MITSUBISHI ELECTRIC
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Automating the World

FACTORY AUTOMATION

New Product Release

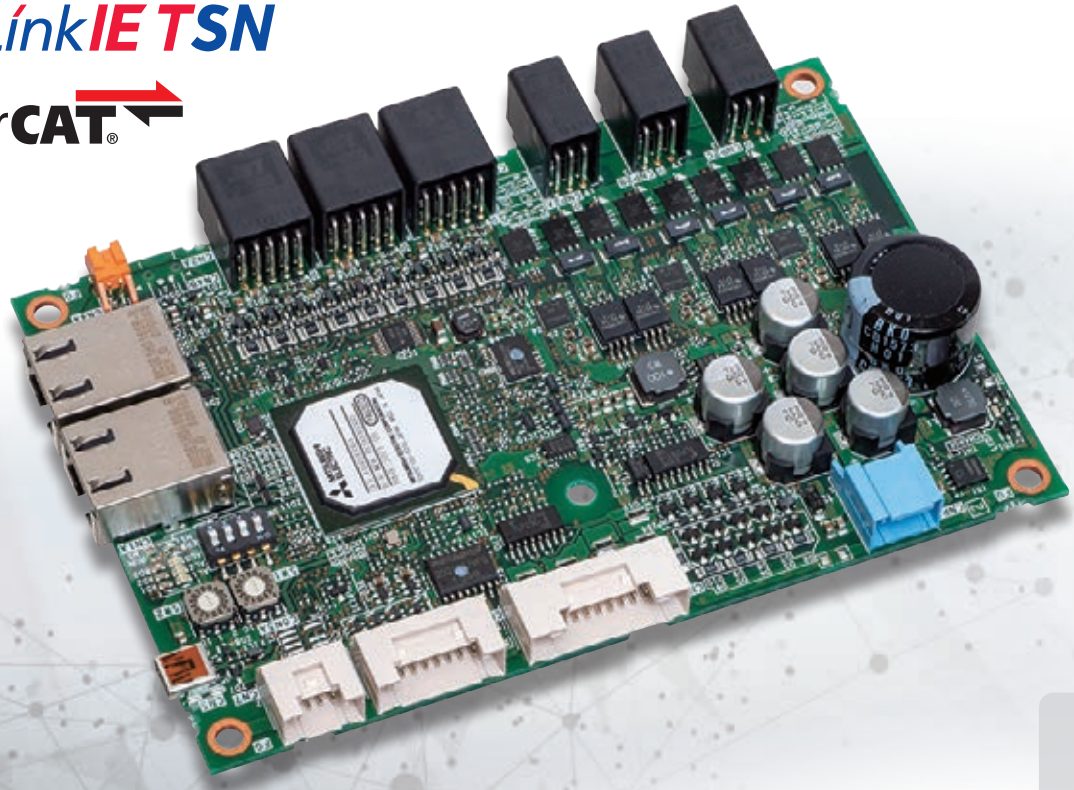
June 2025 [SV2506-2E]

AC Servo System Board-Type 3-Axis Servo Amplifier

MR-MD333G(-N1)

CC-Link IE TSN

EtherCAT®



The board-type servo amplifier features MELSERVO-J5 series functions

- Main circuit power supply: 48 V DC, Control circuit power supply: 24 V DC/48 V DC
- Requires little installation space and less wiring by controlling three axes with one board
- Has a vibration resistance of 39 m/s^2* in three directions, allowing installation on machine moving parts
- Supports CC-Link IE TSN/EtherCAT®, enabling system configuration on the same network with MR-J5-G(-N1)
- Features MELSERVO-J5 series functions such as "quick tuning" and "one-touch tuning"

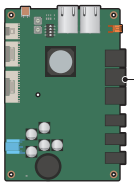
* The vibration resistance of 39 m/s^2 is applicable under continuous vibration of 10 Hz to 55 Hz (directions of X, Y, and Z axes).

Compact Machine

The compact servo motors combined with the board-type servo amplifiers (3-axis with CC-Link IE TSN/EtherCAT® interface) reduce the size of your machines.

HG-AK/HK-KT

CC-Link IE TSN EtherCAT

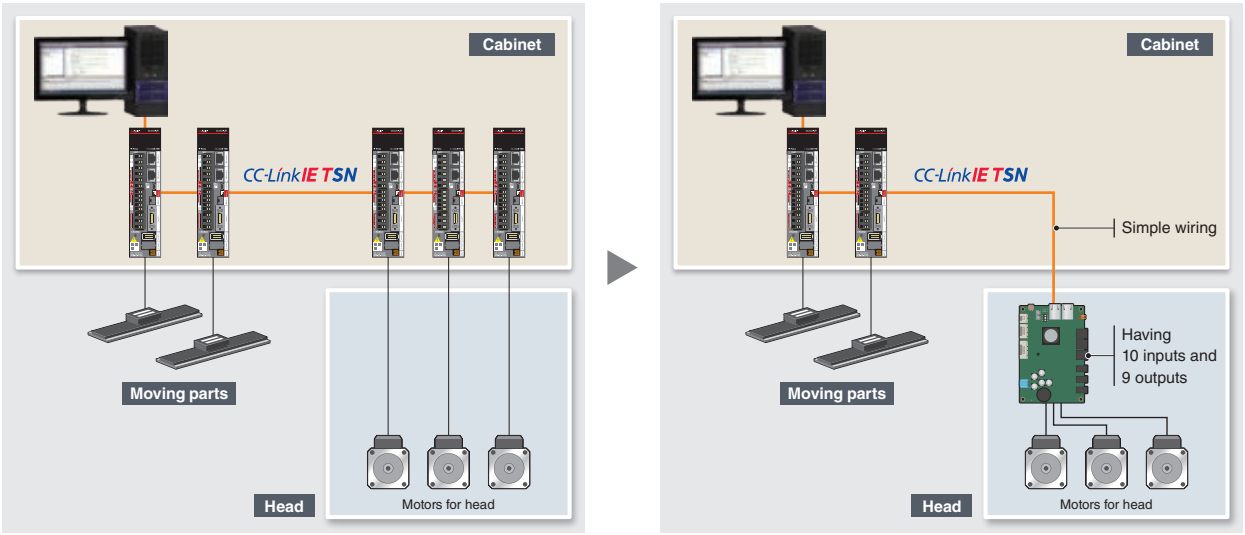


MR-MD333G(-N1) NEW

[unit: mm]

Simplified Wiring

MR-MD333G can be installed to a machine moving part (head), which makes the wiring to the motors for the head shorter and lighter.



When the servo amplifier MR-J5-G is used:

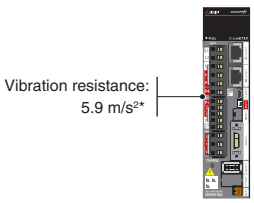
- The head for multi-axis applications, which requires encoder and motor power supply cables for each axis, uses a large number of long cables.
- The cable weight tends to be heavier.

When the board-type 3-axis servo amplifier MR-MD333G is used:

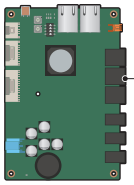
- Wiring between the cabinet and the head can be simplified by using only an Ethernet cable and a DC power cable.
- The wiring can be lighter and shorter.

Improved Vibration Resistance

MR-MD333G is designed to be installed to a machine moving part (head).
MR-MD333G with a vibration resistance of 39 m/s² is more suitable for vibration environment than MR-J5 series with 5.9 m/s².



MR-J5

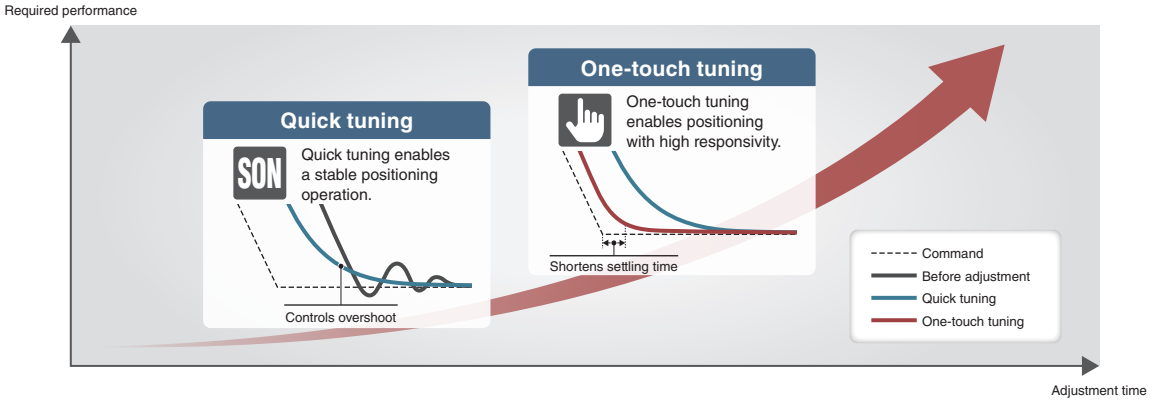


MR-MD333G

* Under continuous vibration of 10 Hz to 55 Hz (directions of X, Y, and Z axes).

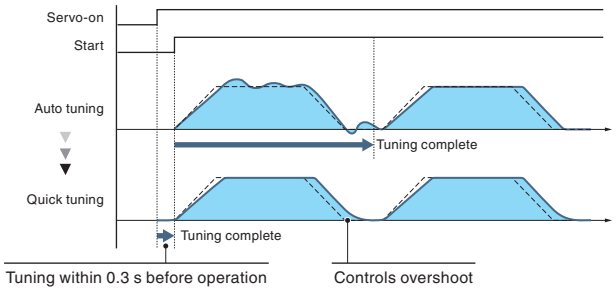
Tuning Functions

MR-MD333G features the same tuning functions as MELSERVO-J5 series.
Use the tuning methods that are optimal for your machines.



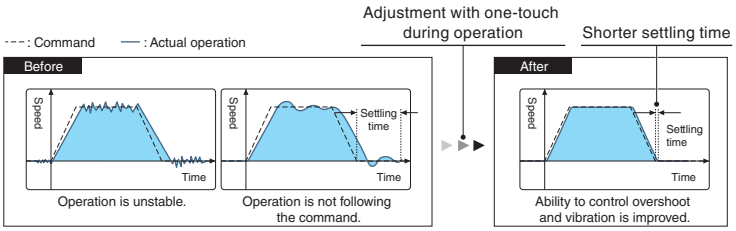
Quick Tuning

This function automatically performs easy-to-use auto tuning that controls vibration and overshoot just by turning on the servo-on command. Before normal operation, the servo amplifier sets control gain and machine resonance suppression filters in 0.3 seconds by inputting torque to the servo motor automatically. After completing the setting, the servo amplifier starts operation normally.



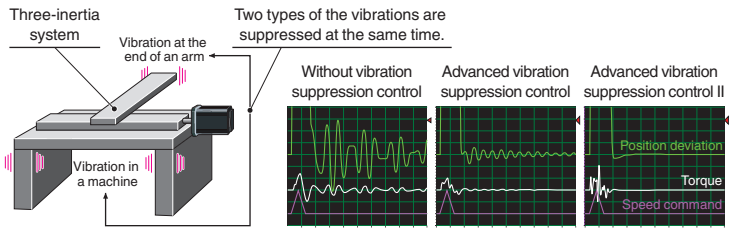
One-Touch Tuning

This function automatically completes servo gain adjustment according to the mechanical characteristics and reduces the settling time just by turning on the one-touch tuning. The servo gain adjustment includes the machine resonance suppression filter, advanced vibration suppression control II, and the robust filter. Controlling overshoot and vibration is improved, maximizing your machine performance.



Advanced Vibration Suppression Control II

This function suppresses two types of low frequency vibrations, owing to vibration suppression algorithm which supports three-inertia system. This function is effective in suppressing residual vibration with relatively low frequency of approximately 100 Hz or less generated at the end of an arm and in a machine, enabling a shorter settling time. Adjustment is easily performed on MR Configurator2.



Command Notch Filter

The frequency can be set close to the machine vibration frequency because the command notch filter has an applicable frequency range between approximately 1 Hz and 2000 Hz.

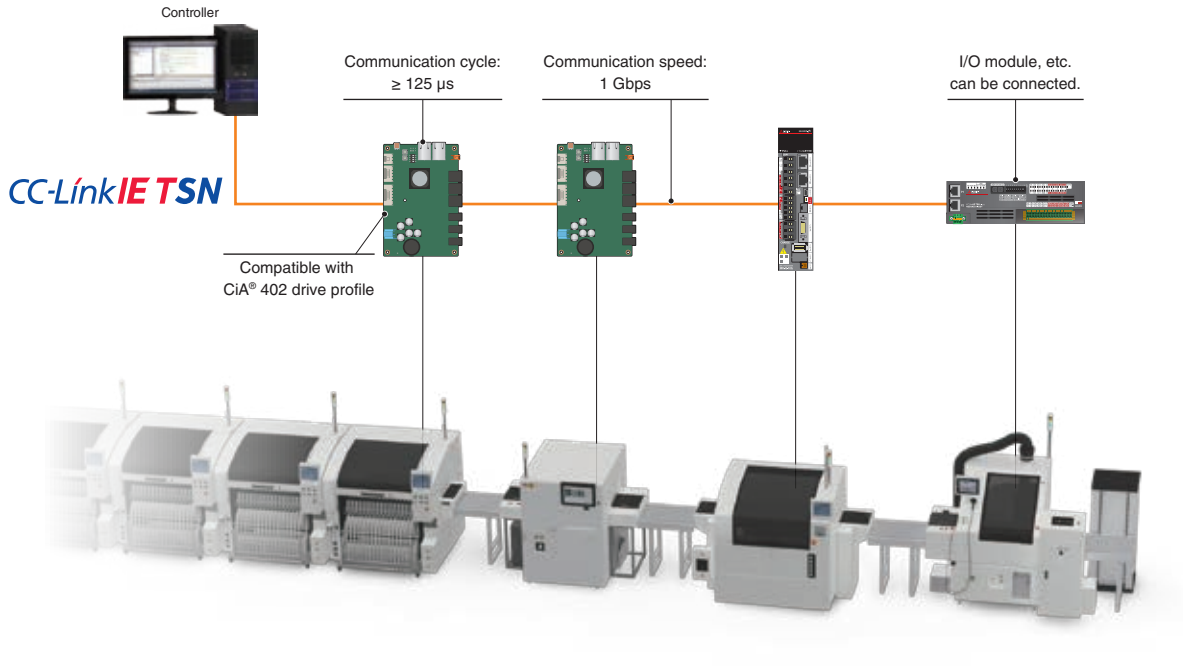
Machine Resonance Suppression Filter

The expanded applicable frequency range is between 10 Hz and 8000 Hz. Five filters are simultaneously applicable, improving vibration suppression performance of a machine. The machine resonance frequency is detected by the machine analyzer function in MR Configurator2.

Command Interface

CC-Link IE TSN

MR-MD333G supports CC-Link IE TSN.
The servo amplifiers drive the servo motors by receiving commands (position/velocity/torque) at regular intervals in synchronous communication with the CC-Link IE TSN-compatible controller.
The servo amplifiers enable exact synchronous operation of axes and machines through high-speed, high-precision time synchronization.
The servo amplifiers support CiA® 402 drive profile and enable the profile mode (position) and the positioning mode (point table).
When combined with the controllers supporting the profile mode, the servo amplifiers generate a positioning command to a target position, reducing loads of the controllers.



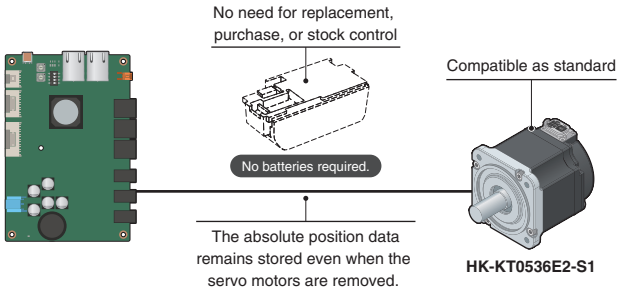
EtherCAT®

MR-MD333G-N1 supports EtherCAT®.
MR-MD333G-N1 supports the same profiles as MR-J5 servo amplifiers.

Communication specification	CANopen® over EtherCAT® (CoE) Ethernet over EtherCAT® (EoE)
Drive profile	CiA® 402
Communication cycle	250 µs, 500 µs, 1 ms, 2 ms, 4 ms, 8 ms
Control mode	Cyclic synchronous position mode (csp)
	Cyclic synchronous velocity mode (csv)
	Cyclic synchronous torque mode (cst)
	Profile position mode (pp)
	Homing mode (hm)

Compatible Servo Motors

MR-MD333G is compatible with HK-KT0536E2-S1 equipped with a 26-bit resolution batteryless absolute position encoder as standard and the ultra-compact HG-AK series.



Application Examples

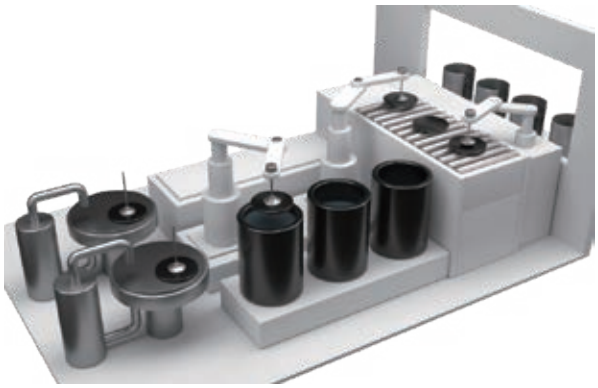
- The board-type servo amplifier and the compact servo motor are suitable for a compact machine and a machine head.
- The servo amplifier supports CC-Link IE TSN/EtherCAT®, which enables configuring a system on the same network with MR-J5-G(-N1) servo amplifiers, I/O modules, and other devices.
- The high-performance servo amplifier enables shorter cycle time.

Mounters/Bonders

[Machine head]

- Vibration suppression control suppresses machine vibrations, enabling shorter cycle time.
- The high-resolution encoder achieves high-accuracy positioning.

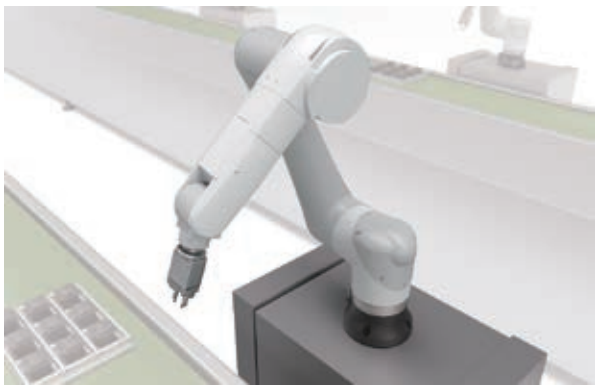
Semiconductor/FPD manufacturing systems



[Compact machine handling axis]

- The board-type servo amplifiers/ultra-compact servo motors enable compact machine.
- The high-resolution encoder achieves high-accuracy positioning.

Compact robots



[Compact robot joint drive and hand]

- The 3-axis servo amplifier is suitable for multiple-joint articulated robots.
- Vibration suppression control suppresses machine vibrations, enabling shorter cycle time.

Electronic component manufacturing machines

[Multi-point positioning]

- Replacement of pneumatic equipment by servo contributes to energy savings.

Compact X-Y tables | Inspection systems | Processing machines | Electronic devices assembling systems

Photovoltaic manufacturing systems | Compact actuators | Screw tightening systems | Others

Model Designation for Servo Amplifier

M R - M D 3 3 3 G - ___

AC servo system
Board-type
3-axis servo amplifier

Symbol	Interface
G	Network compatible

Symbol	Special specifications
None	CC-Link IE TSN-compatible standard
N1	EtherCAT®-compatible standard

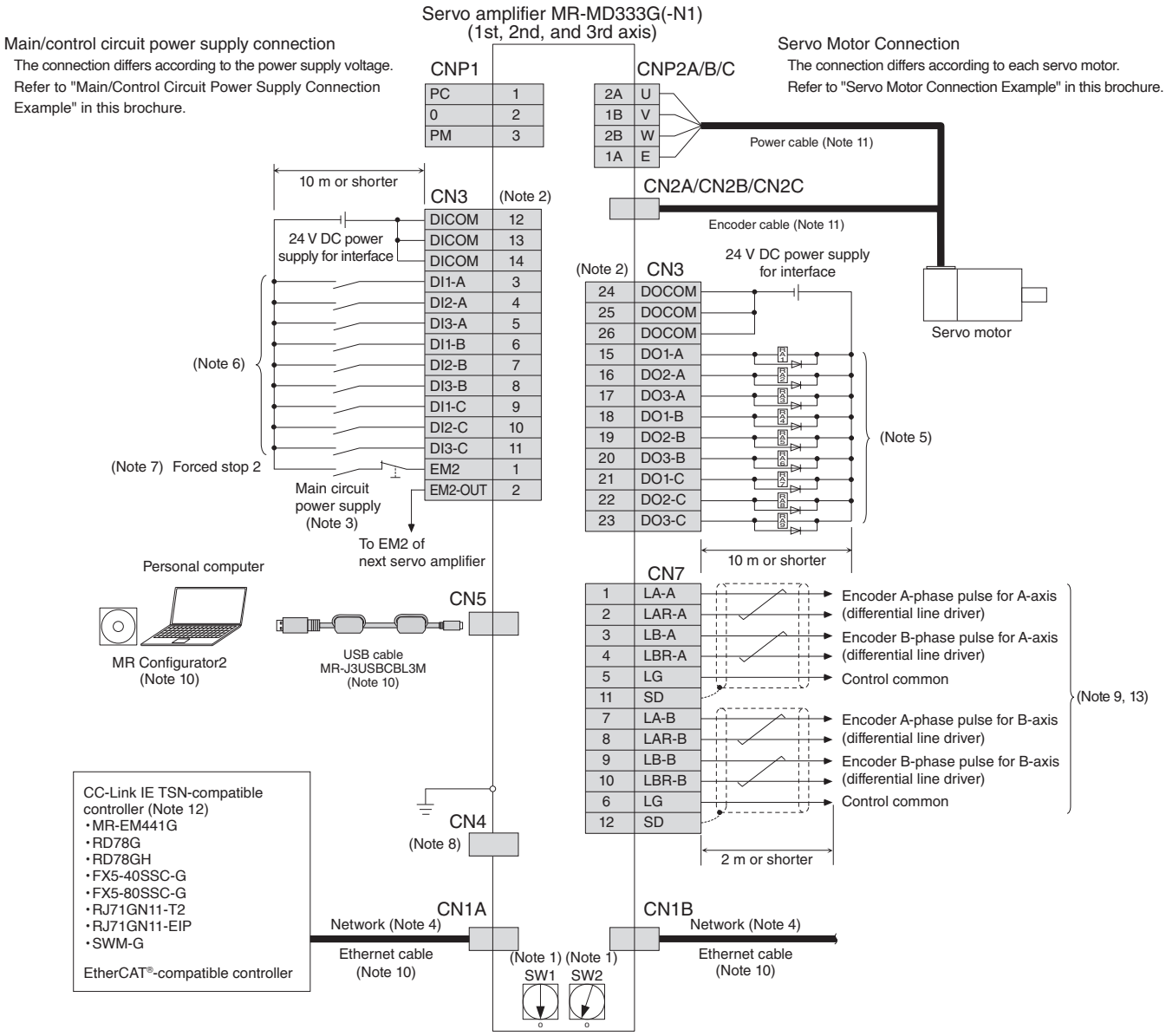
MR-MD333G(-N1) Specifications

Servo amplifier model		MR-MD333G(-N1)
Output	Voltage	3-phase 0 V AC to 39 V AC
	Rated current (each axis) [A]	2.2
Main circuit power supply input	Voltage (Note 1)	48 V DC
	Rated current [A]	3.8
	Permissible voltage fluctuation	40.8 V DC to 55.2 V DC
Control circuit power supply input	Voltage	24 V DC/48 V DC
	Rated current	For 24 V DC: 1 A For 48 V DC: 0.5 A
	Permissible voltage fluctuation	For 24 V DC: 21.6 V DC to 26.4 V DC For 48 V DC: 40.8 V DC to 55.2 V DC
	Power consumption [W]	25
Interface power supply		24 V DC ± 10 % (required current capacity: 0.5 A)
Control method		Sine-wave PWM control/current control method
Dynamic brake (Note 5)		Built-in (Note 4)
CC-Link IE TSN Class B (Note 9) (MR-MD333G)	Communication cycle (Note 2, 3)	125 µs, 250 µs, 500 µs, 1 ms, 2 ms, 4 ms, 8 ms
	Protocol version	1.0/2.0
CC-Link IE TSN Class A (Note 9) (MR-MD333G)	Communication cycle (Note 2, 3)	500 µs to 500 ms
	Protocol version	2.0
EtherCAT® (MR-MD333G-N1)	Communication cycle (Note 2, 3)	250 µs, 500 µs, 1 ms, 2 ms, 4 ms, 8 ms
Communication function	USB	Connect a personal computer (MR Configurator2 compatible)
A/B-phase pulse output	MR-MD333G	Compatible only with A-axis and B-axis (Note 3, 6)
	MR-MD333G-N1	Not compatible
Analog monitor		None
Positioning mode (Note 3, 7)		Point table method
Servo functions		Advanced vibration suppression control II, adaptive filter II, robust filter, quick tuning, auto tuning, one-touch tuning, vibration tough drive function, drive recorder function, machine diagnosis function (including failure prediction), power monitoring function, lost motion compensation function, super trace control, continuous operation to torque control mode (Note 10)
Protective functions		Overcurrent shut-off, regenerative overvoltage shut-off, overload shut-off (electronic thermal), servo motor overheat protection, encoder error protection, undervoltage protection, instantaneous power failure protection, overspeed protection, error excessive protection
Compatible servo motor (Note 8)		HK-KT0536E2-S1, HG-AK0136 (Note 11), HG-AK0236 (Note 11), HG-AK0336 (Note 11)
Structure (IP rating)		Board type, natural cooling, open (IP00)
Environment	Ambient temperature	Operation: 0 °C to 45 °C (non-freezing), storage: -25 °C to 70 °C (non-freezing)
	Ambient humidity	Operation/storage: 5 %RH to 95 %RH (non-condensing)
	Ambience	Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist, or dust
	Altitude	1000 m or less
	Vibration resistance	39 m/s^2 at 10 Hz to 55 Hz (directions of X, Y, and Z axes)
Mass [kg]		0.12

Notes:
1. Rated output and speed of a rotary servo motor are applicable when the servo amplifier is operated within the specified power supply voltage.
2. The communication cycle depends on the controller specifications and the number of device stations connected.
3. For the restrictions on the communication cycle, contact your local sales office.
4. The dynamic brake is electronic. The electronic dynamic brake does not operate when the control circuit power is off. It may not operate depending on alarms and warnings. Contact your local sales office for details.
5. When using the dynamic brake, contact your local sales office for the permissible load to motor inertia ratio.
6. When the command unit selection function (command unit/s) is enabled, encoder output pulses are not outputted.
7. Refer to "MELSERVO-J5 catalog (L(NA)03179ENG)" for details of positioning mode.
8. Combinations of HK-KT0536E2-S1 and the HG-AK series are also possible.
9. A communication speed of 1 Gbps/100 Mbps can be selected.
10. The function is not available with MR-MD333G-N1.
11. Use the HG-AK series manufactured in June 2020 or later. Otherwise, an alarm occurs. Refer to "Servo Motor Instruction Manual (Vol. 3)" for how to check the date of manufacture.

Use MR-MD333G(-N1) with firmware version A4 or later. Otherwise, there are restrictions on the compatible controllers and functions.

MR-MD333G(-N1) Standard Wiring Diagram Example

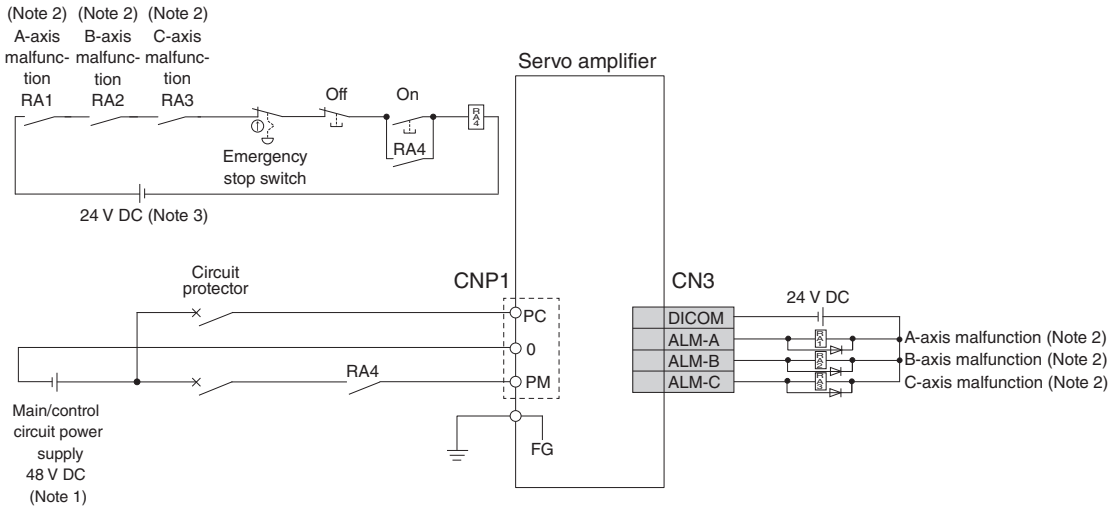


Notes:
1. The node address or the 4th octet of the IP address can be set to between 1 and 254 with a combination of the ID setting switches or the rotary switches (SW1 and SW2). Note that the number of the connectable device stations depends on the controller specifications.
2. This is for sink wiring. Source wiring is also possible.
3. 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.
4. When branching off CC-Link IE TSN (synchronous communication function) with a switching hub, use a switching hub (Class B) recommended by CC-Link Partner Association. When a switching hub (Class A) is used, there are restrictions on the topologies to be used. Refer to the controller manual for details.
5. Devices for these pins can be changed with [Pr. PD07] and [Pr. PD09].
6. Devices for these pins can be changed with [Pr. PD03], [Pr. PD04], and [Pr. PD05].
7. The forced stop signal is issued for three axes of the servo amplifier. For overall system, apply the emergency stop on the controller side.
8. Install the MR-BT6VCASE battery case and MR-BAT6V1 batteries (sold as options) under the following conditions:
   • When the HG-AK series is used in the absolute position detection system.
   • When combinations of HK-KT0536E2-S1 and the HG-AK series are used in the absolute position detection system.
   For the connection of the battery case, use the battery cable (MR-BT6V1CBL_M). For details of the battery case, battery, and battery cable, refer to "MELSERVO-J5 catalog (L(NA)03179ENG)". For details of the absolute position detection system, contact your local sales office.
9. For the restrictions on the communication cycle, contact your local sales office.
10. Refer to "MELSERVO-J5 catalog (L(NA)03179ENG)" for details.
11. Use the cables introduced in this brochure. When fabricating a cable, contact your local sales office.
12. For combinations other than the listed compatible controllers, contact your local sales office.
13. For the availability of the A/B-phase pulse output, refer to "MR-MD333G(-N1) Specifications" in this brochure.

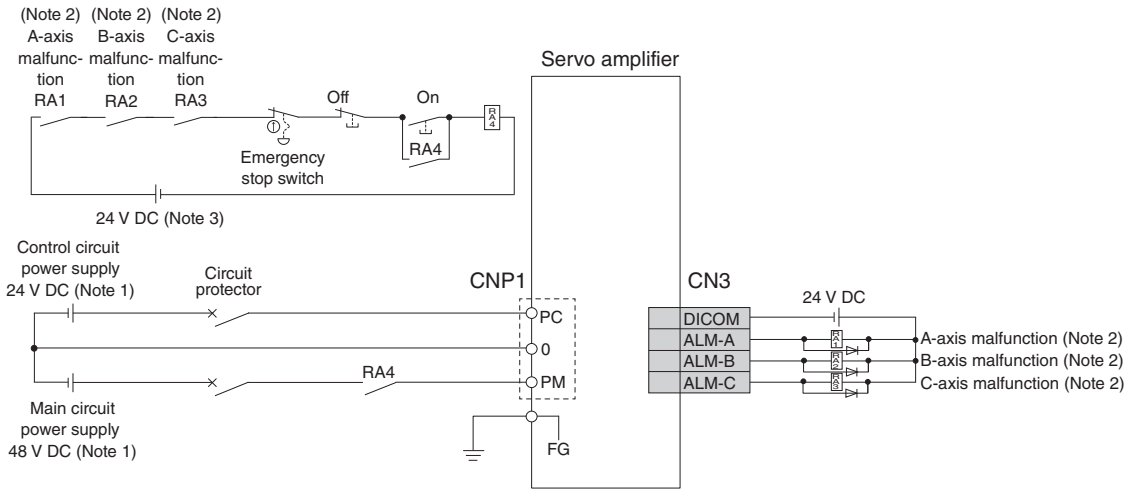
Contact your local sales office for the actual wiring and use. Use the equipment after you have a full knowledge of the equipment, safety information and instructions.

Main/Control Circuit Power Supply Connection Example

●For 48 V DC power supply voltage for main/control circuit



●For 48 V DC power supply voltage for main circuit and 24 V DC for control circuit

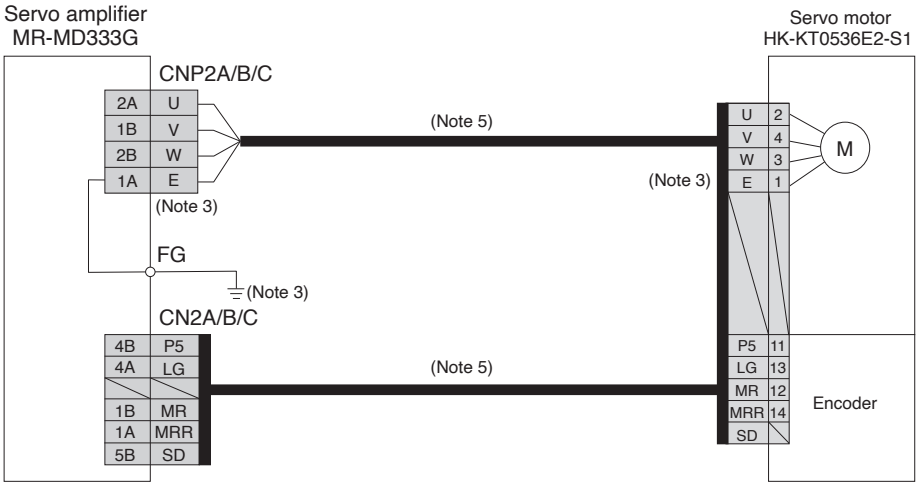


Notes: 1. For 24 V DC and 48 V DC, use a power supply with reinforced insulation, and connect the negative side wiring (0 V) to the power supply terminal.
2. This circuit is an example of stopping all axes when an alarm occurs. If disabling ALM (Malfunction) output with the parameter, configure the circuit which switches off the main circuit power supply after detection of alarm occurrence on the controller side.
3. Do not use the 24 V DC interface power supply for the magnetic contactor. Provide a dedicated power supply to the magnetic contactor.

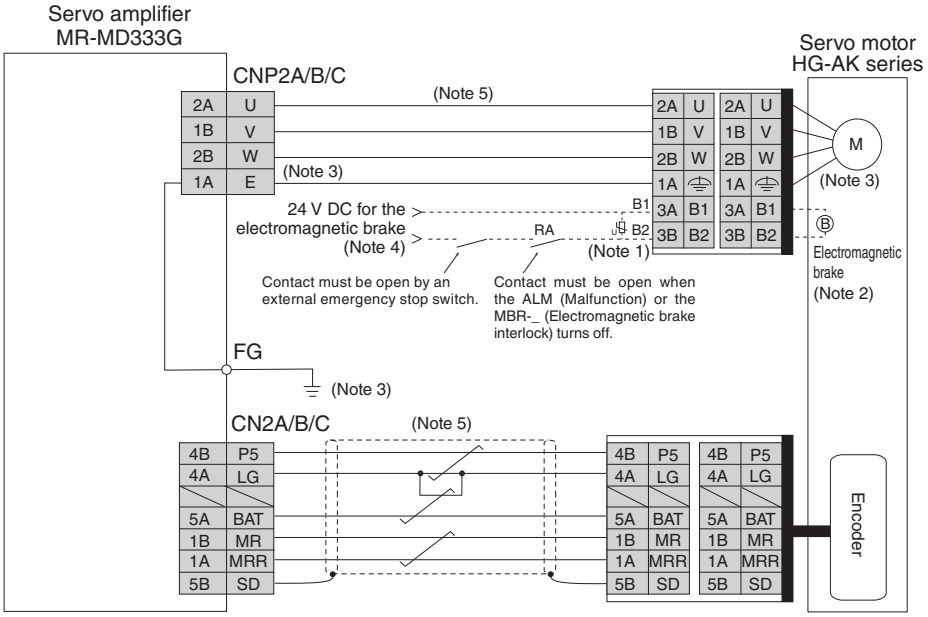
Contact your local sales office for the actual wiring and use. Use the equipment after you have a full knowledge of the equipment, safety information and instructions.

Servo Motor Connection Example

●For HK-KT0536E2-S1



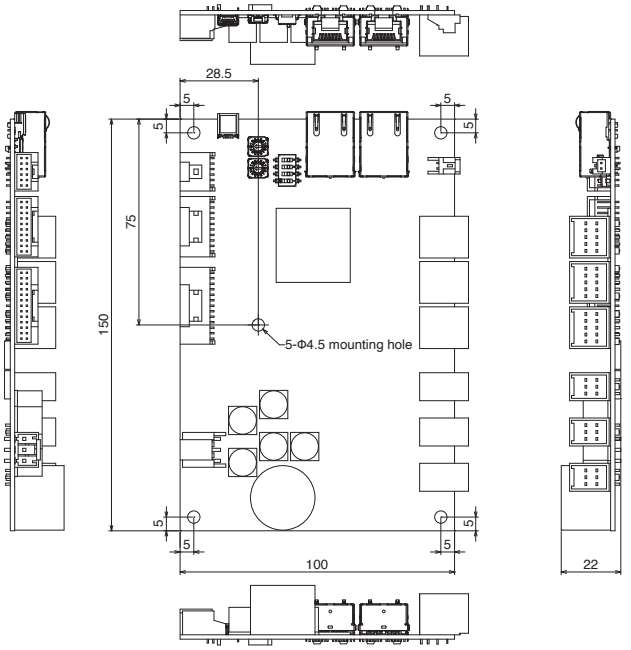
●For HG-AK series



Notes: 1. Install a surge absorber between B1 and B2.
2. This is for the servo motors with an electromagnetic brake. The electromagnetic brake terminals do not have polarity.
3. FG is connected to E terminals of CNP2A/B/C in the servo amplifier. Connect FG and the grounding terminal of the cabinet for grounding the servo motor.
4. Do not use the 24 V DC interface power supply for the electromagnetic brake. Provide a dedicated power supply to the electromagnetic brake.
5. Use the cables introduced in this brochure. When fabricating a cable, contact your local sales office.

Contact your local sales office for the actual wiring and use. Use the equipment after you have a full knowledge of the equipment, safety information and instructions.

MR-MD333G(-N1) Dimensions



Terminal arrangement

CNP1

PC	1
0	2
PM	3

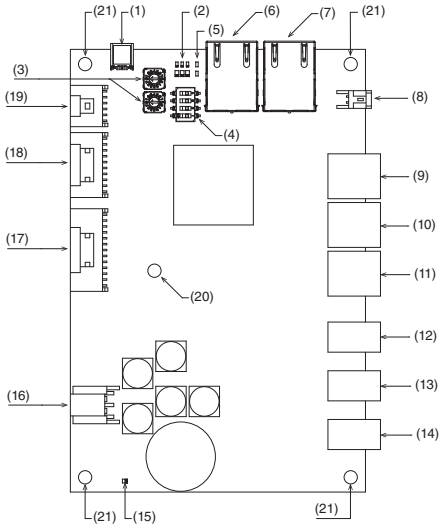
CNP2A/CNP2B/CNP2C

		3
W	U	2
V	E	1
B	A	

Mounting screw size: M4

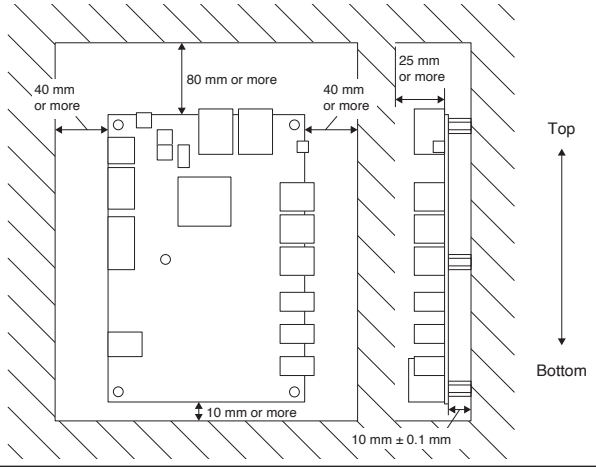
[Unit: mm]

MR-MD333G(-N1) Structure (Note 1)



No.	Name
(1)	USB communication connector (CN5)
(2)	Each axis status LEDs
(3)	MR-MD333G: Rotary switches (SW1/SW2) MR-MD333G-N1: ID setting switches (SW1/SW2)
(4)	DIP switch (SW3)
(5)	Network status LEDs
(6)	Ethernet cable connector (CN1A)
(7)	Ethernet cable connector (CN1B)
(8)	Battery connector (CN4)
(9)	A-axis encoder connector (CN2A)
(10)	B-axis encoder connector (CN2B)
(11)	C-axis encoder connector (CN2C)
(12)	A-axis servo motor power output connector (CNP2A)
(13)	B-axis servo motor power output connector (CNP2B)
(14)	C-axis servo motor power output connector (CNP2C)
(15)	Charge light
(16)	Main/control circuit power supply connector (CNP1)
(17)	DI/O connector (CN3)
(18)	Manufacturer setting connector (CN6)
(19)	MR-MD333G: A/B-phase pulse output connector (CN7) MR-MD333G-N1: Connector for manufacturer setting (CN7)
(20)	Mounting hole
(21)	Mounting hole (FG)

MR-MD333G(-N1) Installation (Note 2)



Notes: 1. Contact your local sales office for the details of each connector.
2. Mount MR-MD333G(-N1) with the CN1A/CN1B connectors on the upper side. Contact your local sales office for other installation methods.

Model Designation for Servo Motor (Note 1)

●HK-KT series (low inertia, small capacity)

H K - K T 0 5 3 6 E 2 - S 1

Symbol	Special specification
E2-S1	MR-MD333G(-N1) dedicated items

Symbol	Power supply
6	48 V DC

Symbol	Rated speed [r/min]
3	3000

Symbol	Rated output [W]
05	50

●HG-AK series (ultra-compact size, ultra-small capacity)

H G - A K 0 1 3 6 B -

Symbol	Special specification
None	Standard
S100	Vertical encoder cable lead

Symbol	Shaft end
None	Standard (Straight shaft)
D	D-cut shaft

Symbol	Electromagnetic brake
None	None
B	Installed

Symbol	Power supply
6	48 V DC

Symbol	Rated speed [r/min]
3	3000

Symbol	Rated output [W]
01	10
02	20
03	30

Notes: 1. This section describes what each symbol in a model name indicates. Some combinations of symbols are not available.

HK-KT0536E2-S1 (Low Inertia, Small Capacity) Specifications

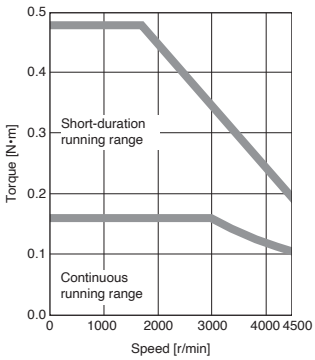
Rotary servo motor model		HK-KT	0536E2-S1
Continuous running duty (Note 4)	Rated output	[W]	50
	Rated torque (Note 3)	[N•m]	0.16
Maximum torque		[N•m]	0.48
Rated speed (Note 4)		[r/min]	3000
Maximum speed (Note 4)		[r/min]	4500
Permissible instantaneous speed		[r/min]	-
Power rate at continuous rated torque		[kW/s]	6.4
Rated current		[A]	2.2
Maximum current		[A]	7.2
Moment of inertia J		[× 10^{-4} kg•m^2]	0.0394
Recommended load to motor inertia ratio (Note 1)			30 times or less (Note 5)
Speed/position detector			Batteryless absolute/incremental 26-bit encoder (resolution: 67108864 pulses/rev)
Type			Permanent magnet synchronous motor
Oil seal			None
Electromagnetic brake			None
Thermistor			None
Insulation class			155 (F)
Structure			Totally enclosed, natural cooling (IP rating: IP67) (Note 2)
Environment *5	Ambient temperature		Operation: 0 °C to 40 °C (non-freezing), storage: -15 °C to 70 °C (non-freezing)
	Ambient humidity		Operation: 10 %RH to 90 %RH (non-condensing), storage: 10 %RH to 90 %RH (non-condensing)
	Ambience		Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist, or dust, no object generating a strong magnetic field
	Altitude		1000 m or less
	Vibration resistance *1	[m/s^2]	X: 49, Y: 49
External magnetic field			10 mT or less
Vibration rank			V10 *3
Permissible load for the shaft *2	L	[mm]	25
	Radial	[N]	88
	Thrust	[N]	59
Mass		[kg]	0.27

Notes: 1. Contact your local sales office if the load to motor inertia ratio exceeds the value in the table.
2. The shaft-through portion is excluded. Refer to the asterisk 4 on p. 17 for the shaft-through portion.
3. When unbalanced torque is generated, such as in a vertical lift machine, keep the unbalanced torque of the machine under 70 % of the servo motor rated torque.
4. The continuous running duty and the speed are not guaranteed when the power supply voltage is dropped.
5. MR-MD333G is not equipped with a built-in regenerative resistor. When the servo motor speed is high, the overvoltage alarm may occur. In this case, review the operation pattern to lower the load to motor inertia ratio and the servo motor speed.

Refer to "Annotations for Rotary Servo Motor Specifications" on p. 17 for details about asterisks 1 to 3 and 5.

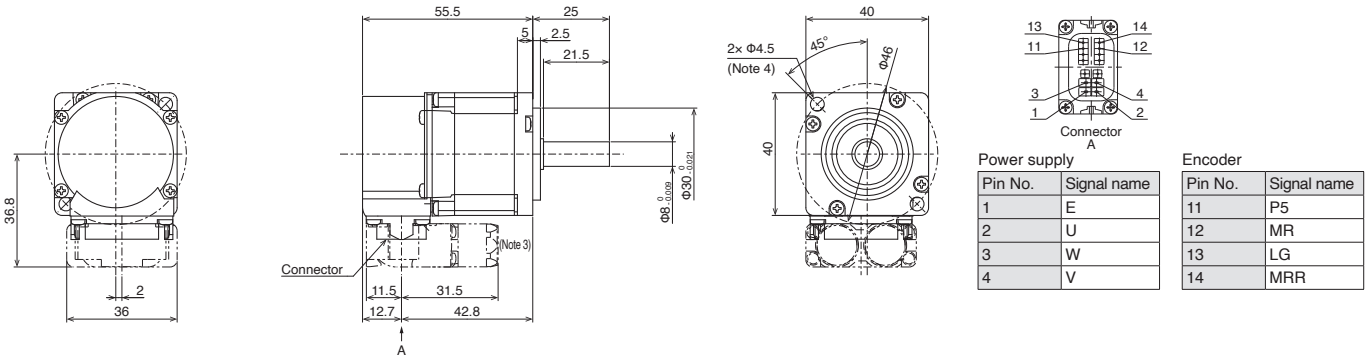
HK-KT0536E2-S1 Torque Characteristics (Note 1, 2)

: For 48 V DC



Notes: 1. Torque drops when the power supply voltage is below the specified value.
2. The torque characteristics shown here are reference values.

HK-KT0536E2-S1 Dimensions (Note 1, 2)



Power supply

Pin No.	Signal name
1	E
2	U
3	W
4	V

Encoder

Pin No.	Signal name
11	P5
12	MR
13	LG
14	MRR

[Unit: mm]

Notes: 1. Use a friction coupling to fasten a load.
2. The actual dimensions may be up to 3 mm larger than those shown in the drawing because of shifting and variance of parts that occur during the assembly and manufacture of the rotary servo motors. The dimensions and tolerances shown are applicable at a temperature of 20 °C and may vary depending on the ambient temperature. Design the machine to allow for sufficient space.
3. The dimensions are applicable when a dual type motor cable is led to the load side. Refer to the dimensions of HK-KT053W indicated in "HK-KT Series Connector Dimensions" in "MELSERVO-J5 catalog (L(NA)03179ENG)" for the dimensions when leading the cable to the opposite to the load side or leading vertically.
4. Use hexagon socket head cap screws when mounting the servo motor.

HG-AK Series (Ultra-Compact Size, Ultra-Small Capacity) Specifications (Note 4)

Rotary servo motor model		HG-AK	0136	0236	0336
Continuous running duty (Note 5)	Rated output	[W]	10	20	30
	Rated torque (Note 3)	[N•m]	0.032	0.064	0.095
Maximum torque		[N•m]	0.095	0.191	0.286
Rated speed (Note 5)		[r/min]	3000		
Maximum speed (Note 5)		[r/min]	6000		
Permissible instantaneous speed		[r/min]	6900		
Power rate at continuous rated torque [kW/s]	Without electromagnetic brake		3.5	9.0	15.0
	With electromagnetic brake		2.4	7.0	12.3
Rated current		[A]	2.1		2.2
Maximum current		[A]	6.3		6.6
Moment of inertia J [× 10^{-4} kg•m^2]	Without electromagnetic brake		0.0029	0.0045	0.0061
	With electromagnetic brake		0.0042	0.0058	0.0074
Recommended load to motor inertia ratio (Note 1)			30 times or less (Note 7)		
Speed/position detector			Absolute/incremental 18-bit encoder (battery backup type) (Note 6) (resolution: 262144 pulses/rev)		
Type			Permanent magnet synchronous motor		
Oil seal			None		
Electromagnetic brake			None (Servo motors with an electromagnetic brake are available.)		
Thermistor			None		
Insulation class			130 (B)		
Structure			Totally enclosed, natural cooling (IP rating: IP55) (Note 2)		
Environment *5	Ambient temperature		Operation: 0 °C to 40 °C (non-freezing), storage: -15 °C to 70 °C (non-freezing)		
	Ambient humidity		Operation: 10 %RH to 80 %RH (non-condensing), storage: 10 %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		
	Vibration resistance *1	[m/s^2]	X: 49, Y: 49		
Vibration rank			V10 *3		
Permissible load for the shaft *2	L	[mm]	16		
	Radial	[N]	34	44	49
	Thrust	[N]	14		
Mass [kg]	Without electromagnetic brake		0.12	0.14	0.16
	With electromagnetic brake		0.22	0.24	0.26

Notes:
1. Contact your local sales office if the load to motor inertia ratio exceeds the value in the table.
2. The shaft-through portion, the connector, and the power cable leading part are excluded. Refer to the asterisk 4 on p. 17 for the shaft-through portion.
3. When unbalanced torque is generated, such as in a vertical lift machine, keep the unbalanced torque of the machine under 70 % of the servo motor rated torque.
4. Specifications of HG-AK_-S100 are the same as those of HG-AK_ except for the dimensions.
5. The continuous running duty and the speed are not guaranteed when the power supply voltage is dropped.
6. A battery is required when configuring an absolute position detection system.
7. MR-MD333G is not equipped with a built-in regenerative resistor. When the servo motor speed is high, the overvoltage alarm may occur. In this case, review the operation pattern to lower the load to motor inertia ratio and the servo motor speed.

Refer to "Annotations for Rotary Servo Motor Specifications" on p. 17 for details about asterisks 1 to 3 and 5.

HG-AK Series Electromagnetic Brake Specifications (Note 1)

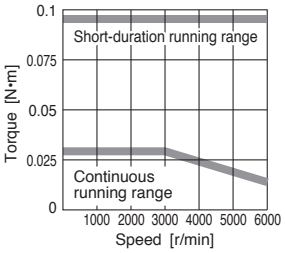
Model		HG-AK	0136B	0236B	0336B
Type (Note 3)			Spring actuated type safety brake		
Rated voltage (Note 4)			24 V DC (-10 % to 0 %)		
Power consumption		[W] at 20 °C	1.8		
Electromagnetic brake static friction torque (Note 5)		[N•m]	0.095 or higher		
Permissible braking work	Per braking	[J]	4.6		
	Per hour	[J]	46		
Electromagnetic brake life (Note 2)	Number of braking times		20000		
	Work per braking	[J]	1		

Notes: 1. The electromagnetic brake is for holding. It cannot be used for deceleration applications.
2. Brake lining wear due to braking will increase the brake gap, but the gap is not adjustable. Therefore, the brake life indicates the number of times the brake can be applied before gap adjustment becomes necessary.
3. This type does not have a manual release mechanism. Use a 24 V DC power supply to release the brake electrically.
4. Prepare a power supply exclusively for the electromagnetic brake.
5. The value of the brake static friction torque is the lower limit in the initial state at 20 °C.

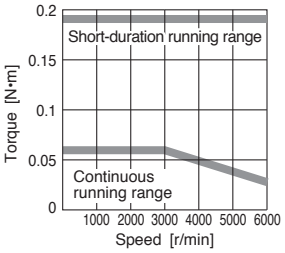
HG-AK Series Torque Characteristics (Note 1, 2)

: For 48 V DC

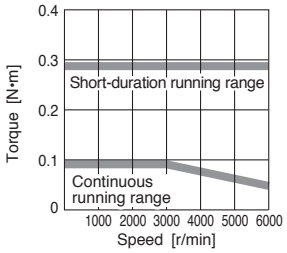
HG-AK0136



HG-AK0236



HG-AK0336

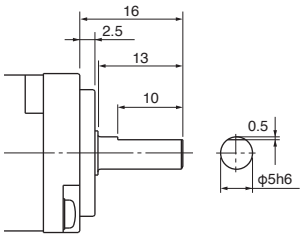


Notes: 1. Torque drops when the power supply voltage is below the specified value.
2. The torque characteristics shown here are reference values.

HG-AK Series Special Shaft Specifications (Note 1)

Motors with the following specifications are also available.

D-cut shaft

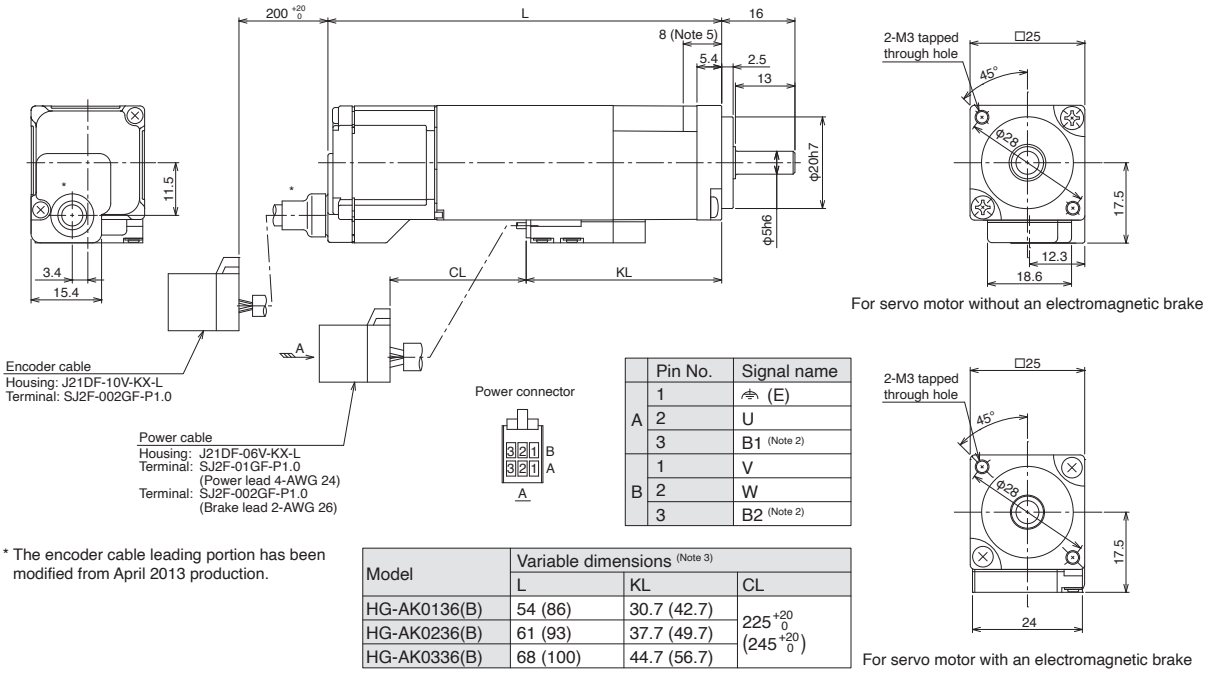


[Unit: mm]

Notes: 1. Specifications of HG-AK_-S100 are the same as those of HG-AK_ except for the dimensions.

HG-AK Series Dimensions (Note 1, 4)

●HG-AK0136(B), HG-AK0236(B), HG-AK0336(B)



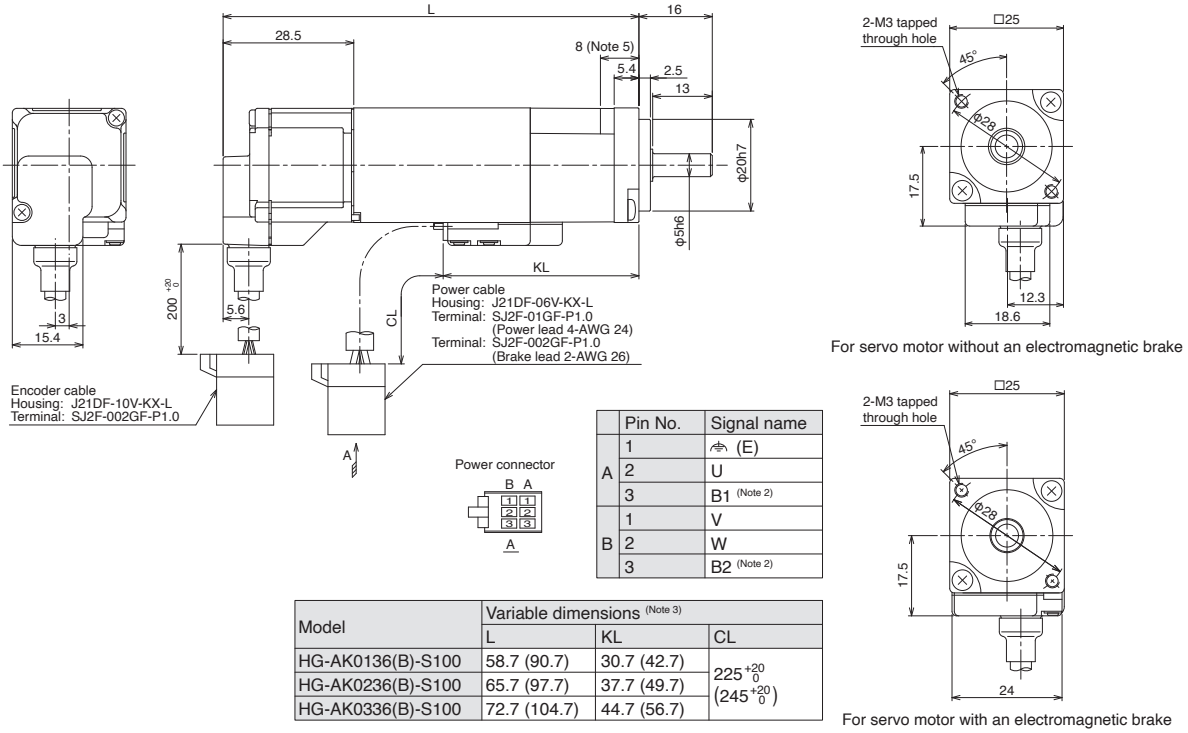
	Pin No.	Signal name
A	1	⏚ (E)
	2	U
	3	B1 (Note 2)
B	1	V
	2	W
	3	B2 (Note 2)

* The encoder cable leading portion has been modified from April 2013 production.

Model	Variable dimensions (Note 3)		
	L	KL	CL
HG-AK0136(B)	54 (86)	30.7 (42.7)	225^{+20}_{0} (245^{+20}_{0})
HG-AK0236(B)	61 (93)	37.7 (49.7)	
HG-AK0336(B)	68 (100)	44.7 (56.7)	

[Unit: mm]

●HG-AK0136(B)-S100, HG-AK0236(B)-S100, HG-AK0336(B)-S100



	Pin No.	Signal name
A	1	⏚ (E)
	2	U
	3	B1 (Note 2)
B	1	V
	2	W
	3	B2 (Note 2)

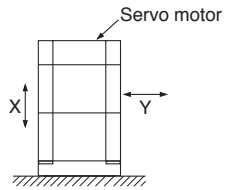
Model	Variable dimensions (Note 3)		
	L	KL	CL
HG-AK0136(B)-S100	58.7 (90.7)	30.7 (42.7)	225^{+20}_{0} (245^{+20}_{0})
HG-AK0236(B)-S100	65.7 (97.7)	37.7 (49.7)	
HG-AK0336(B)-S100	72.7 (104.7)	44.7 (56.7)	

[Unit: mm]

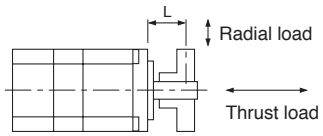
Notes: 1. General tolerances are applied to the dimensions in which tolerances are not given in the drawing.
2. The electromagnetic brake terminals do not have polarity.
3. The dimensions in brackets are for the models with an electromagnetic brake.
4. Use a friction coupling to fasten a load.
5. Select a mounting screw whose length is within this dimension.

Annotations for Rotary Servo Motor Specifications

*1. The vibration direction is shown in the diagram below. The numerical value indicates the maximum value of the component (commonly the bracket in the opposite direction of the load side).
Fretting tends to occur on the bearing when the servo motor stops. Thus, maintain vibration level at approximately one-half of the allowable value.

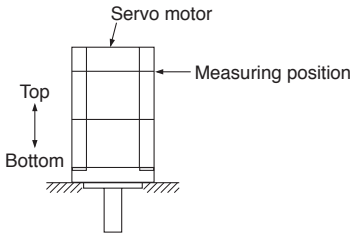


*2. Refer to the diagram below for the permissible load for the shaft. Ensure that loads applied on the shaft do not exceed the values specified in the table. The values in the table are applicable when each load is applied singly.

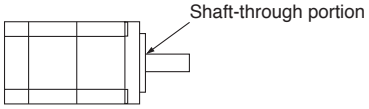


L: Distance between the flange mounting surface and the center of load

*3. V10 indicates that the amplitude of the servo motor itself is 10 μm or less. The following shows mounting orientation and measuring position of the servo motor during the measurement:



*4. Refer to the diagram below for the shaft-through portion.



*5. Do not use the servo motors in the environment where the servo motors are exposed to oil mist, oil and/or water.

Wires

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.

Servo amplifier model	Wire size
	PM/PC/0
MR-MD333G	AWG 18 to 16 (Note 1)

Notes: 1. A voltage drop occurs by the current supplied to the servo amplifier according to the wiring impedance.

Circuit Protector

Power supply specifications	Circuit protector (Note 1)
Control circuit power supply (48 V DC/24 V DC)	CP30-BA 1P 1-M 1A
Main circuit power supply (48 V DC)	CP30-BA 1P 1-M 10A

Notes: 1. Use the circuit protector whose operation characteristic is medium-speed type.

Cable (Products on the Market)

When connecting a rotary servo motor, use the following cables manufactured by Mitsubishi Electric System & Service Co., Ltd.

Servo motor	Item	Model	Cable direction	Cable length	Bending life
HK-KT0536E2-S1	Motor cable (dual cable type) Without electromagnetic brake wires	SC-AEP3C_M-A1-H-DC	In the direction of the load side	0.5 m, 1 m to 20 m	Long bending life
		SC-AEP3C_M-A2-H-DC	In the opposite direction of the load side		
		SC-AEP3C_M-A5-H-DC	Vertical		
HG-AK series	Encoder cable	SC-ENCBL_M-H-DC	-	0.5 m, 1 m to 30 m	Long bending life
	Power cable Without electromagnetic brake wires	SC-PWCBL_M-H-DC			
	Power cable With electromagnetic brake wires	SC-PWBKCBL_M-H-DC			

For details, please contact Mitsubishi Electric System & Service Co., Ltd. OVERSEAS SERVICE SECTION. (Email: osb.webmaster@melsc.jp)

Product List

●Servo amplifiers

Item	Model	Rated output	Main circuit power supply
Servo amplifier	MR-MD333G	30 W	48 V DC
	MR-MD333G-N1	30 W	48 V DC

●Rotary servo motors

Item	Model	Rated output	Rated speed
HK-KT series	HK-KT0536E2-S1	50 W	3000 r/min
HG-AK series B: With an electromagnetic brake	HG-AK0136(B)	10 W	3000 r/min
	HG-AK0236(B)	20 W	3000 r/min
	HG-AK0336(B)	30 W	3000 r/min

AC Servo System MR-MD333G(-N1)

Country/Region	Sales office	
USA	Mitsubishi Electric Automation, Inc. 500 Corporate Woods Parkway, Vernon Hills, IL 60061, U.S.A.	Tel : +1-847-478-2100
Mexico	Mitsubishi Electric Automation, Inc. Mexico Branch Boulevard Miguel de Cervantes Saavedra 301, Torre Norte Piso 5, Int. 502, Ampliacion Granada, Miguel Hidalgo, Ciudad de Mexico, Mexico, C.P.11520	Tel : +52-55-3067-7500
Brazil	Mitsubishi Electric do Brasil Comercio e Servicos Ltda. Avenida Adelino Cardana, 293, 21 andar, Bethaville, Barueri SP, Brazil	Tel : +55-11-4689-3000
Germany	Mitsubishi Electric Europe B.V. German Branch Mitsubishi-Electric-Platz 1, 40882 Ratingen, Germany	Tel : +49-2102-486-0
UK	Mitsubishi Electric Europe B.V. UK Branch Travellers Lane, UK-Hatfield, Hertfordshire, AL10 8XB, U.K.	Tel : +44-1707-28-8780
Italy	Mitsubishi Electric Europe B.V. Italian Branch Campus, Energy Park Via Energy Park 14, Vimercate 20871 (MB) Italy	Tel : +39-039-60531
Spain	Mitsubishi Electric Europe B.V. Spanish Branch Carretera de Rubi, 76-80-Apdo. 420, E-08174 Sant Cugat del Valles (Barcelona), Spain	Tel : +34-935-65-3131
France	Mitsubishi Electric Europe B.V. French Branch 2, rue de l'Union-92565 Rueil-Malmaison Cedex-France	Tel : +33-1-55-68-55-68
Czech Republic	Mitsubishi Electric Europe B.V. Czech Branch, Prague Office Pekarska 621/7, 155 00 Praha 5, Czech Republic	Tel : +420-734-402-587
Poland	Mitsubishi Electric Europe B.V. Polish Branch ul. Krakowska 48, 32-083 Balice, Poland	Tel : +48-12-347-65-00
Sweden	Mitsubishi Electric Europe B.V. (Scandinavia) Hedvig Mollersgata 6, 223 55 Lund, Sweden	Tel : +46-8-625-10-00
Turkey	Mitsubishi Electric Turkey Elektrik Urunleri A.S. Serifali Mah. Kale Sok. No:41 Umraniye / Istanbul, Turkey	Tel : +90-216-969-2500
UAE	Mitsubishi Electric Europe B.V. Dubai Branch Dubai Silicon Oasis, P.O.BOX 341241, Dubai, U.A.E.	Tel : +971-4-3724716
South Africa	Adroit Technologies 20 Waterford Office Park, 189 Witkoppen Road, Fourways, South Africa	Tel : +27-11-658-8100
China	Mitsubishi Electric Automation (China) Ltd. Mitsubishi Electric Automation Center, No.1386 Hongqiao Road, Shanghai, China	Tel : +86-21-2322-3030
Taiwan	Mitsubishi Electric Automation (TAIWAN) Co., Ltd. 6F, No.105, Wugong 3rd Road, Wugu District, New Taipei City 248019, Taiwan	Tel : +886-2-2299-2499
Korea	Mitsubishi Electric Automation Korea Co., Ltd. 7F to 9F, Gangseo Hangang Xi-tower A, 401, Yangcheon-ro, Gangseo-Gu, Seoul, Korea	Tel : +82-2-6103-9474
Singapore	Mitsubishi Electric Asia Pte. Ltd. 307 Alexandra Road, Mitsubishi Electric Building, Singapore 159943	Tel : +65-6473-2486
Thailand	Mitsubishi Electric Factory Automation (Thailand) Co., Ltd. 101, True Digital Park Office, 5th Floor, Sukhumvit Road, Bang Chak, Prakanong, Bangkok, Thailand	Tel : +66-2092-8600
Indonesia	PT. Mitsubishi Electric Indonesia Gedung Jaya 8th Floor, JL. MH. Thamrin No.12, Jakarta Pusat 10340, Indonesia	Tel : +62-21-3192-6461
Vietnam	Mitsubishi Electric Vietnam Company Limited 11th & 12th Floor, Viettel Tower B, 285 Cach Mang Thang Tam Street, Ward 12, District 10, Ho Chi Minh City, Vietnam.	Tel : +84-28-3910-5945
India	Mitsubishi Electric India Pvt. Ltd. Pune Branch ICC-Devi Gaurav Technology Park, Unit no. 402, Fourth Floor, Survey no. 191-192 (P), Opp. Vallabh Nagar Bus Depot, Pune - 411018, Maharashtra, India	Tel : +91-20-4624-2100
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