of 5 m.
3. Use twisted wires for connecting a thermal sensor, and make sure that the sensor does not fail to work properly due to induction noise.

Battery (MR-BAT6V1SET) ^(Note 1)

The absolute position data can be retained when the battery is mounted on the servo amplifier. MR-BAT6V1SET is reusable by replacing the built-in MR-BAT6V1 batteries.

MR-BAT6V1SET is not required for the incremental system.

Appearance	Mounting method
 <p>Model: MR-BAT6V1SET Nominal voltage: 6 V Nominal capacity: 1650 mAh Lithium content: 1.2 g Primary battery: 2CR17335A (CR17335A × 2 pcs. in series) Mass: 55 g</p>	 <p>Attach the battery, and then insert the plug to CN4 connector.</p>

Notes: 1. MR-BAT6V1 is an assembled battery composed of lithium metal batteries of CR17335A. This battery is not subject to the dangerous goods (Class 9) of the UN Recommendations. To transport lithium metal batteries and lithium metal batteries contained in equipment, take actions to comply with the following regulations: the United Nations Recommendations on the Transport of Dangerous Goods, the Technical Instruction (ICAO-TI) by the International Civil Aviation Organization (ICAO), and the International Maritime Dangerous Goods Code (IMDG Code) by the International Maritime Organization (IMO). To transport the batteries, check the latest standards or the laws of the destination country and take actions. Contact your local sales office for more details.

EMC Filter

The following filters are recommended as a filter compliant with the EMC directive for the power supply of the servo amplifier.

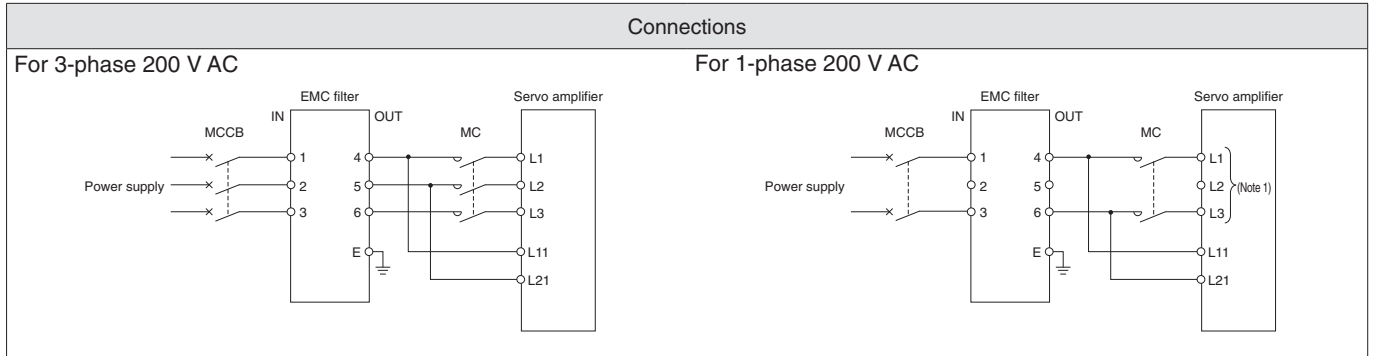
Servo amplifier model	EMC filter model ^(Note 1, 3, 4)	Rated current [A]	Rated voltage [V AC]	Leakage current [mA]	Mass [kg]
MR-JE-10BF to MR-JE-100BF	HF3010A-UN ^(Note 2)	10	250	5	3.5
MR-JE-200BF, MR-JE-300BF	HF3030A-UN ^(Note 2)	30	250	5	5.5

Notes: 1. Manufactured by Soshin Electric Co., Ltd.

2. A surge protector is separately required to use this EMC filter. Refer to "EMC Installation Guidelines."

3. When using the EMC filter, install one EMC filter for each servo amplifier.

4. For dimensions, refer to "MELSERVO-JE catalog (L(NA)03086ENG)."



Notes: 1. Connect the power supply to L1 and L3 terminals. Do not connect anything to L2.

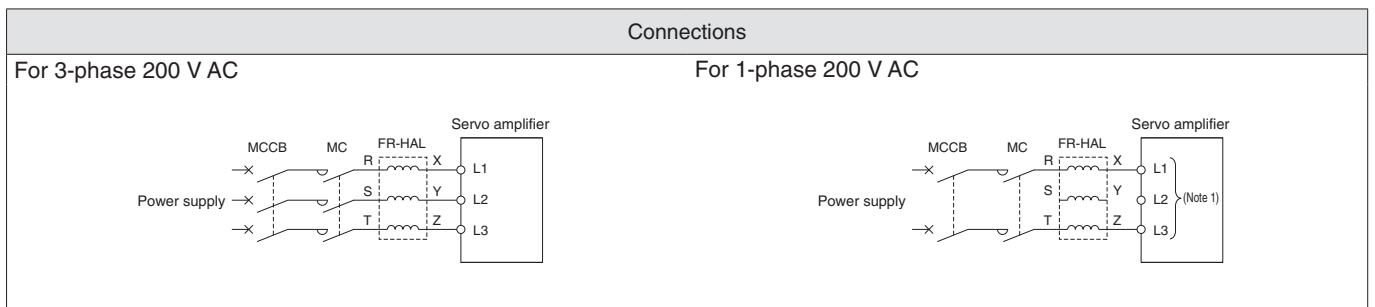
Power Factor Improving AC Reactor (FR-HAL)

This boosts the power factor of servo amplifier and reduces the power supply capacity.

Servo amplifier model	Power factor improving AC reactor model ^(Note 1, 2)
MR-JE-10BF MR-JE-20BF	FR-HAL-0.4K
MR-JE-40BF	FR-HAL-0.75K
MR-JE-70BF	FR-HAL-1.5K
MR-JE-100BF (3-phase power supply input)	FR-HAL-2.2K
MR-JE-100BF (1-phase power supply input) MR-JE-200BF (3-phase power supply input)	FR-HAL-3.7K
MR-JE-200BF (1-phase power supply input) MR-JE-300BF	FR-HAL-5.5K

Notes: 1. When using the power factor improving AC reactor, install one reactor for each servo amplifier.

2. For dimensions, refer to "MELSERVO-JE catalog (L(NA)03086ENG)."



Notes: 1. Connect the power supply to L1 and L3 terminals. Do not connect anything to L2.

Wires, Molded-Case Circuit Breakers and Magnetic Contactors

The following are examples of wire sizes when 600 V grade heat-resistant polyvinyl chloride insulated wires (HIV wires) are used. The wire size for U, V, W, and ⊕ varies depending on the servo motor. Refer to "Selection Example in HIV Wires for Servo Motors" for details on wires for each servo motor.

Servo amplifier model	Molded-case circuit breaker (Note 4, 5)	Magnetic contactor (Note 2, 5)	Wire size [mm ²] (Note 4)			
			L1, L2, L3, ⊕	L11, L21	P+, C	U, V, W, ⊕
MR-JE-10BF	30 A frame 5 A (30 A frame 5 A)	S-T10	2 (AWG 14)	1.25 to 2 (AWG 16 to 14)	2 (AWG 14) (Note 1)	AWG 18 to 14 (Note 3)
MR-JE-20BF	30 A frame 5 A (30 A frame 5 A)	S-T10				
MR-JE-40BF	30 A frame 10 A (30 A frame 5 A)	S-T10				
MR-JE-70BF	30 A frame 15 A (30 A frame 10 A)	S-T10				
MR-JE-100BF (3-phase power supply input)	30 A frame 15 A (30 A frame 10 A)	S-T10				
MR-JE-100BF (1-phase power supply input)	30 A frame 15 A (30 A frame 15 A)	S-T10				
MR-JE-200BF (3-phase power supply input)	30 A frame 20 A (30 A frame 20 A)	S-T21	3.5 (AWG 12)			AWG 16 to 10 (Note 3)
MR-JE-200BF (1-phase power supply input)	30 A frame 20 A (30 A frame 20 A)	S-T21				
MR-JE-300BF	30 A frame 30 A (30 A frame 30 A)	S-T21				

- Notes: 1. Keep the wire length to the regenerative option within 5 m.
2. Be sure to use a magnetic contactor with an operation delay time of 80 ms or less. The operation delay time is the time interval from current being applied to the coil until closure of contacts.
3. The wire size shows applicable size for the servo amplifier connector.
4. When complying with IEC/EN/UL/CSA standard, refer to "MELSERVO-JE MR-JE-_BF Servo amplifier Instructions and Cautions for Safe Use of AC Servos" enclosed with the servo amplifier. When using a power improving reactor, use a molded-case circuit breaker listed in the brackets.
5. Install one molded-case circuit breaker and one magnetic contactor for each servo amplifier.

Selection Example in HIV Wires for Servo Motors

The following are examples of wire sizes when 600 V grade heat-resistant polyvinyl chloride insulated wires (HIV wires) with a length of 30 m are used. Refer to "HG-KN HG-SN Servo Motor Instruction Manual" when using cab-tire cables for supplying power (U, V, and W) to HG-SN series.

Servo motor model	Wire size [mm ²]	
	For power and grounding (U, V, W, ⊕) (general environment)	For electromagnetic brake (B1, B2)
HG-KN13(B)J, 23(B)J, 43(B)J, 73(B)J	0.75 (AWG 18) (Note 1, 2, 3)	0.5 (AWG 20) (Note 4, 6)
HG-SN52(B)J, 102(B)J	1.25 (AWG 16) (Note 5)	1.25 (AWG 16)
HG-SN152(B)J, 202(B)J	2 (AWG 14)	
HG-SN302(B)J	3.5 (AWG 12)	

- Notes: 1. Use a fluorine resin wire of 0.75 mm² (AWG 18) for wiring to the servo motor power connector.
2. This size is applicable for wiring length of 10 m or shorter. For over 10 m, use MR-PWS2CBL03M-A_-L and extend it with HIV wire of 1.25 mm² (AWG 16).
3. When complying with UL/CSA standard, extend the wire using MR-PWS2CBL03M-A_-L and HIV wire of 2 mm² (AWG 14).
4. Use a fluorine resin wire of 0.5 mm² (AWG 20) when connecting to servo motor electromagnetic brake connector.
5. When complying with UL/CSA standard, use 2 mm² (AWG 14). Refer to "HG-KN HG-SN Servo Motor Instruction Manual" for the details.
6. This size is applicable for wiring length of 10 m or shorter. For over 10 m, extend the wire with HIV wire of 1.25 mm² (AWG 16).

Product List

Servo amplifiers

Item	Model	Rated output	Main circuit power supply
MR-JE-BF	MR-JE-10BF	0.1 kW	3-phase or 1-phase 200 V AC to 240 V AC
	MR-JE-20BF	0.2 kW	3-phase or 1-phase 200 V AC to 240 V AC
	MR-JE-40BF	0.4 kW	3-phase or 1-phase 200 V AC to 240 V AC
	MR-JE-70BF	0.75 kW	3-phase or 1-phase 200 V AC to 240 V AC
	MR-JE-100BF	1 kW	3-phase or 1-phase 200 V AC to 240 V AC
	MR-JE-200BF	2 kW	3-phase or 1-phase 200 V AC to 240 V AC
	MR-JE-300BF	3 kW	3-phase 200 V AC to 240 V AC

Battery

Item	Model	Application
Battery	MR-BAT6V1SET	For MR-JE-_BF

Peripheral unit

Item	Model	Application
Safety logic unit	MR-J3-D05	For MR-JE-_BF

Peripheral cable

Item	Model	Length	Application
STO cable	MR-D05UDL3M-B	3 m	For MR-JE-_BF

For safety standard certification

Even though MR-JE-BF servo amplifier and MR-J3-D05 safety logic unit are certified to various safety standards, this does not guarantee that the systems in which they are installed will also be certified. The entire system shall observe the following:

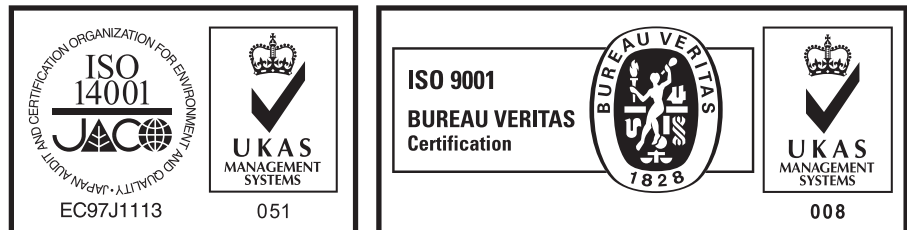
- (1) For safety circuits, use parts and/or devices whose safety are confirmed or which satisfy safety standards.
- (2) For details regarding the use of the servo amplifiers and other cautionary information, refer to relevant Servo Amplifier Instruction Manual.
- (3) Perform risk assessment on the entire machine/system. It is recommended that you use a Certification Body for final safety certification.

General-Purpose AC Servo MELSERVO-JE Series

Servo Amplifier MR-JE-BF

Country/Region	Sales office	Tel/Fax
USA	Mitsubishi Electric Automation, Inc. 500 Corporate Woods Parkway, Vernon Hills, IL 60061, U.S.A.	Tel : +1-847-478-2100 Fax : +1-847-478-2253
Mexico	Mitsubishi Electric Automation, Inc. Mexico Branch Mariano Escobedo #69, Col.Zona Industrial, Tlalnepantla Edo. Mexico, C.P.54030	Tel : +52-55-3067-7500 Fax : -
Brazil	Mitsubishi Electric do Brasil Comercio e Servicos Ltda. Avenida Adelino Cardana, 293, 21 andar, Bethaville, Barueri SP, Brazil	Tel : +55-11-4689-3000 Fax : +55-11-4689-3016
Germany	Mitsubishi Electric Europe B.V. German Branch Mitsubishi-Electric-Platz 1, 40882 Ratingen, Germany	Tel : +49-2102-486-0 Fax : +49-2102-486-1120
UK	Mitsubishi Electric Europe B.V. UK Branch Travellers Lane, UK-Hatfield, Hertfordshire, AL10 8XB, U.K.	Tel : +44-1707-28-8780 Fax : +44-1707-27-8695
Italy	Mitsubishi Electric Europe B.V. Italian Branch Centro Direzionale Colleoni - Palazzo Sirio, Viale Colleoni 7, 20864 Agrate Brianza (MB), Italy	Tel : +39-039-60531 Fax : +39-039-6053-312
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Czech Republic	Mitsubishi Electric Europe B.V. Czech Branch Avenir Business Park, Radlicka 751/113e, 158 00 Praha 5, Czech Republic	Tel : +420-251-551-470 Fax : +420-251-551-471
Poland	Mitsubishi Electric Europe B.V. Polish Branch ul. Krakowska 50, 32-083 Balice, Poland	Tel : +48-12-347-65-00 Fax : +48-12-630-47-01
Russia	Mitsubishi Electric (Russia) LLC St. Petersburg Branch Piskarevsky pr. 2, bld 2, lit "Sch", BC "Benua", office 720; 195027 St. Petersburg, Russia	Tel : +7-812-633-3497 Fax : +7-812-633-3499
Sweden	Mitsubishi Electric Europe B.V. (Scandinavia) Fjellievagen 8, SE-22736 Lund, Sweden	Tel : +46-8-625-10-00 Fax : +46-46-39-70-18
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South Africa	Adroit Technologies 20 Waterford Office Park, 189 Witkoppen Road, Fourways, South Africa	Tel : +27-11-658-8100 Fax : +27-11-658-8101
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Taiwan	SETSUYO ENTERPRISE CO., LTD. 6F, No.105, Wugong 3rd Road, Wugu District, New Taipei City 24889, Taiwan	Tel : +886-2-2299-2499 Fax : +886-2-2299-2509
Korea	Mitsubishi Electric Automation Korea Co., Ltd. 7F-9F, Gangseo Hangang Xi-tower A, 401, Yangcheon-ro, Gangseo-Gu, Seoul 07528, Korea	Tel : +82-2-3660-9510 Fax : +82-2-3664-8372/8335
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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 Bangpongpan, Khet Yannawa, Bangkok 10120, Thailand	Tel : +66-2682-6522 to 6531 Fax : +66-2682-6020
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Vietnam	Mitsubishi Electric Vietnam Company Limited Unit 01-04, 10th Floor, Vincom Center, 72 Le Thanh Ton Street, District 1, Ho Chi Minh City, Vietnam	Tel : +84-8-3910-5945 Fax : +84-8-3910-5947
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 Fax : +91-20-2710-2100
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