



Advanced Gain Tuning

- Further Evolution in Real-Time Auto-Gain Tuning

Agile and Intelligent

- Improved Damping Control handles all types of machines, from low to high stiffness machines with simple but solid operation

Almighty

- Position Control, Velocity Control and Torque Control in one Driver supports multiplicity of application.

Amazingly slim size

- Another Evolution in down-sizing, by 25% in size (compared to A-series)

MINAS A4 Series

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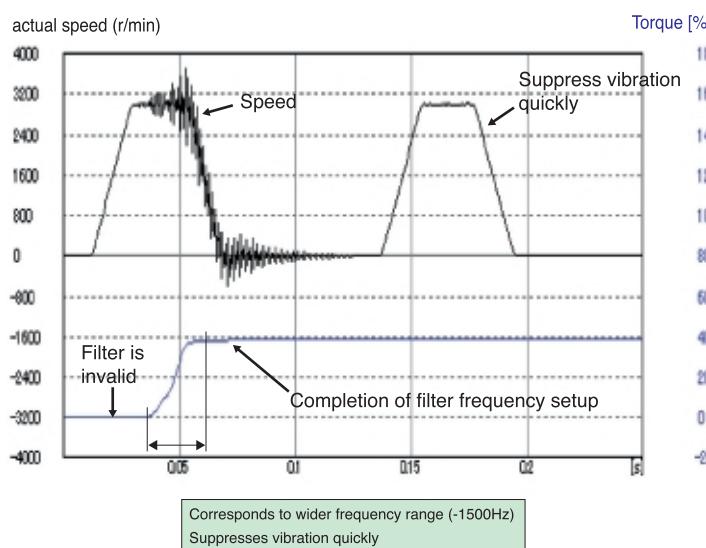
Remarks :Instruction manual is available as an option as
 Japanese version : DV0P4200 and
 English version : DV0P4210

Details of Features

1. Further Adjustment-Free Operation

■ High-functionality Real-Time Auto-Gain Tuning

- Corresponds to even variation of load inertia. Offers real automatic gain tuning to low and high stiffness machines with a combination of an adaptive filter.
- Supports the vertical axis application where the load torque is different in rotational direction.
- Prevents the machine from over-traveling during automatic gain tuning with over-travel detecting function.
- Enables you to set and check while monitoring real-time automatic gain tuning conditions on the front panel.

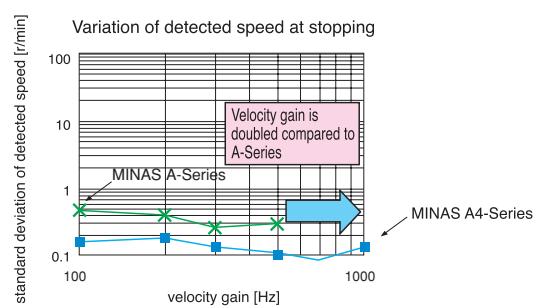
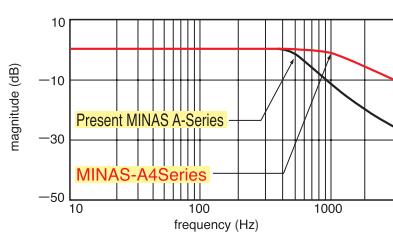


2. Further High-Speed and High-Response

■ Velocity response (bandwidth) of 1kHz

- Implementation of Instantaneous Velocity Observer realizes a detection of motor speed with higher speed and higher resolution.

*) In case of high stiffness machine



■ High-functionality Real-Time Auto-Gain Tuning

- Supports the low stiffness machine of belt-driven and the high stiffness machine of short stroke ball screw driven, and enables to realize high-speed positioning with high-functionality real-time auto-gain tuning.

3. Further Reduction of Vibration

■ Adaptive filter

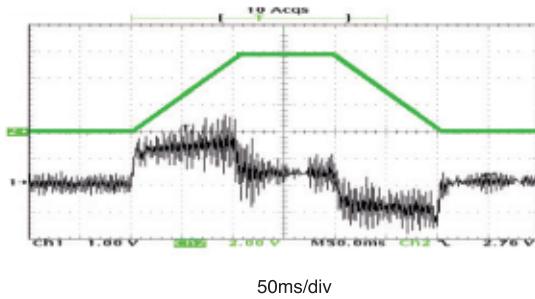
- Makes the notch filter frequency automatically follow the machine resonance frequency.
- Suppression of "Judder" noise of the machine can be expected which is caused by variation of the machines or resonance frequency due to aging.

■ 2-channel notch filters

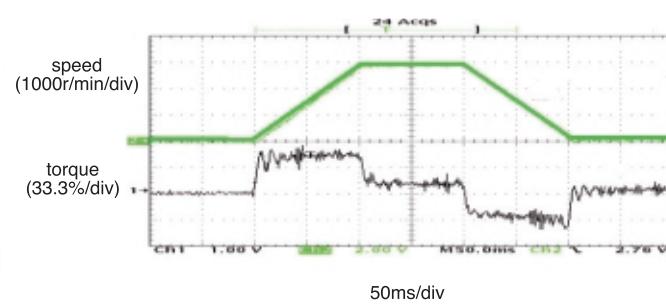
- 2-channel notch filters are equipped in the driver independent from adaptive filter.
- You can set up both frequency and width for each of 2 filters, and set up frequency in unit of 1Hz.
- Suppression of "Judder" noise of the machine which has multiple resonance points can be expected

Effect of notch filter

without notch filter



with notch filter

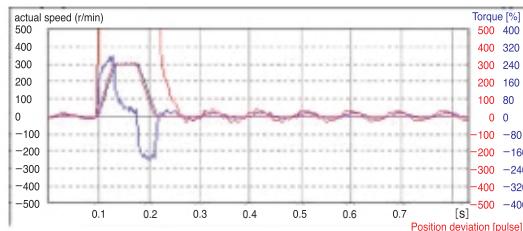


■ Damping control

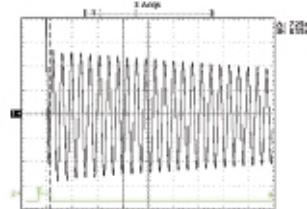
- 2-channel damping filters are equipped in this driver. You can suppress vibration occurring at both starting and stopping in low stiffness machine, by manually setting up vibration frequency in 0.1Hz unit.
- You can also switch the vibration frequency set by 2-channel with rotating direction or with an external input to correspond to the variation of vibration frequency caused by the machine position.
- Easy setup with entry of only frequency and filter value. Improper setup values do not result in unstable operation

motor movement

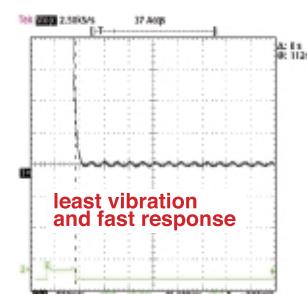
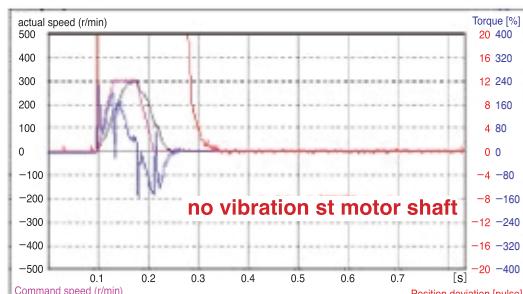
without damping control



machine movement



with damping control



4. Further Flexibility and Multiplicity

Setup support with substantial monitoring function

- Faster communication speed of RS232C/RS485 (Max.57600bps) establishes an easy and comfortable operating condition for setup support software, "PANATERM®".
- Displays the factors of no-motor run and helps you to analyze the causes of troubles.
- You can set up the panel operation lock to inhibit the operation from the front panel, thus enables you to prevent miss-operation such as unintentional change of parameters.

*Note) Refer to page "F3" for setup support software.

Command control modes

- Offers you "Position", "Velocity (including internal 8-speed)" and "Torque" command control modes
- You can set up any one of the command control modes, or selectable two command control mode with parameter.
- You can set up any command control mode depending on your application.

Monitoring function with front panel

- LED display and analog monitor terminals are installed in the front panel.
- Displays "Motor speed", "Motor torque" Position deviation", "Motor load factor" and "Regeneration load factor" on LED.
- You can monitor "Motor speed", "Motor torque" and "Position deviation" through analog monitor terminals.

Trial run (JOG)

- Features the function for trial (JOG) run through the front panel or console (option) without connecting to a host controller.
- You can shorten the machine setup time.

Full-closed control (High precision positioning)

- Features the full-closed control of position and velocity, using the signals from linear scale installed on the load side and high resolution encoder.

Note) Applicable external linear scales are as follows,

AT500 series by Mitutoyo
ST771 by Mitutoyo

- Best suits to high precision machines.

Inrush current suppressing function

- Inrush suppressing resistor is equipped in this driver, which prevents the circuit breaker shutdown of the power supply caused by inrush current at power-on.
- Prevents unintentional shutdown of the power supply circuit breaker in multi-axes application and does not give load to the power line.

Regeneration discharging function

- Discharges the regenerative energy with resister, which energy is generated while stopping the load with large moment of inertia, or use in up-down operation, and is returned to the driver from the motor.
- No regeneration discharge resistor is built-in to Frame A driver (MADDT1105 type.) and Frame B driver (MBDDT2210 type.), and we recommend you to connect optional regenerative resistor.
- Regenerative resistor is built-in to Frame C to F drivers, however, connection of the optional regenerative resistor bring you further regenerative capability.

Built-in dynamic brake

- You can select the dynamic brake action which short the servo motor windings of U, V and W, at Servo-OFF, CW/CCW over-travel inhibition, power shutdown and trip.
- You can select the action sequence setup depending on the machine requirement.

Positioning pulse

- Corresponds up to 2Mpps of pulse input at positioning control.

Setup support software

- With the setup support software, "PANATERM®" via RS232C/RS485 communication port, you can monitor the running status of the driver and set up parameters.
- You can read out the absolute position data of the motor with absolute encoder.

Wave-form graphic function

- With the setup support software, "PANATERM®", you can monitor the "Commanded speed", "Actual speed", "Torque", "Position deviation" and "Positioning complete signal".
- Helps you to analyze the machine and shorten the setup time

*Note) Refer to page "F3" for setup support software.

Torque limit value switching

- You can setup 2 torque limits and use them for tension control or press & hold control

SEMI F47 voltage sag immunity

- Features the function which complies to voltage sag immunity standard of SEMI F47 at no load or light load.
- Useful for semiconductor industry.

Notes)

- 1) Not applicable to single phase, 100V type.
- 2) Verify with the actual machine condition to F47, voltage sag immunity standard.

Frequency analyzing function

- You can confirm the response frequency characteristics of total machine mechanism including the servo motor with the setup support software, "PANATERM®"
- Helps you to analyze the machine and shorten the setup time

■Applicable overseas safety standards



Subject	Standard conformed				
Motor	IEC60034-1	IEC60034-5	UL1004	CSA22.2 NO.100	Conforms to Low-Voltage Directives
	EN50178	UL508C			
	EN55011	Radio Disturbance Characteristics of Industrial, Scientific and Medical (ISM) Radio-Frequency Equipment			
	EN61000-6-2	Immunity for Industrial Environments			
	IEC61000-4-2	Electrostatic Discharge Immunity Test			
	IEC61000-4-3	Radio Frequency Electromagnetic Field Immunity Test			
	IEC61000-4-4	Electric High-Speed Transition Phenomenon/Burst Immunity Test			
	IEC61000-4-5	Lightning Surge Immunity Test			
	IEC61000-4-6	High Frequency Conduction Immunity Test			
	IEC61000-4-11	Instantaneous Outage Immunity Test			
Motor and driver					Conforms to references by EMC Directives

I E C : International Electrotechnical Commission
 E N : Europaischen Normen
 EMC : Electromagnetic Compatibility
 U L : Underwriters Laboratories
 CSA : Canadian Standards Association

List of Specifications

Motor series		Rated output (kW)	Rated rotational speed (Max. speed) (r/min)	Rotary encoder		Brake	Gear	CE/UL	Enclosure	Features	Applications
				2500p/r incremental	17bit absolute/incremental						
Ultra low inertia	MAMA	0.1-0.75	5000 (6000) *For 400W/100V and 750W	○	○	○	—	○	IP65 (Except shaft through hole and connector)	-Small capacity -Suitable for the machines directly coupled with high speed ball screw and high stiffness and high repetitive application	-SMT machines -Inverters -High repetitive positioning application
Low inertia	MSMD	0.05-0.75	3000 (5000) *For 400W/100V and 750W 3000 (4500)	○	○	○	○	○	IP65 (Except shaft through hole and connector)	-Small capacity -Suitable for all applications	-Inverters -Belt driven machines -Unloading robot
Low inertia	MQMA	0.1-0.4	3000 (5000) *For 400W/100V 3000 (4500)	○	○	○	—	○	IP65 (Except shaft through hole and connector)	-Small capacity -Suitable for flat type and low stiffness machines with belt driven	-SMT machines -Inverters -Belt driven machines -Unloading robot
Low inertia	MSMA	1.0-5.0	3000 (5000) *For 4kW and 5kW 3000 (4500)	○	○	○	—	○	IP65 (Except cannon plug/connector pins)	-Middle capacity -Suitable for the machines directly coupled with ball screw and high stiffness and high repetitive application	-SMT machines -Inserter -Food machines
Middle inertia	MDMA	1.0-5.0	2000 (3000)	○	○	○	—	○	IP65 (Except cannon plug/connector pins)	-Middle capacity -Suitable for low stiffness machines with belt driven	-Belt driven machines -Conveyors -Robots
Middle inertia	MGMA	0.9-4.5	1000 (2000)	○	○	○	—	○	IP65 (Except cannon plug/connector pins)	-Middle capacity -Suitable for machines requiring low speed with high torque	-Belt driven machines -Conveyors -Robots
High inertia	MFMA	0.4-4.5	2000 (3000)	○	○	○	—	○	IP65 (Except cannon plug/connector pins)	-Middle capacity -Flat type and suitable for machines with space limitation	-Robots -Food machines
High inertia	MHMA	0.5-5.0	2000 (3000)	○	○	○	—	○	IP65 (Except cannon plug/connector pins)	-Middle capacity -Suitable for low stiffness machines with belt driven, and large load moment of inertia	-Belt driven machines -Conveyors -Robots

Servo Motor

M S M D 5 A Z S 1 S * *

Symbol	Type
MAMA	Ultra low inertia (100W-750W)
MSMD	Low inertia (50W-750W)
MQMA	Low inertia (100W-400W)
MSMA	Low inertia (1.0kW-5.0W)
MDMA	Ultra low inertia (100W-750W)
MGMA	Middle inertia (900W-4.5kW)
MFMA	Middle inertia (400W-4.5kW)
MHMA	Hi inertia (500W-5.0kW)

Motor rated output

Symbol	Rated output	Symbol	Rated output
5A	50W	15	1.5kW
01	100W	20	2.0kW
02	200W	25	2.5kW
04	400W	30	3.0kW
05	500W	40	4.0kW
08	750W	45	4.5kW
09	900W	50	5.0kW
10	1.0kW		

**Design order
1 : Standard****Rotary encoder specifications**

Symbol	Format	Pulse counts	Resolution	Wires
P	Incremental	2500P/r	10000	5
S	Absolute/ Incremental common	17bit	131072	7

Voltage specifications

Symbol	Specifications
1	100V
2	200V
Z	100V/200V common(50W only)

Special specifications**Motor structure**
MSMD , MQMA

Symbol	Shaft	Holding brake	Oil seal	
Symbol	Key-way, center tap	without	with	without
S	●	●		●
T	●		●	●

*Motor with oil seal is manufactured by order.

MSMA , MDMA , MGMA , MFMA , MHMA

Symbol	Shaft	Holding brake	Oil seal	
Symbol	Round	Key-way	without	with
G		●	●	●
H		●	●	●

MAMA

Symbol	Shaft	Holding brake	Oil seal	
Symbol	Round	Key-way	without	with
A	●		●	●
B	●		●	●
E		●	●	●
F		●	●	●

See page, A4-17 for motor specifications

Motor with reduction gear

M S M D 0 1 1 P 3 1 N

Symbol	Type
MSMD	Low inertia (100W-750W)

Motor rated output

Symbol	Rated output
01	100W
02	200W
04	400W
08	750W

Voltage specifications

Symbol	Specifications
1	100V
2	200V

Rotary encoder specifications

Symbol	Format	Pulse counts	Resolution	Wires
P	Incremental	2500P/r	10000	5
S	Absolute/ Incremental common	17bit	131072	7

Gear reduction ration, gear type

Symbol	Gear reduction ratio	Motor output (W)				Gear type
		100	200	400	750	
1N	1 / 5	●	●	●	●	
2N	1 / 9	●	●	●	●	
3N	1 / 15	●	●	●	●	
4N	1 / 25	●	●	●	●	

For high accuracy

Motor structure

Symbol	Shaft		Holding brake
Symbol	Key-way	without	with
3	●	●	
4	●		●

See page, A4-69 for motor with gear reducer specifications

Servo Driver

M A D D T 1 2 0 5 * * *

Symbol	Frame
MADD	A4 series, Frame A
MBDD	A4 series, Frame B
MCDD	A4 series, Frame C
MDDD	A4 series, Frame D
MEDD	A4 series, Frame E
MFDD	A4 series, Frame F

Symbol	Power device Max. current rating
T1	1 0A
T2	1 5A
T3	3 0A
T5	5 0A
T7	7 5A
TA	1 0 0A
TB	1 5 0A

Symbol	Supply voltage specifications
1	Single phase, 100V
2	Single phase, 200V
3	3 Phase, 200V
5	Single/3-phase, 200V

Symbol	Current detector current rating
05	5A
07	7.5A
10	1 0A
20	2 0A
30	3 0A
40	4 0A
64	6 4A
90	9 0A
A2	1 2 0A

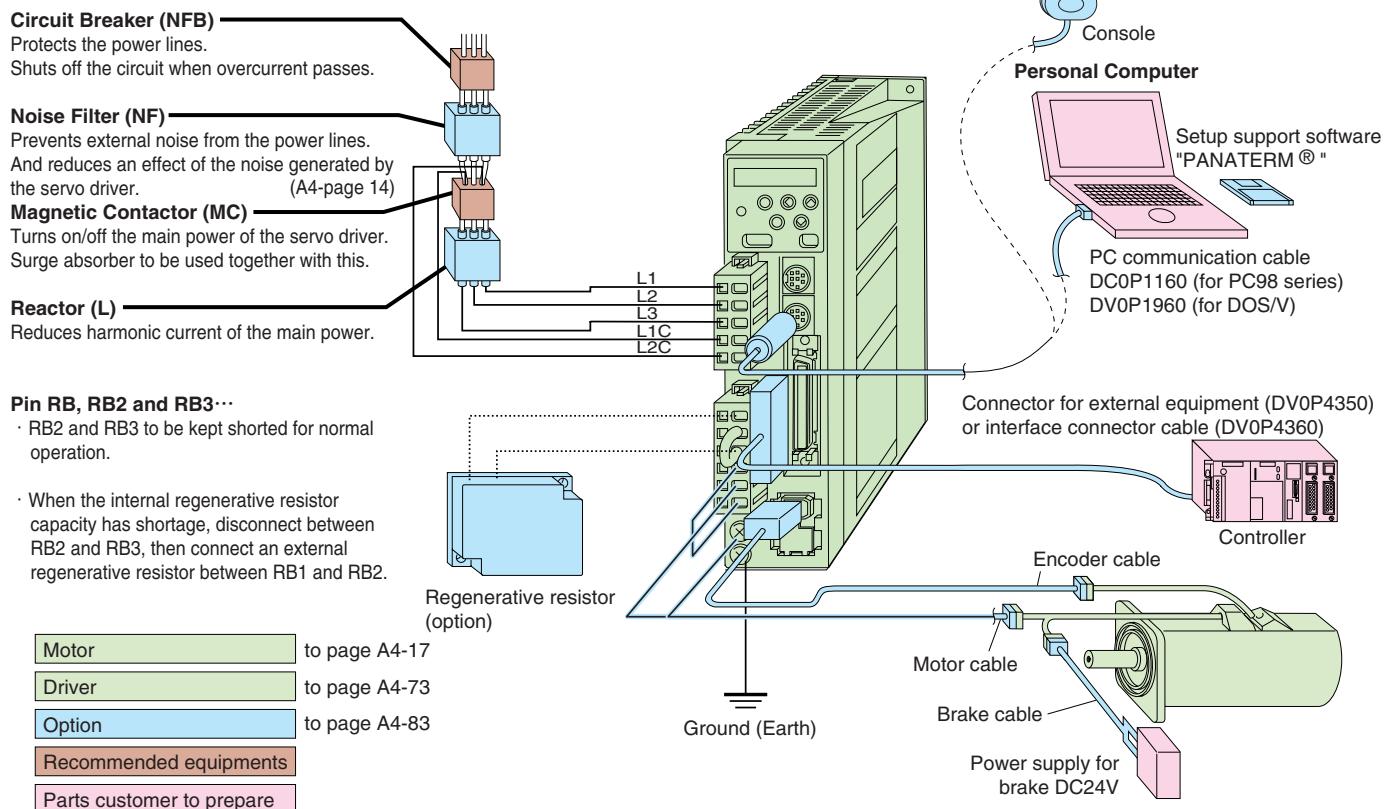
See page, A4-73 for driver specifications

Wiring example

Driver Frame Type Symbol (Frame A, B, C, D)

For details, refer to the Instruction Manual.

●Wiring of main circuit



■List of recommended peripheral equipments

Power supply voltage	Appli cable motor		Power capacity (rated load)	Circuit breaker (rated current)	Noise filter	Surge absorber	Noise filter (signal)	Magnetic contactor (Contact)	Cable diameter (Main circuit)	Cable diameter (control circuit)	Connector
	Series	Out put									
Single phase, 100V	MSMD	50W	Approx. 0.4kVA	DVOP 4170	BMFT61041N (3P+1a)	BBC 3151N (15A)	DVOP 4180	BMFT61541N (3P+1a)	0.75mm ² to 2.0mm ² AWG14 to 18	0.75mm ² AWG18	Connection to exclusive connector
	MSMD	100W	Approx. 0.5kVA								
	MQMA	200W	Approx. 0.5kVA	DVOP 4180							
	MQMA	400W	Approx. 0.9kVA								
Single phase, 200V	MSMD	50W	Approx. 0.5kVA	BBC 2101N (10A)	BMFT61542N (3P+1a)	DVOP 4180	DVOP 1460	BMFT61542N (3P+1a)	0.75mm ² to 2.0mm ² AWG14 to 18	0.75mm ² AWG18	Connection to exclusive connector
	MAMA	100W	Approx. 0.3kVA								
	MQMA	200W	Approx. 0.5kVA	DVOP 4170							
	MAMA	200W	Approx. 0.5kVA	BBC 2101N (10A)							
	MSMD	400W	Approx. 0.9kVA	DVOP 4190							
	MQMA	400W	Approx. 0.9kVA	DVOP 1460							

Power supply voltage	Appli cable motor		Power capacity (rated load)	Circuit breaker (rated current)	Noise filter	Surge absorber	Noise filter (signal)	Magnetic contactor (Contact)	Cable diameter (Main circuit)	Cable diameter (control circuit)	Connector							
	Series	Out put																
Single/ 3-phase, 200V	MAMA	400W	Approx. 0.9kVA	DVOP 4180	BMFT61542N (3P+1a)	BBC 3201N (20A)	DVOP 1460	BMFT61842N (3P+1a)	0.75mm ² to 2.0mm ² AWG14 to 18	0.75mm ² AWG18	Connection to exclusive connector							
	MFMA	500W	Approx. 1.1kVA															
	MHMA	750W	Approx. 1.3kVA	DVOP 4220														
	MSMD	1.0kW	Approx. 1.6kVA															
	MAMA	900W	Approx. 1.8kVA	DVOP 4220														
	MDMA	1.0kW	Approx. 2.0kVA															
	MGMA	1.0kW	Approx. 2.3kVA	DVOP 4220														
	MSMA	1.0kW	Approx. 2.3kVA															
	MDMA	1.5kW	Approx. 2.3kVA															
	MHMA																	

- Select a single and 3-phase common specifications corresponding to the power supplies.
- Listed circuit breaker and magnetic contactor are manufactured by Matsushita Electric Works.

To conform to EC Directives, install a circuit breaker which conforms to IEC and UL Standards (UL Listed and marked) between noise filter and power supply without fail.

- For details of noise filter, refer to Page A4-14.

<Remarks>

- Select a circuit breaker and noise filter which match to the capacity of power supply (including a load condition).
- Terminal block and earth terminals

Use a copper conductor cables with temperature rating of 60°C or higher.

Earth terminals for Frame A to D are M4 and M5 for Frame E to F.

Larger tightening torque for screws than the max.value (M4 : 1.2 N · m, M5 : 2.0 N · m) may damage the terminal block.

- Use an earth cable with diameter of 2.0mm² (AWG14) or larger for 50W to 1.5kW, 3.5mm² (AWG12) or larger for 3kW to 4kW and 5.3mm² (AWG10) or larger for 4.5kW to 5kW.

- Use the attached exclusive connector for A to D-frame, and maintain the peeled off length of 8-9mm.

- Tighten the screws of the connector, CN X5 for the host controller with the torque of 0.3 to 0.35 N · m.

- Larger torque than 0.35N · m may damage the connector at the driver side.

Driver Frame Type Symbol (Frame E, F)

For details, refer to the Instruction Manual.

●Wiring of main circuit

Circuit Breaker (NFB)

Protects the power lines.

Shuts off the circuit when overcurrent passes.

Noise Filter (NF)

Prevents external noise from the power lines.
And reduces an effect of the noise generated by the servo driver. (A4-page 14)

Magnetic Contactor (MC)

Turns on/off the main power of the servo driver.
Surge absorber to be used together with this.

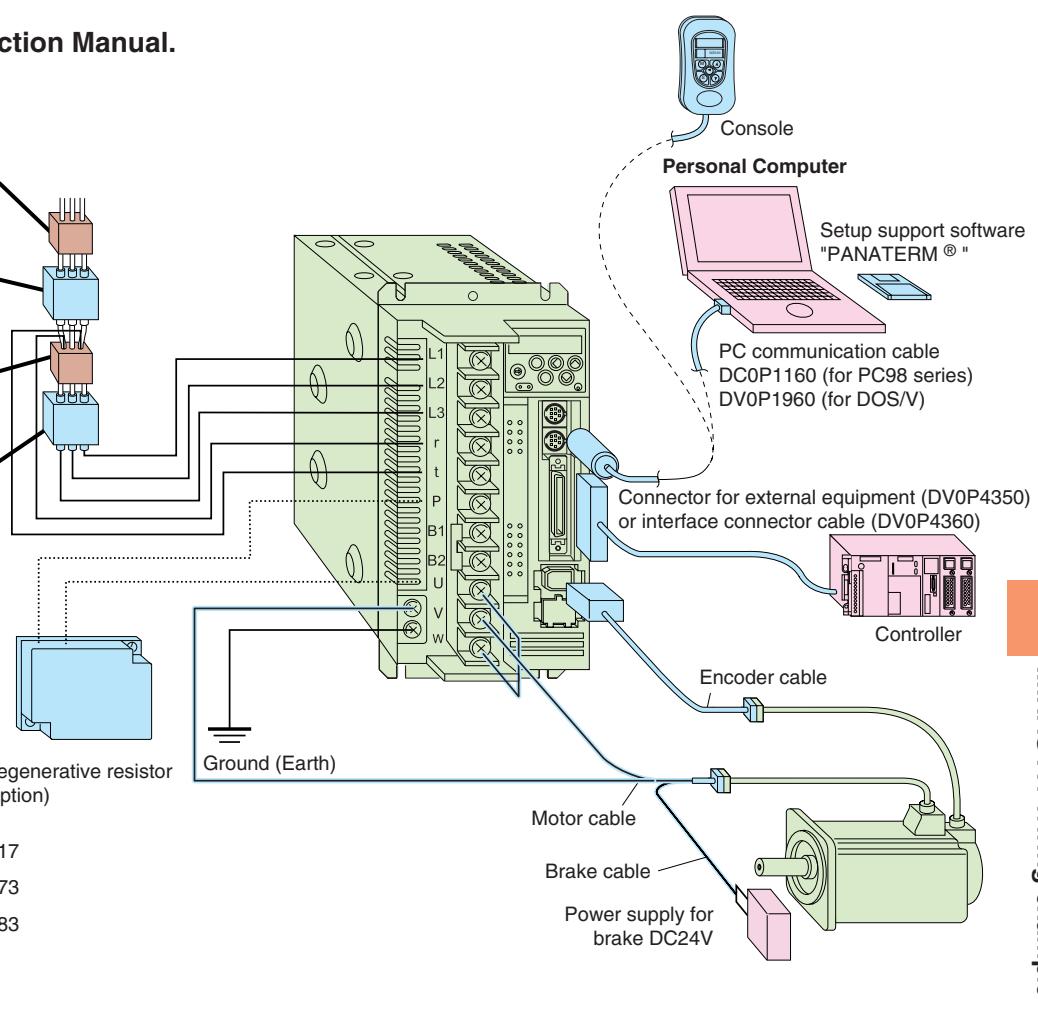
Reactor (L)

Reduces harmonic current of the main power.

Pin RB, RB2 and RB3...

- B1 and B2 to be kept shorted for normal operation.

- When the internal regenerative resistor capacity has shortage, disconnect between B1 and B2, then connect an external regenerative resistor between P and B2.



- | | |
|---------------------------|---------------|
| Motor | to page A4-17 |
| Driver | to page A4-73 |
| Option | to page A4-83 |
| Recommended equipments | |
| Parts customer to prepare | |

■List of recommended peripheral equipments

Power supply voltage	Appli cable motor	Power capacity (rated load)	Circuit breaker rated current	Noise filter	Surge absorber	Noise filter (signal)	Magnetic contactor (Contact)	Cable diameter (Main circuit)	Cable diameter (control circuit)	Connector
Series	Out put									
3-phase, 200V	MSMA							2.0mm ² AWG14		
	MDMA	2.0kW	Approx. 3.3kVA	BBC 3301N (30A)	DVOP 4220					
	MHMA									
	MFMA	2.5kW	Approx. 3.8kVA							
	MGMA	2.0kW								
	MSMA									
	MDMA	3.0kW	Approx. 4.5kVA							
	MHMA									
	MGMA									
	MSMA									
4-phase, 400V	MDMA	4.0kW	Approx. 6.0kVA	BBC 3501N (50A)	DVOP 3410			3.5mm ² AWG12	0.75mm ² AWG18	Connection to terminal block M5
	MHMA									
	MFMA	4.5kW	Approx. 6.8kVA							
	MGMA									
5-phase, 400V	MSMA									
	MDMA	5.0kW	Approx. 7.5kVA					5.3mm ² AWG10		
	MHMA									

- Select a single and 3-phase common specifications corresponding to the power supplies.
- Listed circuit breaker and magnetic contactor are manufactured by Matsushita Electric Works.

To conform to EC Directives, install a circuit breaker which conforms to IEC and UL Standards (UL Listed and marked) between noise filter and power supply without fail.

- For details of noise filter, refer to Page A4-14.

<Remarks>

- Select a circuit breaker and noise filter which match to the capacity of power supply (including a load condition).
- Terminal block and earth terminals
Use a copper conductor cables with temperature rating of 60°C or higher.
Earth terminals for Frame A to D are M4 and M5 for Frame E to F.
Larger tightening torque for screws than the max.value (M4 : 1.2 N · m, M5 : 2.0 N · m) may damage the terminal block.
- Use an earth cable with diameter of 2.0mm² (AWG14) or larger for 50W to 1.5kW, 3.5mm² (AWG12) or larger for 3kW to 4kW and 5.3mm² (AWG10) or larger for 4.5kW to 5kW.
- Use the attached exclusive connector for Frame A to D and maintain the peeled off length of 8-9mm.
- Tighten the screws of the connector, CN X5 for the host controller with the torque of 0.3 to 0.35 N · m.
- Larger torque than 0.35N · m may damage the connector at the driver side.

Table of Part Numbers and Options

Power supply	Motor series	Rated rotational speed (r/min)	Output (W)	2500P/r, Incremental			17bit, Absolute				2500P/r and 17bit common			
				Motor Note) 1	Rating/Spec. (page)	Encoder cable Note) 2	Motor Note) 1	Rating/Spec. (page)	Encoder cable Note) 2	Encoder cable Note) 2	Driver	Frame symbol		
Single phase 200V	MAMA Ultra low inertia	5000	100	MAMA012P1□	A4-17		MAMA012S1□	A4-17			MADDT1207	A-frame		
			200	MAMA022P1□	A4-17		MAMA022S1□	A4-17			MBDDT2210	B-frame		
			400	MAMA042P1□	A4-17		MAMA042S1□	A4-17			MCDDT3520	C-frame		
			750	MAMA082P1□	A4-17		MAMA082S1□	A4-17			MDDDT5540	D-frame		
3-phase, 200V			400	MAMA042P1□	A4-17		MAMA042S1□	A4-17			MCDDT3520	C-frame		
			750	MAMA082P1□	A4-17		MAMA082S1□	A4-17			MDDDT5540	D-frame		
Single phase 100V	MSMD low inertia	1000	50	MSMD5AZP1□	A4-19		MSMD5AZS1□	A4-19			MADDT1105	A-frame		
			100	MSMD011P1□	A4-19		MSMD011S1□	A4-19			MADDT1107	A-frame		
			200	MSMD021P1□	A4-21		MSMD021S1□	A4-21			MBDDT2110	B-frame		
			400	MSMD041P1□	A4-21	MFECA 0 * * 0EAM	MSMD041S1□	A4-21	MFECA 0 * * 0EAE	MFECA 0 * * 0EAD	MCDDT3120	C-frame		
	MQMA low inertia Flat		100	MQMA011P1□	A4-27		MQMA011S1□	A4-27			MADDT1107	A-frame		
			200	MQMA021P1□	A4-27		MQMA021S1□	A4-27			MBDDT2110	B-frame		
			400	MQMA041P1□	A4-27		MQMA041S1□	A4-27			MCDDT3120	C-frame		
			50	MSMD5AZP1□	A4-23		MSMD5AZS1□	A4-23			MADDT1205	A-frame		
Single phase 200V	MSMD low inertia	3000	100	MSMD012P1□	A4-23		MSMD012S1□	A4-23			MADDT1207			
			200	MSMD022P1□	A4-25		MSMD022S1□	A4-25			MBDDT2210	B-frame		
			400	MSMD042P1□	A4-25		MSMD042S1□	A4-25			MCDDT3520	C-frame		
			750	MSMD082P1□	A4-25		MSMD082S1□	A4-25			MADDT1205	A-frame		
			100	MQMA012P1□	A4-29		MQMA012S1□	A4-29			MADDT1207			
	MQMA low inertia Flat		200	MQMA022P1□	A4-29		MQMA022S1□	A4-29			MBDDT2210	B-frame		
			400	MQMA042P1□	A4-29		MQMA042S1□	A4-29			MADDT1205	A-frame		
			1000	MSMA102P1□	A4-31		MSMA102S1□	A4-31			MDDDT5540			
	MSMA low inertia		1500	MSMA152P1□	A4-31		MSMA152S1□	A4-31			MDDDT3530	D-frame		
			1000	MDMA102P1□	A4-35		MDMA102S1□	A4-35			MDDDT5540			
	MDMA Middle inertia		1500	MDMA152P1□	A4-35		MDMA152S1□	A4-35			MDDDT3530			
			1000	MGMA092P1□	A4-41	MFECA 0 * * 0ESD	MGMA092S1□	A4-41	MFECA 0 * * 0ESE	MFECA 0 * * 0ESD	MDDDT5540			
	MFMA Middle inertia		400	MFMA042P1□	A4-45		MFMA042S1□	A4-45			MCDDT3520	C-frame		
			1500	MFMA152P1□	A4-45		MFMA152S1□	A4-45			MDDDT5540	D-frame		
	MHMA High inertia		500	MHMA052P1□	A4-49		MHMA052S1□	A4-49			MCDDT3520	C-frame		
			1000	MHMA102P1□	A4-49		MHMA102S1□	A4-49			MDDDT3530	D-frame		
			1500	MHMA152P1□	A4-49		MHMA152S1□	A4-49			MDDDT5540			
3-phase, 200V	MSMD low inertia		750	MSMD082P1□	A4-25	MFECA 0 * * 0EAM	MSMD082S1□	A4-25	MFECA 0 * * 0EAE	MFECA 0 * * 0EAD	MCDDT3520	C-frame		
			1000	MSMA102P1□	A4-31		MSMA102S1□	A4-31			MDDDT5540	D-frame		
	MSMA low inertia		1500	MSMA152P1□	A4-31		MSMA152S1□	A4-31			MEDDT7364	E-frame		
			2000	MSMA202P1□	A4-31		MSMA202S1□	A4-31			MFDDA390			
			3000	MSMA302P1□	A4-33		MSMA302S1□	A4-33			MFDDTB3A2	F-frame		
			4000	MSMA402P1□	A4-33		MSMA402S1□	A4-33			MDDDT3530			
			5000	MSMA502P1□	A4-33		MSMA502S1□	A4-33			MDDDT5540			
	MDMA Middle inertia		1000	MDMA102P1□	A4-35		MDMA102S1□	A4-35			MDDDT3530	D-frame		
			1500	MDMA152P1□	A4-35		MDMA152S1□	A4-35			MDDDT5540			
			2000	MDMA202P1□	A4-37		MDMA202S1□	A4-37			MEDDT7364	E-frame		
			3000	MDMA302P1□	A4-37		MDMA302S1□	A4-37			MFDDA390			
			4000	MDMA402P1□	A4-39		MDMA402S1□	A4-39			MFDDTB3A2	F-frame		
	MGMA Middle inertia		5000	MDMA502P1□	A4-39		MDMA502S1□	A4-39			MDDDT5540			
			900	MGMA092P1□	A4-41		MGMA092S1□	A4-41			MEDDT7364	E-frame		
			2000	MGMA202P1□	A4-41	MFECA 0 * * 0ESD	MGMA202S1□	A4-41	MFECA 0 * * 0ESE	MFECA 0 * * 0ESD	MFDDA390			
			3000	MGMA302P1□	A4-43		MGMA302S1□	A4-43			MFDDTB3A2	F-frame		
	MFMA Middle inertia		4500	MGMA452P1□	A4-43		MGMA452S1□	A4-43			MDDDT5540			
			400	MFMA042P1□	A4-45		MFMA042S1□	A4-45			MCDDT3520	C-frame		
			1500	MFMA152P1□	A4-45		MFMA152S1□	A4-45			MDDDT5540	D-frame		
			2500	MFMA252P1□	A4-47		MFMA252S1□	A4-47			MEDDT7364	E-frame		
	MHMA High inertia		4500	MFMA452P1□	A4-47		MFMA452S1□	A4-47			MFDDTB3A2	F-frame		
			500	MHMA052P1□	A4-49		MHMA052S1□	A4-49			MCDDT3520	C-frame		
			1000	MHMA102P1□	A4-49		MHMA102S1□	A4-49			MDDDT3530	D-frame		
			1500	MHMA152P1□	A4-49		MHMA152S1□	A4-49			MDDDT5540			
			2000	MHMA202P1□	A4-51		MHMA202S1□	A4-51			MEDDT7364	E-frame		
			3000	MHMA302P1□	A4-51		MHMA302S1□	A4-51			MFDDA390			
			4000	MHMA402P1□	A4-51		MHMA402S1□	A4-51			MFDDTB3A2	F-frame		
			5000	MHMA502P1□	A4-51		MHMA502S1□	A4-51			MFDDTB3A2			

	Optional parts					
	Motor cable Note) 2	Motor cable (with brake) Note) 2	Brake cable Note) 2	Regenerative resistor	Reactor	Noise filter
MFMCA 0**0EED	—	MFMCB 0**0GET		DV0P4283	DV0P220	DV0P4170
					DV0P221	DV0P4180
				DV0P4284		DV0P4220
				DV0P4283	DV0P220	DV0P4180
				DV0P4284	DV0P221	DV0P4220
				DV0P4280	DV0P227	DV0P4170
				DV0P4283	DV0P228	DV0P4180
				DV0P4282		DV0P4170
				DV0P4280	DV0P227	DV0P4180
				DV0P4283	DV0P228	DV0P4170
MFMCD 0**2ECD	MFMCA 0**2FCD	—		DV0P4281	DV0P220	DV0P4170
					DV0P221	DV0P4180
				DV0P4283	DV0P220	DV0P4170
				DV0P4281	DV0P220	DV0P4170
				DV0P4283	DV0P221	
				DV0P4284		DV0P4220
					DV0P222	DV0P4180
				DV0P4283	DV0P220	DV0P4180
				DV0P4284	DV0P222	DV0P4220
				DV0P4283	DV0P220	DV0P4180
MFMCA 0**0EED	—	MFMCB 0**0GET		DV0P4283	DV0P221	DV0P4180
MFMCD 0**2ECD	MFMCA 0**2FCD	—		DV0P4284	DV0P222	DV0P4220
MFMCA 0**2ECD	MFMCA 0**2FCD			DV0P4283	DV0P220	DV0P4180
MFMCD0**2ECT	MFMCA0**2FCT			DV0P4284	DV0P222	DV0P4220
MFMCA 0**3ECT	MFMCA 0**3FCT			DV0P4285	DV0P223	
MFMCD 0**2ECD	MFMCA 0**2FCD			X2 in parallel	DV0P224	
MFMCD0**2ECT	MFMCA0**2FCT			X2 in parallel	DV0P225	DV0P3410
MFMCA 0**3ECT	MFMCA 0**3FCT				—	
MFMCD 0**2ECD	MFMCA 0**2FCD	—		DV0P4284	DV0P222	DV0P4220
MFMCA 0**3ECT	MFMCA 0**3FCT			DV0P4285	DV0P223	
MFMCA 0**2ECD	MFMCA 0**2FCD			X2 in parallel	DV0P224	
MFMCD 0**3ECT	MFMCA 0**3FCT			X2 in parallel	DV0P225	DV0P3410
MFMCD 0**2ECD	MFMCA 0**2FCD	—		DV0P4284	DV0P223	
MFMCA 0**3ECT	MFMCA 0**3FCT			X2 in parallel	DV0P224	
MFMCA 0**2ECD	MFMCA 0**2FCD			DV0P4283	DV0P220	DV0P4180
MFMCD 0**3ECT	MFMCA 0**3FCT			DV0P4284	DV0P222	DV0P4220
MFMCA 0**2ECD	MFMCA 0**2FCD			DV0P4285	DV0P224	
MFMCA 0**3ECT	MFMCA 0**3FCT			X2 in parallel	—	DV0P3410
MFMCD 0**2ECD	MFMCA 0**2FCD			DV0P4283	DV0P220	DV0P4180
MFMCA 0**3ECT	MFMCA 0**3FCT			DV0P4284	DV0P222	DV0P4220
MFMCA 0**2ECD	MFMCA 0**2FCD			DV0P4285	DV0P224	
MFMCA 0**3ECT	MFMCA 0**3FCT			X2 in parallel	—	DV0P3410
MFMCD 0**2ECD	MFMCA 0**2FCD			DV0P4283	DV0P220	DV0P4180
MFMCA 0**3ECT	MFMCA 0**3FCT			DV0P4284	DV0P222	DV0P4220
MFMCA 0**2ECD	MFMCA 0**2FCD			DV0P4285	DV0P224	
MFMCA 0**3ECT	MFMCA 0**3FCT			X2 in parallel	—	DV0P3410

Carrying page

Options	Part No.	Carrying page
Instruction manual	Japanese	DV0P4200
	English	DV0P4210
Console		DV0P3690 A4-91
Setup support software, PANATERM®	Japanese	DV0P4230 A4-90
	English	DV0P4240 A4-90
RS232C communication cable	DOS/V	DV0P1960 A4-89
	PC98 L=200mm	DV0P1160 A4-89
RS485 communication cable	L=200mm	DV0P1970 A4-90
	L=500mm	DV0P1971 A4-90
	L=1000mm	DV0P1972 A4-90
Interface cable		DV0P4360 A4-87
Connector kit for external equipment		DV0P4350 A4-87
		DV0P4290 A4-87
		DV0P4380 A4-88
Connector kit for motor and encoder	Frame A	DV0P4271 A4-90
	Frame B	DV0P4272 A4-90
	Frame C	DV0P4273 A4-90
	Frame D	DV0P4274 A4-90
Encoder cable	MFECA0**0EAD	A4-84
	MFECA0**0EAE	A4-84
	MFECA0**0EAM	A4-84
	MFECA0**0ESD	A4-84
	MFECA0**0ESE	A4-84
Motor cable	MFMCA0**0EED	A4-85
	MFMCA0**2ECD	A4-85
	MFMCA0**3ECT	A4-85
	MFMCD0**2ECT	A4-85
	MFMCD0**3ECT	A4-85
Motor cable (with brake)	MFMCA0**2FCD	A4-86
	MFMCA0**2FCT	A4-86
	MFMCA0**3FCT	A4-86
Brake cable	MFMCA0**0GET	A4-86
	50Ω, 25W	DV0P4280
	100Ω, 25W	DV0P4281
	25Ω, 50W	DV0P4282
	50Ω, 50W	DV0P4283
	30Ω, 100W	DV0P4284
	20Ω, 130W	DV0P4285
Reactor	DV0P220	A4-91
	to DV0P228	
Noise filter	DV0P4170	
	DV0P4180	
	DV0P4220	A4-14
	DV0P3410	
Surge absorber	Single Phase 100V	DV0P4190 A4-14
	3-Phase 200V	DV0P1450 A4-14
Noise filter for signal wire	DV0P1460	A4-15

Note) 1. □ represents the motor structure.

Note) 2. **represents the cable length (specified value)

For details, refer to cable specifications (A4-83).

Conformity to CE and UL

Compliance to EC and EMC Directives

EC Directives

The EC Directives apply to all such electronic products as those having specific functions and have been exported to EU and directly sold to general consumers. Those products are required to conform to the EU unified standards and to furnish the CE marking on the products.

MINAS AC Servos conforms to the EC Directives for Low Voltage Equipment so that the machine incorporating our servos has an easy access to the conformity to relevant EC Directives for the machine.

EMC Directives

MINAS Servo System conforms to relevant standards under EMC Directives setting up certain model (condition) with certain locating distance and wiring of the servo motor and the driver. And actual working condition often differs from this model condition especially in wiring and grounding. Therefore, in order for the machine to conform to the EMC Directives, especially for noise emission and noise terminal voltage, it is necessary to examine the machine incorporating our servos.

Conformed Standards

Subject	Conformed Standard	
Motor	IEC60034-1	Conforms to Low-Voltage Directives
Motor and driver	EN50178 UL508C	
	EN55011 Radio Disturbance Characteristics of Industrial, Scientific and Medical (ISM) Radio-Frequency Equipment	
	EN61000-6-2 Immunity for Industrial Environments	
	IEC61000-4-2 Electrostatic Discharge Immunity Test	
	IEC61000-4-3 Radio Frequency Electromagnetic Field Immunity Test	
	IEC61000-4-4 Electric High-Speed Transition Phenomenon/Burst Immunity Test	
	IEC61000-4-5 Lightening Surge Immunity Test	
	IEC61000-4-6 High Frequency Conduction Immunity Test	
	IEC61000-4-11 Instantaneous Outage Immunity Test	

IEC : International Electrotechnical Commission

EN : Europaischen Normen

EMC : Electromagnetic Compatibility

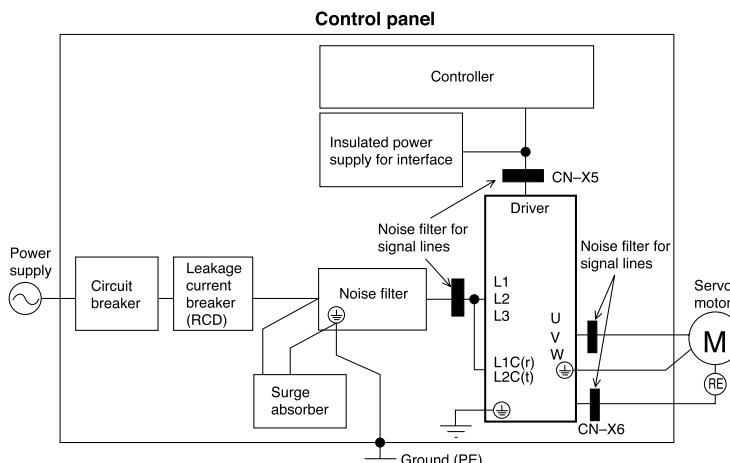
UL : Underwriters Laboratories

CSA : Canadian Standards Association

Composition of peripheral equipment

Installation environment

Use the MINAS driver in environment of Pollution Degree 1 or 2 prescribed in IEC-60664-1
(e.g. Install the driver in control panel with IP54 protection structure.)



Power supply

100V system : Single phase 100V	+ 10%	- 15%	115V	+ 10%	- 15%	50/60Hz
(Frame A to C)						
200V system : Single 200V	+ 10%	- 15%	240V	+ 10%	- 15%	50/60Hz
(Frame A to B)						
200V system : Single/3- phase 200V	+ 10%	- 15%	240V	+ 10%	- 15%	50/60Hz
(Frame C to D)						
200V system : 3- phase 200V	+ 10%	- 15%	230V	+ 10%	- 15%	50/60Hz
(Frame E to F)						

(1)This product is designed to be used under Overvoltage

Category (Installation Category) II of EN50178 :1997.

Install a surge absorber which conforms to EN61643-11 : 2002 and other relevant standards at the power entry when you want to use this product under Overvoltage Category (Installation Category) III .

(2)For a interface power supply, use an insulated one with 12 to 24 VDC which conforms to CE Marking or EN Standards.

Circuit breaker

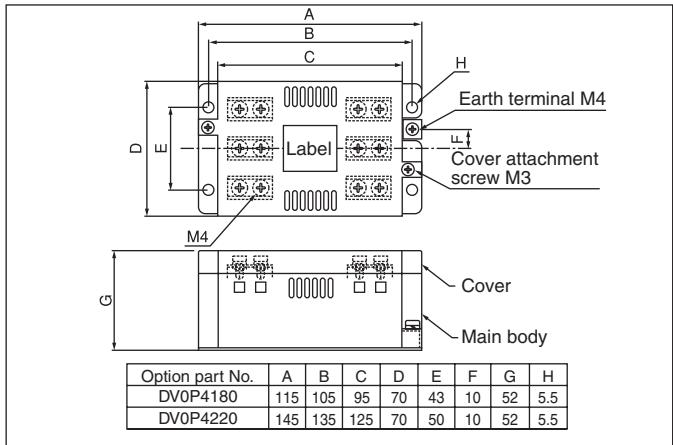
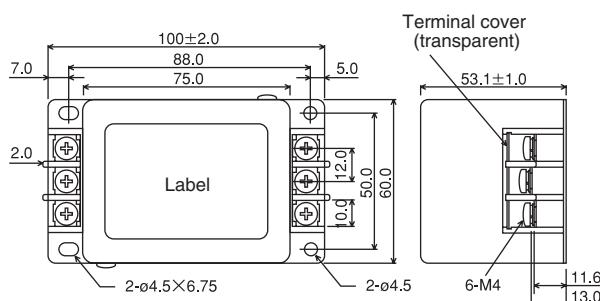
Connect a circuit breaker which conforms to IEC standards and is UL recognized (listed and marked), between the power supply and the noise filter.

Noise filter

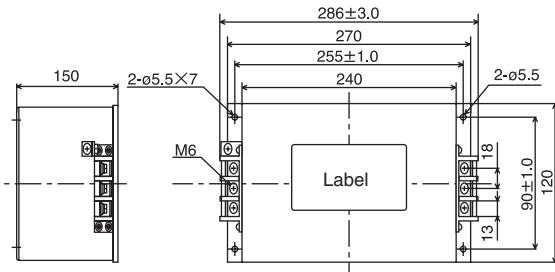
When you install one noise filter in the power supply for multi-axes application, consult with the manufacturer of the filter.

Option part No.	Part No.	Manufacturer
DV0P4170	SUP-EK5-ER-6	Okaya Electric Industries Co.
DV0P4180	3SUP-HQ10-ER-6	
DV0P4220	3SUP-HU30-ER-6	
DV0P3410	3SUP-HL50-ER-6B	

DV0P4170



DV0P3410

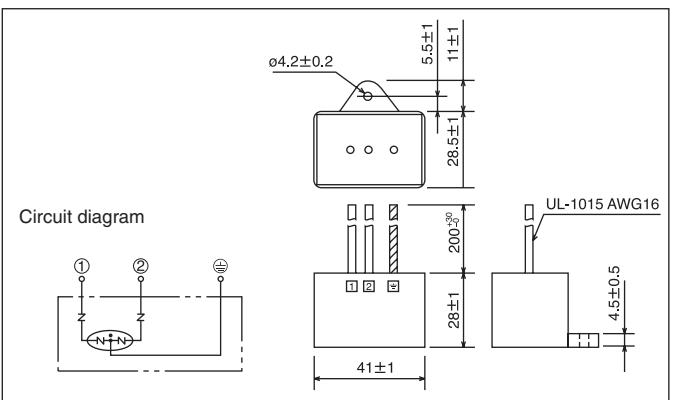
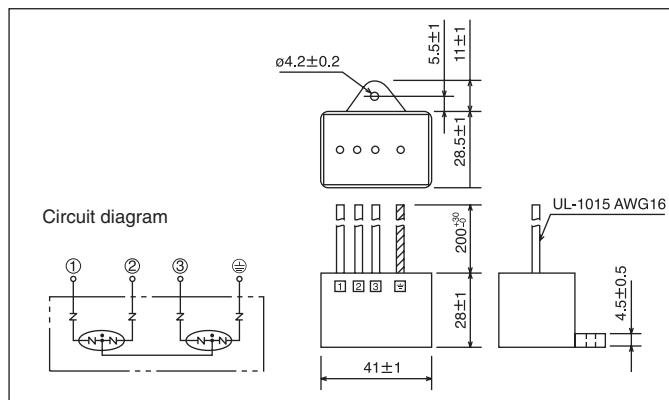


Surge absorber

Install a surge absorber at primary side of the noise filter.

Option part No.	Driver voltage spec	Part No.	Manufacturer
DV0P1450	3-phase, 200V	R · A · V-781BXZ-4	Okaya Electric

Option part No.	Driver voltage spec	Part No.	Manufacturer
DV0P4190	Single phase, 100V, 200V	R · A · V-781BWZ-4	Okaya Electric



<Remarks>

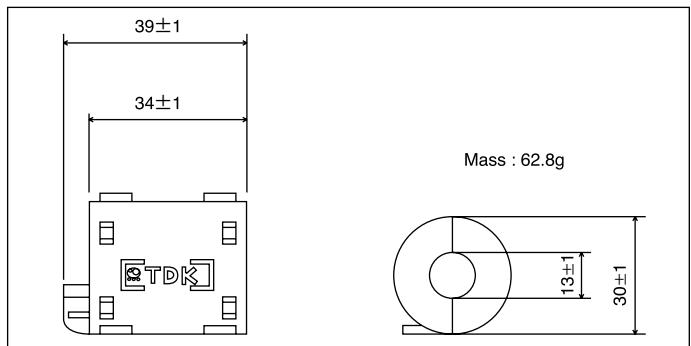
Remove this surge absorber when you perform dielectric test on the machine, or surge absorber might be damaged.

Conformity to CE and UL

Noise filter for signal lines

Install noise filters for signal lines to all cables (Power line, motor cable, encoder cable, interface cable)

Option part No.	Part No.	Manufacturer
DV0P1460	ZCAT3035-1330	TDK Corp.



Ground-fault breaker

Install a B-type ground-fault breaker (RCD) at primary side of the power supply of the driver.

Grounding

- (1) Connect the protective earth terminal of the driver (\ominus) and protective earth terminal of the control panel (PE) without fail to prevent electrical shocks.
- (2) Do not co-clamp to the protective earth terminals (\ominus). Two protective earth terminals are provided.

Conformity to UL Standards

Observe the following conditions ((1) and (2)) to make the system conform to UL508C (File No. E164620).

(1) Use Minas driver in environment of Pollution Degree 1 or 2 prescribed in IEC-60664-1.

(e.g. Install in the control panel with IP54 protective structure)

(2) Connect the UL recognized (UL Listed, UL marked) circuit breaker or UL recognized (UL Listed, UL marked) fuse between the power supply and noise filter.

IP65 Rating

- MSMD, MQMA and MAMA motors conform to IP65 rating except for the connector and shaft through hole.
- For MSMA, MDMA, MGMA, MFMA and MHMA motors, customer to supply the plug and cable clamp which conform to IP65 rating.
(Optional connector kits for encoder cable and motor cable do not provide IP65 rating.)

Motor		Motor side Receptacle type	Plug and clamp (Customer to supply) manufactured by Japan Aviation Electronics Ind.		
			Plug		Cable clamp type
Series	Output (kW)		Straight type	Angle type (L-shape)	
Without brake	MSMA	1.0 - 2.0	JL04V-2E20-4PE-B	JL04V-6A20-4SE-EB	JL04V-8A20-4SE-EB
		3.0 - 5.0	JL04HV-2E22-22PE-B	JL04V-6A22-22SE-EB	JL04V-8A22-22SE-EB
	MDMA	1.0 - 2.0	JL04V-2E20-4PE-B	JL04V-6A20-4SE-EB	JL04V-8A20-4SE-EB
		3.0 - 5.0	JL04HV-2E22-22PE-B	JL04V-6A22-22SE-EB	JL04V-8A22-22SE-EB
	MGMA	0.9	JL04V-2E20-4PE-B	JL04V-6A20-4SE-EB	JL04V-8A20-4SE-EB
		2.0 - 4.5	JL04HV-2E22-22PE-B	JL04V-6A22-22SE-EB	JL04V-8A22-22SE-EB
	MHMA	0.5 - 1.5	JL04V-2E20-4PE-B	JL04V-6A20-4SE-EB	JL04V-8A20-4SE-EB
		2.0 - 5.0	JL04HV-2E22-22PE-B	JL04V-6A22-22SE-EB	JL04V-8A22-22SE-EB
	MFMA	0.4 - 1.5	JL04V-2E20-18PE-B	JL04V-6A20-18SE-EB	JL04V-8A20-18SE-EB
		2.5 - 4.5	JL04V-2E24-11PE-B	JL04V-6A24-11SE-EB	JL04V-8A24-11SE-EB
	MSMA	1.0 - 2.0	JL04V-2E20-18PE-B	JL04V-6A20-18SE-EB	JL04-2022CK (14)
		3.0 - 5.0	JL04V-2E24-11PE-B	JL04V-6A24-11SE-EB	JL04-2428CK (17)
	MDMA	1.0 - 2.0	JL04V-2E20-18PE-B	JL04V-6A20-18SE-EB	JL04-2022CK (14)
		3.0 - 5.0	JL04V-2E24-11PE-B	JL04V-6A24-11SE-EB	JL04-2428CK (17)
	MGMA	0.9	JL04V-2E20-18PE-B	JL04V-6A20-18SE-EB	JL04-2022CK (14)
		2.0 - 4.5	JL04V-2E24-11PE-B	JL04V-6A24-11SE-EB	JL04-2428CK (17)
	MHMA	0.5 - 1.5	JL04V-2E20-18PE-B	JL04V-6A20-18SE-EB	JL04-2022CK (14)
		2.0 - 5.0	JL04V-2E24-11PE-B	JL04V-6A24-11SE-EB	JL04-2428CK (17)
	MFMA	0.4 - 1.5	JL04V-2E20-18PE-B	JL04V-6A20-18SE-EB	JL04-2022CK (14)
		2.5 - 4.5	JL04V-2E24-11PE-B	JL04V-6A24-11SE-EB	JL04-2428CK (17)
Encoder		MS3102A 20-29P	JA06A-20-29S-J1-EB	JA08A-20-29S-J1-EB	JL04-2022CK (14)

Motor Specifications and Ratings 200V MAMA 100W to 750W Ultra low inertia Small capacity

		AC200V													
Motor model		012P1□	012S1□	022P1□	022S1□	042P1□	042S1□	082P1□	082S1□						
Applicable driver	Model No.	MADDT1207		MBDDT2210		MCDDT3520		MDDT5540							
	Frame symbol	Frame A		Frame B		Frame C		Frame D							
Power supply capacity (kVA)		0.4		0.5		1.0		1.3							
Rated output (W)		100		200		400		750							
Rated torque (N · m)		0.19		0.38		0.76		1.43							
Momentary Max. peak torque (N · m)		0.95		1.91		3.82		7.16							
Rated current (Arms)		0.9		1.54		3.1		5.1							
Max. current (Ao-p)		6.3		10.9		21.7		36.0							
Regenerative brake frequency (times/min) Note)1	Without option	No limit Note)2													
	DV0P4283	No limit Note)2													
	DV0P4284	—													
Rated rotational speed (r/min)		5000													
Max. rotational speed (r/min)		6000													
Moment of inertia of rotor (x10 ⁻⁴ kg · m ²)	Without brake	0.025	0.035	0.078	0.088	0.14	0.15	0.50	0.51						
	With brake	0.029	0.039	0.11	0.12	0.17	0.18	0.58	0.59						
Recommended moment of inertia ratio of the load and the rotor Note)3		Smaller than 15 times													
Rotary encoder specifications		2500P/r Incremental	17-bit Absolute/Incremental	2500P/r Incremental	17-bit Absolute/Incremental	2500P/r Incremental	17-bit Absolute/Incremental	2500P/r Incremental	17-bit Absolute/Incremental						
Resolution per single turn		10000	131072	10000	131072	10000	131072	10000	131072						
Protective enclosure rating		IP65 (except shaft through hole and cable end connector)													
Environment	Ambient temperature	0 to 40°C (free from freezing), Storage : -20 to + 80°C													
	Ambient humidity	85%RH or lower (free from condensing)													
	Installation location	Indoors (no direct sunlight), free from corrosive gas, inflammable gas, oil mist and dust													
	Altitude	1000m or lower													
	Vibration resistance	49m/s ² or less	24m/s ² or less	49m/s ² or less	24m/s ² or less	49m/s ² or less	24m/s ² or less	49m/s ² or less	24m/s ² or less						
Mass (kg). () represents holding brake type		0.65 (0.85)	0.71 (0.91)	1.1 (1.5)	1.2 (1.6)	1.5 (1.9)	1.6 (2.0)	3.3 (4.0)	3.4 (4.1)						

Brake specifications (This brake will be released when it is energized. Do not use this for braking the motor in motion.)				
Static friction torque (N·m)	0.29		1.27	2.45
Engaging time (ms)	35		50	70
Releasing time (ms) Note)4	10 (60)		10 (100)	20 (-)
Exciting current (DC) (A)	0.25		0.30	0.35
Releasing voltage	DC2V or more			
Exciting voltage	DC 24 V ± 5%			

Permissible load				
During assembly	Radial load P-direction (N)	147		392
	Thrust load A-direction (N)	88		147
	Thrust load B-direction (N)	117.6		196
During operation	Radial load P-direction (N)	68.6		245
	Thrust load A-direction (N)	49		68.6
	Thrust load B-direction (N)	49		68.6

For motor dimensions, refer to page A4-53 , and for the diver, refer to pages A4-80 and 81.

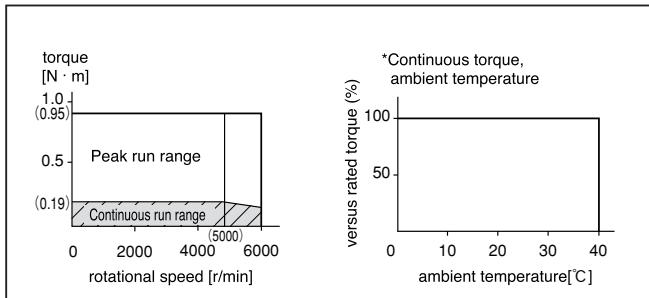
Model designation MAMA series, 100W to 750W

e.g.)

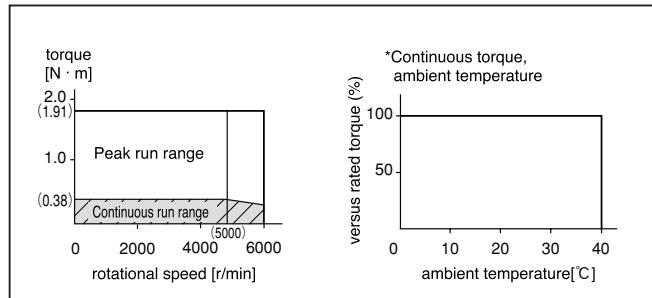
M	A	M	A	0	1	2	S	1	A	
<hr/>										
Symbol	Type	Voltage specifications					Design order			
MAMA	Ultra low inertia (100W-750W)	Symbol 2 Specifications 200V					1 : Standard			
Motor rated output										
Symbol	Rated output	Rotary encoder specifications					Motor structure			
01	100W	Symbol P	Format Incremental	Pulse counts 2500P/r	Resolution 10000	Wires 5	Symbol	Shaft	Holding brake	
02	200W	Symbol S	Absolute/Incremental	17-bit	131072	7	Rounded	Key-way	without with	
04	400W								without with	
08	750W						A	●	●	●
							B	●	●	●
							E	●	●	●
							F	●	●	●

Torque characteristics at AC200V of power voltage

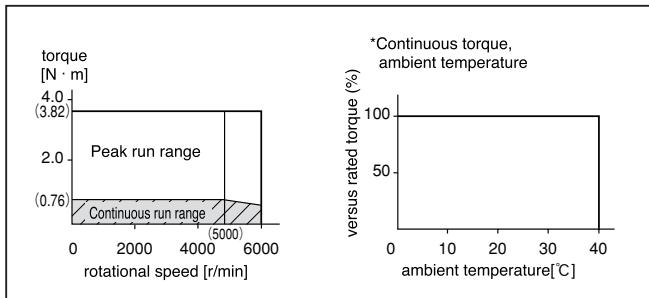
MAMA012□1□



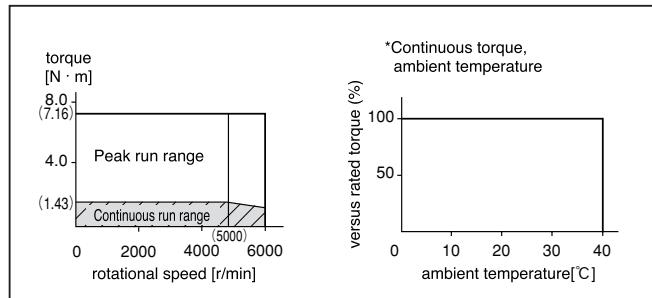
MAMA022□1□



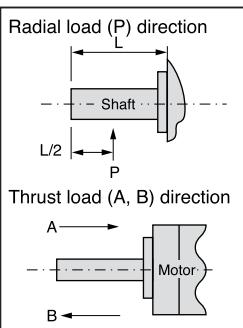
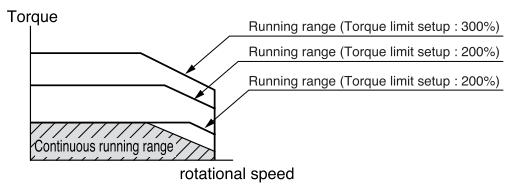
MAMA042□1□



MAMA082□1□



*When you lower the torque limit setup (Pr5E and 5F), running range at high speed might be lowered as well.



- Note) 1. Regenerative brake frequency represents the frequency of the motor's stops from the rated speed with deceleration without load.
- If the load is connected, frequency will be defined as $1/(m+1)$, where m =load moment of inertia/rotor moment of inertia.
 - When the motor speed exceeds the rated speed, regenerative brake frequency is in inverse proportion to the square of (running speed/rated speed).
 - Power supply voltage is AC230V (at 200V of the main voltage).
 - If the supply voltage fluctuates, frequency is in inverse proportion to the square of (Running supply voltage/230) relative to the value in the table.
 - When regeneration occurs continuously such cases as running speed frequently changes or vertical feeding, consult us or a dealer.
2. If the effective torque is within the rated torque, there is no limit in generative brake.
3. Consult us or a dealer if the load moment of inertia exceeds the specified value.
4. Specified releasing time is obtained with the use of surge absorber for brake (Z15D151 by Ishizuka Electronic or equivalent). () represents the actually measured value using a diode (200V, 1A or equivalent).

Motor Specifications and Ratings

100V MSMD

50W to 100W Low inertia Small Capacity

		AC100V									
Motor model		MSMD	5AZP1□	5AZS1□	011P1□	011S1□					
Applicable driver	Model No.	MADDT1105			MADDT1107						
	Frame symbol	Frame A									
Power supply capacity (kVA)		0.3		0.4							
Rated output (W)		50		100							
Rated torque (N · m)		0.16		0.32							
Momentary Max. peak torque (N · m)		0.48		0.95							
Rated current (Arms)		1.1		1.7							
Max. current (Ao-p)		4.7		7.2							
Regenerative brake frequency (times/min) Note1	Without option	No limit		Note2							
	DV0P4280	No limit		Note2							
Rated rotational speed (r/min)		3000									
Max. rotational speed (r/min)		5000									
Moment of inertia of rotor ($\times 10^{-4}$ kg · m 2)	Without brake	0.025		0.051							
	With brake	0.027		0.054							
Recommended moment of inertia ratio of the load and the rotor Note3		Smaller than 30 times									
Rotary encoder specifications		2500P/r Incremental	17-bit Absolute/ Incremental	2500P/r Incremental	17-bit Absolute/ Incremental						
Resolution per single turn		10000	131072	10000	131072						
Protective enclosure rating		IP65 (except shaft through hole and cable end connector)									
Environment	Ambient temperature	0 to 40°C (free from freezing), Storage : -20 to + 80°C									
	Ambient humidity	85%RH or lower (free from condensing)									
	Installation location	Indoors (no direct sunlight), free from corrosive gas, inflammable gas, oil mist and dust									
	Altitude	1000m or lower									
	Vibration resistance	49m/s 2 or less		49m/s 2 or less							
Mass (kg), () represents holding brake type		0.32 (0.53)		0.47 (0.68)							

Brake specifications (This brake will be released when it is energized. Do not use this for braking the motor in motion.)

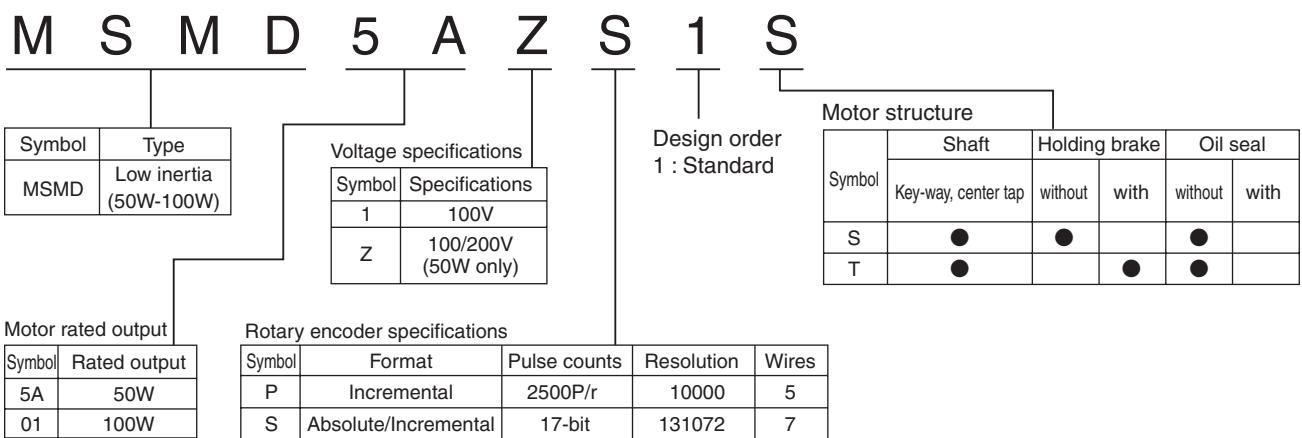
Static friction torque (N·m)	0.29
Engaging time (ms)	35
Releasing time (ms) Note4	20 (—)
Exciting current (DC) (A)	0.30
Releasing voltage	DC1V or more
Exciting voltage	DC 24 V ± 5%

Permissible load		
During assembly	Radial load P-direction (N)	147
	Thrust load A-direction (N)	88
	Thrust load B-direction (N)	117
During operation	Radial load P-direction (N)	68
	Thrust load A-direction (N)	58
	Thrust load B-direction (N)	58

For motor dimensions, refer to page A4-54 , and for the diver, refer to pages A4-80.

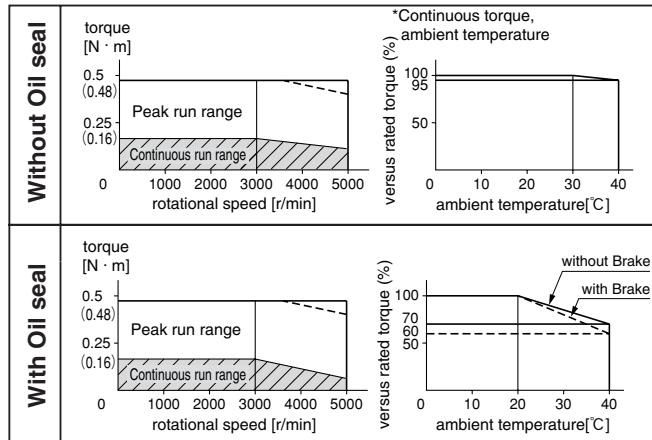
Model designation MSMD series, 50W to 100W

e.g.)

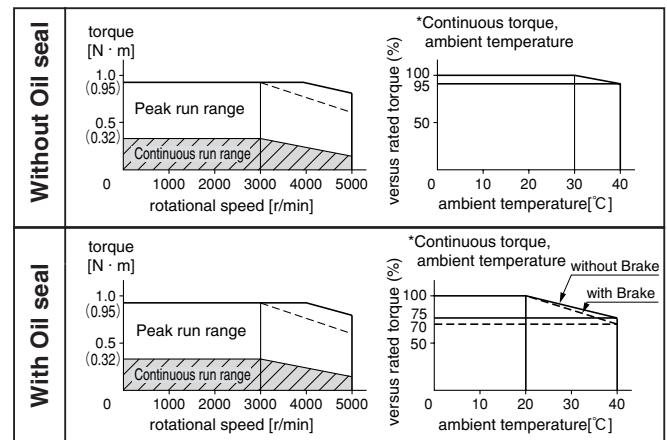

Torque characteristics at AC100V of power voltage

(Dotted line represents the torque at 10% less supply voltage.)

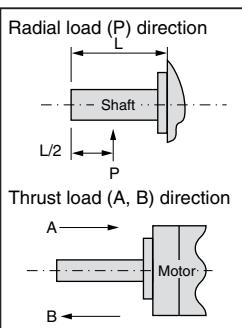
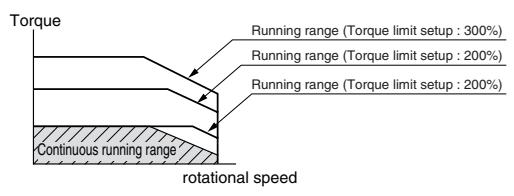
MSMD5AZ□1□



MSMD011 □1□



*When you lower the torque limit setup (Pr5E and 5F), running range at high speed might be lowered as well.



- Note) 1. Regenerative brake frequency represents the frequency of the motor's stops from the rated speed with deceleration without load.
- If the load is connected, frequency will be defined as $1/(m+1)$, where m =load moment of inertia/rotor moment of inertia.
 - When the motor speed exceeds the rated speed, regenerative brake frequency is in inverse proportion to the square of (running speed/rated speed).
 - Power supply voltage is AC115V (at 100V of the main voltage).
 - If the supply voltage fluctuates, frequency is in inverse proportion to the square of (Running supply voltage/115) relative to the value in the table.
 - When regeneration occurs continuously such cases as running speed frequently changes or vertical feeding, consult us or a dealer.
2. If the effective torque is within the rated torque, there is no limit in generative brake.
3. Consult us or a dealer if the load moment of inertia exceeds the specified value.
4. Specified releasing time is obtained with the use of surge absorber for brake (Z15D271 by Ishizuka Electronic or equivalent). () represents the actually measured value using a diode (200V, 1A or equivalent).

Motor Specifications and Ratings

100V MSMD

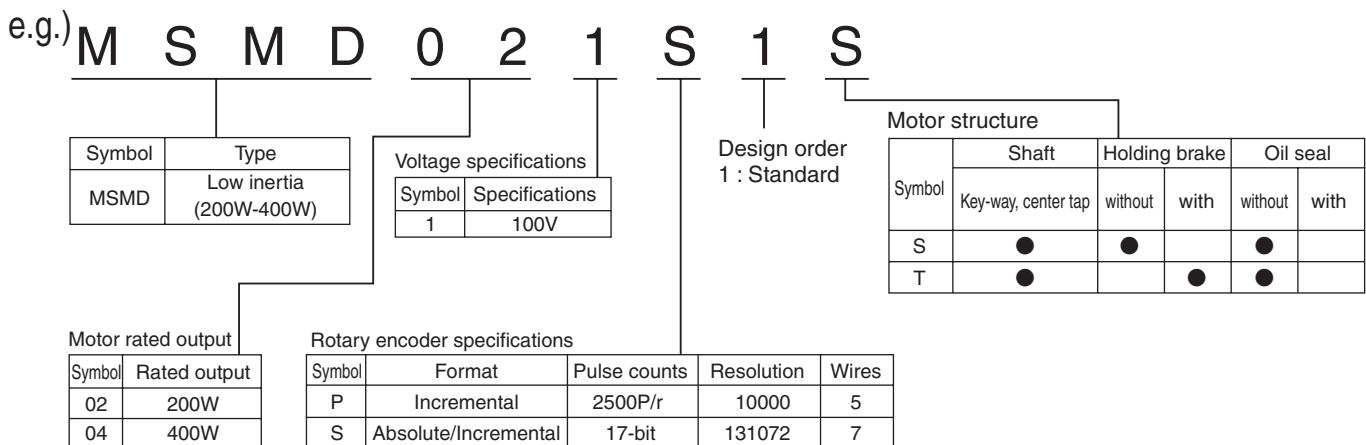
200W to 400W Low inertia Small Capacity

		AC100V				
Motor model		MSMD	021P1□	021S1□	041P1□	041S1□
Applicable driver	Model No.	MBDDT2110			MCDDT3120	
	Frame symbol	Frame B			Frame C	
Power supply capacity (kVA)		0.5			1.0	
Rated output (W)		200			400	
Rated torque (N · m)		0.64			1.3	
Momentary Max. peak torque (N · m)		1.91			3.8	
Rated current (Arms)		2.5			4.6	
Max. current (Ao-p)		10.6			19.5	
Regenerative brake frequency (times/min) Note)1	Without option	No limit			Note)2	
	DV0P4282	—			No limit	
	DV0P4283	No limit			Note)2	
Rated rotational speed (r/min)		3000				
Max. rotational speed (r/min)		5000				
Moment of inertia of rotor ($\times 10^{-4}$ kg · m 2)	Without brake	0.14			0.26	
	With brake	0.16			0.28	
Recommended moment of inertia ratio of the load and the rotor Note)3		Smaller than 30 times				
Rotary encoder specifications		2500P/r Incremental	17-bit Absolute/ Incremental	2500P/r Incremental	17-bit Absolute/ Incremental	
		Resolution per single turn	10000	131072	10000	131072
Protective enclosure rating		IP65 (except shaft through hole and cable end connector)				
Environment	Ambient temperature	0 to 40°C (free from freezing), Storage : -20 to + 80°C				
	Ambient humidity	85%RH or lower (free from condensing)				
	Installation location	Indoors (no direct sunlight), free from corrosive gas, inflammable gas, oil mist and dust				
	Altitude	1000m or lower				
	Vibration resistance	49m/s ² or less				
Mass (kg), () represents holding brake type		0.82 (1.3)			1.2 (1.7)	

Brake specifications (This brake will be released when it is energized. Do not use this for braking the motor in motion.)		
Static friction torque (N·m)	1.27	
Engaging time (ms)	50	
Releasing time (ms) Note)4	15 (—)	
Exciting current (DC) (A)	0.36	
Releasing voltage	DC1V or more	
Exciting voltage	DC 24 V ± 5%	

Permissible load		
During assembly	Radial load P-direction (N)	392
	Thrust load A-direction (N)	147
	Thrust load B-direction (N)	196
During operation	Radial load P-direction (N)	245
	Thrust load A-direction (N)	98
	Thrust load B-direction (N)	98

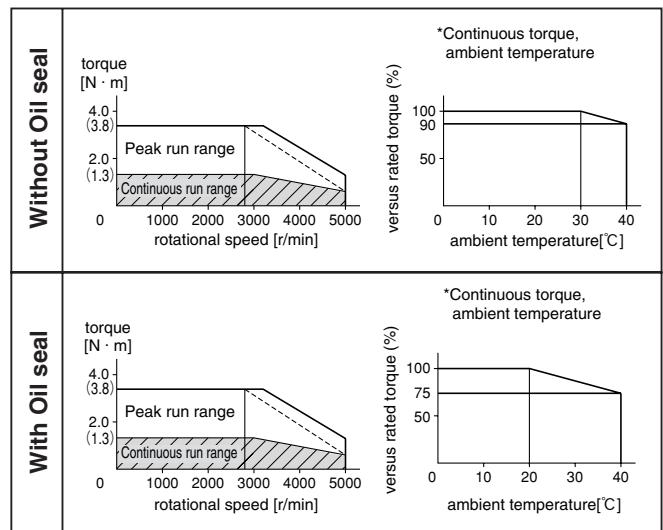
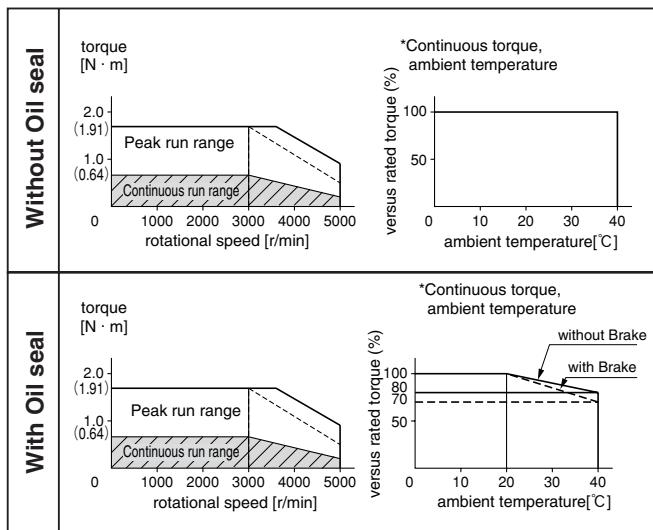
For motor dimensions, refer to page A4-55 , and for the diver, refer to pages A4-80 and 81.

Model designation MSMD series, 200W to 400W

Torque characteristics at AC100V of power voltage

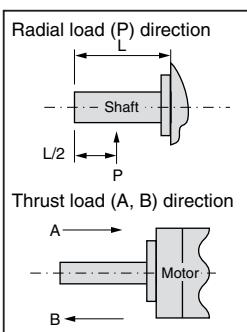
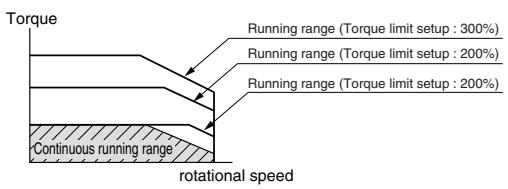
(Dotted line represents the torque at 10% less supply voltage.)

MSMD021□1□

MSMD041□1□



*When you lower the torque limit setup (Pr5E and 5F), running range at high speed might be lowered as well.



- Note) 1. Regenerative brake frequency represents the frequency of the motor's stops from the rated speed with deceleration without load.
- If the load is connected, frequency will be defined as $1/(m+1)$, where m =load moment of inertia/rotor moment of inertia.
 - When the motor speed exceeds the rated speed, regenerative brake frequency is in inverse proportion to the square of (running speed/rated speed).
 - Power supply voltage is AC115V (at 100V of the main voltage). If the supply voltage fluctuates, frequency is in inverse proportion to the square of (Running supply voltage/115) relative to the value in the table.
 - When regeneration occurs continuously such cases as running speed frequently changes or vertical feeding, consult us or a dealer.
2. If the effective torque is within the rated torque, there is no limit in generative brake.
3. Consult us or a dealer if the load moment of inertia exceeds the specified value.
4. Specified releasing time is obtained with the use of surge absorber for brake (Z15D271 by Ishizuka Electronic or equivalent). () represents the actually measured value using a diode (200V, 1A or equivalent)

Motor Specifications and Ratings 200V MSMD

50W to 100W Low inertia Small Capacity

		AC200V					
Motor model MSMD		5AZP1□	5AZS1□	012P1□	012S1□		
Applicable driver	Model No.	MADDT1205					
	Frame symbol	Frame A					
Power supply capacity (kVA)		0.3		0.3			
Rated output (W)		50		100			
Rated torque (N · m)		0.16		0.32			
Momentary Max. peak torque (N · m)		0.48		0.95			
Rated current (Arms)		1.1					
Max. current (Ao-p)		4.7					
Regenerative brake frequency (times/min) Note1	Without option	No limit Note2					
	DV0P4281	No limit Note2					
Rated rotational speed (r/min)		3000					
Max. rotational speed (r/min)		5000					
Moment of inertia of rotor ($\times 10^{-4}$ kg · m 2)	Without brake	0.025		0.051			
	With brake	0.027		0.054			
Recommended moment of inertia ratio of the load and the rotor Note3		Smaller than 30 times					
Rotary encoder specifications		2500P/r Incremental	17-bit Absolute/ Incremental	2500P/r Incremental	17-bit Absolute/ Incremental		
Resolution per single turn		10000	131072	10000	131072		
Protective enclosure rating		IP65 (except shaft through hole and cable end connector)					
Environment	Ambient temperature	0 to 40°C (free from freezing), Storage : -20 to + 80°C					
	Ambient humidity	85%RH or lower (free from condensing)					
	Installation location	Indoors (no direct sunlight), free from corrosive gas, inflammable gas, oil mist and dust					
	Altitude	1000m or lower					
	Vibration resistance	49m/s 2 or less		49m/s 2 or less			
Mass (kg). () represents holding brake type		0.32 (0.53)		0.47 (0.68)			

Brake specifications (This brake will be released when it is energized. Do not use this for braking the motor in motion.)

Static friction torque (N·m)	0.29
Engaging time (ms)	35
Releasing time (ms) Note4	20 (-)
Exciting current (DC) (A)	0.30
Releasing voltage	DC1V or more
Exciting voltage	DC 24 V ± 5%

Permissible load		
During assembly	Radial load P-direction (N)	147
	Thrust load A-direction (N)	88
	Thrust load B-direction (N)	117
During operation	Radial load P-direction (N)	68
	Thrust load A-direction (N)	58
	Thrust load B-direction (N)	58

For motor dimensions, refer to page A4-54 , and for the diver, refer to pages A4-80.

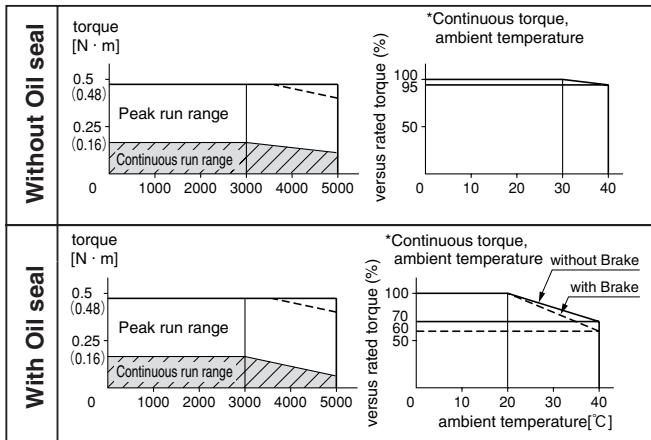
Model designation MSMD series, 50W to 100W

e.g.)

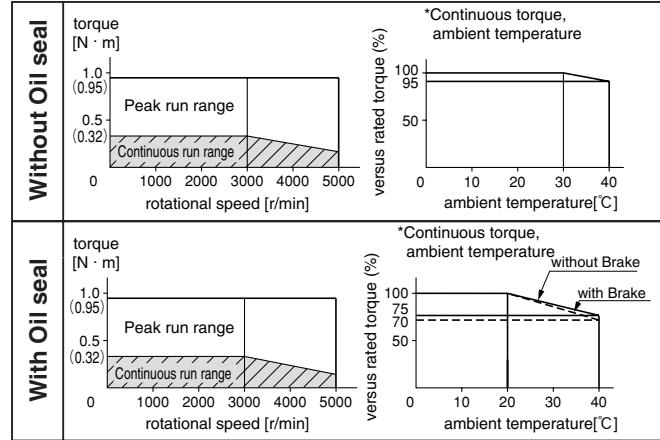
M	S	M	D	5	A	Z	S	1	S
Symbol					Motor structure				
Type					Design order				
MSMD					1 : Standard				
Voltage specifications					Shaft				
Symbol					Holding brake				
2					without				
Z					with				
Symbol					without				
S					with				
Symbol					Symbol				
5A					Key-way, center tap				
01					without				
Symbol					with				
P					S				
S					T				
Symbol					●				
Symbol					●				
Symbol					●				
Symbol					●				

Torque characteristics at AC200V of power voltage

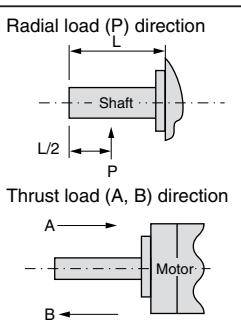
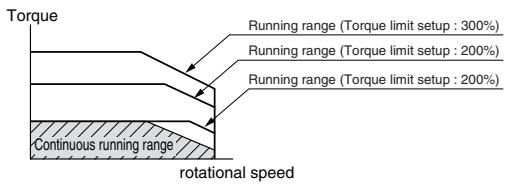
MSMD5AZ□1□



MSMD012□1□



*When you lower the torque limit setup (Pr5E and 5F), running range at high speed might be lowered as well.



- Note)
1. Regenerative brake frequency represents the frequency of the motor's stops from the rated speed with deceleration without load.
 - If the load is connected, frequency will be defined as $1/(m+1)$, where $m = \text{load moment of inertia}/\text{rotor moment of inertia}$.
 - When the motor speed exceeds the rated speed, regenerative brake frequency is in inverse proportion to the square of (running speed/rated speed).
 - Power supply voltage is AC230V (at 200V of the main voltage).
 - If the supply voltage fluctuates, frequency is in inverse proportion to the square of (Running supply voltage/230) relative to the value in the table.
 - When regeneration occurs continuously such cases as running speed frequently changes or vertical feeding, consult us or a dealer.
 2. If the effective torque is within the rated torque, there is no limit in generative brake.
 3. Consult us or a dealer if the load moment of inertia exceeds the specified value.
 4. Specified releasing time is obtained with the use of surge absorber for brake (Z15D271 by Ishizuka Electronic or equivalent).
 (\quad) represents the actually measured value using a diode (200V, 1A or equivalent)

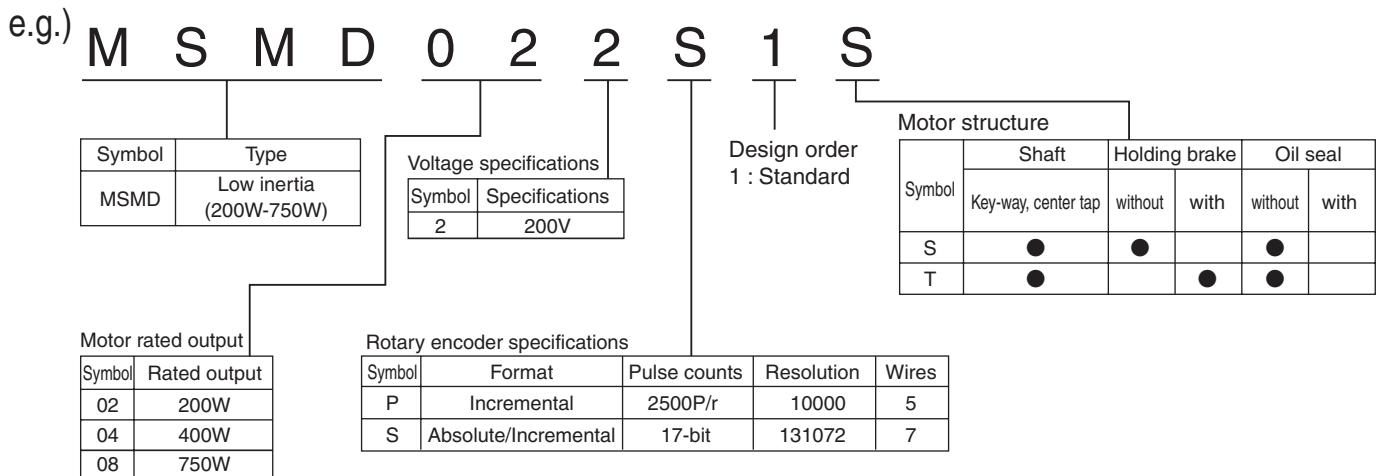
Motor Specifications and Ratings

200V MSMD

200W to 750W Low inertia Small Capacity

		AC200V										
Motor model		MSMD	022P1□	022S1□	042P1□	042S1□	082P1□	082S1□				
Applicable driver	Model No.	MADDT1207			MBDDT2210		MCDDT3520					
	Frame symbol	Frame A			Frame B		Frame C					
Power supply capacity (kVA)		0.5			0.9		1.3					
Rated output (W)		200			400		750					
Rated torque (N · m)		0.64			1.3		2.4					
Momentary Max. peak torque (N · m)		1.91			3.8		7.1					
Rated current (Arms)		1.6			2.6		4.0					
Max. current (Ao-p)		6.9			11.0		17.0					
Regenerative brake frequency (times/min) Note1	Without option	No limit Note2										
	DV0P4283	No limit Note2										
Rated rotational speed (r/min)		3000										
Max. rotational speed (r/min)		5000					4500					
Moment of inertia of rotor ($\times 10^{-4}$ kg · m 2)	Without brake	0.14			0.26		0.87					
	With brake	0.16			0.28		0.97					
Recommended moment of inertia ratio of the load and the rotor Note3		Smaller than 30 times					Smaller than 20 times					
Rotary encoder specifications		2500P/r Incremental	17-bit Absolute/ Incremental	2500P/r Incremental	17-bit Absolute/ Incremental	2500P/r Incremental	17-bit Absolute/ Incremental					
Resolution per single turn		10000	131072	10000	131072	10000	131072					
Protective enclosure rating		IP65 (except shaft through hole and cable end connector)										
Environment	Ambient temperature	0 to 40°C (free from freezing), Storage : -20 to + 80°C										
	Ambient humidity	85%RH or lower (free from condensing)										
	Installation location	Indoors (no direct sunlight), free from corrosive gas, inflammable gas, oil mist and dust										
	Altitude	1000m or lower										
	Vibration resistance	49m/s 2 or less										
Mass (kg), () represents holding brake type		0.82 (1.3)			1.2 (1.7)		2.3 (3.1)					
Brake specifications (This brake will be released when it is energized. Do not use this for braking the motor in motion.)												
Static friction torque (N · m)		1.27										
Engaging time (ms)		50										
Releasing time (ms) Note4		15 (—)										
Exciting current (DC) (A)		0.36										
Releasing voltage		DC1V or more										
Exciting voltage		DC 24 V ± 5%										
Permissible load												
During assembly	Radial load P-direction (N)	392					686					
	Thrust load A-direction (N)	147					294					
	Thrust load B-direction (N)	196					392					
During operation	Radial load P-direction (N)	245					392					
	Thrust load A-direction (N)	98					147					
	Thrust load B-direction (N)	98					147					

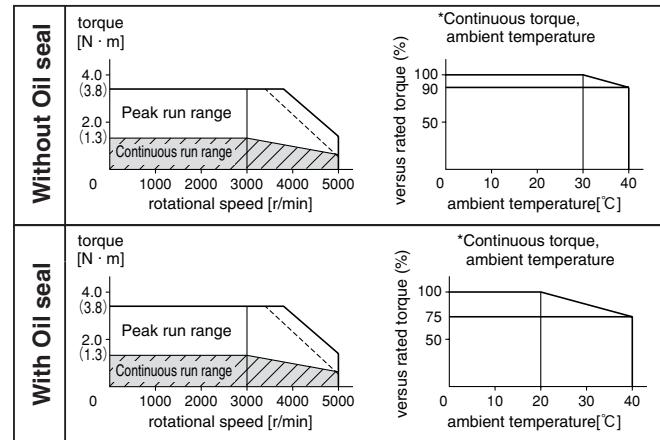
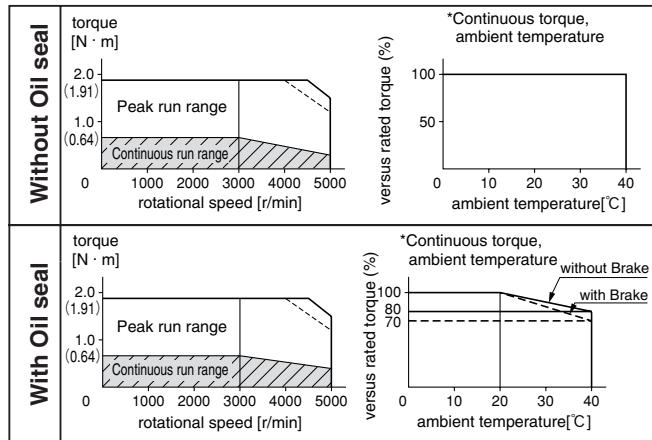
For motor dimensions, refer to page A4-55 , and for the diver, refer to pages A4-80 and 81.

Model designation MSMD series, 200W to 750W

Torque characteristics
at AC200V of power voltage

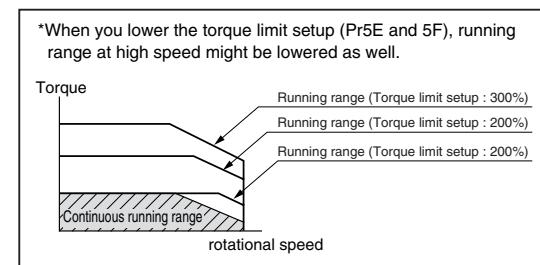
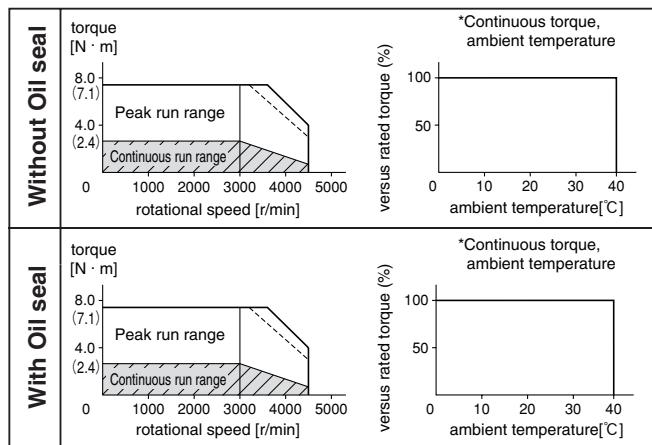
(Dotted line represents the torque at 10% less supply voltage.)

MSMD022□1□

MSMD042□1□



MSMD082□1□



Note) 1. Regenerative brake frequency represents the frequency of the motor's stops from the rated speed with deceleration without load.

- If the load is connected, frequency will be defined as $1/(m+1)$, where m =load moment of inertia/rotor moment of inertia.

- When the motor speed exceeds the rated speed, regenerative brake frequency is in inverse proportion to the square of (running speed/rated speed).

- Power supply voltage is AC230V (at 200V of the main voltage).

- If the supply voltage fluctuates, frequency is in inverse proportion to the square of (Running supply voltage/230) relative to the value in the table.

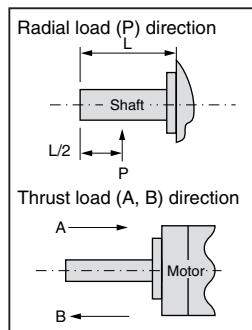
- When regeneration occurs continuously such cases as running speed frequently changes or vertical feeding, consult us or a dealer.

2. If the effective torque is within the rated torque, there is no limit in generative brake.

3. Consult us or a dealer if the load moment of inertia exceeds the specified value.

4. Specified releasing time is obtained with the use of surge absorber for brake (Z15D271 by Ishizuka Electronic or equivalent).

() represents the actually measured value using a diode (200V, 1A or equivalent)



Motor Specifications and Ratings 100V MQMA

100W to 400W Low inertia, Flat, Small Capacity

		AC100V					
Motor model		MQMA					
		011P1□	011S1□	021P1□	021S1□	041P1□	041S1□
Applicable driver	Model No.	MADDT1107			MBDDT2110		MCDDT3120
	Frame symbol	Frame A			Frame B		Frame C
Power supply capacity (kVA)		0.4		0.5		1.0	
Rated output (W)		100		200		400	
Rated torque (N · m)		0.32		0.64		1.3	
Momentary Max. peak torque (N · m)		0.95		1.91		3.82	
Rated current (Arms)		1.6		2.5		4.4	
Max. current (Ao-p)		6.9		10.5		18.6	
Regenerative brake frequency (times/min) Note1	Without option	No limit Note2					
	DV0P4280	No limit	Note2	—	—	—	—
	DV0P4282	—	—	—	—	No limit	Note2
	DV0P4283	—	—	No limit	Note2	—	—
Rated rotational speed (r/min)		3000					
Max. rotational speed (r/min)		5000				4500	
Moment of inertia of rotor (x10 ⁻⁴ kg · m ²)	Without brake	0.09	0.10	0.34	0.35	0.64	0.65
	With brake	0.12	0.13	0.42	0.43	0.72	0.73
Recommended moment of inertia ratio of the load and the rotor Note3		Smaller than 20 times					
Rotary encoder specifications		2500P/r Incremental	17-bit Absolute/ Incremental	2500P/r Incremental	17-bit Absolute/ Incremental	2500P/r Incremental	17-bit Absolute/ Incremental
Resolution per single turn		10000	131072	10000	131072	10000	131072
Protective enclosure rating		IP65 (except shaft through hole and cable end connector)					
Environment	Ambient temperature	0 to 40°C (free from freezing), Storage : -20 to + 80°C					
	Ambient humidity	85%RH or lower (free from condensing)					
	Installation location	Indoors (no direct sunlight), free from corrosive gas, inflammable gas, oil mist and dust					
	Altitude	1000m or lower					
	Vibration resistance	49m/s ² or less	24m/s ² or less	49m/s ² or less	24m/s ² or less	49m/s ² or less	24m/s ² or less
Mass (kg). () represents holding brake type		0.65 (0.90)	0.75 (1.0)	1.3 (2.0)	1.4 (2.1)	1.8 (2.5)	1.9 (2.6)

Brake specifications (This brake will be released when it is energized. Do not use this for braking the motor in motion.)					
Static friction torque (N · m)	0.29	1.27			
Engaging time (ms)	50	60			
Releasing time (ms) Note4	15 (100)	15 (100)			
Exciting current (DC) (A)	0.29	0.41			
Releasing voltage	DC1V or more				
Exciting voltage	DC 24 V ± 5%				

Permissible load			
During assembly	Radial load P-direction (N)	147	392
	Thrust load A-direction (N)	88	147
	Thrust load B-direction (N)	117	196
During operation	Radial load P-direction (N)	68	245
	Thrust load A-direction (N)	58	98
	Thrust load B-direction (N)	58	98

For motor dimensions, refer to page A4-56 , and for the diver, refer to pages A4-80 and 81.

Model designation MQMA series, 100W to 400W

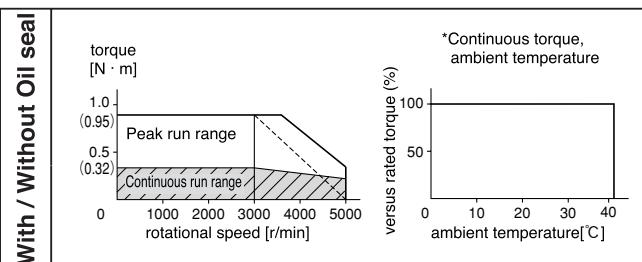
e.g.)

M	Q	M	A	0	1	1	S	1	S	
Symbol					Type					
MQMA					Low inertia (100W-400W)					
Symbol					Voltage specifications					
1					Symbol					
100V					Design order					
1 : Standard					Motor structure					
					Shaft		Holding brake		Oil seal	
					Symbol		Key-way, center tap		without	
					with		with		without	
					S		●		●	
					T		●		●	
Motor rated output					Rotary encoder specifications					
					Symbol		Format		Pulse counts	
					P		Incremental		2500P/r	
					S		Absolute/Incremental		17-bit	
					Resolution		10000		5	
					Wires		131072		7	

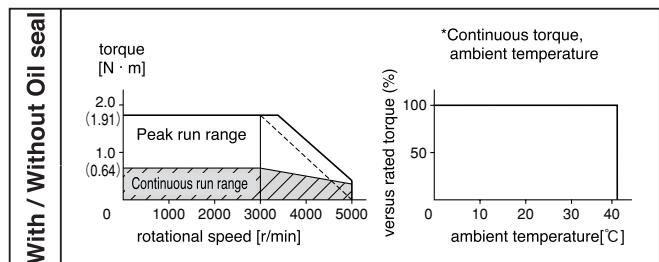
Torque characteristics**at AC100V of power voltage**

(Dotted line represents the torque at 10% less supply voltage.)

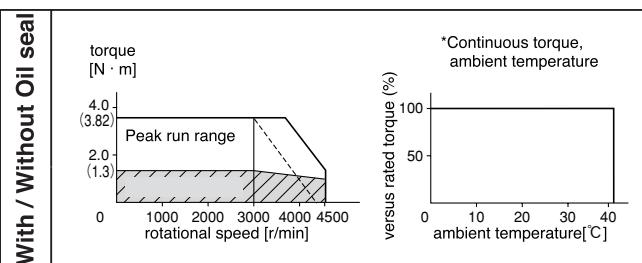
MQMA011□1□



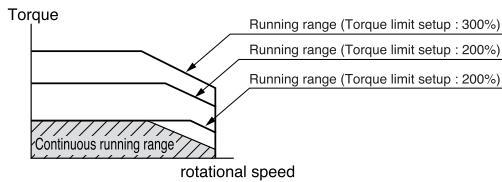
MQMA021□1□



MQMA041□1□

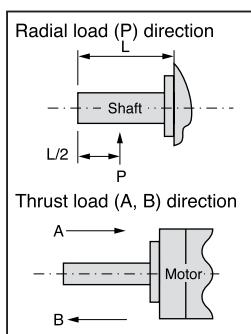


*When you lower the torque limit setup (Pr5E and 5F), running range at high speed might be lowered as well.



Note) 1. Regenerative brake frequency represents the frequency of the motor's stops from the rated speed with deceleration without load.

- If the load is connected, frequency will be defined as $1/(m+1)$, where m =load moment of inertia/rotor moment of inertia.
- When the motor speed exceeds the rated speed, regenerative brake frequency is in inverse proportion to the square of (running speed/rated speed).
- Power supply voltage is AC115V (at 100V of the main voltage).
- If the supply voltage fluctuates, frequency is in inverse proportion to the square of (Running supply voltage/115) relative to the value in the table.
- When regeneration occurs continuously such cases as running speed frequently changes or vertical feeding, consult us or a dealer.
- 2. If the effective torque is within the rated torque, there is no limit in generative brake.
- 3. Consult us or a dealer if the load moment of inertia exceeds the specified value.
- 4. Specified releasing time is obtained with the use of surge absorber for brake (Z15D151 by Ishizuka Electronic or equivalent). () represents the actually measured value using a diode (200V, 1A or equivalent)



Motor Specifications and Ratings 200V MQMA

100W to 400W Low inertia, Flat, Small Capacity

		AC200V									
Motor model		012P1□	012S1□	022P1□	022S1□	042P1□	042S1□				
Applicable driver	Model No.	MADDT1205		MADDT1207		MBDDT2210					
	Frame symbol	Frame A				Frame B					
Power supply capacity (kVA)		0.4		0.5		1.0					
Rated output (W)		100		200		400					
Rated torque (N · m)		0.32		0.64		1.3					
Momentary Max. peak torque (N · m)		0.95		1.91		3.82					
Rated current (Arms)		1.0		1.6		2.5					
Max. current (Ao-p)		4.3		6.8		10.5					
Regenerative brake frequency (times/min) Note1	Without option	No limit Note2									
	DV0P4283	No limit Note2									
Rated rotational speed (r/min)		3000									
Max. rotational speed (r/min)		5000									
Moment of inertia of rotor (x10 ⁻⁴ kg · m ²)	Without brake	0.090	0.100	0.340	0.350	0.640	0.650				
	With brake	0.120	0.130	0.420	0.430	0.720	0.730				
Recommended moment of inertia ratio of the load and the rotor Note3		Smaller than 20 times									
Rotary encoder specifications		2500P/r Incremental	17-bit Absolute/ Incremental	2500P/r Incremental	17-bit Absolute/ Incremental	2500P/r Incremental	17-bit Absolute/ Incremental				
Resolution per single turn		10000	131072	10000	131072	10000	131072				
Protective enclosure rating		IP65 (except shaft through hole and cable end connector)									
Environment	Ambient temperature	0 to 40°C (free from freezing), Storage : -20 to + 80°C									
	Ambient humidity	85%RH or lower (free from condensing)									
	Installation location	Indoors (no direct sunlight), free from corrosive gas, inflammable gas, oil mist and dust									
	Altitude	1000m or lower									
	Vibration resistance	49m/s ² or less	24m/s ² or less	49m/s ² or less	24m/s ² or less	49m/s ² or less	24m/s ² or less				
Mass (kg), () represents holding brake type		0.65 (0.90)	0.75 (1.0)	1.3 (2.0)	1.4 (2.1)	1.8 (2.5)	1.9 (2.6)				

Brake specifications (This brake will be released when it is energized. Do not use this for braking the motor in motion.)					
Static friction torque (N · m)	0.29	1.27			
Engaging time (ms)	50	60			
Releasing time (ms) Note4	15 (100)	15 (100)			
Exciting current (DC) (A)	0.29	0.41			
Releasing voltage	DC1V or more				
Exciting voltage	DC 24 V ± 10%				

Permissible load				
During assembly	Radial load P-direction (N)	147	392	
	Thrust load A-direction (N)	88	147	
	Thrust load B-direction (N)	117	196	
During operation	Radial load P-direction (N)	68	245	
	Thrust load A-direction (N)	58	98	
	Thrust load B-direction (N)	58	98	

For motor dimensions, refer to page A4-56 , and for the diver, refer to pages A4-80.

Model designation MQMA series, 100W to 400W

e.g.)

M	Q	M	A	0	1	2	S	1	S
Symbol		Type					Motor structure		
MQMA		Low inertia (100W-400W)					Shaft		
Symbol		Voltage specifications					Holding brake		
2		Symbol					Oil seal		
200V		Symbol					Symbol		
Design order		1 : Standard					Key-way, center tap		
Motor rated output		Symbol					without		
Symbol		Symbol					with		
01		Symbol					without		
100W		Symbol					with		
02		Symbol					without		
200W		Symbol					with		
04		Symbol					without		
400W		Symbol					with		

Motor rated output

Symbol	Rated output
01	100W
02	200W
04	400W

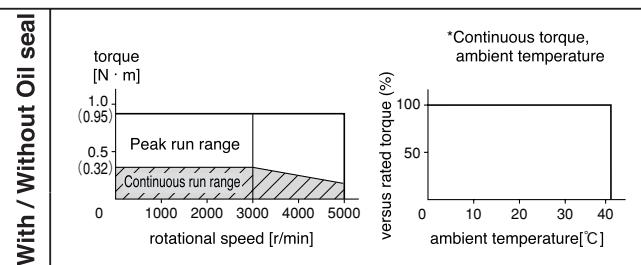
Rotary encoder specifications

Symbol	Format	Pulse counts	Resolution	Wires
P	Incremental	2500P/r	10000	5
S	Absolute/Incremental	17-bit	131072	7

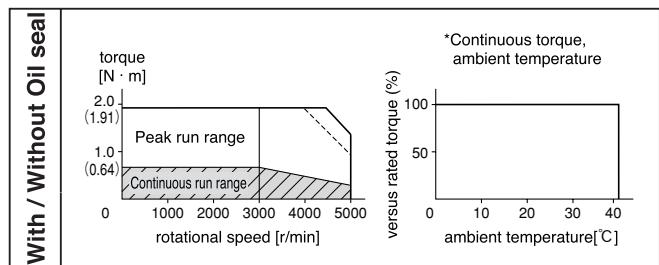
Torque characteristics**at AC200V of power voltage**

(Dotted line represents the torque at 10% less supply voltage.)

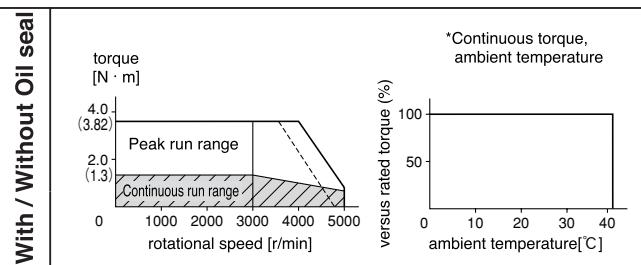
MQMA012□1□



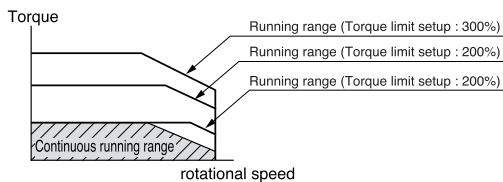
MQMA022□1□



MQMA042□1□

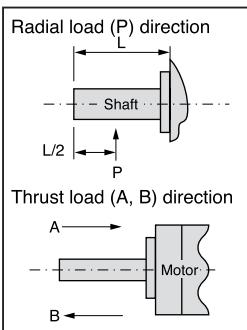


*When you lower the torque limit setup (Pr5E and 5F), running range at high speed might be lowered as well.



Note) 1. Regenerative brake frequency represents the frequency of the motor's stops from the rated speed with deceleration without load.

- If the load is connected, frequency will be defined as $1/(m+1)$, where m =load moment of inertia/rotor moment of inertia.
- When the motor speed exceeds the rated speed, regenerative brake frequency is in inverse proportion to the square of (running speed/rated speed).
- Power supply voltage is AC230V (at 200V of the main voltage).
- If the supply voltage fluctuates, frequency is in inverse proportion to the square of (Running supply voltage/230) relative to the value in the table.
- When regeneration occurs continuously such cases as running speed frequently changes or vertical feeding, consult us or a dealer.
- 2. If the effective torque is within the rated torque, there is no limit in generative brake.
- 3. Consult us or a dealer if the load moment of inertia exceeds the specified value.
- 4. Specified releasing time is obtained with the use of surge absorber for brake (Z15D151 by Ishizuka Electronic or equivalent). () represents the actually measured value using a diode (200V, 1A or equivalent).



Motor Specifications and Ratings 200V MSMA

1.0kW to 2.0kW Low inertia, Medium Capacity

		AC200V							
Motor model		MSMA	102P1□	102S1□	152P1□	152S1□	202P1□	202S1□	
Applicable driver	Model No.	MDDDT5540				MEDDT7364			
	Frame symbol	Frame D				Frame E			
Power supply capacity (kVA)		1.8		2.3		3.3			
Rated output (W)		1000		1500		2000			
Rated torque (N · m)		3.18		4.77		6.36			
Momentary Max. peak torque (N · m)		9.5		14.3		19.1			
Rated current (Arms)		7.2		9.4		13.0			
Max. current (Ao-p)		30		40		56			
Regenerative brake frequency (times/min) Note)1	Without option	No limit Note)2							
	DV0P4284	No limit Note)2				—			
	DV0P4285×2	—				No limit Note)2			
Rated rotational speed (r/min)		3000							
Max. rotational speed (r/min)		5000							
Moment of inertia of rotor ($\times 10^{-4}$ kg · m ²)	Without brake	1.69		2.59		3.46			
	With brake	1.88		2.84		3.81			
Recommended moment of inertia ratio of the load and the rotor Note)3		Smaller than 15 times							
Rotary encoder specifications		2500P/r Incremental	17-bit Absolute/Incremental	2500P/r Incremental	17-bit Absolute/Incremental	2500P/r Incremental	17-bit Absolute/Incremental		
Resolution per single turn		10000	131072	10000	131072	10000	131072		
Protective enclosure rating	IP65 (except shaft through hole and cable end connector)								
Environment	Ambient temperature	0 to 40°C (free from freezing), Storage : -20 to +80°C							
	Ambient humidity	85%RH or lower (free from condensing)							
	Installation location	Indoors (no direct sunlight), free from corrosive gas, inflammable gas, oil mist and dust							
	Altitude	1000m or lower							
	Vibration resistance	49m/s ² or less							
Mass (kg). () represents holding brake type		4.5 (5.1)		5.1 (6.5)		6.5 (7.9)			

Brake specifications (This brake will be released when it is energized. Do not use this for braking the motor in motion.)			
Static friction torque (N · m)		4.9	7.8
Engaging time (ms)		50	50
Releasing time (ms) Note)4		15 (100)	15 (100)
Exciting current (DC) (A)		0.74	0.81
Releasing voltage	DC2V or more		
Exciting voltage	DC 24 V ± 10%		

Permissible load			
During assembly	Radial load P-direction (N)	686	980
	Thrust load A-direction (N)	392	588
	Thrust load B-direction (N)	490	686
During operation	Radial load P-direction (N)	392	490
	Thrust load A-direction (N)	147	196
	Thrust load B-direction (N)	147	196

For motor dimensions, refer to page A4-57 , and for the diver, refer to pages A4-81 and 82.

Model designation MSMA series, 1.0kW to 2.0kW

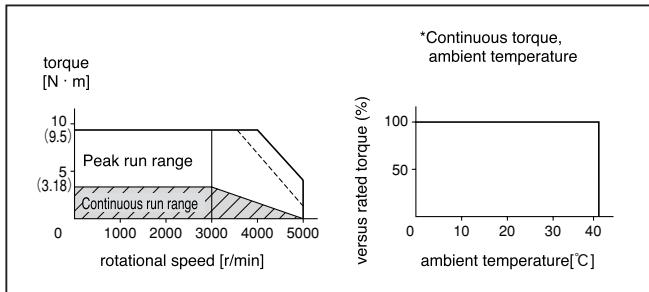
e.g.) M S M A 1 0 2 S 1 G

Symbol	Type	Voltage specifications	Design order	Motor structure
MSMA	Low inertia (1.0kW-2.0kW)	Symbol Specifications 2 200V	1 : Standard	Symbol Shaft Holding brake Oil seal Round Key-way without with without with G ● ● ● ● ● ● H ● ● ● ● ● ●
Motor rated output	Symbol Rated output	Rotary encoder specifications		
10	1.0kW	Symbol Format Pulse counts Resolution Wires P Incremental 2500P/r 10000 5		
15	1.5kW	S Absolute/Incremental 17-bit 131072 7		
20	2.0kW			

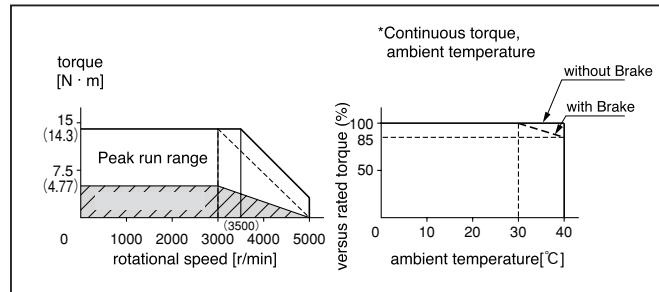
Torque characteristics at AC200V of power voltage

(Dotted line represents the torque at 10% less supply voltage.)

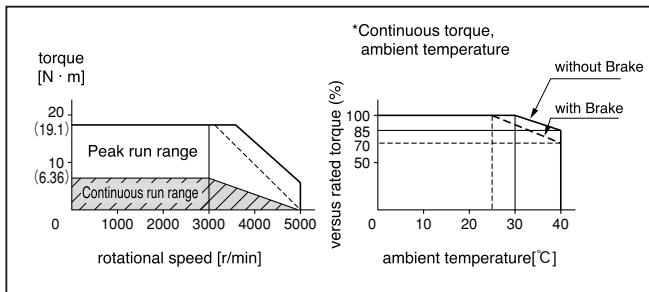
MSMA102□1□



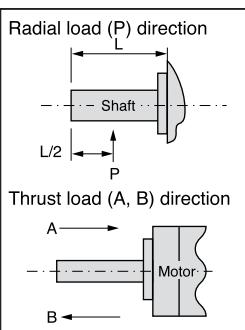
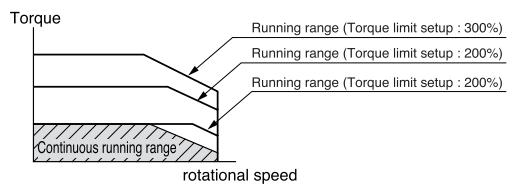
MSMA152□1□



MSMA202□1□



*When you lower the torque limit setup (Pr5E and 5F), running range at high speed might be lowered as well.



- Note) 1. Regenerative brake frequency represents the frequency of the motor's stops from the rated speed with deceleration without load.
- If the load is connected, frequency will be defined as $1/(m+1)$, where m =load moment of inertia/rotor moment of inertia.
 - When the motor speed exceeds the rated speed, regenerative brake frequency is in inverse proportion to the square of (running speed/rated speed).
 - Power supply voltage is AC230V (at 200V of the main voltage).
 - If the supply voltage fluctuates, frequency is in inverse proportion to the square of (Running supply voltage/230) relative to the value in the table.
 - When regeneration occurs continuously such cases as running speed frequently changes or vertical feeding, consult us or a dealer.
2. If the effective torque is within the rated torque, there is no limit in generative brake.
3. Consult us or a dealer if the load moment of inertia exceeds the specified value.
4. Specified releasing time is obtained with the use of surge absorber for brake (Z15D151 by Ishizuka Electronic or equivalent). () represents the actually measured value using a diode (200V, 1A or equivalent).

Motor Specifications and Ratings 200V MSMA

3.0kW to 5.0kW Low inertia, Medium Capacity

		AC200V										
Motor model	MSMA	302P1□	302S1□	402P1□	402S1□	502P1□	502S1□					
Applicable driver	Model No.	MFDDTA390		MFDDTB3A2								
	Frame symbol	Frame F										
Power supply capacity (kVA)		4.5		6.0		7.5						
Rated output (W)		3000		4000		5000						
Rated torque (N · m)		9.54		12.6		15.8						
Momentary Max. peak torque (N · m)		28.6		37.9		47.6						
Rated current (Arms)		18.6		24.7		28.5						
Max. current (Ao-p)		80		105		120						
Regenerative brake frequency (times/min) Note1	Without option DV0P4285×2	No limit Note2			326							
Rated rotational speed (r/min)		3000										
Max. rotational speed (r/min)		5000		4500								
Moment of inertia of rotor (x10 ⁻⁴ kg · m ²)	Without brake With brake	6.77		12.7		17.8						
Recommended moment of inertia ratio of the load and the rotor Note3		Smaller than 15 times										
Rotary encoder specifications		2500P/r Incremental	17-bit Absolute/ Incremental	2500P/r Incremental	17-bit Absolute/ Incremental	2500P/r Incremental	17-bit Absolute/ Incremental					
Resolution per single turn		10000	131072	10000	131072	10000	131072					
Protective enclosure rating		IP65 (except shaft through hole and cable end connector)										
Environment	Ambient temperature	0 to 40°C (free from freezing), Storage : -20 to + 80°C										
	Ambient humidity	85%RH or lower (free from condensing)										
	Installation location	Indoors (no direct sunlight), free from corrosive gas, inflammable gas, oil mist and dust										
	Altitude	1000m or lower										
	Vibration resistance	49m/s ² or less										
Mass (kg), () represents holding brake type		9.3 (11.0)		12.9 (14.8)		17.3 (19.2)						

Brake specifications (This brake will be released when it is energized. Do not use this for braking the motor in motion.)		
Static friction torque (N · m)	11.8	16.1
Engaging time (ms)	80	110
Releasing time (ms) Note4	15 (100)	50 (130)
Exciting current (DC) (A)	0.81	0.90
Releasing voltage	DC2V or more	
Exciting voltage	DC 24 V ± 10%	

Permissible load			
During assembly	Radial load P-direction (N)	980	
	Thrust load A-direction (N)	588	
	Thrust load B-direction (N)	686	
During operation	Radial load P-direction (N)	490	784
	Thrust load A-direction (N)	196	343
	Thrust load B-direction (N)	196	343

For motor dimensions, refer to page A4-58 , and for the diver, refer to pages A4-82.

Model designation MSMA series, 3.0kW to 5.0kW

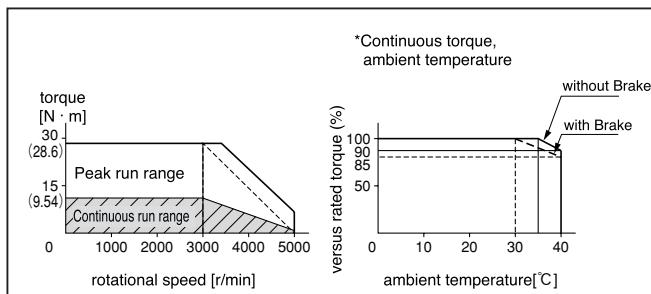
e.g.)

M	S	M	A	3	0	2	S	1	G	
Symbol					Voltage specifications					
MSMA					Symbol					
Low inertia (3.0kW-5.0kW)					Specifications					
Symbol					Symbol					
2					200V					
Motor rated output					Design order					
Symbol					1 : Standard					
Symbol					Motor structure					
					Shaft		Holding brake		Oil seal	
					Symbol	Round	Key-way	without	with	Symbol
					G	●	●			H
								●	●	

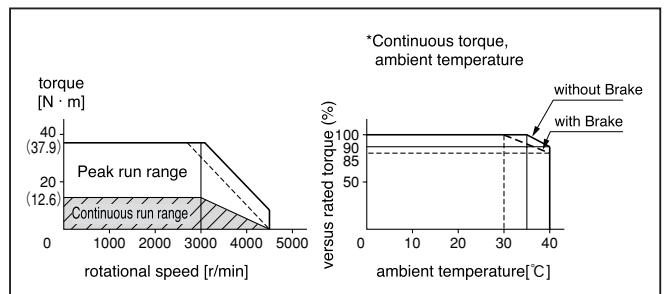
Torque characteristics at AC200V of power voltage

(Dotted line represents the torque at 10% less supply voltage.)

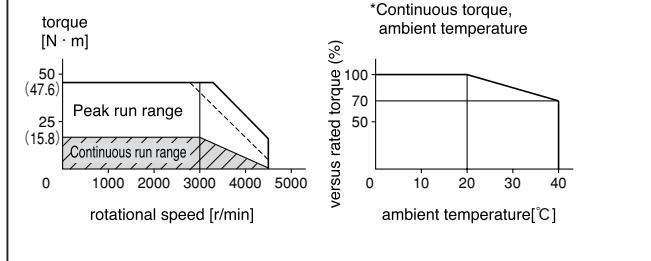
MSMA302□1□



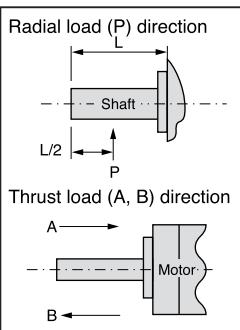
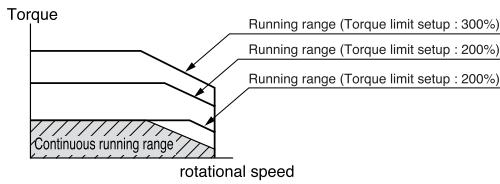
MSMA402□1□



MSMA502□1□



*When you lower the torque limit setup (Pr5E and 5F), running range at high speed might be lowered as well.



- Note) 1. Regenerative brake frequency represents the frequency of the motor's stops from the rated speed with deceleration without load.
- If the load is connected, frequency will be defined as $1/(m+1)$, where m =load moment of inertia/rotor moment of inertia.
 - When the motor speed exceeds the rated speed, regenerative brake frequency is in inverse proportion to the square of (running speed/rated speed).
 - Power supply voltage is AC230V (at 200V of the main voltage).
 - If the supply voltage fluctuates, frequency is in inverse proportion to the square of (Running supply voltage/230) relative to the value in the table.
 - When regeneration occurs continuously such cases as running speed frequently changes or vertical feeding, consult us or a dealer.
2. If the effective torque is within the rated torque, there is no limit in generative brake.
3. Consult us or a dealer if the load moment of inertia exceeds the specified value.
4. Specified releasing time is obtained with the use of surge absorber for brake (Z15D151 by Ishizuka Electronic or equivalent). () represents the actually measured value using a diode (200V, 1A or equivalent).

Motor Specifications and Ratings 200V MDMA

1.0kW to 1.5kW Low inertia, Medium Capacity

		AC200V									
Motor model		MDMA	102P1□	102S1□	152P1□	152S1□					
Applicable driver	Model No.	MDDDT3530			MDDDT5540						
	Frame symbol	Frame D									
Power supply capacity (kVA)		1.8		2.3							
Rated output (W)		1000		1500							
Rated torque (N · m)		4.8		7.15							
Momentary Max. peak torque (N · m)		14.4		21.5							
Rated current (Arms)		5.6		9.4							
Max. current (Ao-p)		24		40							
Regenerative brake frequency (times/min) Note1	Without option	No limit		Note2							
	DV0P4284	No limit		Note2							
Rated rotational speed (r/min)		2000									
Max. rotational speed (r/min)		3000									
Moment of inertia of rotor (x10 ⁻⁴ kg · m ²)	Without brake	6.17		11.2							
	With brake	6.79		12.3							
Recommended moment of inertia ratio of the load and the rotor Note3		Smaller than 10 times									
Rotary encoder specifications		2500P/r Incremental	17-bit Absolute/ Incremental	2500P/r Incremental	17-bit Absolute/ Incremental						
Resolution per single turn		10000	131072	10000	131072						
Protective enclosure rating		IP65 (except shaft through hole and cable end connector)									
Environment	Ambient temperature	0 to 40°C (free from freezing), Storage : -20 to +80°C									
	Ambient humidity	85%RH or lower (free from condensing)									
	Installation location	Indoors (no direct sunlight), free from corrosive gas, inflammable gas, oil mist and dust									
	Altitude	1000m or lower									
	Vibration resistance	49m/s ² or less									
Mass (kg), () represents holding brake type		6.8 (8.7)		8.5 (10.1)							

Brake specifications (This brake will be released when it is energized. Do not use this for braking the motor in motion.)			
Static friction torque (N · m)		4.9	13.7
Engaging time (ms)		80	100
Releasing time (ms) Note4		70 (200)	50 (130)
Exciting current (DC) (A)		0.59	0.79
Releasing voltage	DC2V or more		
Exciting voltage	DC 24 V ± 10%		

Permissible load			
During assembly	Radial load P-direction (N)	980	
	Thrust load A-direction (N)	588	
	Thrust load B-direction (N)	686	
During operation	Radial load P-direction (N)	490	
	Thrust load A-direction (N)	196	
	Thrust load B-direction (N)	196	

For motor dimensions, refer to page A4-59 , and for the diver, refer to pages A4-81.

Model designation MDMA series, 1.0kW to 1.5kW

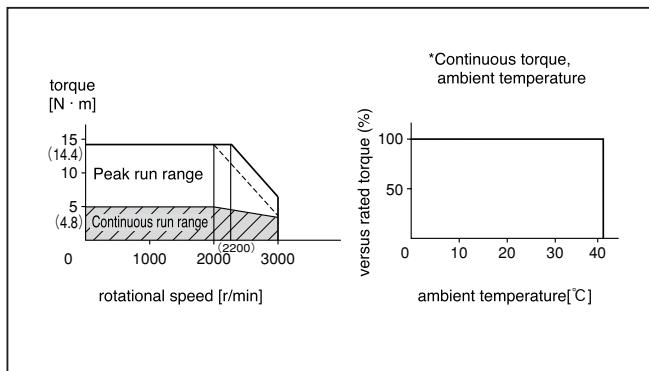
e.g.)

M	D	M	A	1	0	2	S	1	G					
<hr/>														
Symbol		Type					Design order							
MDMA		Middle inertia (1.0kW-1.5kW)					1 : Standard							
Motor rated output		Voltage specifications					Motor structure							
Symbol		Symbol					Shaft	Holding brake	Oil seal					
MDMA		2					Round	Key-way	without					
		200V						with	without					
									with					
							G	●	●					
							H	●	●					
<hr/>														
Rotary encoder specifications														
Symbol		Format		Pulse counts		Resolution		Wires						
P		Incremental		2500P/r		10000		5						
S		Absolute/Incremental		17-bit		131072		7						

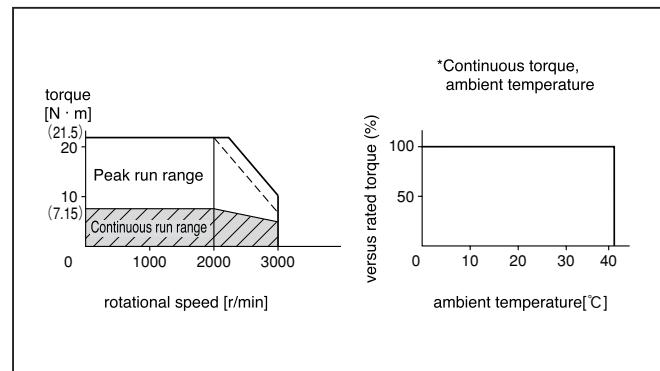
Torque characteristics**at AC200V of power voltage**

(Dotted line represents the torque at 10% less supply voltage.)

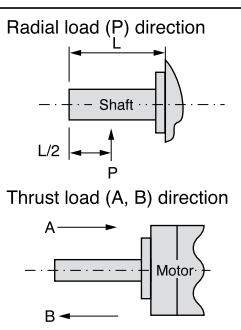
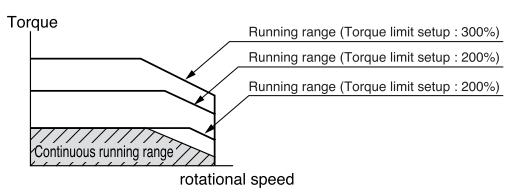
MDMA102□1□



MDMA152□1□



*When you lower the torque limit setup (Pr5E and 5F), running range at high speed might be lowered as well.



- Note) 1. Regenerative brake frequency represents the frequency of the motor's stops from the rated speed with deceleration without load.
- If the load is connected, frequency will be defined as $1/(m+1)$, where m =load moment of inertia/rotor moment of inertia.
 - When the motor speed exceeds the rated speed, regenerative brake frequency is in inverse proportion to the square of (running speed/rated speed).
 - Power supply voltage is AC230V (at 200V of the main voltage).
 - If the supply voltage fluctuates, frequency is in inverse proportion to the square of (Running supply voltage/230) relative to the value in the table.
 - When regeneration occurs continuously such cases as running speed frequently changes or vertical feeding, consult us or a dealer.
2. If the effective torque is within the rated torque, there is no limit in generative brake.
3. Consult us or a dealer if the load moment of inertia exceeds the specified value.
4. Specified releasing time is obtained with the use of surge absorber for brake (Z15D151 by Ishizuka Electronic or equivalent). () represents the actually measured value using a diode (200V, 1A or equivalent)

Motor Specifications and Ratings 200V MDMA

2.0kW to 3.0kW Middle inertia, Medium Capacity

		AC200V				
Motor model		MDMA	202P1□	202S1□	302P1□	302S1□
Applicable driver	Model No.	MEDDT7364			MFDDTA390	
	Frame symbol	Frame E			Frame F	
Power supply capacity (kVA)		3.3			4.5	
Rated output (W)		2000			3000	
Rated torque (N · m)		9.54			14.3	
Momentary Max. peak torque (N · m)		28.5			42.9	
Rated current (Arms)		12.3			17.8	
Max. current (Ao-p)		52			76	
Regenerative brake frequency (times/min) Note1	Without option	No limit			Note2	
	DV0P4285×2	No limit			Note2	
Rated rotational speed (r/min)		2000				
Max. rotational speed (r/min)		3000				
Moment of inertia of rotor ($\times 10^{-4}$ kg · m 2)	Without brake	15.2			22.3	
	With brake	16.7			24.6	
Recommended moment of inertia ratio of the load and the rotor Note3		Smaller than 10 times				
Rotary encoder specifications		2500P/r Incremental	17-bit Absolute/ Incremental	2500P/r Incremental	17-bit Absolute/ Incremental	
Resolution per single turn		10000	131072	10000	131072	
Protective enclosure rating		IP65 (except shaft through hole and cable end connector)				
Environment	Ambient temperature	0 to 40°C (free from freezing), Storage : -20 to + 80°C				
	Ambient humidity	85%RH or lower (free from condensing)				
	Installation location	Indoors (no direct sunlight), free from corrosive gas, inflammable gas, oil mist and dust				
	Altitude	1000m or lower				
	Vibration resistance	49m/s 2 or less				
Mass (kg), () represents holding brake type		10.6 (12.5)			14.6 (16.5)	

Brake specifications (This brake will be released when it is energized. Do not use this for braking the motor in motion.)

Static friction torque (N · m)	13.7	16.1
Engaging time (ms)	100	110
Releasing time (ms) Note4	50 (130)	50 (130)
Exciting current (DC) (A)	0.79	0.90
Releasing voltage	DC2V or more	
Exciting voltage	DC 24 V ± 10%	

Permissible load

During assembly	Radial load P-direction (N)	980	980
	Thrust load A-direction (N)	588	588
	Thrust load B-direction (N)	686	686
During operation	Radial load P-direction (N)	490	784
	Thrust load A-direction (N)	196	343
	Thrust load B-direction (N)	196	343

For motor dimensions, refer to page A4-60 , and for the diver, refer to pages A4-82.

Model designation MDMA series, 2.0kW to 3.0kW

e.g.)

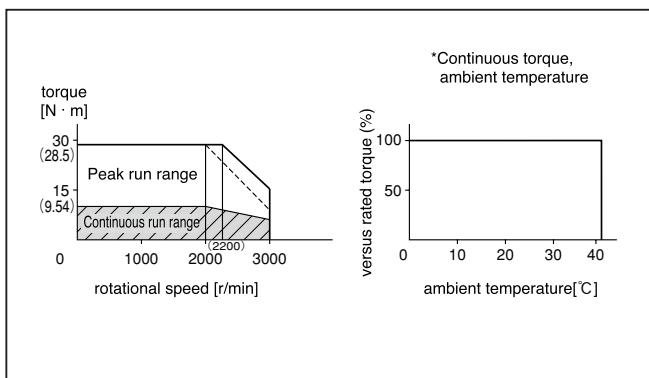
M	D	M	A	2	0	2	S	1	G	
<hr/>										
Symbol		Type					Design order			
MDMA		Middle inertia (2.0kW-3.0kW)					1 : Standard			
Motor rated output		Voltage specifications					Motor structure			
Symbol		Symbol					Shaft	Holding brake	Oil seal	
MDMA		200V					Symbol	Round	Key-way	
G		2					without	with	without	
H		200V					●	●	●	
Motor rated output		Rotary encoder specifications					Symbol	Shaft	Holding brake	Oil seal
Symbol		Format					Symbol	Round	Key-way	without
20		Incremental					2	●	●	●
30		Absolute/Incremental					3	●	●	●
Motor rated output		Resolution					Wires			
20		10000					5			
30		131072					7			
Motor rated output		Resolution					Wires			
20		10000					5			
30		131072					7			

Torque characteristics

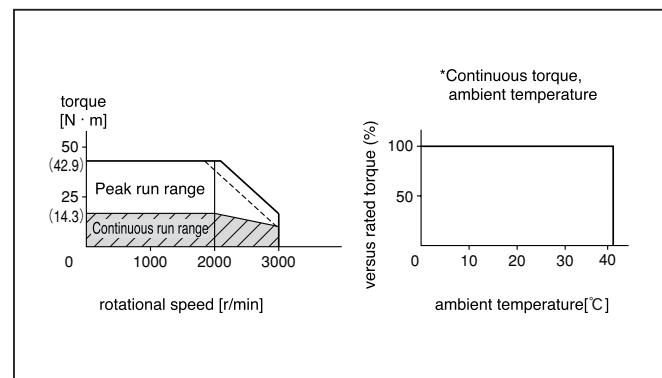
at AC200V of power voltage

(Dotted line represents the torque at 10% less supply voltage.)

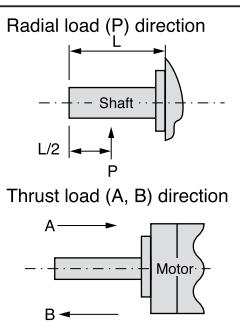
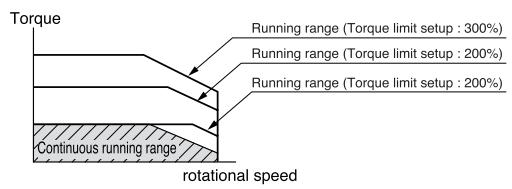
MDMA202□1□



MDMA302□1□



*When you lower the torque limit setup (Pr5E and 5F), running range at high speed might be lowered as well.



- Note) 1. Regenerative brake frequency represents the frequency of the motor's stops from the rated speed with deceleration without load.
- If the load is connected, frequency will be defined as $1/(m+1)$, where m =load moment of inertia/rotor moment of inertia.
 - When the motor speed exceeds the rated speed, regenerative brake frequency is in inverse proportion to the square of (running speed/rated speed).
 - Power supply voltage is AC230V (at 200V of the main voltage).
 - If the supply voltage fluctuates, frequency is in inverse proportion to the square of (Running supply voltage/230) relative to the value in the table.
 - When regeneration occurs continuously such cases as running speed frequently changes or vertical feeding, consult us or a dealer.
2. If the effective torque is within the rated torque, there is no limit in generative brake.
3. Consult us or a dealer if the load moment of inertia exceeds the specified value.
4. Specified releasing time is obtained with the use of surge absorber for brake (Z15D151 by Ishizuka Electronic or equivalent). () represents the actually measured value using a diode (200V, 1A or equivalent).

Motor Specifications and Ratings 200V MDMA

4.0kW to 5.0kW Middle inertia, Medium Capacity

		AC200V					
Motor model		MDMA	402P1□	402S1□	502P1□	502S1□	
Applicable driver	Model No.	MFDDTB3A2					
	Frame symbol	Frame F					
Power supply capacity (kVA)		3.8		7.5			
Rated output (W)		4000		5000			
Rated torque (N · m)		18.8		23.8			
Momentary Max. peak torque (N · m)		56.4		71.4			
Rated current (Arms)		23.4		28.0			
Max. current (Ao-p)		100.0		120.0			
Regenerative brake frequency (times/min) Note)1	Without option	250		94			
	DV0P4285×2	No limit		Note)2			
Rated rotational speed (r/min)		2000					
Max. rotational speed (r/min)		3000					
Moment of inertia of rotor ($\times 10^{-4}$ kg · m 2)	Without brake	42.5		60.7			
	With brake	46.8		66.7			
Recommended moment of inertia ratio of the load and the rotor Note)3		Smaller than 10 times					
Rotary encoder specifications		2500P/r Incremental	17-bit Absolute/ Incremental	2500P/r Incremental	17-bit Absolute/ Incremental		
Resolution per single turn		10000	131072	10000	131072		
Protective enclosure rating		IP65 (except shaft through hole and cable end connector)					
Environment	Ambient temperature	0 to 40°C (free from freezing), Storage : -20 to + 80°C					
	Ambient humidity	85%RH or lower (free from condensing)					
	Installation location	Indoors (no direct sunlight), free from corrosive gas, inflammable gas, oil mist and dust					
	Altitude	1000m or lower					
	Vibration resistance	49m/s 2 or less					
Mass (kg), () represents holding brake type		18.8 (21.3)		25.0 (28.5)			

Brake specifications (This brake will be released when it is energized. Do not use this for braking the motor in motion.)

Static friction torque (N · m)	21.5	24.5
Engaging time (ms)	90	80
Releasing time (ms) Note)4	35 (150)	25 (200)
Exciting current (DC) (A)	1.10	1.3
Releasing voltage	DC2V or more	
Exciting voltage	DC 24 V ± 10%	

Permissible load

During assembly	Radial load P-direction (N)	1666
	Thrust load A-direction (N)	784
	Thrust load B-direction (N)	980
During operation	Radial load P-direction (N)	784
	Thrust load A-direction (N)	343
	Thrust load B-direction (N)	343

For motor dimensions, refer to page A4-61 , and for the diver, refer to pages A4-82.

Model designation MDMA series, 4.0kW to 5.0kW

e.g.)

M D M A 4 0 2 S 1 G

Symbol	Type
MDMA	Middle inertia (4.0kW-5.0kW)

Voltage specifications	
Symbol	Specifications
2	200V

Design order
1 : Standard

Motor structure

Symbol	Shaft		Holding brake	Oil seal	
	Round	Key-way	without	with	without
G		●	●		●
H		●	●		●

Motor rated output

Symbol	Rated output
40	4.0kW
50	5.0kW

Rotary encoder specifications

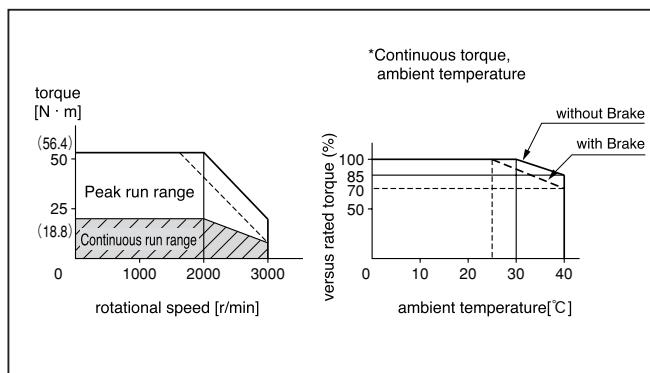
Symbol	Format	Pulse counts	Resolution	Wires
P	Incremental	2500P/r	10000	5
S	Absolute/Incremental	17-bit	131072	7

Torque characteristics

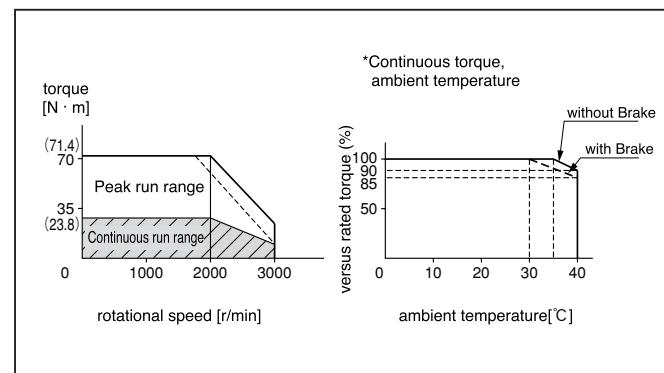
at AC200V of power voltage

(Dotted line represents the torque at 10% less supply voltage.)

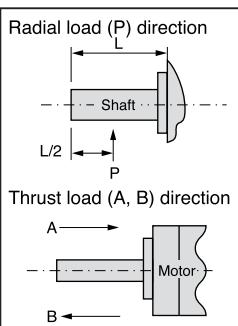
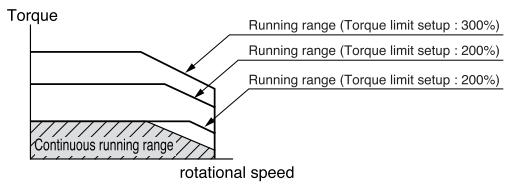
MDMA402□1□



MDMA502□1□



*When you lower the torque limit setup (Pr5E and 5F), running range at high speed might be lowered as well.



- Note) 1. Regenerative brake frequency represents the frequency of the motor's stops from the rated speed with deceleration without load.
- If the load is connected, frequency will be defined as $1/(m+1)$, where m =load moment of inertia/rotor moment of inertia.
 - When the motor speed exceeds the rated speed, regenerative brake frequency is in inverse proportion to the square of (running speed/rated speed).
 - Power supply voltage is AC230V (at 200V of the main voltage).
 - If the supply voltage fluctuates, frequency is in inverse proportion to the square of (Running supply voltage/230) relative to the value in the table.
 - When regeneration occurs continuously such cases as running speed frequently changes or vertical feeding, consult us or a dealer.
2. If the effective torque is within the rated torque, there is no limit in generative brake.
3. Consult us or a dealer if the load moment of inertia exceeds the specified value.
4. Specified releasing time is obtained with the use of surge absorber for brake (Z15D151 by Ishizuka Electronic or equivalent). () represents the actually measured value using a diode (200V, 1A or equivalent).

Motor Specifications and Ratings

200V MGMA

900W to 2.0kW Middle inertia, Medium Capacity

		AC200V									
Motor model		MGMA	092P1□	092S1□	202P1□	202S1□					
Applicable driver	Model No.	MDDDT5540			MFDDTA390						
	Frame symbol	Frame D		Frame F							
Power supply capacity (kVA)		1.8		3.8							
Rated output (W)		900		2000							
Rated torque (N · m)		8.62		19.1							
Momentary Max. peak torque (N · m)		19.3		44							
Rated current (Arms)		7.6		18.5							
Max. current (Ao-p)		24.0		60.0							
Regenerative brake frequency (times/min) Note1	Without option	No limit		Note2							
	DV0P4284	No limit	Note2	—							
	DV0P4285×2	—		No limit Note2							
Rated rotational speed (r/min)		1000									
Max. rotational speed (r/min)		2000									
Moment of inertia of rotor ($\times 10^{-4}$ kg · m 2)	Without brake	11.2		35.5							
	With brake	12.3		41.4							
Recommended moment of inertia ratio of the load and the rotor Note3		Smaller than 10 times									
Rotary encoder specifications		2500P/r Incremental	17-bit Absolute/ Incremental	2500P/r Incremental	17-bit Absolute/ Incremental						
Resolution per single turn		10000	131072	10000	131072						
Protective enclosure rating		IP65 (except shaft through hole and cable end connector)									
Environment	Ambient temperature	0 to 40°C (free from freezing), Storage : -20 to + 80°C									
	Ambient humidity	85%RH or lower (free from condensing)									
	Installation location	Indoors (no direct sunlight), free from corrosive gas, inflammable gas, oil mist and dust									
	Altitude	1000m or lower									
	Vibration resistance	49m/s 2 or less									
Mass (kg). () represents holding brake type		8.5 (10.0)		17.5 (21.0)							

Brake specifications (This brake will be released when it is energized. Do not use this for braking the motor in motion.)			
Static friction torque (N · m)	13.7	24.5	
Engaging time (ms)	100	80	
Releasing time (ms) Note4	50 (130)	25 (200)	
Exciting current (DC) (A)	0.79	1.30	
Releasing voltage	DC2V or more		
Exciting voltage	DC 24 V ± 10%		

Permissible load			
During assembly	Radial load P-direction (N)	980	1666
	Thrust load A-direction (N)	588	784
	Thrust load B-direction (N)	686	980
During operation	Radial load P-direction (N)	686	1176
	Thrust load A-direction (N)	196	490
	Thrust load B-direction (N)	196	490

For motor dimensions, refer to page A4-62 , and for the diver, refer to pages A4-81 and 82.

Model designation MGMA series, 900W to 2.0kW

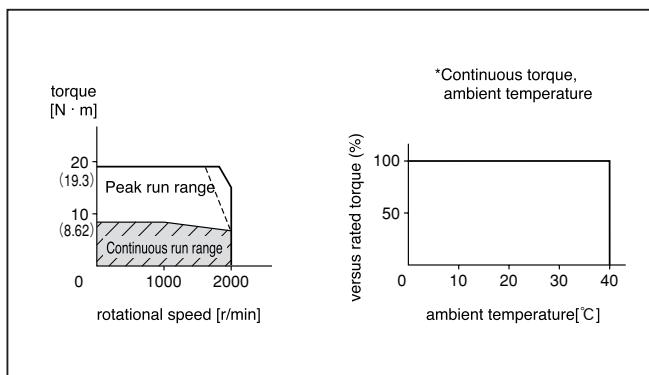
e.g.)

M	G	M	A	0	9	2	S	1	G								
<hr/>																	
Symbol		Type					Voltage specifications										
MGMA		Middle inertia (900W-2.0kW)					Symbol										
Motor rated output		<hr/>					Specifications										
Symbol		Rated output					Symbol										
09		900W					2										
20		2.0kW					200V										
<hr/>																	
Rotary encoder specifications																	
Symbol		Format		Pulse counts		Resolution		Wires									
P		Incremental		2500P/r		10000		5									
S		Absolute/Incremental		17-bit		131072		7									

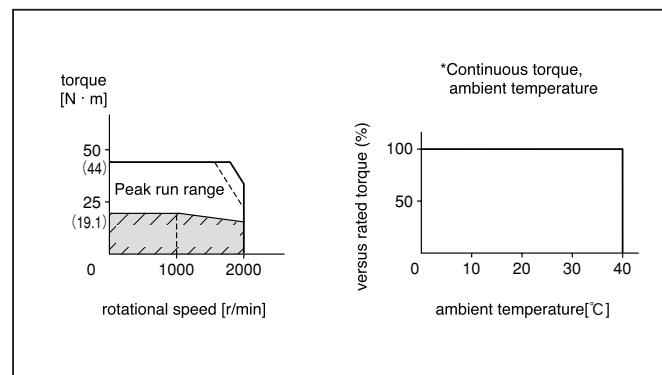
Torque characteristics**at AC200V of power voltage**

(Dotted line represents the torque at 10% less supply voltage.)

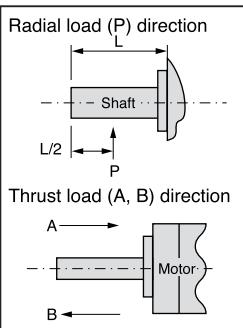
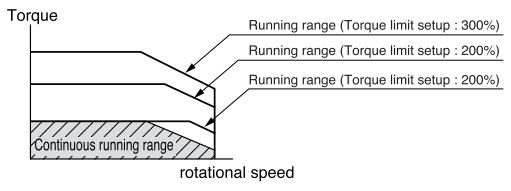
MGMA092□1□



MGMA202□1□



*When you lower the torque limit setup (Pr5E and 5F), running range at high speed might be lowered as well.



- Note) 1. Regenerative brake frequency represents the frequency of the motor's stops from the rated speed with deceleration without load.
- If the load is connected, frequency will be defined as $1/(m+1)$, where m =load moment of inertia/rotor moment of inertia.
 - When the motor speed exceeds the rated speed, regenerative brake frequency is in inverse proportion to the square of (running speed/rated speed).
 - Power supply voltage is AC230V (at 200V of the main voltage).
 - If the supply voltage fluctuates, frequency is in inverse proportion to the square of (Running supply voltage/230) relative to the value in the table.
 - When regeneration occurs continuously such cases as running speed frequently changes or vertical feeding, consult us or a dealer.
2. If the effective torque is within the rated torque, there is no limit in generative brake.
3. Consult us or a dealer if the load moment of inertia exceeds the specified value.
4. Specified releasing time is obtained with the use of surge absorber for brake (Z15D151 by Ishizuka Electronic or equivalent). () represents the actually measured value using a diode (200V, 1A or equivalent).

Motor Specifications and Ratings 200V MGMA

3.0kW to 4.5kW Middle inertia, Medium Capacity

		AC200V					
Motor model MGMA		302P1□	302S1□	452P1□	452S1□		
Applicable driver	Model No.	MFDDTB3A2					
	Frame symbol	Frame F					
Power supply capacity (kVA)		5.3		7.5			
Rated output (W)		3000		4500			
Rated torque (N · m)		28.4		42.9			
Momentary Max. peak torque (N · m)		63.7		107			
Rated current (Arms)		24		33			
Max. current (Ao-p)		80.0		118			
Regenerative brake frequency (times/min) Note)1	Without option	No limit		Note)2			
	DV0P4285×2	No limit		Note)2			
Rated rotational speed (r/min)		1000					
Max. rotational speed (r/min)		2000					
Moment of inertia of rotor ($\times 10^{-4}$ kg · m 2)	Without brake	55.7		80.9			
	With brake	61.7		86.9			
Recommended moment of inertia ratio of the load and the rotor Note)3		Smaller than 10 times					
Rotary encoder specifications		2500P/r Incremental	17-bit Absolute/ Incremental	2500P/r Incremental	17-bit Absolute/ Incremental		
Resolution per single turn		10000	131072	10000	131072		
Protective enclosure rating		IP65 (except shaft through hole and cable end connector)					
Environment	Ambient temperature	0 to 40°C (free from freezing), Storage : -20 to + 80°C					
	Ambient humidity	85%RH or lower (free from condensing)					
	Installation location	Indoors (no direct sunlight), free from corrosive gas, inflammable gas, oil mist and dust					
	Altitude	1000m or lower					
	Vibration resistance	49m/s 2 or less					
Mass (kg), () represents holding brake type		25.0 (28.5)		34.0 (39.5)			

Brake specifications (This brake will be released when it is energized. Do not use this for braking the motor in motion.)

Static friction torque (N · m)	58.8
Engaging time (ms)	150
Releasing time (ms) Note)4	50 (130)
Exciting current (DC) (A)	1.40
Releasing voltage	DC2V or more
Exciting voltage	DC 24 V ± 10%

Permissible load		
During assembly	Radial load P-direction (N)	2058
	Thrust load A-direction (N)	980
	Thrust load B-direction (N)	1176
During operation	Radial load P-direction (N)	1470
	Thrust load A-direction (N)	490
	Thrust load B-direction (N)	490

For motor dimensions, refer to page A4-63 , and for the diver, refer to pages A4-82.

Model designation MGMA series, 3.0kW to 4.5kW

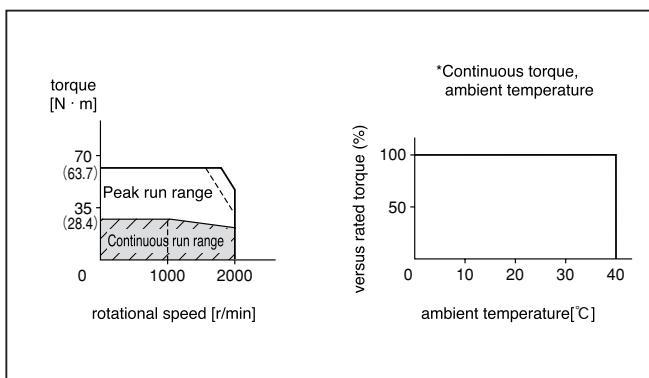
e.g.)

M	G	M	A	3	0	2	S	1	G								
<hr/>																	
Symbol		Type					Voltage specifications										
MGMA		Middle inertia (3.0kW-4.5kW)					Symbol										
Motor rated output		Symbol					Specifications										
30		2					200V										
<hr/>																	
Design order 1 : Standard																	
<hr/>																	
Motor structure																	
Symbol		Shaft		Holding brake		Oil seal											
G		Round		Key-way		without		with									
H		●		●		●		●									
<hr/>																	
Rotary encoder specifications																	
Symbol		Format		Pulse counts		Resolution		Wires									
P		Incremental		2500P/r		10000		5									
S		Absolute/Incremental		17-bit		131072		7									

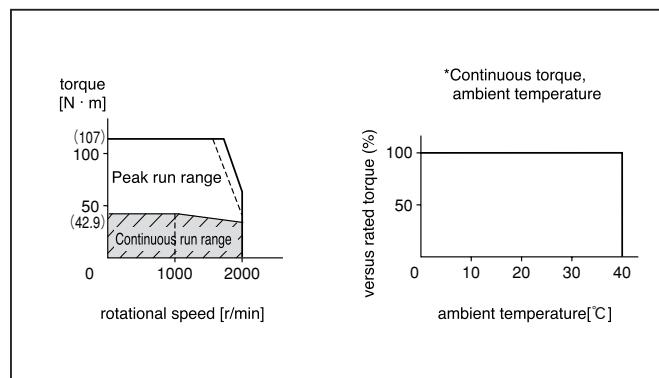
Torque characteristics**at AC200V of power voltage**

(Dotted line represents the torque at 10% less supply voltage.)

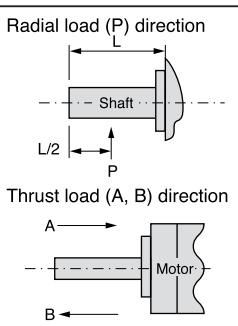
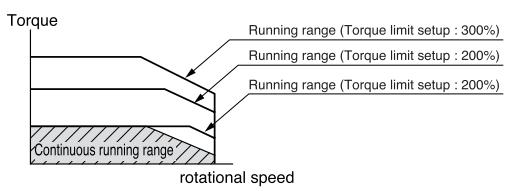
MGMA302□1□



MGMA452□1□



*When you lower the torque limit setup (Pr5E and 5F), running range at high speed might be lowered as well.



- Note) 1. Regenerative brake frequency represents the frequency of the motor's stops from the rated speed with deceleration without load.
- If the load is connected, frequency will be defined as $1/(m+1)$, where m =load moment of inertia/rotor moment of inertia.
 - When the motor speed exceeds the rated speed, regenerative brake frequency is in inverse proportion to the square of (running speed/rated speed).
 - Power supply voltage is AC230V (at 200V of the main voltage).
 - If the supply voltage fluctuates, frequency is in inverse proportion to the square of (Running supply voltage/230) relative to the value in the table.
 - When regeneration occurs continuously such cases as running speed frequently changes or vertical feeding, consult us or a dealer.
2. If the effective torque is within the rated torque, there is no limit in generative brake.
3. Consult us or a dealer if the load moment of inertia exceeds the specified value.
4. Specified releasing time is obtained with the use of surge absorber for brake (Z15D151 by Ishizuka Electronic or equivalent). () represents the actually measured value using a diode (200V, 1A or equivalent).

Motor Specifications and Ratings 200V MFMA

400W to 1.5kW Middle inertia, Medium Capacity

		AC200V				
Motor model		MFMA	042P1□	042S1□	152P1□	152S1□
Applicable driver	Model No.	MCDDT3520			MDDDT5540	
	Frame symbol	Frame C			Frame D	
Power supply capacity (kVA)		1.0			2.3	
Rated output (W)		400			1500	
Rated torque (N · m)		1.9			7.15	
Momentary Max. peak torque (N · m)		5.3			21.5	
Rated current (Arms)		2.8			9.5	
Max. current (Ao-p)		12.0			40.0	
Regenerative brake frequency (times/min) Note1	Without option	No limit Note2			100	
	DV0P4283	No limit Note2			—	
	DV0P4284	—			No limit Note2	
Rated rotational speed (r/min)		2000				
Max. rotational speed (r/min)		3000				
Moment of inertia of rotor ($\times 10^{-4}$ kg · m 2)	Without brake	2.45			20.1	
	With brake	2.7			21.5	
Recommended moment of inertia ratio of the load and the rotor Note3		Smaller than 10 times				
Rotary encoder specifications		2500P/r Incremental	17-bit Absolute/ Incremental	2500P/r Incremental	17-bit Absolute/ Incremental	
Resolution per single turn		10000	131072	10000	131072	
Protective enclosure rating		IP65 (except shaft through hole and cable end connector)				
Environment	Ambient temperature	0 to 40°C (free from freezing), Storage : -20 to + 80°C				
	Ambient humidity	85%RH or lower (free from condensing)				
	Installation location	Indoors (no direct sunlight), free from corrosive gas, inflammable gas, oil mist and dust				
	Altitude	1000m or lower				
	Vibration resistance	49m/s 2 or less				
Mass (kg). () represents holding brake type		4.7 (6.7)			11.0 (14.0)	

Brake specifications (This brake will be released when it is energized. Do not use this for braking the motor in motion.)			
Static friction torque (N · m)		4.9	7.8
Engaging time (ms)		80	80
Releasing time (ms) Note4		70	35
Exciting current (DC) (A)		0.59	0.83
Releasing voltage	DC2V or more		
Exciting voltage	DC 24 V ± 10%		

Permissible load			
During assembly	Radial load P-direction (N)	980	
	Thrust load A-direction (N)	588	
	Thrust load B-direction (N)	686	
During operation	Radial load P-direction (N)	392	490
	Thrust load A-direction (N)	147	196
	Thrust load B-direction (N)	147	196

For motor dimensions, refer to page A4-64 , and for the diver, refer to pages A4-81.

Model designation MFMA series, 400W to 1.5kW

e.g.)

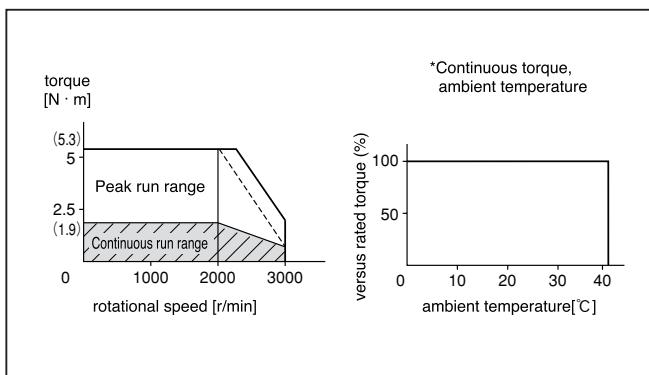
M	F	M	A	0	4	2	S	1	G
Symbol		Type					Design order		
MFMA		Middle inertia (400W-1.5kW)					1 : Standard		
Motor rated output		Voltage specifications					Motor structure		
Symbol		Symbol					Shaft	Holding brake	Oil seal
MFMA		2					Round	Key-way	without with
Symbol		Specifications					G	●	●
04		200V					H	●	●
Rotary encoder specifications									
Symbol		Format		Pulse counts		Resolution		Wires	
P		Incremental		2500P/r		10000		5	
S		Absolute/Incremental		17-bit		131072		7	

Torque characteristics

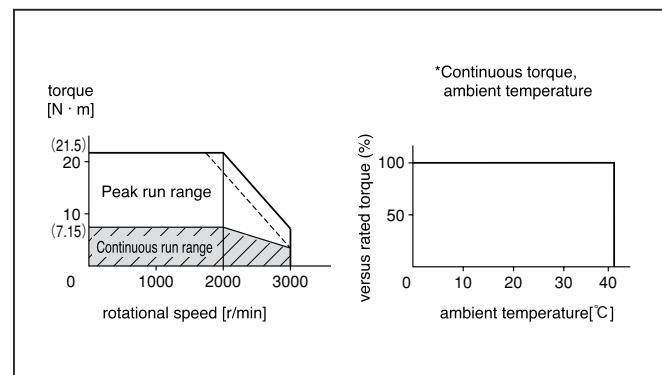
at AC200V of power voltage

(Dotted line represents the torque at 10% less supply voltage.)

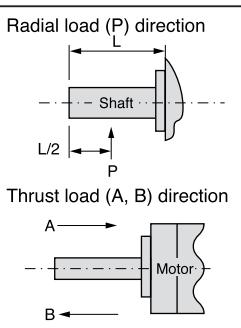
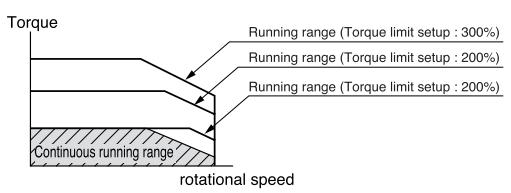
MFMA042□1□



MFMA152□1□



*When you lower the torque limit setup (Pr5E and 5F), running range at high speed might be lowered as well.



- Note) 1. Regenerative brake frequency represents the frequency of the motor's stops from the rated speed with deceleration without load.
- If the load is connected, frequency will be defined as $1/(m+1)$, where m =load moment of inertia/rotor moment of inertia.
 - When the motor speed exceeds the rated speed, regenerative brake frequency is in inverse proportion to the square of (running speed/rated speed).
 - Power supply voltage is AC230V (at 200V of the main voltage).
 - If the supply voltage fluctuates, frequency is in inverse proportion to the square of (Running supply voltage/230) relative to the value in the table.
 - When regeneration occurs continuously such cases as running speed frequently changes or vertical feeding, consult us or a dealer.
2. If the effective torque is within the rated torque, there is no limit in generative brake.
3. Consult us or a dealer if the load moment of inertia exceeds the specified value.
4. Specified releasing time is obtained with the use of surge absorber for brake (Z15D151 by Ishizuka Electronic or equivalent). () represents the actually measured value using a diode (200V, 1A or equivalent).

Motor Specifications and Ratings 200V MFMA

2.5kW to 4.5kW Middle inertia, Medium Capacity

		AC200V				
Motor model		MFMA	252P1□	252S1□	452P1□	452S1□
Applicable driver	Model No.	MEDDT7364			MFDDTB3A2	
	Frame symbol	Frame E			Frame F	
Power supply capacity (kVA)		3.8			6.8	
Rated output (W)		2500			4500	
Rated torque (N · m)		11.8			21.5	
Momentary Max. peak torque (N · m)		30.4			54.9	
Rated current (Arms)		13.4			23.5	
Max. current (Ao-p)		57.0			100.0	
Regenerative brake frequency (times/min) Note1	Without option	75			67	
	DV0P4285×2	No limit Note2			375	
Rated rotational speed (r/min)		2000				
Max. rotational speed (r/min)		3000				
Moment of inertia of rotor ($\times 10^{-4}$ kg · m 2)	Without brake	41.3			72.3	
	With brake	45.3			78.5	
Recommended moment of inertia ratio of the load and the rotor Note3		Smaller than 10 times				
Rotary encoder specifications		2500P/r Incremental	17-bit Absolute/ Incremental	2500P/r Incremental	17-bit Absolute/ Incremental	
Resolution per single turn		10000	131072	10000	131072	
Protective enclosure rating		IP65 (except shaft through hole and cable end connector)				
Environment	Ambient temperature	0 to 40°C (free from freezing), Storage : -20 to + 80°C				
	Ambient humidity	85%RH or lower (free from condensing)				
	Installation location	Indoors (no direct sunlight), free from corrosive gas, inflammable gas, oil mist and dust				
	Altitude	1000m or lower				
	Vibration resistance	49m/s 2 or less				
Mass (kg). () represents holding brake type		14.8 (17.5)			19.9 (24.3)	

Brake specifications (This brake will be released when it is energized. Do not use this for braking the motor in motion.)

Static friction torque (N · m)	21.6	31.4
Engaging time (ms)	150	150
Releasing time (ms) Note4	100 (450)	100 (450)
Exciting current (DC) (A)	0.75	0.75
Releasing voltage	DC2V or more	
Exciting voltage	DC 24 V ± 10%	

Permissible load		
During assembly	Radial load P-direction (N)	1862
	Thrust load A-direction (N)	686
	Thrust load B-direction (N)	686
During operation	Radial load P-direction (N)	784
	Thrust load A-direction (N)	294
	Thrust load B-direction (N)	294

For motor dimensions, refer to page A4-65 , and for the diver, refer to pages A4-82.

Model designation MFMA series, 2.5kW to 4.5kW

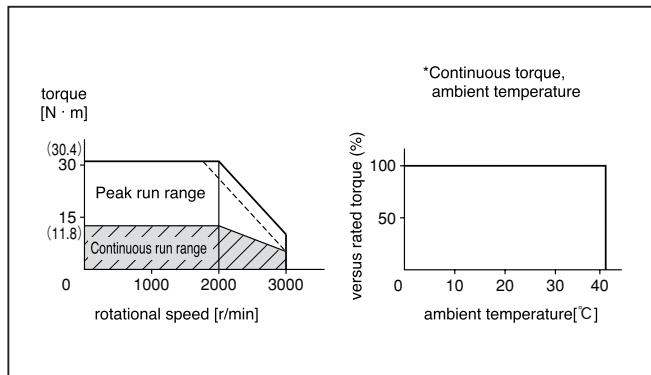
e.g.)

M	F	M	A	2	5	2	S	1	G
<hr/>									
Symbol		Type					Design order		
MFMA		Middle inertia (2.5kW-4.5kW)					1 : Standard		
Motor rated output		Voltage specifications					Motor structure		
Symbol		Symbol					Shaft	Holding brake	Oil seal
MFMA		2					Round	Key-way	without with
		200V					G	●	●
							H	●	●
Rotary encoder specifications									
Symbol		Format		Pulse counts	Resolution	Wires			
P		Incremental		2500P/r	10000	5			
S		Absolute/Incremental		17-bit	131072	7			

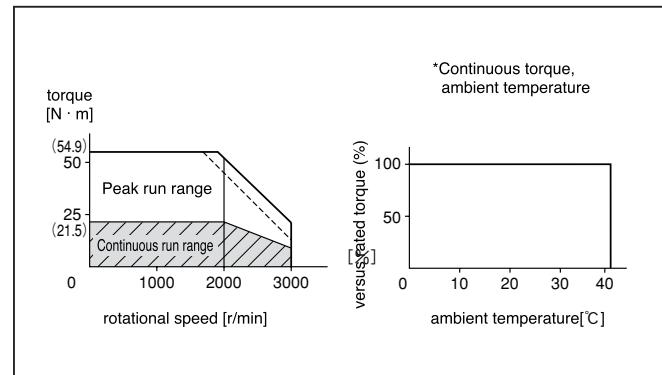
Torque characteristics**at AC200V of power voltage**

(Dotted line represents the torque at 10% less supply voltage.)

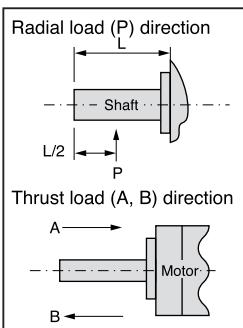
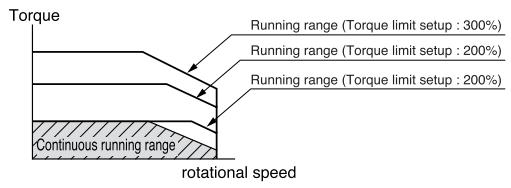
MFMA252□1□



MFMA452□1□



*When you lower the torque limit setup (Pr5E and 5F), running range at high speed might be lowered as well.



- Note) 1. Regenerative brake frequency represents the frequency of the motor's stops from the rated speed with deceleration without load.
- If the load is connected, frequency will be defined as $1/(m+1)$, where m =load moment of inertia/rotor moment of inertia.
 - When the motor speed exceeds the rated speed, regenerative brake frequency is in inverse proportion to the square of (running speed/rated speed).
 - Power supply voltage is AC230V (at 200V of the main voltage).
 - If the supply voltage fluctuates, frequency is in inverse proportion to the square of (Running supply voltage/230) relative to the value in the table.
 - When regeneration occurs continuously such cases as running speed frequently changes or vertical feeding, consult us or a dealer.
2. If the effective torque is within the rated torque, there is no limit in generative brake.
3. Consult us or a dealer if the load moment of inertia exceeds the specified value.
4. Specified releasing time is obtained with the use of surge absorber for brake (Z15D151 by Ishizuka Electronic or equivalent). () represents the actually measured value using a diode (200V, 1A or equivalent).

Motor Specifications and Ratings

200V MHMA

500W to 1.5kW High inertia, Medium Capacity

		AC200V					
Motor model	MHMA	052P1□	052S1□	102P1□	102S1□	152P1□	152S1□
Applicable driver	Model No.	MCDDT3520		MDDDT3530		MDDDT5540	
	Frame symbol	Frame C			Frame D		
Power supply capacity (kVA)		1.0		1.8		2.3	
Rated output (W)		500		1000		1500	
Rated torque (N · m)		2.38		4.8		7.15	
Momentary Max. peak torque (N · m)		6.0		14.4		21.5	
Rated current (Arms)		3.2		5.6		9.4	
Max. current (Ao-p)		11.5		24.0		40.0	
Regenerative brake frequency (times/min) Note1	Without option	No limit	Note2	33		25	
	DV0P4283	No limit	Note2				
	DV0P4284				No limit	Note2	
Rated rotational speed (r/min)				2000			
Max. rotational speed (r/min)				3000			
Moment of inertia of rotor ($\times 10^{-4}$ kg · m 2)	Without brake	14.0		26.0		42.9	
	With brake	15.2		27.2		44.1	
Recommended moment of inertia ratio of the load and the rotor Note3				Smaller than 5 times			
Rotary encoder specifications		2500P/r Incremental	17-bit Absolute/ Incremental	2500P/r Incremental	17-bit Absolute/ Incremental	2500P/r Incremental	17-bit Absolute/ Incremental
Resolution per single turn		10000	131072	10000	131072	10000	131072
Protective enclosure rating		IP65 (except shaft through hole and cable end connector)					
Environment	Ambient temperature	0 to 40°C (free from freezing), Storage : -20 to + 80°C					
	Ambient humidity	85%RH or lower (free from condensing)					
	Installation location	Indoors (no direct sunlight), free from corrosive gas, inflammable gas, oil mist and dust					
	Altitude	1000m or lower					
	Vibration resistance	49m/s 2 or less					
Mass (kg). () represents holding brake type		5.3 (6.9)		8.9 (9.5)		10.0 (11.6)	

Brake specifications (This brake will be released when it is energized. Do not use this for braking the motor in motion.)		
Static friction torque (N · m)	4.9	13.7
Engaging time (ms)	80	100
Releasing time (ms) Note4	70 (200)	50 (130)
Exciting current (DC) (A)	0.59	0.79
Releasing voltage	DC2V or more	
Exciting voltage	DC 24 V ± 10%	

Permissible load		
During assembly	Radial load P-direction (N)	980
	Thrust load A-direction (N)	588
	Thrust load B-direction (N)	686
During operation	Radial load P-direction (N)	490
	Thrust load A-direction (N)	196
	Thrust load B-direction (N)	196

For motor dimensions, refer to page A4-66 , and for the diver, refer to pages A4-81.

Model designation MHMA series, 500W to 1.5kW

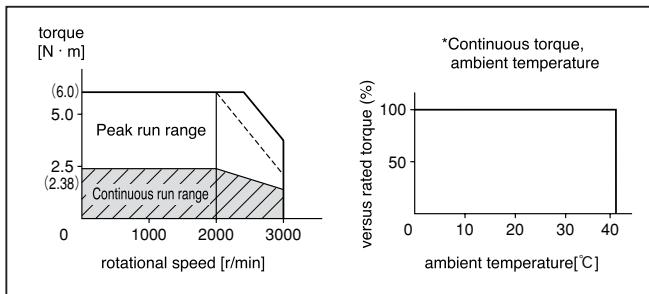
e.g.)

M	H	M	A	0	5	2	S	1	G
<hr/>									
Symbol		Type					Design order		
MHMA		High inertia (500W-1.5kW)					1 : Standard		
Motor rated output		Voltage specifications					Motor structure		
Symbol		Symbol					Shaft	Holding brake	Oil seal
MHMA		2					Symbol	Round	Key-way
		200V					Symbol	without	with
							G	●	●
							H	●	●
Rotary encoder specifications									
Symbol		Format					Pulse counts	Resolution	Wires
P		Incremental					2500P/r	10000	5
S		Absolute/Incremental					17-bit	131072	7

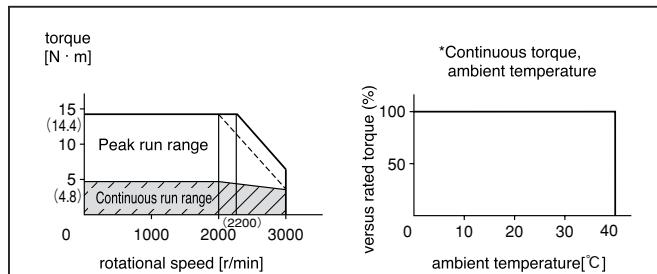
Torque characteristics
at AC200V of power voltage

(Dotted line represents the torque at 10% less supply voltage.)

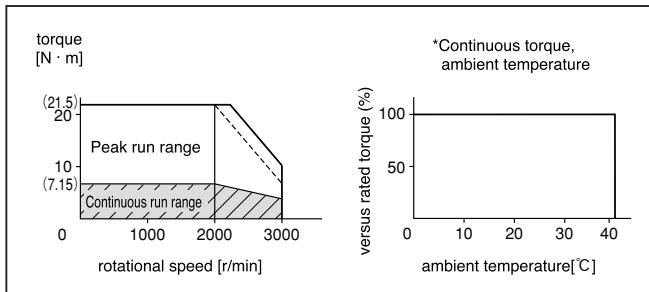
MHMA052□1□



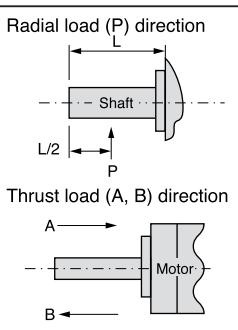
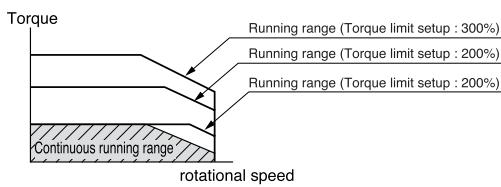
MHMA102□1□



MHMA152□1□



*When you lower the torque limit setup (Pr5E and 5F), running range at high speed might be lowered as well.



- Note) 1. Regenerative brake frequency represents the frequency of the motor's stops from the rated speed with deceleration without load.
- If the load is connected, frequency will be defined as $1/(m+1)$, where m =load moment of inertia/rotor moment of inertia.
 - When the motor speed exceeds the rated speed, regenerative brake frequency is in inverse proportion to the square of (running speed/rated speed).
 - Power supply voltage is AC230V (at 200V of the main voltage).
 - If the supply voltage fluctuates, frequency is in inverse proportion to the square of (Running supply voltage/230) relative to the value in the table.
 - When regeneration occurs continuously such cases as running speed frequently changes or vertical feeding, consult us or a dealer.
2. If the effective torque is within the rated torque, there is no limit in generative brake.
3. Consult us or a dealer if the load moment of inertia exceeds the specified value.
4. Specified releasing time is obtained with the use of surge absorber for brake (Z15D151 by Ishizuka Electronic or equivalent). () represents the actually measured value using a diode (200V, 1A or equivalent).

Motor Specifications and Ratings 200V MHMA

2.0kW to 5.0kW High inertia, Medium Capacity

		AC200V													
Motor model		MHMA		202P1□	202S1□	302P1□	302S1□	402P1□	402S1□	502P1□	502S1□				
Applicable driver	Model No.	MEDDT7364		MFDDTA390		MFDDTB3A2									
	Frame symbol	Frame E		Frame F											
Power supply capacity (kVA)		3.3		4.5		6.0		7.5							
Rated output (W)		2000		3000		4000		5000							
Rated torque (N·m)		9.54		14.3		18.8		23.8							
Momentary Max. peak torque (N·m)		28.5		42.9		56.4		71.4							
Rated current (Arms)		12.3		17.8		23.4		28.0							
Max. current (Ao-p)		52.0		76.0		100.0		120.0							
Regenerative brake frequency (times/min) Note1	Without option	38		43		32		20							
	DVOP4285×2	No limit		Note2		200		150							
Rated rotational speed (r/min)		2000													
Max. rotational speed (r/min)		3000													
Moment of inertia of rotor (x10 ⁻⁴ kg · m ²)	Without brake	62.0		94.1		120.0		170.0							
	With brake	67.9		100.0		126.0		176.0							
Recommended moment of inertia ratio of the load and the rotor Note3		Smaller than 5 times													
Rotary encoder specifications		2500P/r Incremental	17-bit Absolute/ Incremental	2500P/r Incremental	17-bit Absolute/ Incremental	2500P/r Incremental	17-bit Absolute/ Incremental	2500P/r Incremental	17-bit Absolute/ Incremental						
Resolution per single turn		10000	131072	10000	131072	10000	131072	10000	131072						
Protective enclosure rating		IP65 (except shaft through hole and cable end connector)													
Environment	Ambient temperature	0 to 40°C (free from freezing), Storage : -20 to + 80°C													
	Ambient humidity	85%RH or lower (free from condensing)													
	Installation location	Indoors (no direct sunlight), free from corrosive gas, inflammable gas, oil mist and dust													
	Altitude	1000m or lower													
	Vibration resistance	49m/s ² or less													
Mass (kg), () represents holding brake type		16.0 (19.5)		18.2 (21.7)		22.0 (25.5)		26.7 (30.2)							

Brake specifications (This brake will be released when it is energized. Do not use this for braking the motor in motion.)

Static friction torque (N · m)	24.5
Engaging time (ms)	80
Releasing time (ms) Note4	25 (200)
Exciting current (DC) (A)	1.30
Releasing voltage	DC2V or more
Exciting voltage	DC 24 V ± 10%

Permissible load

During assembly	Radial load P-direction (N)	1666
	Thrust load A-direction (N)	784
	Thrust load B-direction (N)	980
During operation	Radial load P-direction (N)	784
	Thrust load A-direction (N)	343
	Thrust load B-direction (N)	343

For motor dimensions, refer to page A4-67, and for the diver, refer to pages A4-82.

Model designation MHMA series, 2.0W to 5.0kW

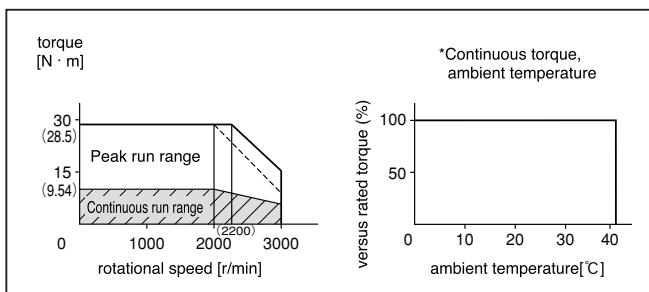
e.g.)

M	H	M	A	2	0	2	S	1	G
Symbol					Type				
MHMA					High inertia (2.0kW-5.0kW)				
Motor rated output					Voltage specifications				
Symbol					Specifications				
2					200V				
Design order					1 : Standard				
Motor structure					Shaft				
Symbol					Round	Key-way	without	with	without
G					●	●			●
H					●	●		●	●

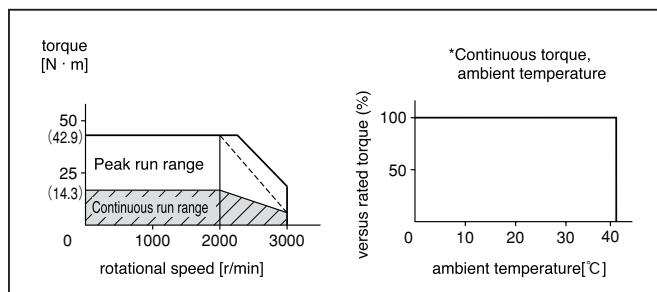
Torque characteristics
at AC200V of power voltage

(Dotted line represents the torque at 10% less supply voltage.)

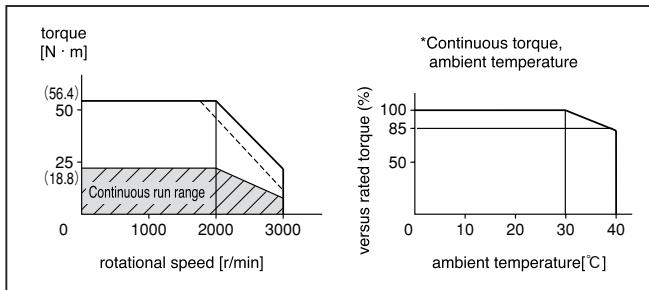
MHMA202□1□



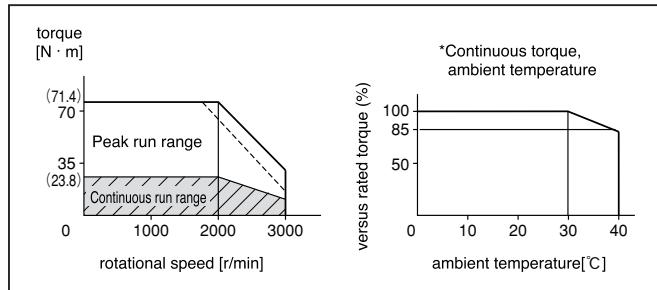
MHMA302□1□



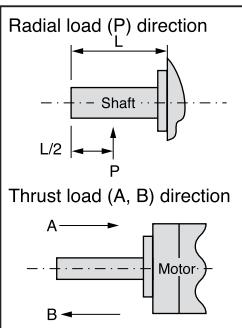
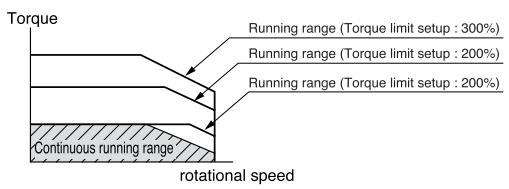
MHMA402□1□



MHMA502□1□



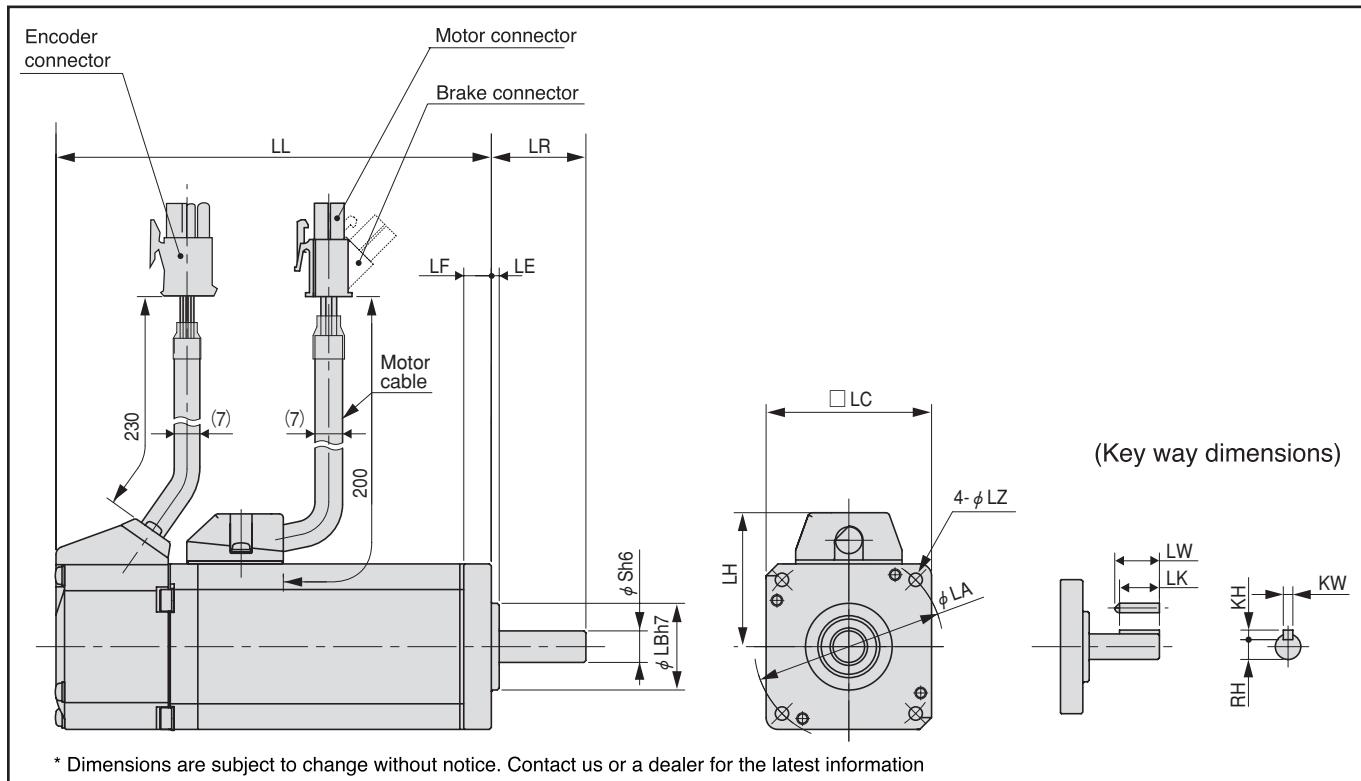
*When you lower the torque limit setup (Pr5E and 5F), running range at high speed might be lowered as well.



- Note) 1. Regenerative brake frequency represents the frequency of the motor's stops from the rated speed with deceleration without load.
- If the load is connected, frequency will be defined as $1/(m+1)$, where m =load moment of inertia/rotor moment of inertia.
 - When the motor speed exceeds the rated speed, regenerative brake frequency is in inverse proportion to the square of (running speed/rated speed).
 - Power supply voltage is AC230V (at 200V of the main voltage).
 - If the supply voltage fluctuates, frequency is in inverse proportion to the square of (Running supply voltage/230) relative to the value in the table.
 - When regeneration occurs continuously such cases as running speed frequently changes or vertical feeding, consult us or a dealer.
2. If the effective torque is within the rated torque, there is no limit in generative brake.
3. Consult us or a dealer if the load moment of inertia exceeds the specified value.
4. Specified releasing time is obtained with the use of surge absorber for brake (Z15D151 by Ishizuka Electronic or equivalent). () represents the actually measured value using a diode (200V, 1A or equivalent).

Motor Dimensions

MAMA 100W - 750W



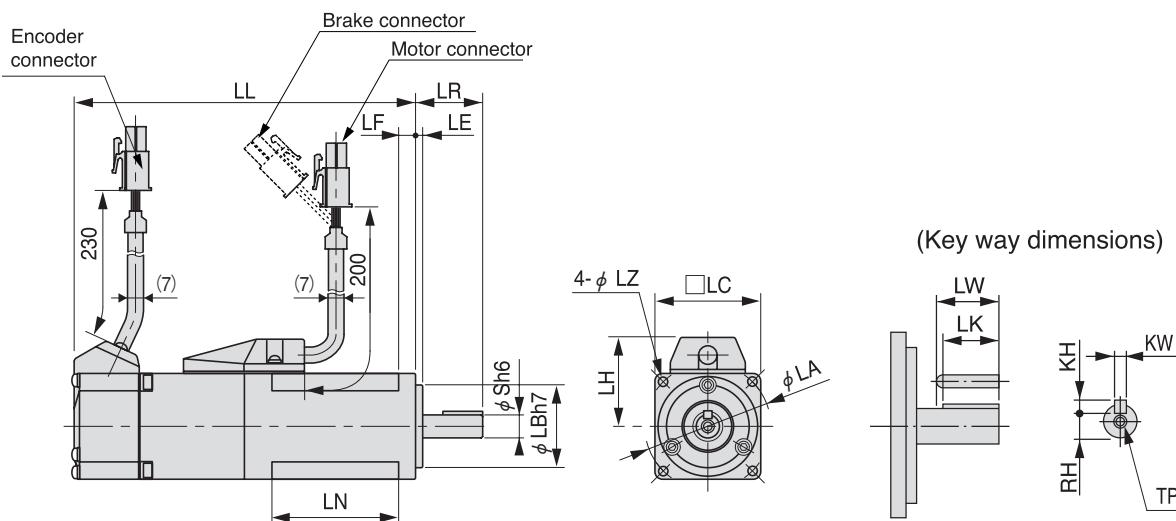
MAMA series (Ultra low inertia)								
Motor output		100W		200W		400W		750W
Motor model	MAMA	012P1□	012S1□	022P1□	022S1□	042P1□	042S1□	082P1□
Rotary encoder specifications		2500P/r Incremental	17-bit Absolute/ Incremental	2500P/r Incremental	17-bit Absolute/ Incremental	2500P/r Incremental	17-bit Absolute/ Incremental	2500P/r Incremental
LL	Without brake	110.5	127	111	126	139	154	160
	With brake	138	154.5	139	154	167	182	192.5
LR		24		30		30		35
S		8		11		14		19
LA		48		70		70		90
LB		22		50		50		70
LC		42		60		60		80
LD		—		—		—		—
LE		2		3		3		3
LF		7		7		7		8
LG		—		—		—		—
LH		34		43		43		53
LZ		3.4		4.5		4.5		6
Key way	LW	14		20		25		25
	LK	12.5		18		22.5		22
	KW	3h9		4h9		5h9		6h9
	KH	3		4		5		6
	RH	6.2		8.5		11		15.5
Mass (kg)	Without brake	0.65	0.71	1.1	1.2	1.5	1.6	3.3
	With brake	0.85	0.91	1.5	1.6	1.9	2.0	4.0
Connector/Plug specifications								
refer to Fig.1, page A4-68								

* Cautions : Reduce the moment of inertia ratio if high speed response operation is required.

Read the Instruction Manual carefully and understand all precautions and remarks before using the products.

Motor Dimensions

MSMD 50W - 100W



* Dimensions are subject to change without notice. Contact us or a dealer for the latest information

MSMD series (Low inertia)

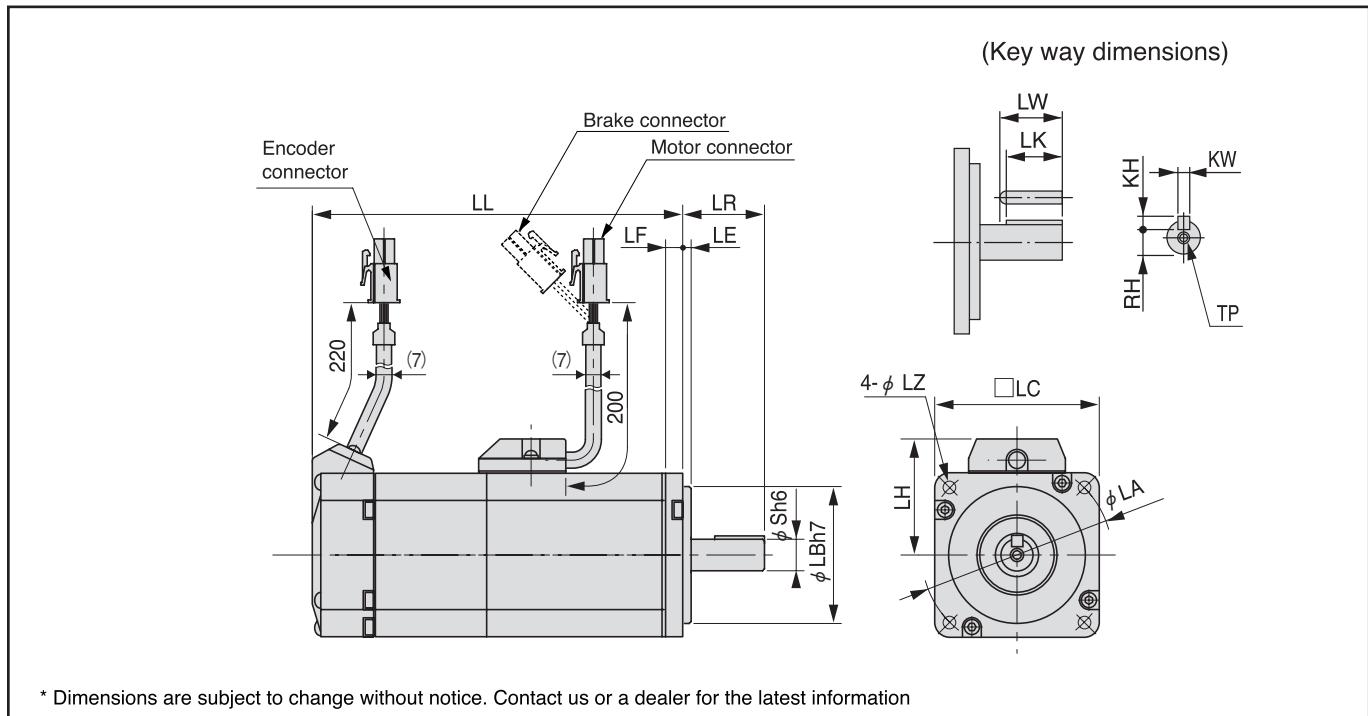
Motor output		50W		100W	
Motor model	MSMD	5A□P1□	5A□S1□	01□P1□	01□S1□
Rotary encoder specifications		2500P/r Incremental	17-bit Absolute/ Incremental	2500P/r Incremental	17-bit Absolute/ Incremental
LL	Without brake	72		92	
	With brake	102		122	
LR		25		25	
S		8		8	
LA		45		45	
LB		30		30	
LC		38		38	
LD		—		—	
LE		3		3	
LF		6		6	
LG		—		—	
LH		32		32	
LN		26.5		46.5	
LZ		3.4		3.4	
Key way	LW	14		14	
	LK	12.5		12.5	
	KW	3h9		3h9	
	KH	3		3	
	RH	6.2		6.2	
	TP	M3 x 6 (depth)		M3 x 6 (depth)	
Mass (kg)	Without brake	0.32		0.47	
	With brake	0.53		0.68	
Connector/Plug specifications		refer to Fig.1, page A4-68			

* Cautions : Reduce the moment of inertia ratio if high speed response operation is required.

Read the Instruction Manual carefully and understand all precautions and remarks before using the products.

Motor Dimensions

MSMD 200W - 750W



* Dimensions are subject to change without notice. Contact us or a dealer for the latest information

MSMD series (Low inertia)

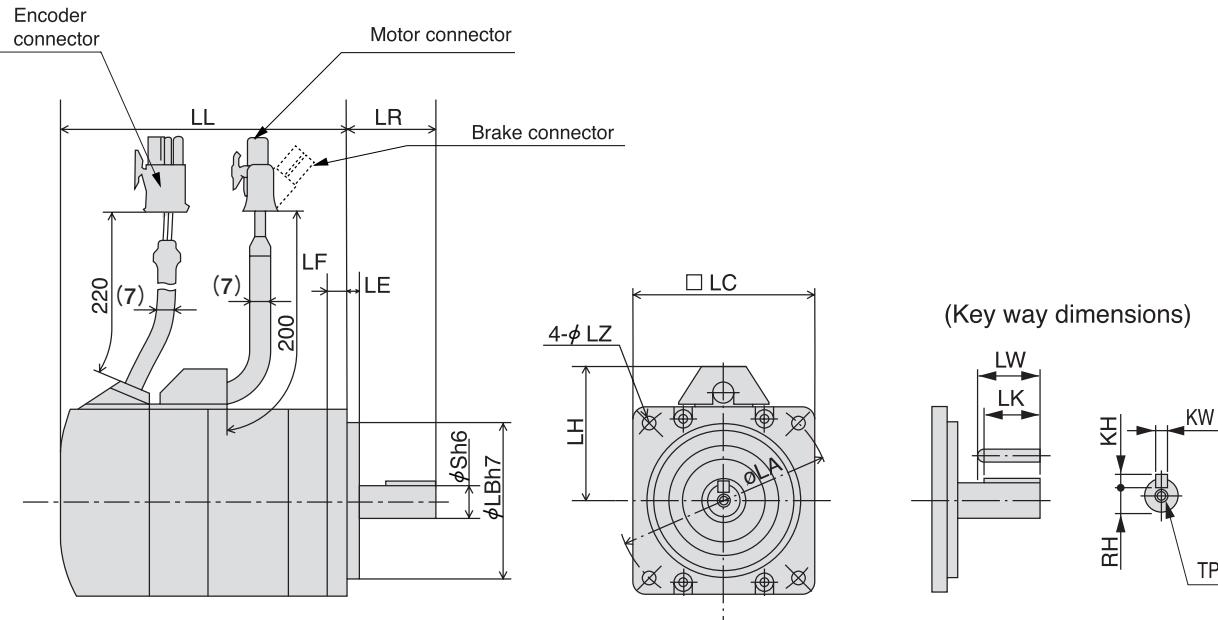
Motor output		200W		400W		750W	
Motor model	MSMD	02□P1□	02□S1□	04□P1□	04□S1□	08□P1□	08□S1□
Rotary encoder specifications		2500P/r Incremental	17-bit Absolute/ Incremental	2500P/r Incremental	17-bit Absolute/ Incremental	2500P/r Incremental	17-bit Absolute/ Incremental
LL	Without brake	79		98.5		112	
	With brake	115.5		135		149	
LR		30		30		35	
S		11		14		19	
LA		70		70		90	
LB		50		50		70	
LC		60		60		80	
LD		—		—		—	
LE		3		3		3	
LF		6.5		6.5		8	
LG		—		—		—	
LH		43		43		53	
LN		—		—		—	
LZ		4.5		4.5		6	
Key way	LW	20		25		25	
	LK	18		22.5		22	
	KW	4h9		5h9		6h9	
	KH	4		5		6	
	RH	8.5		11		15.5	
	TP	M4 x 8 (depth)		M5 x 10 (depth)		M5 x 10 (depth)	
Mass (kg)	Without brake	0.82		1.2		2.3	
	With brake	1.3		1.7		3.1	
Connector/Plug specifications		refer to Fig.1, page A4-68					

* Cautions : Reduce the moment of inertia ratio if high speed response operation is required.

Read the Instruction Manual carefully and understand all precautions and remarks before using the products.

Motor Dimensions

MQMA 100W - 400W



* Dimensions are subject to change without notice. Contact us or a dealer for the latest information

MQMA series (Low inertia)

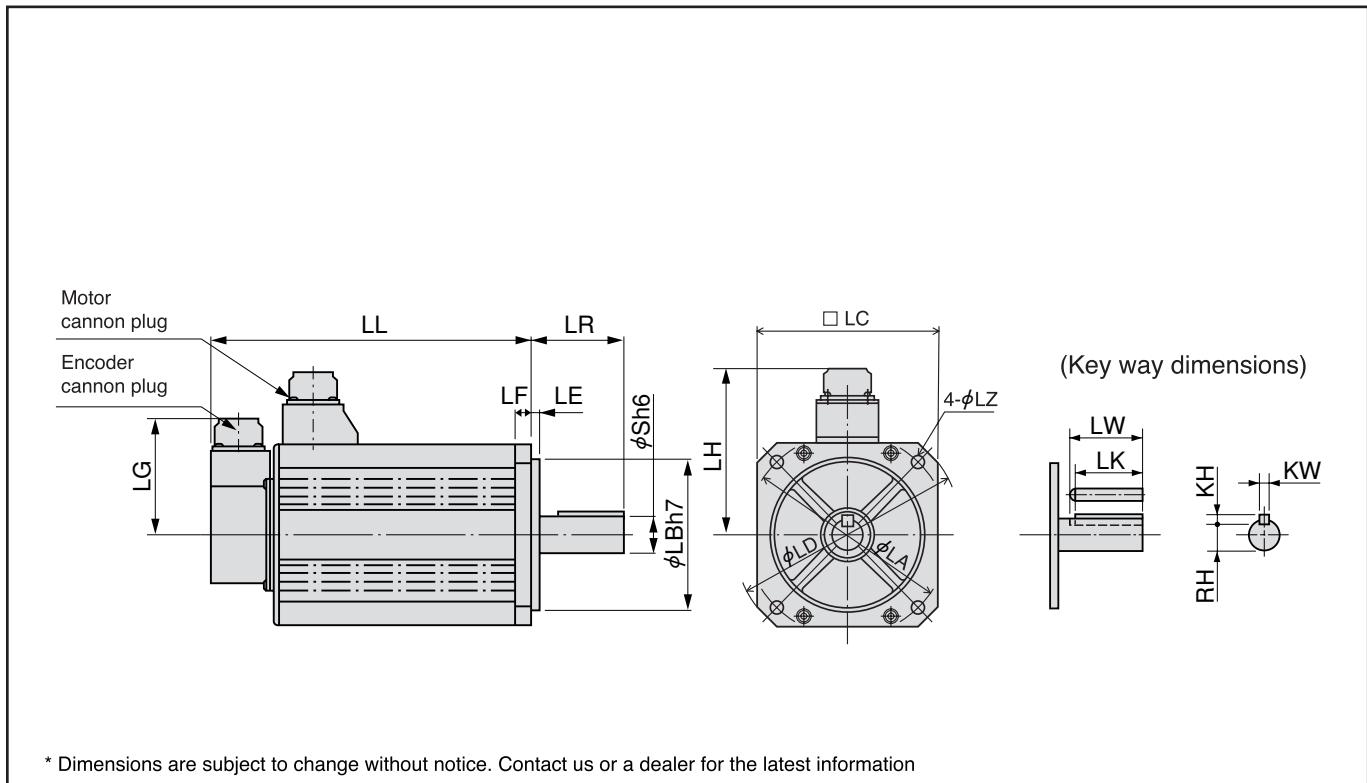
Motor output		100W		200W		400W	
Motor model	MQMA	01□P1□	01□S1□	02□P1□	02□S1□	04□P1□	04□S1□
Rotary encoder specifications		2500P/r Incremental	17-bit Absolute/ Incremental	2500P/r Incremental	17-bit Absolute/ Incremental	2500P/r Incremental	17-bit Absolute/ Incremental
LL	Without brake	60	87	67	94	82	109
	With brake	84	111	99.5	126.5	114.5	141.5
L R		25		30		30	
S		8		11		14	
L A		70		90		90	
L B		50		70		70	
L C		60		80		80	
L D		—		—		—	
L E		3		5		5	
L F		7		8		8	
L G		—		—		—	
L H		43		53		53	
L Z		4.5		5.5		5.5	
Key way	LW	14		20		25	
	L K	12.5		18		22.5	
	KW	3h9		4h9		5h9	
	KH	3		4		5	
	RH	6.2		8.5		11	
	TP	M3 x 6 (depth)		M4 x 8 (depth)		M5 x 10 (depth)	
Mass (kg)	Without brake	0.65	0.75	1.3	1.4	1.8	1.9
	With brake	0.90	1.00	2.0	2.1	2.5	2.6
Connector/Plug specifications		refer to Fig.1, page A4-68					

* Cautions : Reduce the moment of inertia ratio if high speed response operation is required.

Read the Instruction Manual carefully and understand all precautions and remarks before using the products.

Motor Dimensions

MSMA 1.0kW - 2.0kW



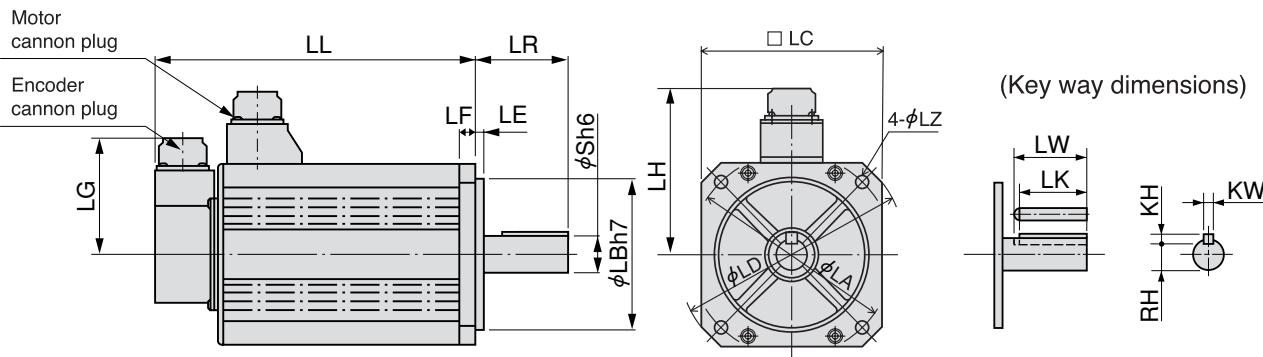
MSMA series (Low inertia)						
Motor output		1.0kW		1.5kW		2.0kW
Motor model	MSMA	10□P1□	10□S1□	15□P1□	15□S1□	20□P1□
Rotary encoder specifications		2500P/r Incremental	17-bit Absolute/ Incremental	2500P/r Incremental	17-bit Absolute/ Incremental	2500P/r Incremental
LL	Without brake	175	175	180	180	205
	With brake	200	200	205	205	230
LR		55		55		55
S		19		19		19
LA		100		115		115
LB		80		95		95
LC		90		100		100
LD		120		135		135
LE		3		3		3
LF		7		10		10
LG		84		84		84
LH		98		103		103
LZ		6.6		9		9
Key way	LW		45		45	
	LK		42		42	
	KW		6h9		6h9	
	KH		6		6	
	RH		15.5		15.5	
Mass (kg)	Without brake	4.5	4.5	5.1	5.1	6.5
	With brake	5.1	5.1	6.5	6.5	7.9
Connector/Plug specifications		refer to Fig.1, page A4-68				

* Cautions : Reduce the moment of inertia ratio if high speed response operation is required.

Read the Instruction Manual carefully and understand all precautions and remarks before using the products.

Motor Dimensions

MSMA 3.0kW - 5.0kW



* Dimensions are subject to change without notice. Contact us or a dealer for the latest information

MSMA series (Low inertia)

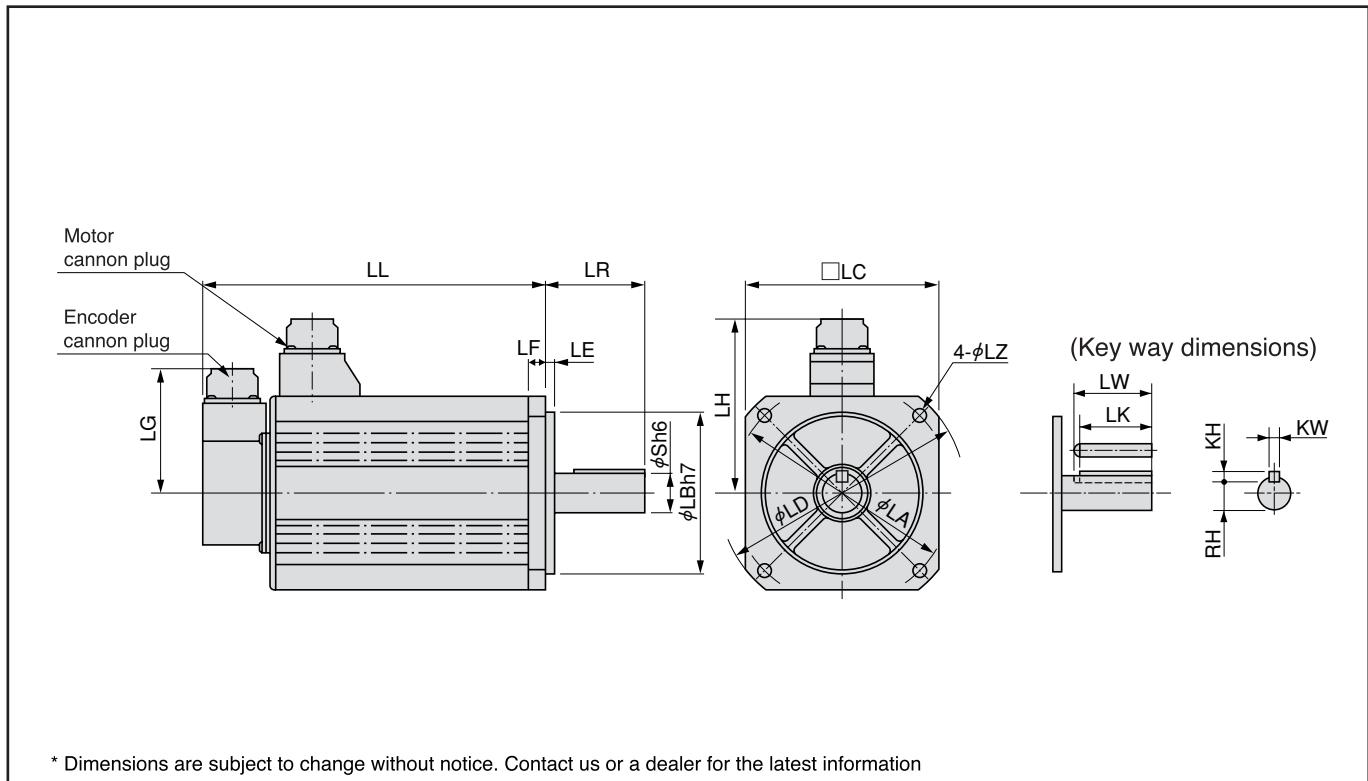
Motor output		3.0kW		4.0kW		5.0kW	
Motor model	MSMA	30□P1□	30□S1□	40□P1□	40□S1□	50□P1□	50□S1□
Rotary encoder specifications		2500P/r Incremental	17-bit Absolute/ Incremental	2500P/r Incremental	17-bit Absolute/ Incremental	2500P/r Incremental	17-bit Absolute/ Incremental
LL	Without brake	217	217	240	240	280	280
	With brake	242	242	265	265	305	305
LR		55		65		65	
S		22		24		24	
LA		130/145 (slot)		145		145	
LB		110		110		110	
LC		120		130		130	
LD		162		165		165	
LE		3		6		6	
LF		12		12		12	
LG		84		84		84	
LH		111		118		118	
LZ		9		9		9	
Key way	LW	45		55		55	
	LK	41		51		51	
	KW	8h9		8h9		8h9	
	KH	7		7		7	
	RH	18		20		20	
Mass (kg)		Without brake	9.3	9.3	12.9	12.9	17.3
		With brake	11.0	11.0	14.8	14.8	19.2
Connector/Plug specifications							
refer to Fig.2, page A4-68							

* Cautions : Reduce the moment of inertia ratio if high speed response operation is required.

Read the Instruction Manual carefully and understand all precautions and remarks before using the products.

Motor Dimensions

MDMA 1.0kW - 1.5kW



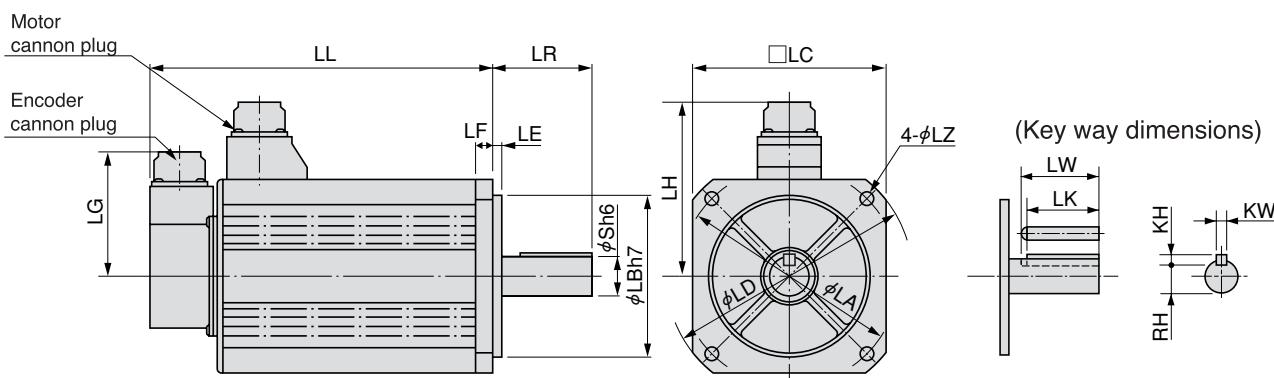
MDMA series (Middle inertia)					
Motor output		1.0kW		1.5kW	
Motor model	MDMA	10□P1□	10□S1□	15□P1□	15□S1□
Rotary encoder specifications		2500P/r Incremental	17-bit Absolute/ Incremental	2500P/r Incremental	17-bit Absolute/ Incremental
LL	Without brake	150	150	175	175
	With brake	175	175	200	200
LR		55		55	
S		22		22	
LA		145		145	
LB		110		110	
LC		130		130	
LD		165		165	
LE		6		6	
LF		12		12	
LG		84		84	
LH		118		118	
LZ		9		9	
Key way	LW	45		45	
	LK	41		41	
	KW	8h9		8h9	
	KH	7		7	
	RH	18		18	
Mass (kg)	Without brake	6.8	6.8	8.5	8.5
	With brake	8.7	8.7	10.1	10.1
Connector/Plug specifications		refer to Fig.2, page A4-68			

* Cautions : Reduce the moment of inertia ratio if high speed response operation is required.

Read the Instruction Manual carefully and understand all precautions and remarks before using the products.

Motor Dimensions

MDMA 2.0kW - 3.0kW



* Dimensions are subject to change without notice. Contact us or a dealer for the latest information

MDMA series (Middle inertia)

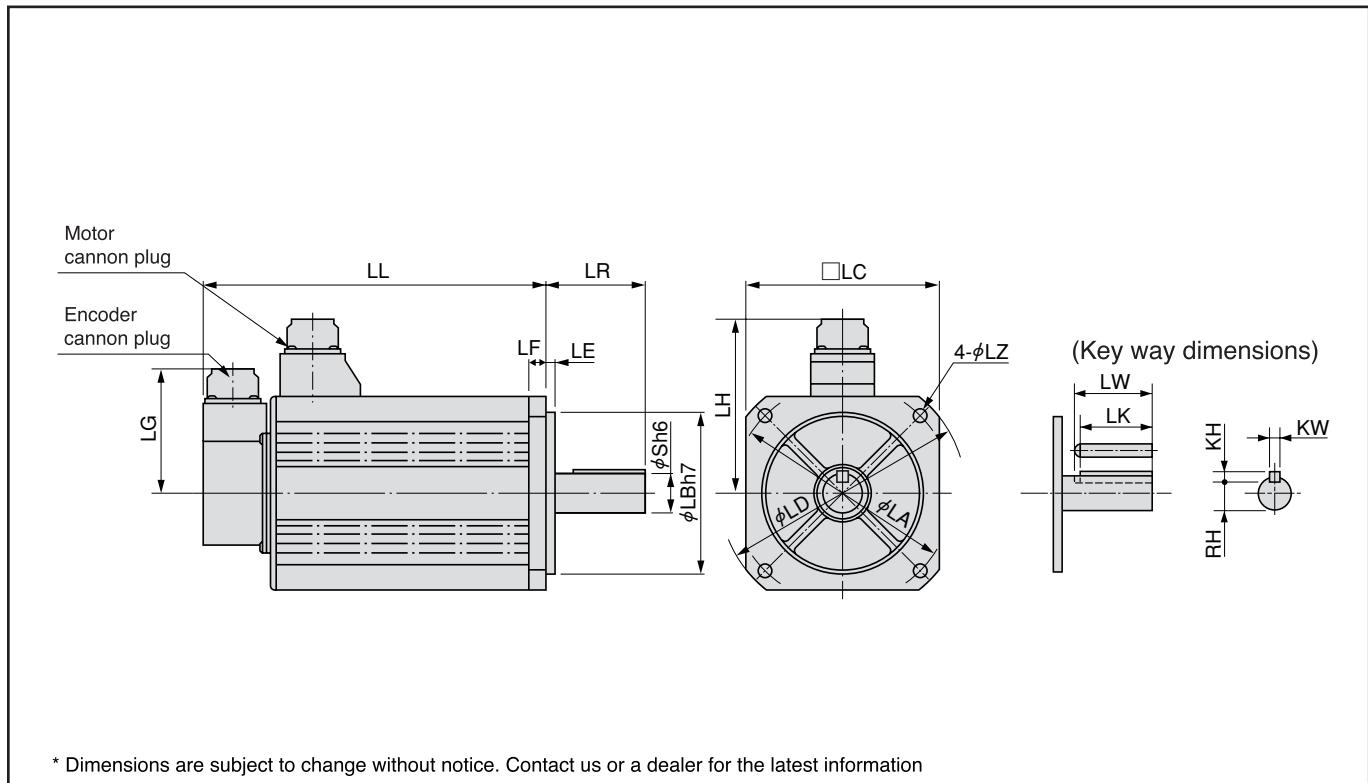
Motor output		2.0kW		3.0kW	
Motor model	MDMA	20□P1□	20□S1□	30□P1□	30□S1□
Rotary encoder specifications		2500P/r Incremental	17-bit Absolute/ Incremental	2500P/r Incremental	17-bit Absolute/ Incremental
LL	Without brake	200	200	250	250
	With brake	225	225	275	275
LR		55		65	
S		22		24	
LA		145		145	
LB		110		110	
LC		130		130	
LD		165		165	
LE		6		6	
LF		12		12	
LG		84		84	
LH		118		118	
LZ		9		9	
Key way	LW	45		55	
	LK	41		51	
	KW	8h9		8h9	
	KH	7		7	
	RH	18		20	
Mass (kg)	Without brake	10.6	10.6	14.6	14.6
	With brake	12.5	12.5	16.5	16.5
Connector/Plug specifications		refer to Fig.2, page A4-68			

* Cautions : Reduce the moment of inertia ratio if high speed response operation is required.

Read the Instruction Manual carefully and understand all precautions and remarks before using the products.

Motor Dimensions

MDMA 4.0kW - 5.0kW



* Dimensions are subject to change without notice. Contact us or a dealer for the latest information

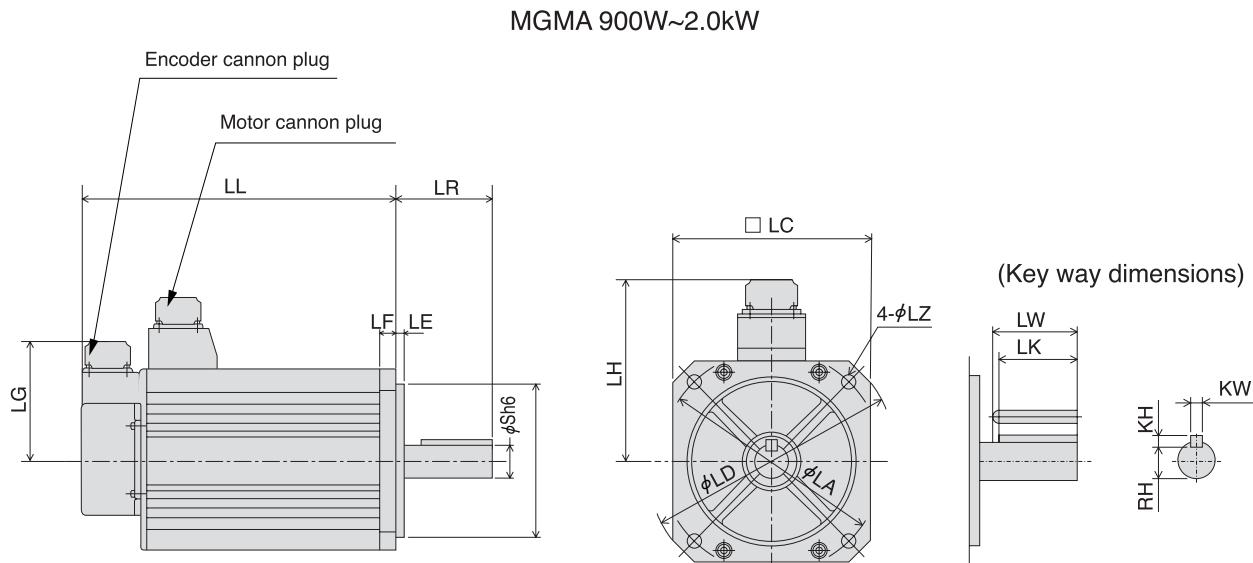
MDMA series (Middle inertia)					
Motor output		4.0kW		5.0kW	
Motor model	MDMA	40□P1□	40□S1□	50□P1□	50□S1□
Rotary encoder specifications		2500P/r Incremental	17-bit Absolute/ Incremental	2500P/r Incremental	17-bit Absolute/ Incremental
LL	Without brake	242	242	225	225
	With brake	267	267	250	250
LR		65		70	
S		28		35	
LA		165		200	
LB		130		114.3	
LC		150		176	
LD		190		233	
LE		3.2		3.2	
LF		18		18	
LG		84		84	
LH		128		143	
LZ		11		13.5	
Key way	LW	55		55	
	LK	51		50	
	KW	8h9		10h9	
	KH	7		8	
	RH	24		30	
Mass (kg)	Without brake	18.8	18.8	25.0	25.0
	With brake	21.3	21.3	28.5	28.5
Connector/Plug specifications		refer to Fig.2, page A4-68			

* Cautions : Reduce the moment of inertia ratio if high speed response operation is required.

Read the Instruction Manual carefully and understand all precautions and remarks before using the products.

Motor Dimensions

MGMA 900W - 2.0kW



* Dimensions are subject to change without notice. Contact us or a dealer for the latest information

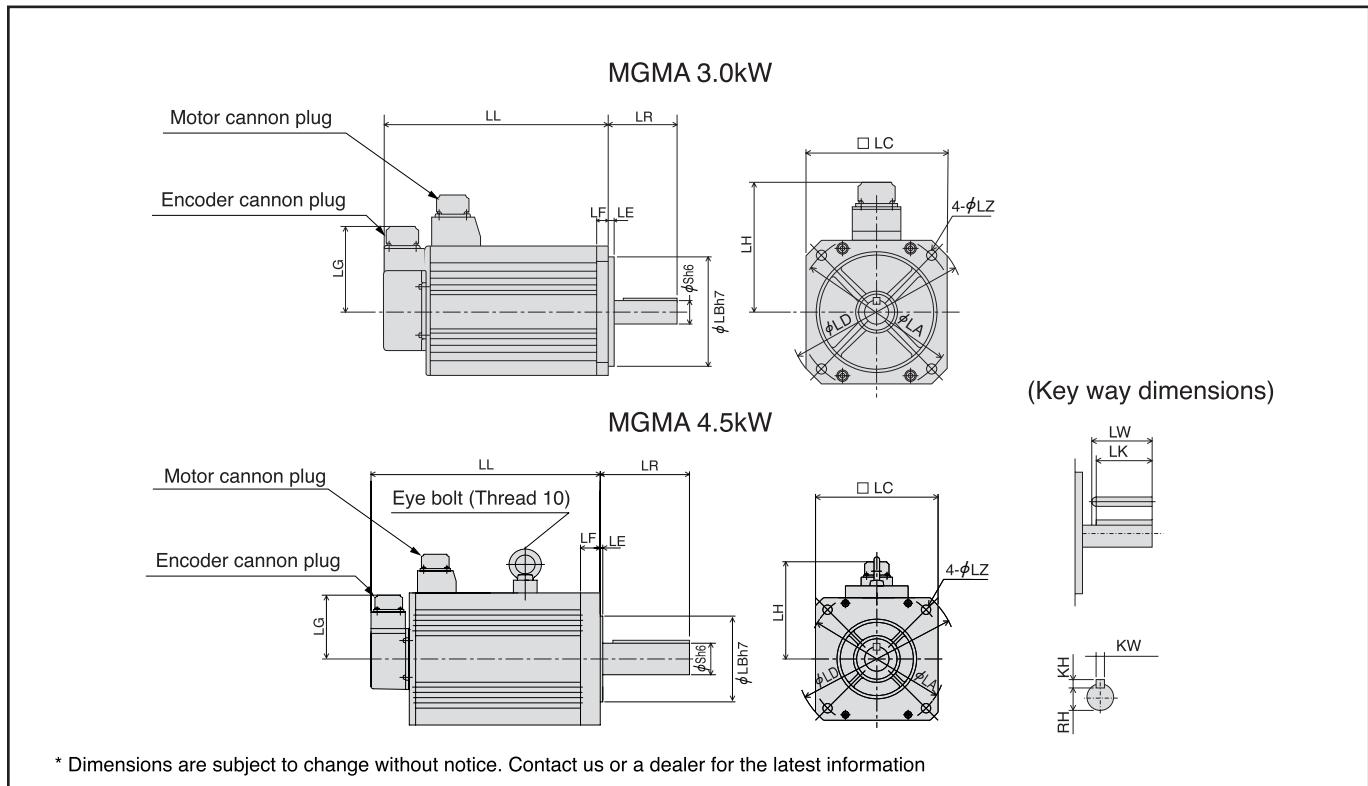
MGMA series (Middle inertia)					
Motor output		900W		2.0kW	
Motor model	MGMA	09□P1□	09□S1□	20□P1□	20□S1□
Rotary encoder specifications		2500P/r Incremental	17-bit Absolute/ Incremental	2500P/r Incremental	17-bit Absolute/ Incremental
LL	Without brake	175	175	182	182
	With brake	200	200	207	207
LR		70		80	
S		22		35	
LA		145		200	
LB		110		114.3	
LC		130		176	
LD		165		233	
LE		6		3.2	
LF		12		18	
LG		84		84	
LH		118		143	
LZ		9		13.5	
Key way	LW	45		55	
	LK	41		50	
	KW	8h9		10h9	
	KH	7		8	
	RH	18		30	
Mass (kg)	Without brake	8.5	8.5	17.5	17.5
	With brake	10.0	10.0	21.0	21.0
Connector/Plug specifications		refer to Fig.2, page A4-68			

* Cautions : Reduce the moment of inertia ratio if high speed response operation is required.

Read the Instruction Manual carefully and understand all precautions and remarks before using the products.

Motor Dimensions

MGMA 3.0kW - 4.5kW



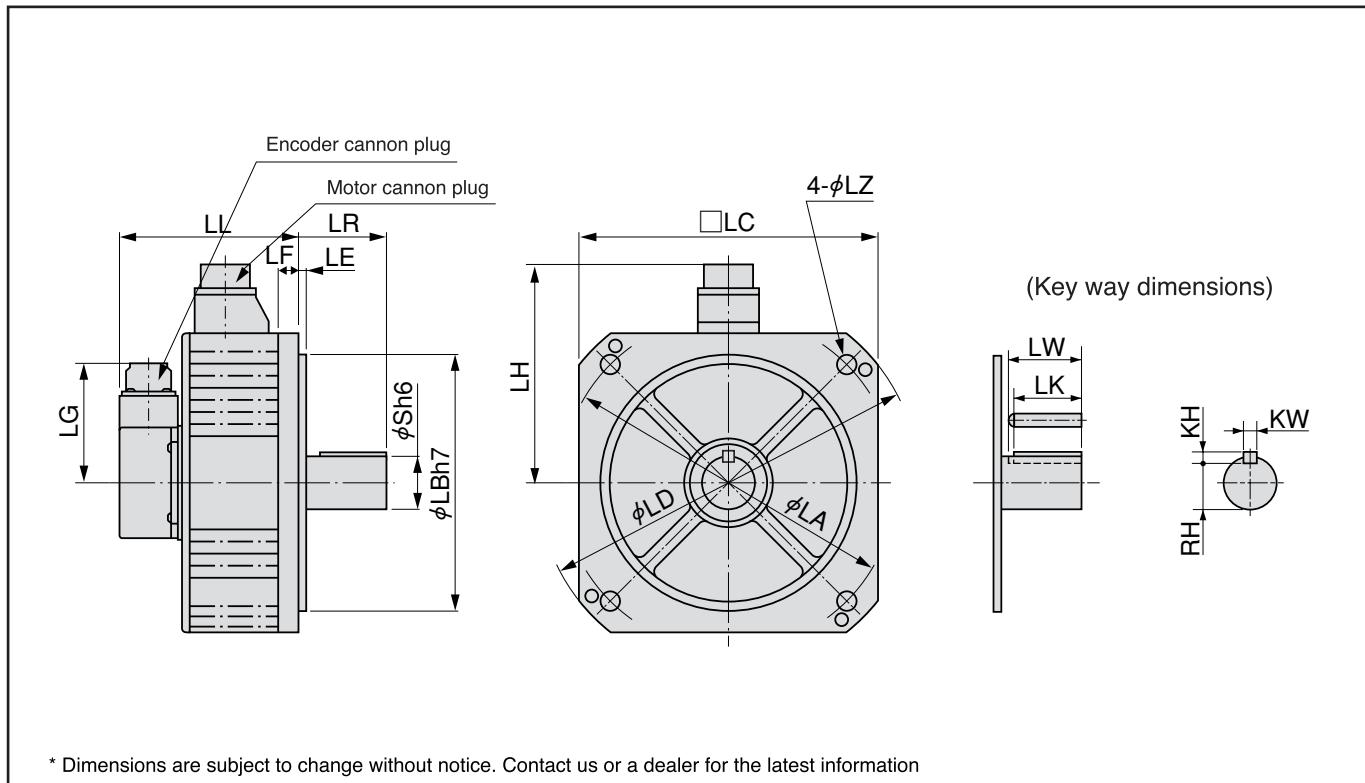
MGMA series (Middle inertia)					
Motor output		3.0kW		4.5kW	
Motor model	MGMA	30□P1□	30□S1□	45□P1□	45□S1□
Rotary encoder specifications		2500P/r Incremental	17-bit Absolute/ Incremental	2500P/r Incremental	17-bit Absolute/ Incremental
LL	Without brake	222	222	300.5	300.5
	With brake	271	271	337.5	337.5
LR		80		113	
S		35		42	
LA		200		200	
LB		114.3		114.3	
LC		176		176	
LD		233		233	
LE		3.2		3.2	
LF		18		24	
LG		84		84	
LH		143		143	
LZ		13.5		13.5	
Key way	LW	55		96	
	LK	50		90	
	KW	10h9		12h9	
	KH	8		8	
	RH	30		37	
Mass (kg)	Without brake	25.0	25.0	34.0	34.0
	With brake	28.5	28.5	39.5	39.5
Connector/Plug specifications		refer to Fig.2, page A4-68			

* Cautions : Reduce the moment of inertia ratio if high speed response operation is required.

Read the Instruction Manual carefully and understand all precautions and remarks before using the products.

Motor Dimensions

MFMA 400W - 1.5kW



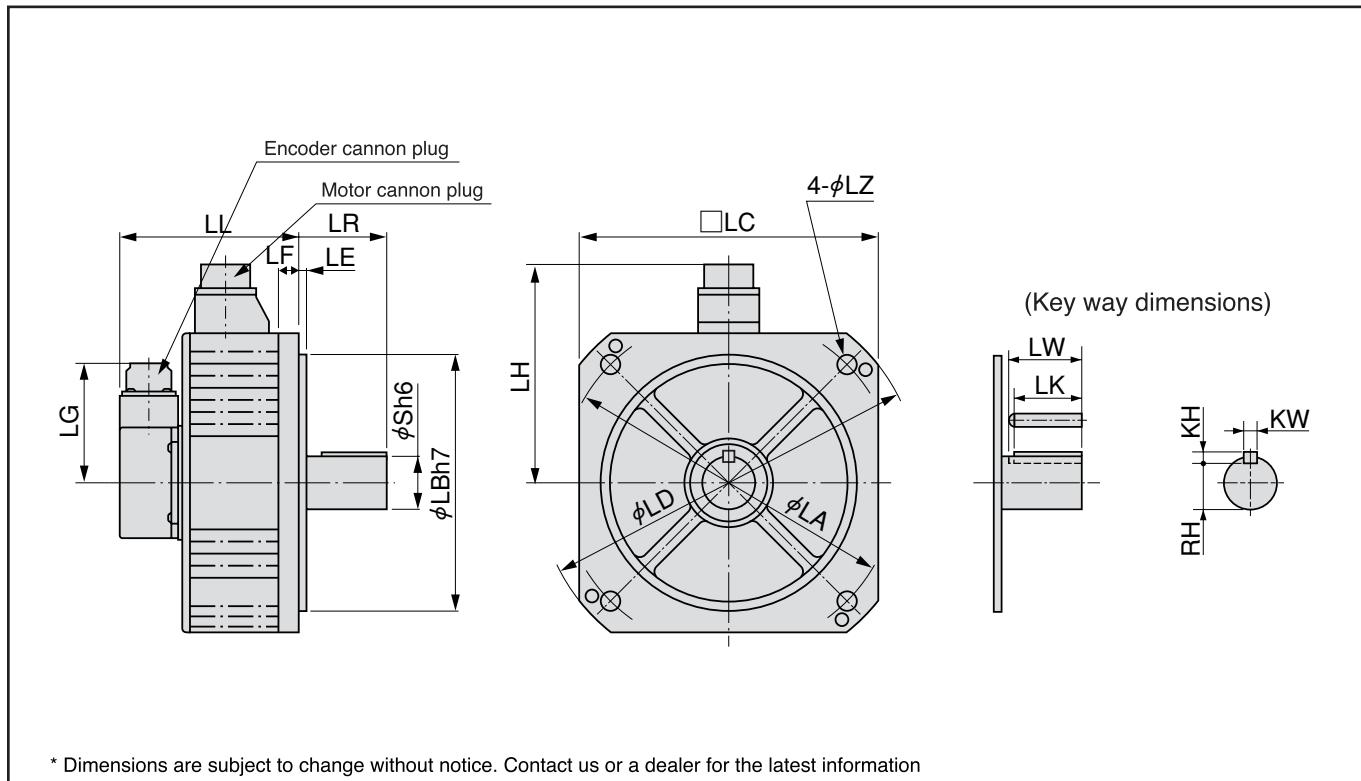
MFMA series (Middle inertia)					
Motor output		400W		1.5kW	
Motor model	MFMA	04□P1□	04□S1□	15□P1□	15□S1□
Rotary encoder specifications		2500P/r Incremental	17-bit Absolute/ Incremental	2500P/r Incremental	17-bit Absolute/ Incremental
LL	Without brake	120	120	145	145
	With brake	145	145	170	170
LR		55		65	
S		19		35	
LA		145		200	
LB		110		114.3	
LC		130		176	
LD		165		233	
LE		6		3.2	
LF		12		18	
LG		84		84	
LH		118		143	
LZ		9		13.5	
Key way	LW	45		55	
	LK	42		50	
	KW	6h9		10h9	
	KH	6		8	
	RH	15.5		30	
Mass (kg)	Without brake	4.7	4.7	11.0	11.0
	With brake	6.7	6.7	14.0	14.0
Connector/Plug specifications		refer to Fig.2, page A4-68			

* Cautions : Reduce the moment of inertia ratio if high speed response operation is required.

Read the Instruction Manual carefully and understand all precautions and remarks before using the products.

Motor Dimensions

MFMA 2.5kW - 4.5kW



* Dimensions are subject to change without notice. Contact us or a dealer for the latest information

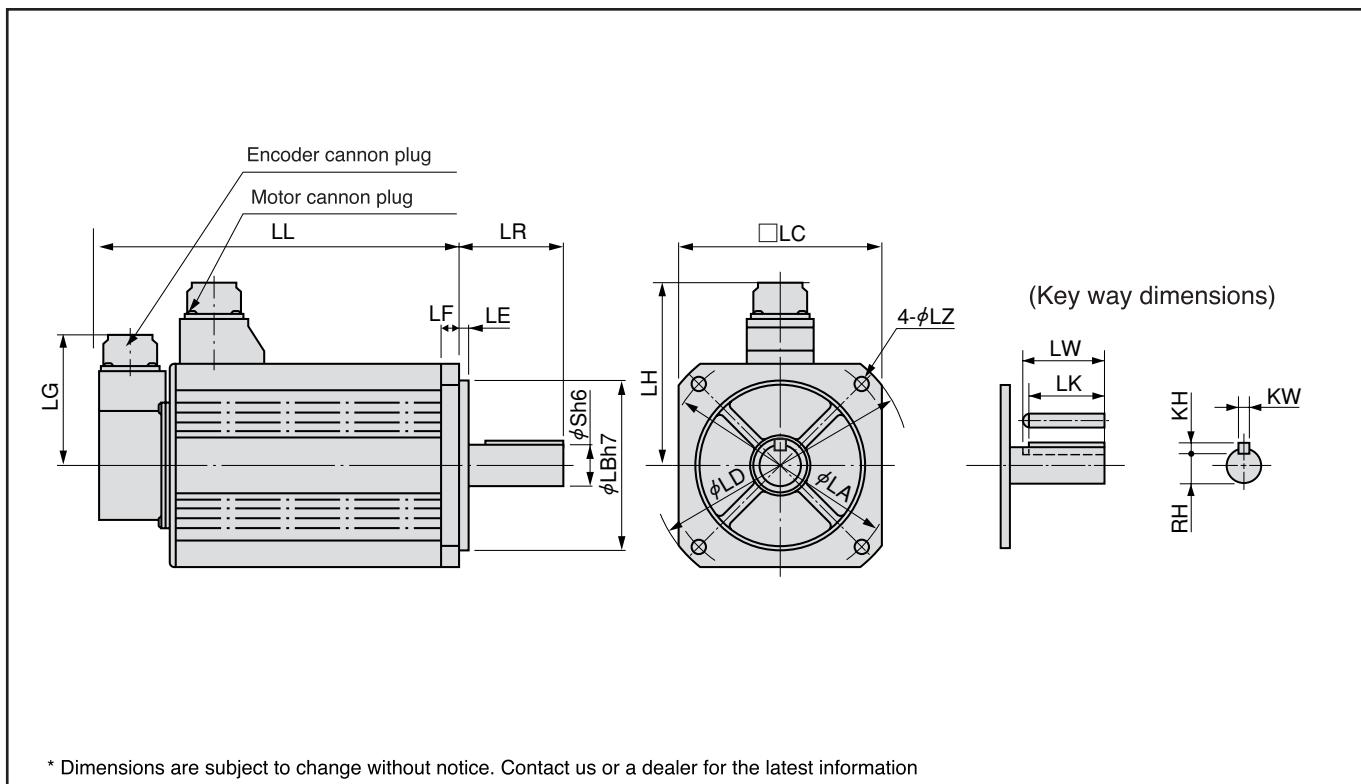
MFMA series (Middle inertia)					
Motor output		2.5kW		4.5kW	
Motor model	MFMA	25□P1□	25□S1□	45□P1□	45□S1□
Rotary encoder specifications		2500P/r Incremental	17-bit Absolute/ Incremental	2500P/r Incremental	17-bit Absolute/ Incremental
LL	Without brake	139	139	163	163
	With brake	166	166	194	194
LR		65		70	
S		35		35	
LA		235		235	
LB		200		200	
LC		220		220	
LD		268		268	
LE		4		4	
LF		16		16	
LG		84		84	
LH		164		164	
LZ		13.5		13.5	
Key way	LW	55		55	
	LK	50		50	
	KW	10h9		10h9	
	KH	8		8	
	RH	30		30	
Mass (kg)	Without brake	14.8	14.8	19.9	19.9
	With brake	17.5	17.5	24.3	24.3
Connector/Plug specifications		refer to Fig.2, page A4-68			

* Cautions : Reduce the moment of inertia ratio if high speed response operation is required.

Read the Instruction Manual carefully and understand all precautions and remarks before using the products.

Motor Dimensions

MHMA 500W - 1.5kW



* Dimensions are subject to change without notice. Contact us or a dealer for the latest information

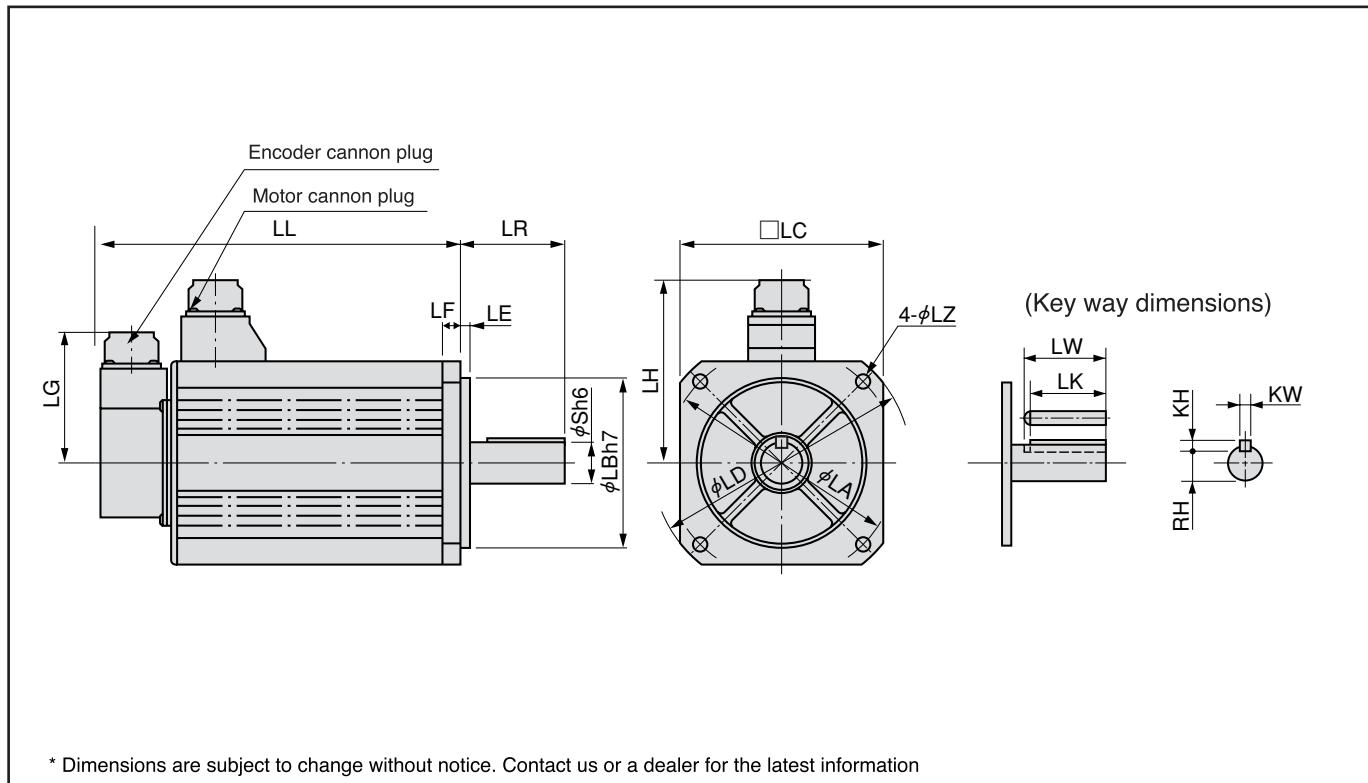
MHMA series (High inertia)							
Motor output		500W		1.0kW		1.5kW	
Motor model	MHMA	05□P1□	05□S1□	10□P1□	10□S1□	15□P1□	15□S1□
Rotary encoder specifications		2500P/r Incremental	17-bit Absolute/ Incremental	2500P/r Incremental	17-bit Absolute/ Incremental	2500P/r Incremental	17-bit Absolute/ Incremental
LL	Without brake	150	150	175	175	200	200
	With brake	175	175	200	200	225	225
LR		70		70		70	
S		22		22		22	
LA		145		145		145	
LB		110		110		110	
LC		130		130		130	
LD		165		165		165	
LE		6		6		6	
LF		12		12		12	
LG		84		84		84	
LH		118		118		118	
LZ		9		9		9	
Key way	LW	45		45		45	
	LK	41		41		41	
	KW	8h9		8h9		8h9	
	KH	7		7		7	
	RH	18		18		18	
Mass (kg)	Without brake	5.3	5.3	8.9	8.9	10.0	10.0
	With brake	6.9	6.9	9.5	9.5	11.6	11.6
Connector/Plug specifications							
refer to Fig.2, page A4-68							

* Cautions : Reduce the moment of inertia ratio if high speed response operation is required.

Read the Instruction Manual carefully and understand all precautions and remarks before using the products.

Motor Dimensions

MHMA 2.0kW - 5.0kW



MHMA series (High inertia)								
Motor output		2.0kW		3.0kW		4.0kW		5.0kW
Motor model	MHMA	20□P1□	20□S1□	30□P1□	30□S1□	40□P1□	40□S1□	50□P1□
Rotary encoder specifications		2500P/r Incremental	17-bit Absolute/ Incremental	2500P/r Incremental	17-bit Absolute/ Incremental	2500P/r Incremental	17-bit Absolute/ Incremental	2500P/r Incremental
LL	Without brake	190	190	205	205	230	230	255
	With brake	215	215	230	230	255	255	280
LR		80		80		80		80
S		35		35		35		35
LA		200		200		200		200
LB		114.3		114.3		114.3		114.3
LC		176		176		176		176
LD		233		233		233		233
LE		3.2		3.2		3.2		3.2
LF		18		18		18		18
LG		84		84		84		84
LH		143		143		143		143
LZ		13.5		13.5		13.5		13.5
Key way	LW	55		55		55		55
	LK	50		50		50		50
	KW	10h9		10h9		10h9		10h9
	KH	8		8		8		8
	RH	30		30		30		30
Mass (kg)	Without brake	16.0	16.0	18.2	18.2	22.0	22.0	26.7
	With brake	19.5	19.5	21.7	21.7	25.5	25.5	30.2
Connector/Plug specifications		refer to Fig.2, page A4-68						

* Cautions : Reduce the moment of inertia ratio if high speed response operation is required.

Read the Instruction Manual carefully and understand all precautions and remarks before using the products.

Connector and Plug Specifications

Fig. 1

MAMA 100W - 750W, MSMD 50W - 750W, MQMA 100W - 400W

■ Plug specifications

● Motor	● 2500P/r Incremental encoder	● 17-bit Absolute encoder	● Brake (Option)
AMP Plug 172167-1	AMP Plug 172168-1	AMP Plug 172169-1	AMP Plug 172165-1
Pin 170360-1	Pin 170359-1	Pin 170359-1	Pin 170360-1
Mating (not included)	Mating (not included)	Mating (not included)	Mating (not included)
Cap 172159-1	Cap 172160-1	Cap 172161-1	Cap 172157-1
Socket 170362-1 or 170366-1	Socket 170361-1 or 170365-1	Socket 170361-1 or 170365-1	Socket 170362-1 or 170366-1

■ Connector Specifications

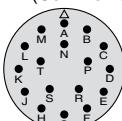
	1	2	3	4	5	6	7	8	9
2500P/r Incremental encoder	NC	PS	PS	E5V	E0V	FG			
Motor	U	V	W	E					
Brake		Brake							
17-bit Absolute encoder	BAT+	BAT-	FG	PS	PS	NC	E5V	E0V	NC

Do not connect anything to (NC) terminals.

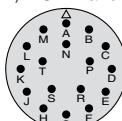
Fig. 2

MSMA 1.0kW - 5.0kW, MDMA 1.0kW - 5.0kW, MFMA 400W - 4.5kW, MHMA 500W - 5.0kW, MGMA 900W - 4.5kW

■ Encoder connector specifications (Common to MSMA, MDMA, MFMA, MGMA and MHMA)



Encoder : MS3102A 20-29P



Encoder : MS3102A 20-29P

● 2500P/r Incremental encoder

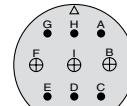
PIN No.	Signal
A	NC
B	NC
C	NC
D	NC
E	NC
F	NC
G	E0V
H	E5V
J	Frame ground
K	PS
L	PS
M	NC
N	NC
P	NC
R	NC
S	NC
T	NC

● 17-bit Absolute encoder

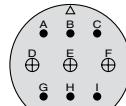
PIN No.	Signal
A	NC
B	NC
C	NC
D	NC
E	NC
F	NC
G	E0V
H	E5V
J	Frame ground
K	PS
L	PS
M	NC
N	NC
P	NC
R	NC
S	BAT- *
T	BAT+ *

* No connection is required to Pin No. S and T when you use in incremental.

■ Motor/Brake connector specifications



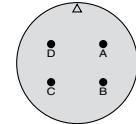
Motor with brake (with or without brake)
JL04V-2E20-18PE-B (by JAE) or equivalent



Motor with brake (with or without brake)
JL04V-2E24-11PE-B (by JAE) or equivalent

PIN No.	Signal
G	Brake (w/o) NC
H	Brake (w/o) NC
A	NC
F	U-phase
I	V-phase
B	W-phase
E	Ground
D	Ground
C	NC

PIN No.	Signal
A	Brake (w/o) NC
B	Brake (w/o) NC
C	NC
D	U-phase
E	V-phase
F	W-phase
G	Ground
H	Ground
I	NC



Motor without brake
JL04V-2E20-4EP-B (by JAE) or equivalent,
JL04HV-2E22PE-B (by JAE) or equivalent

PIN No.	Signal
A	U-phase
B	V-phase
C	W-phase
D	Ground

● Connector pin comparison table by models

Motor (kW)	MSMA	MDMA	MFMA	MHMA	MGMA
Brake	1.0 - 2.0	3.0 - 5.0	1.0 - 2.0	3.0 - 5.0	0.4 - 1.5
out	20-18P	24-11P	20-18P	24-11P	20-18P
Without	20- 4P	22-22P	20- 4P	22-22P	20-4P

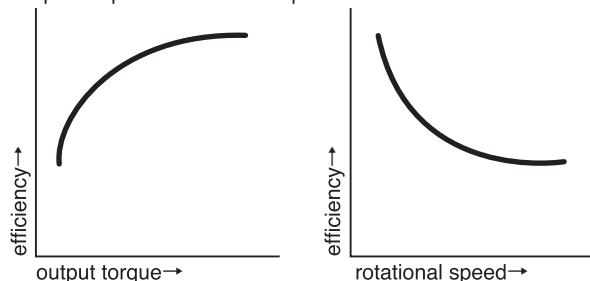
* Dimensions are subject to change without notice. Contact us or a dealer for the latest information.

MINAS A4 Series (MSMD) Motors with Gear Reducer

■ Motor types with gear reducer

Reduction ratio	Motor output (W)				Type of reducer
	100	200	400	750	
1/5	●	●	●	●	
1/9	●	●	●	●	
1/15	●	●	●	●	For high precision
1/25	●	●	●	●	

Efficiency of the gear reducer show the following inclination in relation to output torque and rotational speed.



■ Specifications of motor with gear reducer

	Motor type	MSMD
Gear reducer	Backlash	3 minutes or smaller (initial value) at output shaft of the reducer
	Composition of gear	Planetary gear
	Gear efficiency	65% to 85%
	Rotational direction at output shaft (of reducer)	Same direction as the motor output shaft
	Composition of gear	Planetary gear
	Mounting method	Flange mounting
	Permissible moment of inertia of the load (conversion to the motor shaft)	10 times or smaller than rotor moment of inertia of the motor
Environment	Protective structure	IP44 (at gear reducer)
	Ambient temperature	0 to 40°C
	Ambient humidity	85%RH (free from condensation) or less
	Vibration resistance	49m/s ² or less (at motor frame)
	Impact resistance	98m/s ² or less

Ratings and Specifications of Motor with Gear Reducer

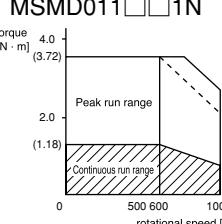
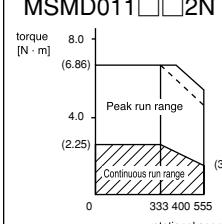
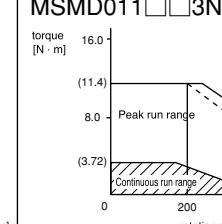
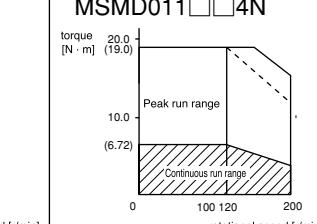
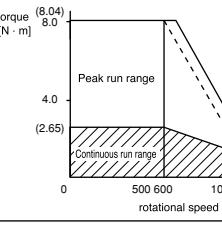
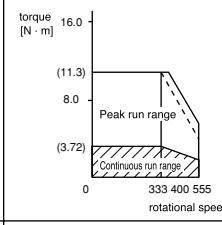
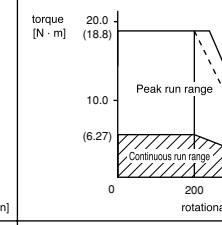
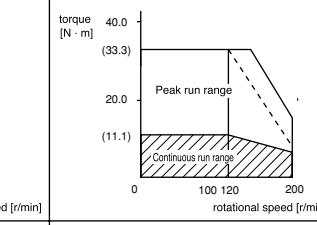
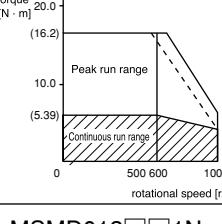
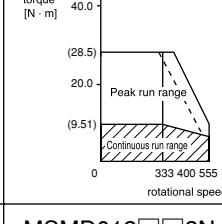
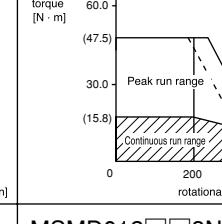
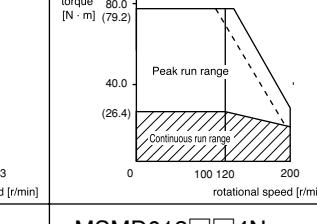
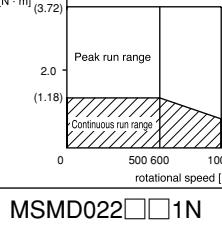
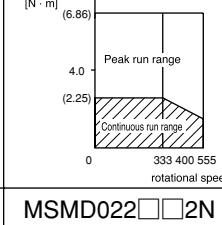
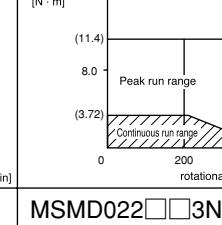
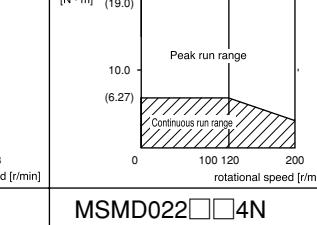
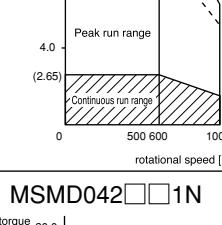
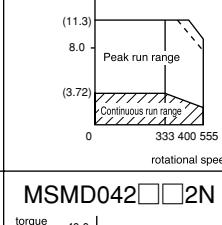
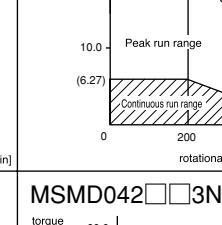
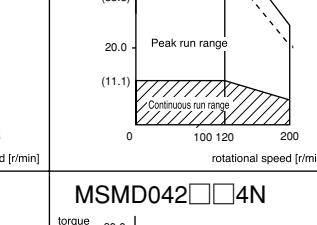
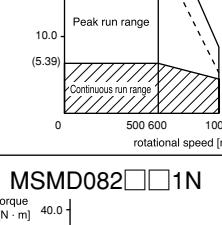
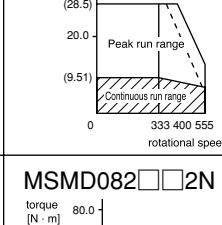
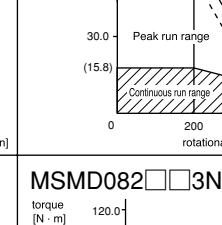
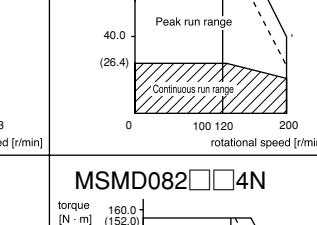
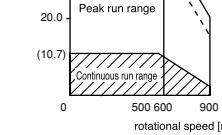
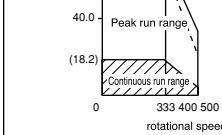
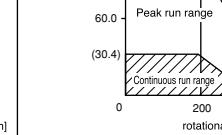
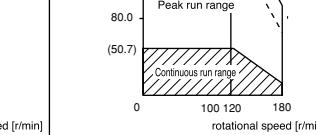
■ Model No. designation

e.g.) M S M D 0 1 1 P 3 1 N

Symbol	Type
MSMD	Low inertia (100-750W)

Torque Characteristics of Motor with Gear Reducer

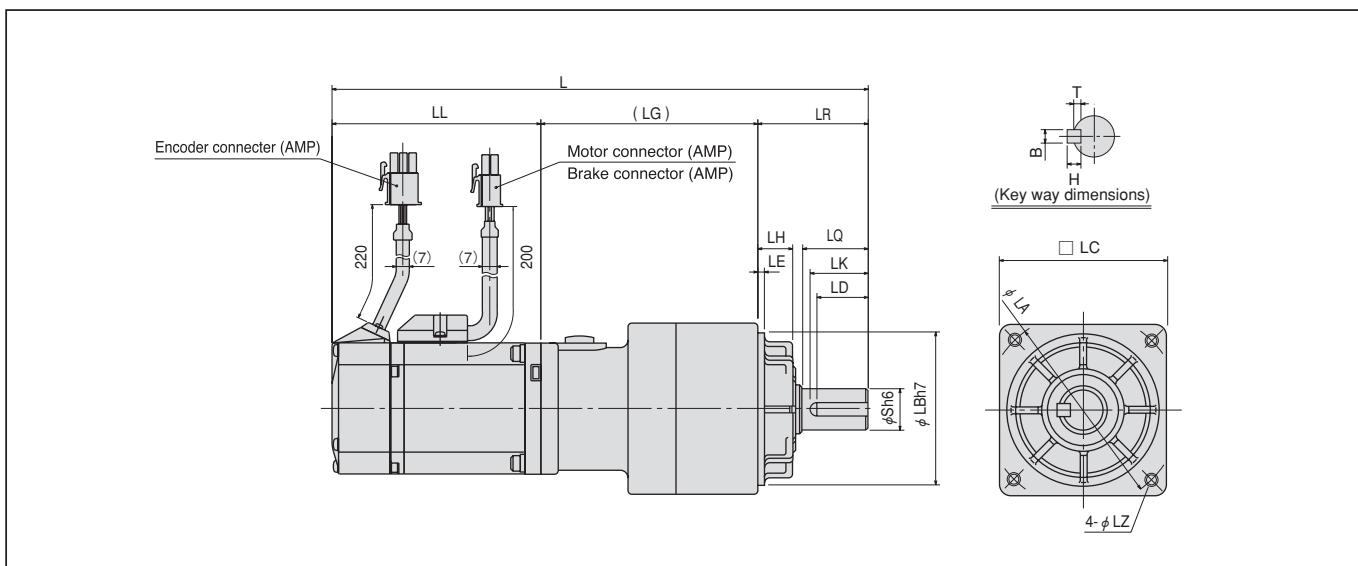
■For high precision (MSMD Series 100W - 750W)

Supply voltage to driver	Reduction ratio Motor output	1/5	1/9	1/15	1/25
100V	100W	MSMD011□□1N 	MSMD011□□2N 	MSMD011□□3N 	MSMD011□□4N 
	200W	MSMD021□□1N 	MSMD021□□2N 	MSMD021□□3N 	MSMD021□□4N 
	400W	MSMD041□□1N 	MSMD041□□2N 	MSMD041□□3N 	MSMD041□□4N 
	100W	MSMD012□□1N 	MSMD012□□2N 	MSMD012□□3N 	MSMD012□□4N 
	200W	MSMD022□□1N 	MSMD022□□2N 	MSMD022□□3N 	MSMD022□□4N 
	400W	MSMD042□□1N 	MSMD042□□2N 	MSMD042□□3N 	MSMD042□□4N 
	750W	MSMD082□□1N 	MSMD082□□2N 	MSMD082□□3N 	MSMD082□□4N 

Dotted line represents the torque at 10% less supply voltage.

Dimensions of Motor with Gear Reducer

■ MSMD series with gear reducer



■ 2500P/r encoder

■ 17-bit encoder

Model	Motor output	Reduction ratio	L	LL	LR	LQ	LC	LB	LA	S	LH	LZ	LK	(LG)	LE	Key way BXHXLD	T		
MSMD01□□□1N	100W	1 / 5	191.5	92	32	20	52	50	60	12	10	M5 (Depth : 12)	18	67.5	4×4×16	2.5			
MSMD01□□□2N			221.5	122															
MSMD01□□□3N		1 / 9	191.5	92															
MSMD01□□□4N			221.5	122															
MSMD02□□□1N		1 / 15	202	92	50	30	78	70	90	19	17	M6 (Depth : 20)	26	92					
MSMD02□□□2N			232	122															
MSMD02□□□3N	200W	1 / 25	234	92	50	30	78	70	90	19	17	M6 (Depth : 20)	26	92	6×6×22	3.5			
MSMD02□□□4N			264	122															
MSMD02□□□1N		1 / 5	183.5	79	32	20	52	50	60	12	10	M5 (Depth : 12)	18	72.5					
MSMD02□□□2N			220	115.5															
MSMD02□□□3N		1 / 9	218.5	79	50	30	78	70	90	19	17	M6 (Depth : 20)	26	92					
MSMD02□□□4N			255	115.5															
MSMD04□□□1N	400W	1 / 15	229	79	50	30	78	70	90	19	17	M6 (Depth : 20)	26	89.5	6×6×22	3.5			
MSMD04□□□2N			265.5	115.5															
MSMD04□□□3N		1 / 25	229	79	61	40	98	90	115	24	18	M8 (Depth : 20)	35	104					
MSMD04□□□4N			265.5	115.5															
MSMD082□□1N		1 / 5	238	98.5	50	30	78	70	90	19	17	M6 (Depth : 20)	26	93.5	3	6×6×22	3.5		
MSMD082□□2N			274.5	135															
MSMD082□□3N	750W	1 / 9	238	98.5	61	40	98	90	115	24	18	M8 (Depth : 20)	35	104	5	8×7×30	4		
MSMD082□□4N			274.5	135															
MSMD082□□1N		1 / 15	248.5	98.5	61	40	98	90	115	24	18	M8 (Depth : 20)	35	104					
MSMD082□□2N			285	135															
MSMD082□□3N		1 / 25	263.5	98.5	61	40	98	90	115	24	18	M8 (Depth : 20)	35	104					
MSMD082□□4N			300	135															
MSMD082□□1N	750W	1 / 5	255.5	112	50	30	78	70	90	19	17	M6 (Depth : 20)	26	93.5	3	6×6×22	3.5		
MSMD082□□2N			292.5	149															
MSMD082□□3N		1 / 9	270.5	112	61	40	98	90	115	24	18	M8 (Depth : 20)	35	104					
MSMD082□□4N			307.5	149															
MSMD082□□1N	1 / 15	283	112	61	40	98	90	115	24	18	M8 (Depth : 20)	35	104						
MSMD082□□2N		320	149																
MSMD082□□3N	1 / 25	283	112	61	40	98	90	115	24	18	M8 (Depth : 20)	35	104						
MSMD082□□4N		320	149																

Upper column : without brake Lower column : with brake

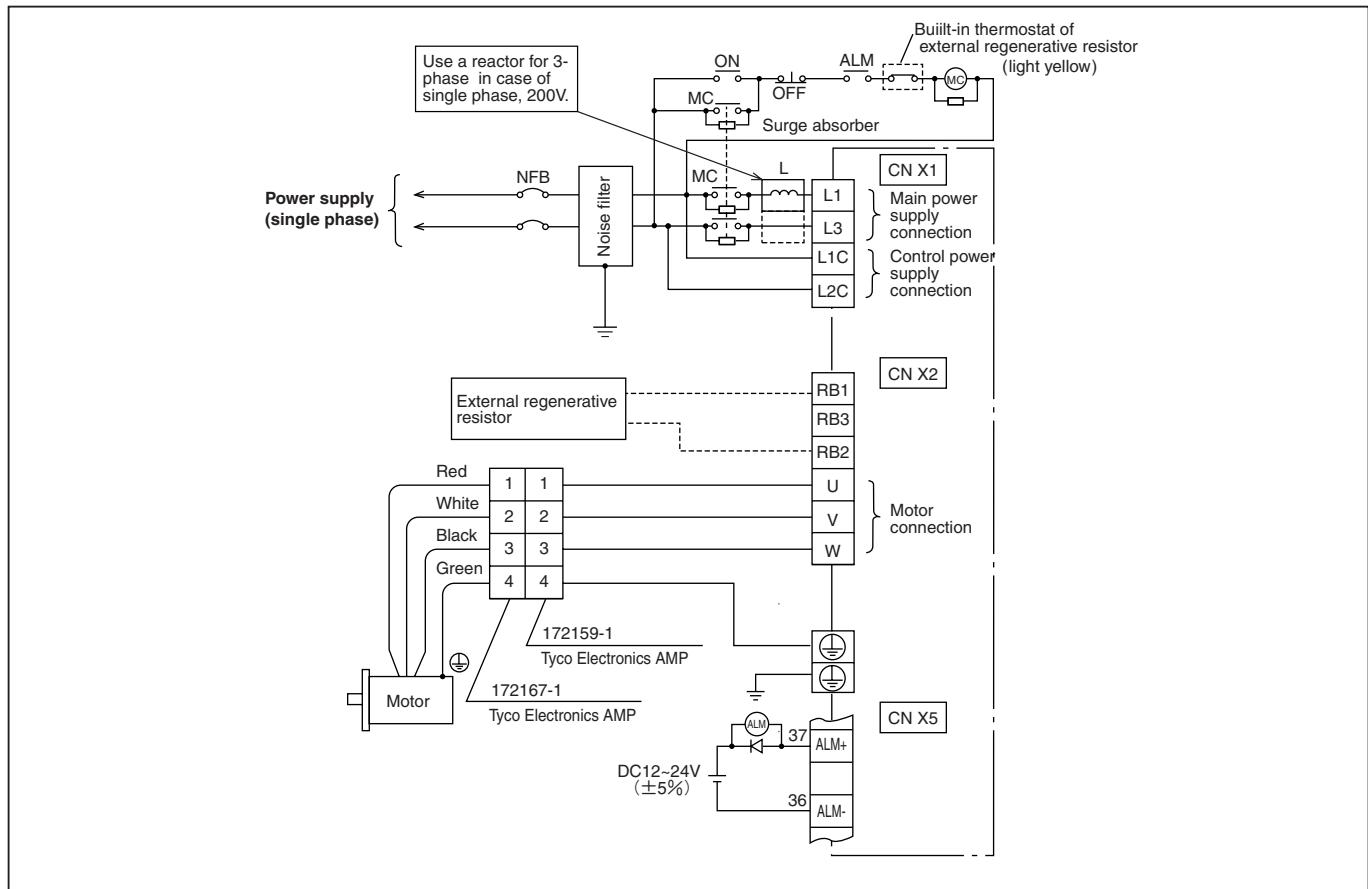
Common Specifications of Driver

Basic Specifications	Input power	100V	Main circuit	Single phase, 100-115V	+10% -15%	50/60Hz
			Control circuit	Single phase, 100-115V	+10% -15%	50/60Hz
		200V	Main circuit	Frame A, B	Single phase, 200-240V	+10% -15%
				Frame C, D	Single/3-phase, 200-240V	+10% -15%
			Frame E, F	3-phase, 200-230V	+10% -15%	50/60Hz
		Control circuit	Frame A, D	Single phase, 200-240V	+10% -15%	50/60Hz
			Frame E, F	Single phase, 200-230V	+10% -15%	50/60Hz
	Environment	Temperature	Operating : 0 to 55°C, Storage : -20 to +80°C			
		Humidity	Both operating and storage : 90%RH or less (free from condensation)			
		Altitude	1000m or lower			
		Vibration	5.88m/s ² or less, 10 to 60Hz (No continuous use at resonance frequency)			
	Control method		IGBT PWM Sinusoidal wave drive			
	Encoder feedback		17-bit (131072 resolution) absolute/incremental encoder, 2500P/r (10000 resolution) incremental encoder			
	External scale feedback		AT500 series, ST771 by Mitsutoyo			
	Control signal	Input	10 inputs (1) Servo-ON, (2) Control mode switching, (3) Gain switching/Torque limit switching, (4) Alarm clear Other inputs vary depending on the control mode.			
			6 outputs (1) Servo alarm, (2) Servo ready, (3) Release signal of external brake (4) Zero speed detection, (5) Torque in-limit. Other outputs vary depending on the control mode.			
	Analog signal	Input	3 inputs (16Bit A/D : 1 input, 10Bit A/D : 2 inputs)			
			2 outputs (for monitoring) (1) Speed monitor (Monitoring of actual motor speed or command speed is enabled. Select the content and scale with parameter.), (2) Torque monitor (Monitoring of torque command, (approx.. 3V/rated torque)), deviation counter or full-closed deviation is enabled. Select the content or scale with parameter.)			
	Pulse signal	Input	2 inputs Select the exclusive input for line driver or photo-coupler input with parameter.			
			4 outputs Feed out the encoder pulse (A, B and Z-phase) or external scale pulse (EXA, EXB and EXZ-phase) in line driver. Z-phase and EXZ-phase pulse is also fed out in open collector.			
	Communication function	RS232C	1 : 1 communication to a host with RS23c interface is enabled.			
		RS485	1 : n communication up to 15 axes to a host with RS485 interface is enabled.			
	Front panel Regeneration		(1) 5 keys (MODE, SET, UP, DOWN, SHIFT), (2) LED (6-digit) Frame A, B : no built-in regenerative resistor (external resistor only) Frame C to F : Built-in regenerative resistor (external resistor is also enabled.)			
	Dynamic brake		Setup of action sequence at Power-OFF, Servo-OFF, at protective function activation and over-travel inhibit input is enabled.			
	Control mode		Switching among the following 7 mode is enabled, (1) Position control, (2) Velocity control, (3) Toque control, (4) Position/Velocity control, (5) Position/Torque control, (6) Velocity/Torque control and (7) Full-closed control.			

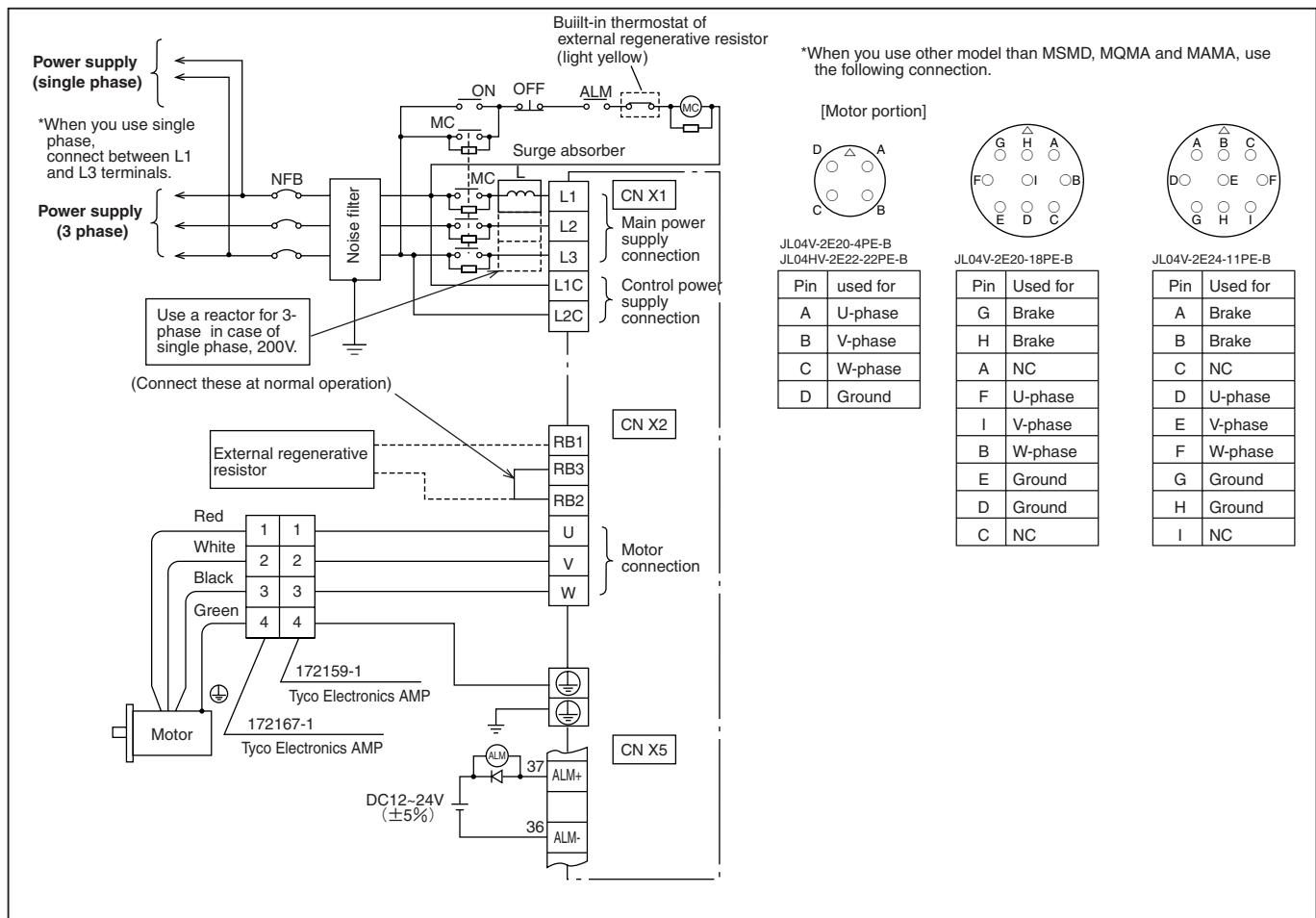
Position control	Control input	(7) Deviation counter clear, (8) Command pulse inhibition, (9) Electronic gear switching, (10) Damping control switching
	Control output	(6) Positioning complete (In-position)
	Pulse input	Exclusive interface for line driver : 2Mpps, Line driver : 500kpps, Open collector : 200kpps
	Max. command pulse frequency	
	Input pulse signal format	Support (1) RS422 line drive signal and (2) Open collector signal from controller.
	Type of input pulse	Differential input. Selectable with parameter, ((1) CW/CCW, (2) A and B-phase, (3) Command and Direction)
	Electronic gear (Division/Multiplication) of command pulse	Process the command pulse frequency $\times \frac{(1 \text{ to } 10000) \times 2^{(0-17)}}{1 \text{ to } 10000}$ as a position command input
	Smoothing filter	Primary delay filter or FIR type filter is selectable to the command input.
	Analog input	Individual torque limit for both CW and CCW direction is enabled. (3V/rated torque)
	Instantaneous speed observer	Usable
Velocity control	Damping control	Usable
	Control input	(7) Speed zero clamp, (8) Selection of internal speed setup, (9) Gain switching or Torque limit switching input
	Control output	(6) Speed arrival (at-speed)
	Analog input	Setup of scale and rotational direction of the motor against the command voltage is enabled with parameter, with the permissible max. voltage input = $\pm 10V$ and 6V/rated speed (default setup).
	Velocity command input	
	Torque limit command input	Individual torque limit for both CW and CCW direction is enabled. (3V/rated torque)
	Speed control range	1 : 5000
	Internal speed command	8-speed with parameter setup
	Soft-start/down function	Individual setup of acceleration and deceleration is enabled, with 0 to 10s/1000r/min. Sigmoid acceleration/deceleration is also enabled.
	Zero-speed clamp	0-clamp of internal speed command with speed zero clamp input is enabled.
Torque control	Instantaneous speed observer	Usable
	Speed command filter	Usable
	Control input	(7) Speed zero clamp
	Control output	(6) Speed arrival (at-speed)
	Analog input	Setup of scale and CW/CCW torque generating direction of the motor against the command voltage is enabled with parameter, with the permissible max. voltage input = $\pm 10V$ and 3V/rated speed (default setup).
	Speed command input	
	Speed limit input	Speed limit input by analog voltage is enabled. Scale setup with parameter.
	Speed limit function	Speed limit value with parameter or analog input is enabled.
	Control input	(6) Deviation counter clear, (4) Command pulse input inhibition, (5) Electronic gear switching, (6) Damping control switching
	Control output	(6) Full-closed positioning complete (in-position)
Full-closed control	Pulse input	Exclusive interface for line driver : 2Mpps, Line driver : 500kpps, Open collector : 200kpps
		Differential input. Selectable with parameter ((1) CCW/CW, (2) A and B-phase, (3) Command and direction
		Process the command pulse frequency $\times \frac{(1 \text{ to } 10000) \times 2^{(0-17)}}{1 \text{ to } 10000}$ as a position command input
	Max. command pulse frequency	
	Input pulse signal format	
	Electronic gear (Division/Multiplication) of command pulse	
	Smoothing filter	Primary delay filter is adaptable to the command input.
	Analog input	Individual torque limit for both CW and CCW direction is enabled. (3V/rated torque)
	Setup range of division / multiplication of external scale	Setting of ratio between encoder pulse (denominator) and external scale pulse (numerator) is enabled within a range of $(1 \text{ to } 10000) \times 2^{(0-17)} / (1 \text{ to } 10000)$.
Common	Auto-gain tuning	Real-time
		Corresponds to load inertia fluctuation, possible to automatically set up parameters related to notch filter.
		Normal mode
		Estimates load inertia and sets up an appropriate servo gain.
		Fit-gain function
		Automatically searches and sets up the value which makes the fastest settling time with external command input.
		Masking of unnecessary input
		Masking of the following input signal is enabled. (1) Over-travel inhibition, (2) Torque limit, (3) Command pulse inhibition, (4) Speed-zero clamp, (5) Counter clear
		Division of encoder feedback pulse
		Set up of any value is enabled (encoder pulses count is the max.).
Protective function	Soft error	Over-voltage, under-voltage, over-speed over-load, over-heat, over-current and encoder error etc.
		Excess position deviation, command pulse division error, EEPROM error etc.
	Hard error	
	Traceability of alarm data	Traceable up to past 14 alarms including the present one.
Setup	Damping control function	Manual setup with parameter
		5push switches on front panel MODE SET
	Manual	
	Setup support software	PANATERM® (Supporting OS : Windows95, Windows98, Windows ME, Windows2000, Windows.NET and Windows)

Standard Wiring Example of Main Circuit

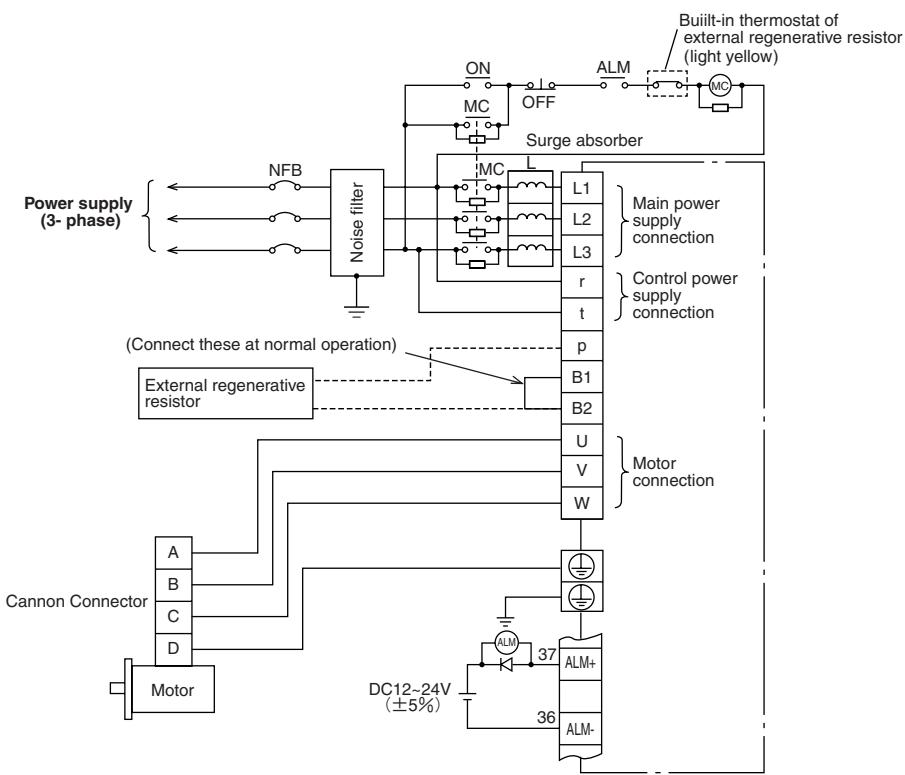
■ Frame A, B



■ Frame C, D



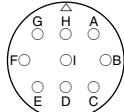
■ Frame E, F



[Motor portion]

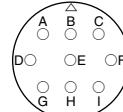
JL04V-2E20-4PE-B
JL04HV-2E22-22PE-B

PIN	used for
A	U-phase
B	V-phase
C	W-phase
D	Ground



JL04V-2E20-18PE-B

PIN	Used for
G	Brake
H	Brake
A	NC
F	U-phase
I	V-phase
B	W-phase
E	Ground
D	Ground
C	NC



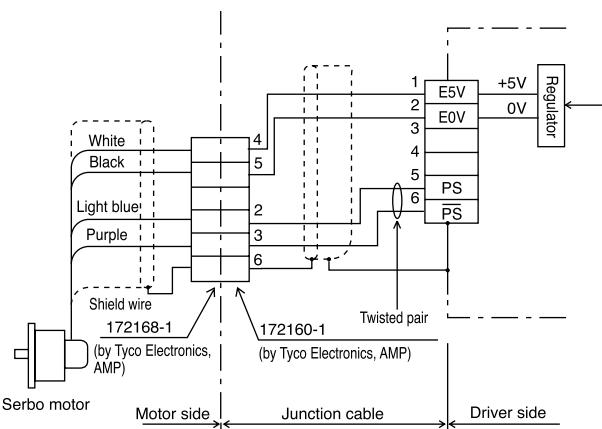
JL04V-2E24-11PE-B

PIN	Used for
A	Brake
B	Brake
C	NC
D	U-phase
E	V-phase
F	W-phase
G	Ground
H	Ground
I	NC

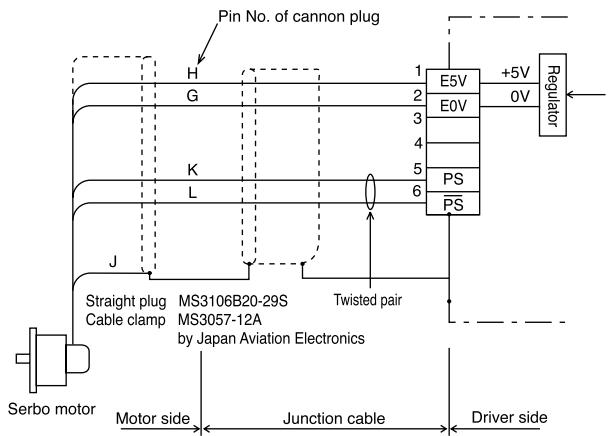
Encoder Wiring Diagram

■ 2500P/r Incremental encoder

Motor MAMA, MSMD and MQMA series

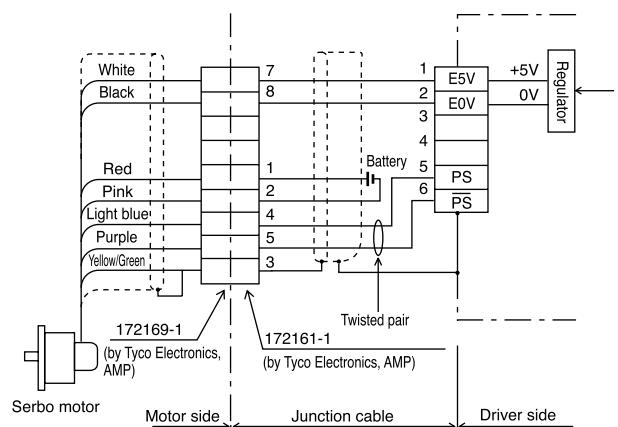


Motor MSMA, MDMA and MFMA, MGMA series

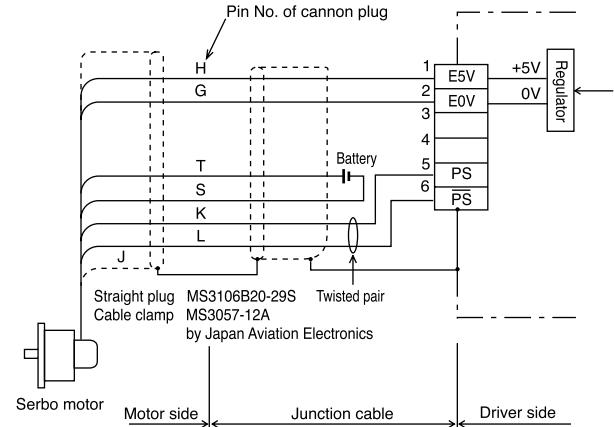


■ 17bit Absolute encoder

Motor MAMA, MSMD and MQMA series



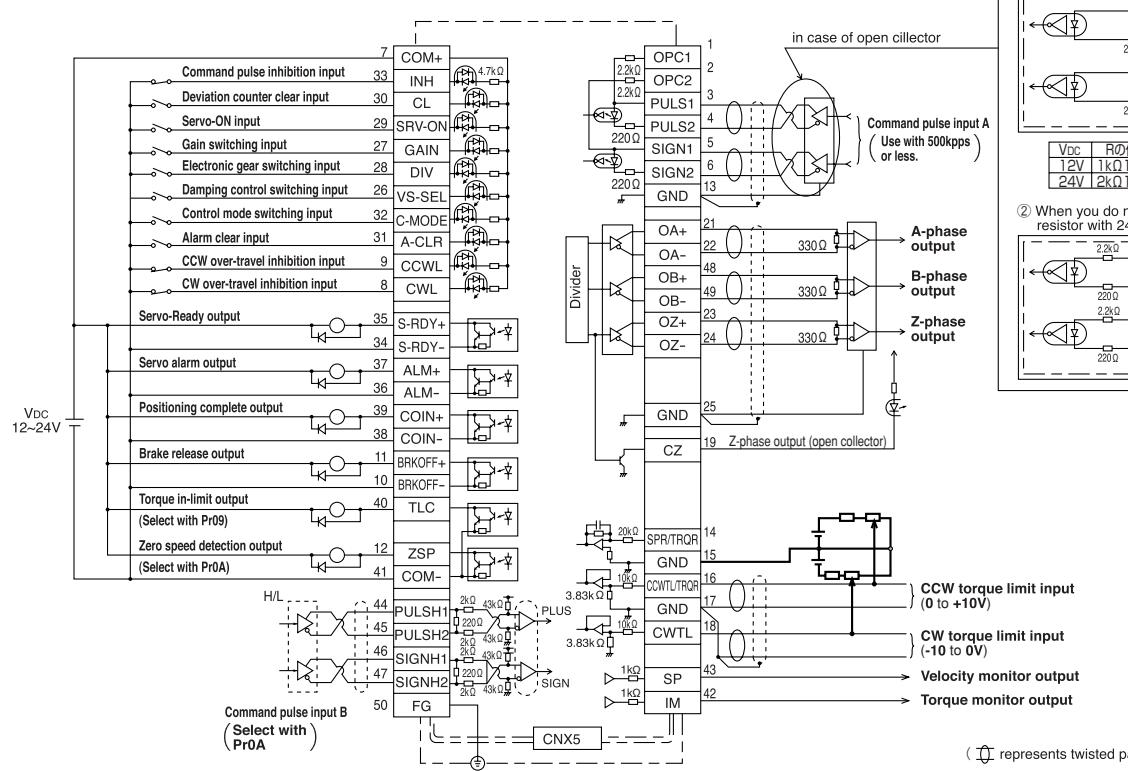
Motor MSMA, MDMA and MFMA, MGMA series



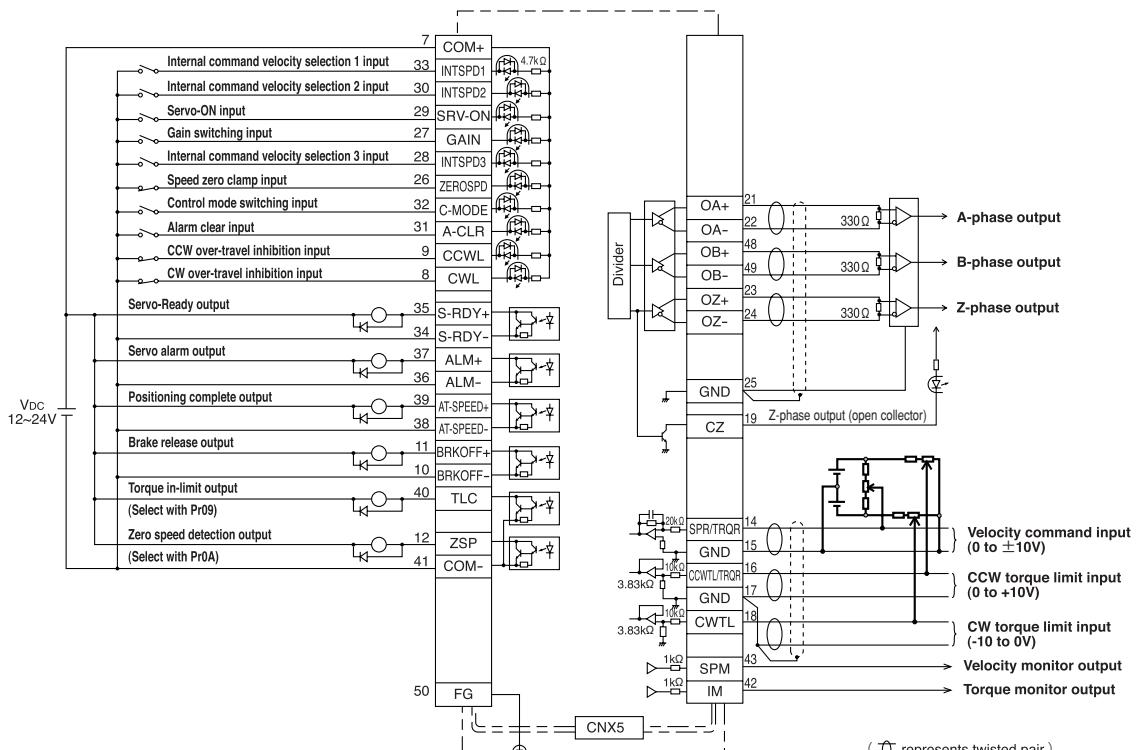
Standard Wiring Example of Control Circuit

■ Wiring examples at each control mode

● CN X5 Wiring example at position control mode



● CN X5 Wiring example at velocity control mode



● CN X5 Wiring example at torque control mode

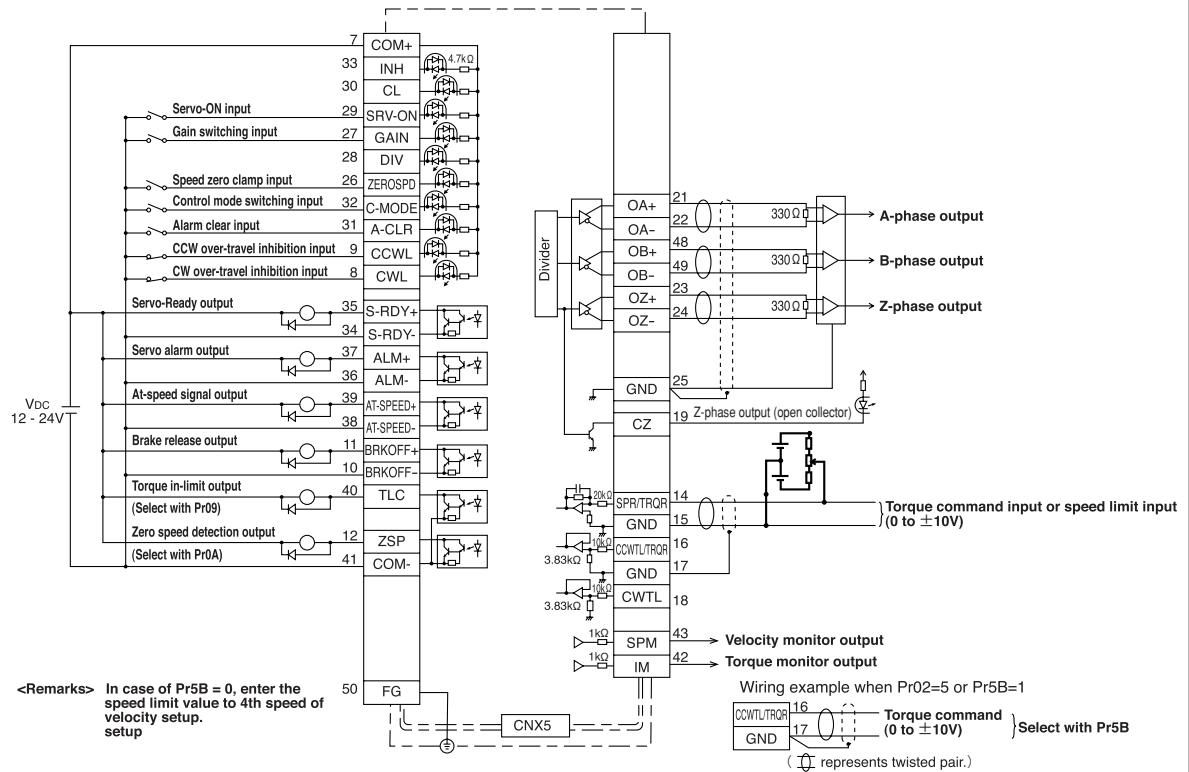


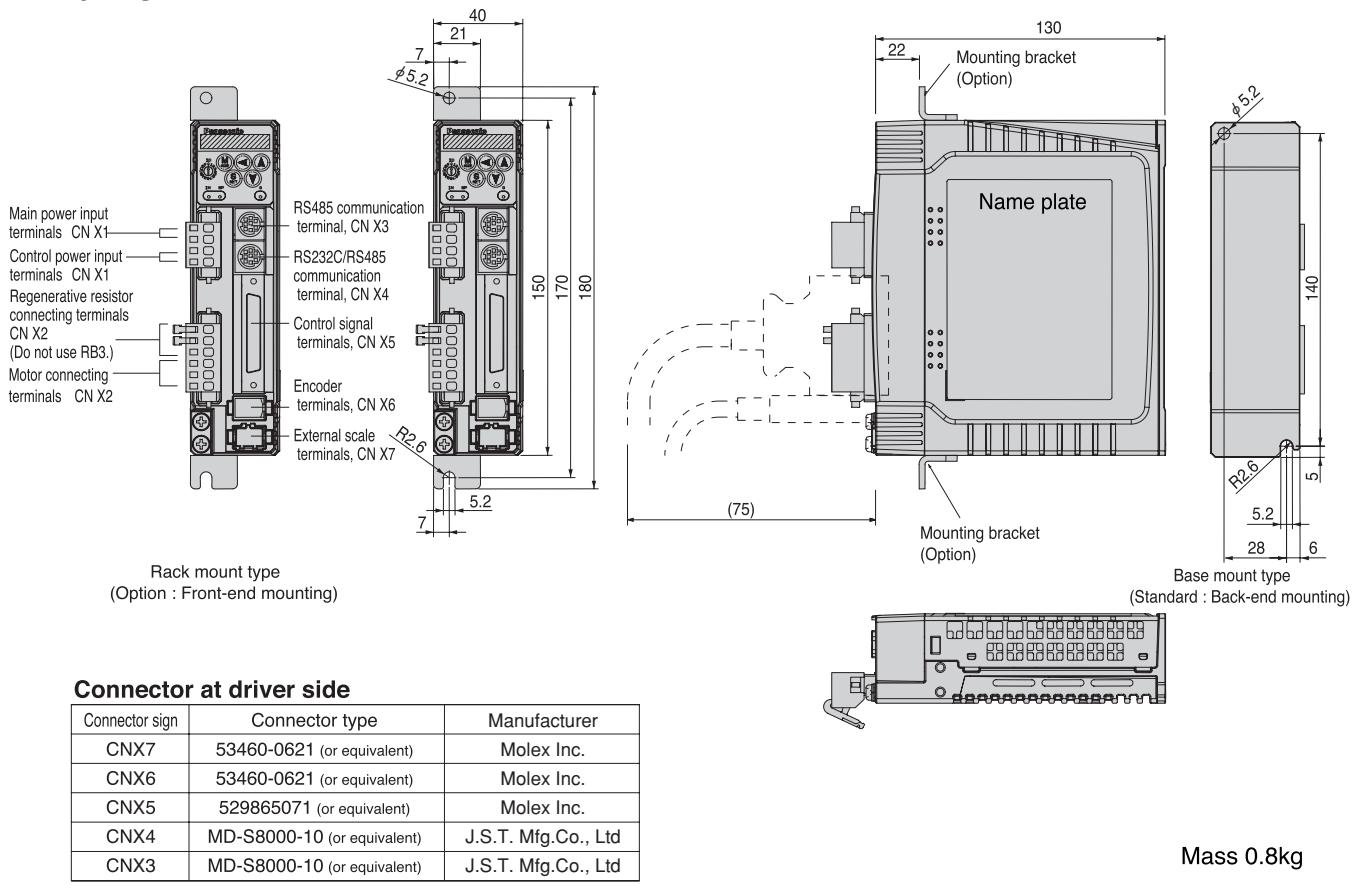
Table of Applicable Motors

Driver		Motor series							
Frame symbol	Part No.	MAMA	MSMD	MQMA	MSMA	MDMA	MGMA	MFMA	MHMA
A-frame	MADDT1105		MSMD5AZ***						
	MADDT1107		MSMD011***	MQMA011***					
	MADDT1205		MSMD5AZ***	MQMA012***					
	MADDT1207	MAMA012***	MSMD022***	MQMA022***					
B-frame	MBDDT2110		MSMD021***	MQMA021***					
	MBDDT2210	MAMA022***	MSMD042***	MQMA042***					
C-frame	MCDDT3120		MSMD041***	MQMA041***				MFMA042***	MHMA052***
	MCDDT3520	MAMA042***	MSMD082***						
D-frame	MDDDT3530				MSMA102***	MDMA102***			MHMA102***
	MDDDT5540	MAMA082***			MSMA152***	MDMA152***	MGMA092***	MFMA152***	MHMA152***
E-frame	MEDDT7364				MSMA202***	MDMA202***		MFMA252***	MHMA202***
F-frame	MFDDTA390				MSMA302***	MDMA302***	MGMA202***		MHMA302***
	MFDDTB3A2				MSMA402***	MDMA402***	MGMA302***	MFMA452***	MHMA402***
					MSMA502***	MDMA502***	MGMA452***		MHMA502***

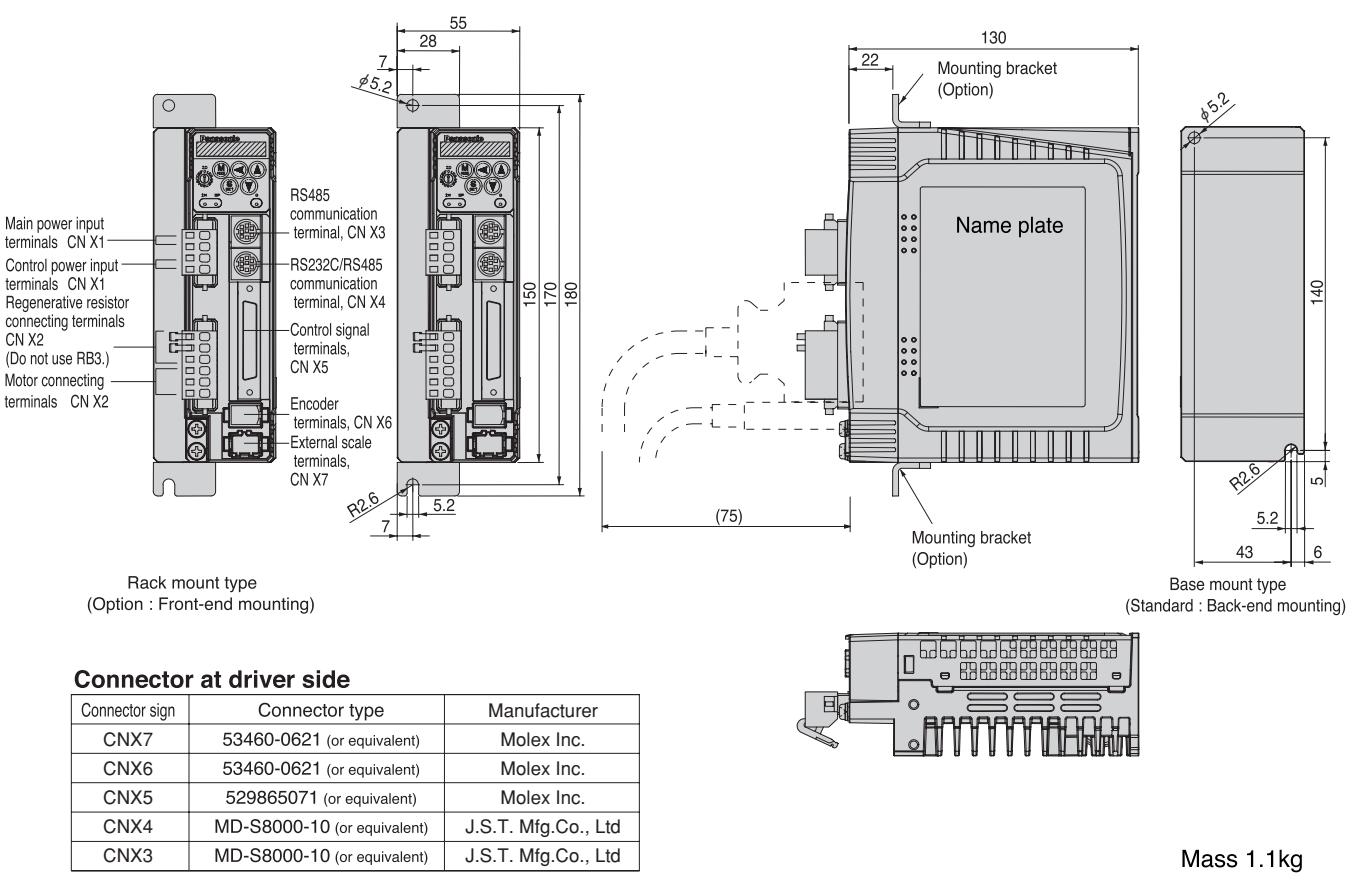
Refer to page, A4-11, Table of Part Numbers and Options as well.

Driver/Dimensions

Frame A

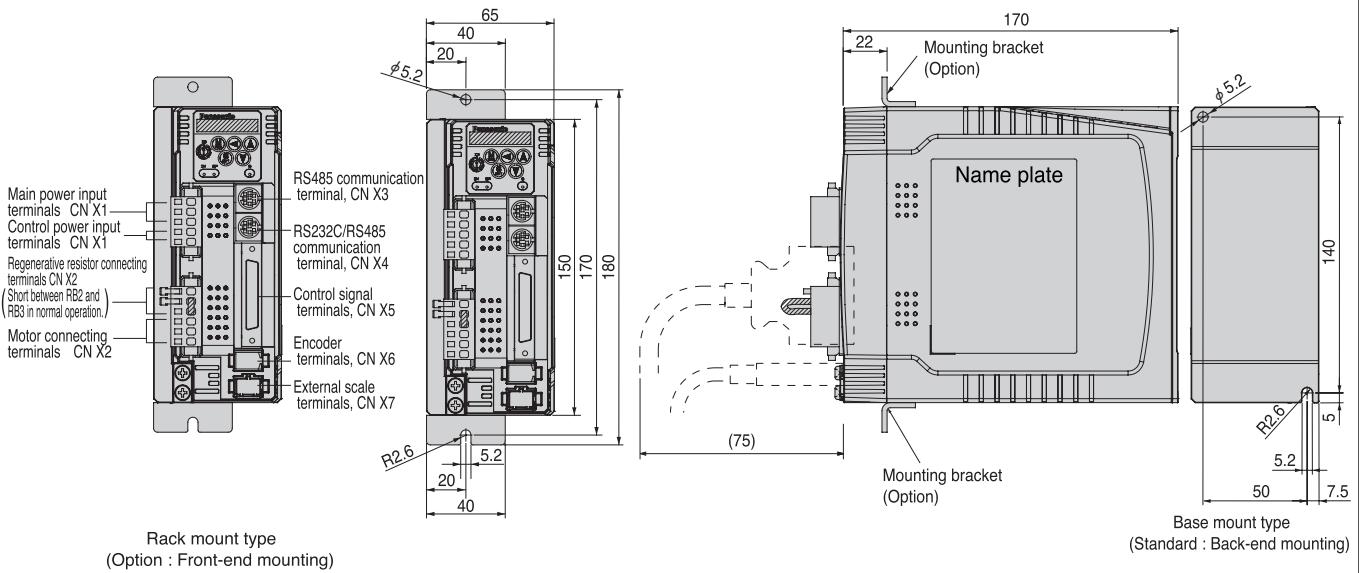


Frame B



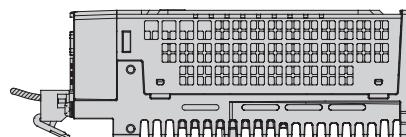
Driver/Dimensions

Frame C



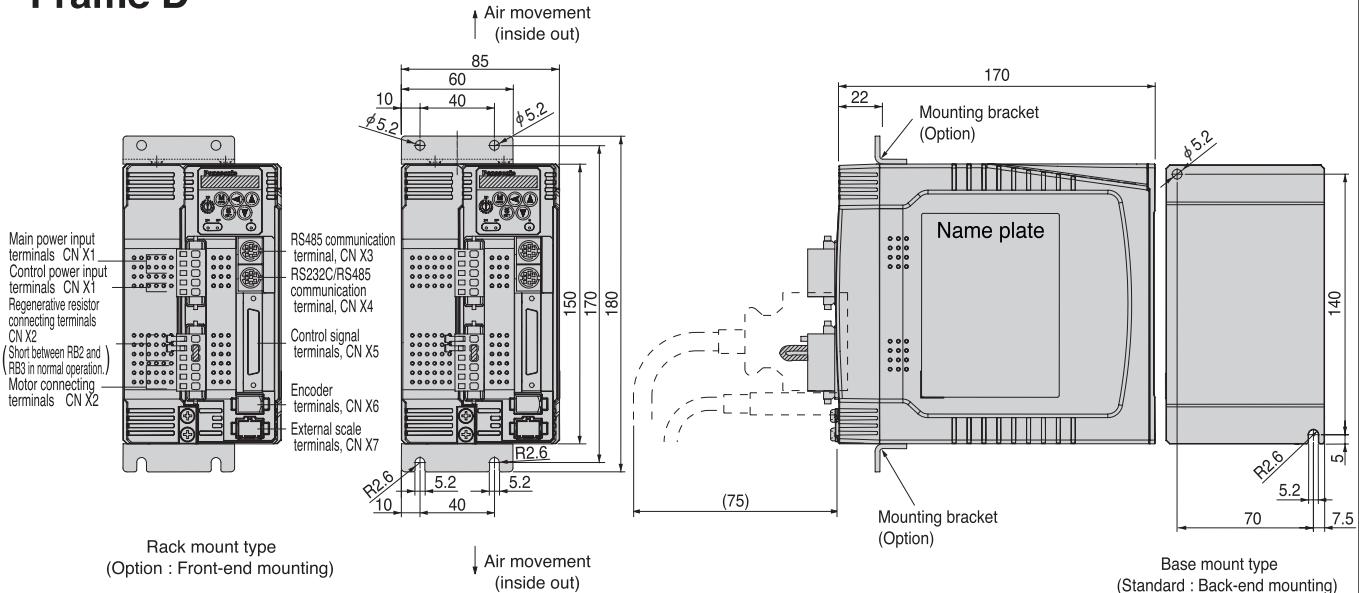
Connector at driver side

Connector sign	Connector type	Manufacturer
CNX7	53460-0621 (or equivalent)	Molex Inc.
CNX6	53460-0621 (or equivalent)	Molex Inc.
CNX5	529865071 (or equivalent)	Molex Inc.
CNX4	MD-S8000-10 (or equivalent)	J.S.T. Mfg.Co., Ltd
CNX3	MD-S8000-10 (or equivalent)	J.S.T. Mfg.Co., Ltd



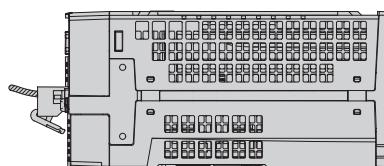
Mass 1.5kg

Frame D



Connector at driver side

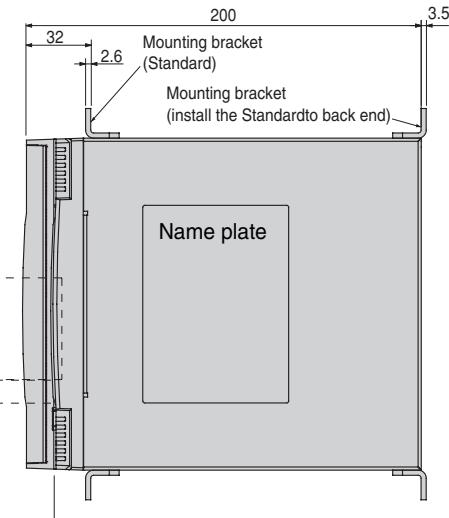
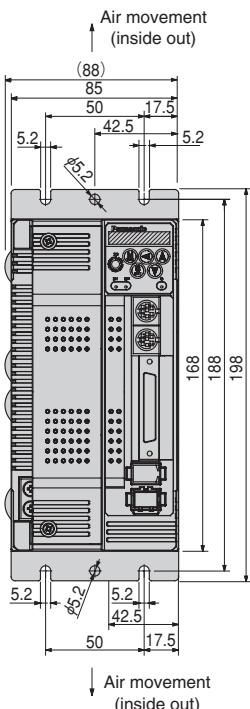
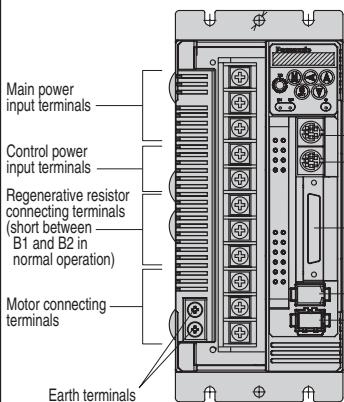
Connector sign	Connector type	Manufacturer
CNX7	53460-0621 (or equivalent)	Molex Inc.
CNX6	53460-0621 (or equivalent)	Molex Inc.
CNX5	529865071 (or equivalent)	Molex Inc.
CNX4	MD-S8000-10 (or equivalent)	J.S.T. Mfg.Co., Ltd
CNX3	MD-S8000-10 (or equivalent)	J.S.T. Mfg.Co., Ltd



Mass 1.7kg

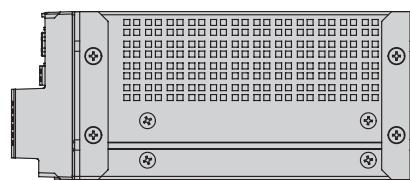
Driver/Dimensions

Frame E



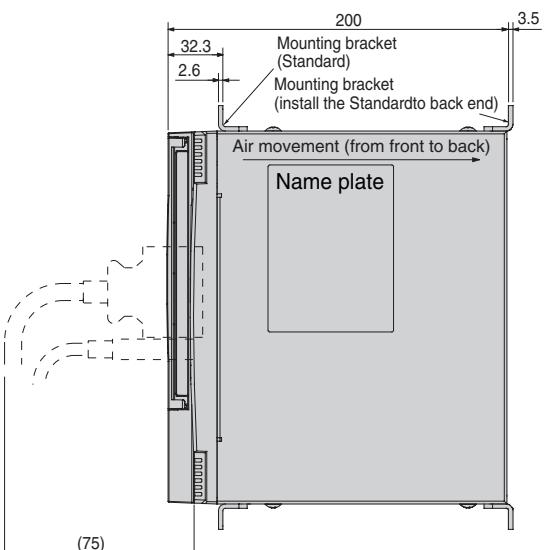
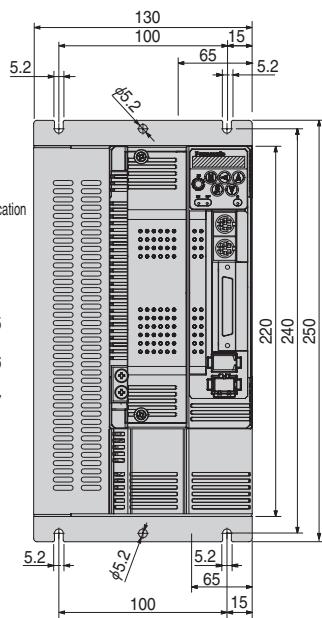
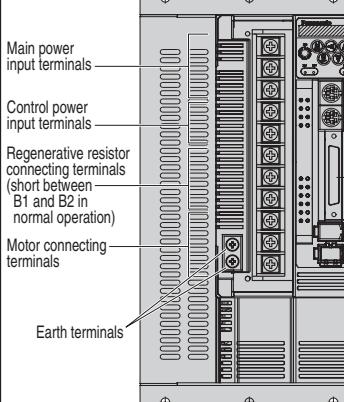
Connector at driver side

Connector sign	Connector type	Manufacturer
CNX7	53460-0621 (or equivalent)	Molex Inc.
CNX6	53460-0621 (or equivalent)	Molex Inc.
CNX5	529865071 (or equivalent)	Molex Inc.
CNX4	MD-S8000-10 (or equivalent)	J.S.T. Mfg.Co., Ltd
CNX3	MD-S8000-10 (or equivalent)	J.S.T. Mfg.Co., Ltd



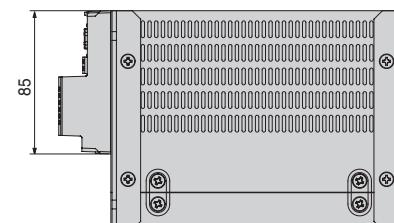
Mass 3.2kg

Frame F



Connector at driver side

Connector sign	Connector type	Manufacturer
CNX7	53460-0621 (or equivalent)	Molex Inc.
CNX6	53460-0621 (or equivalent)	Molex Inc.
CNX5	529865071 (or equivalent)	Molex Inc.
CNX4	MD-S8000-10 (or equivalent)	J.S.T. Mfg.Co., Ltd
CNX3	MD-S8000-10 (or equivalent)	J.S.T. Mfg.Co., Ltd



Mass 6.0kg

Options

Cable part No. designation

Encoder cable

1	2	3	4	5	6	7	8	9	10	11	12
M	F	E	C	A	O	O	5	0	E	A	M

Cable end (Driver side)

D	Molex connector (MINAS A4 series, incremental)
E	Molex connector (MINAS A4 series, absolute)
M	Molex connector (MINAS A4 series, E series)

Cable end (Encoder side)

S	S-type cannon plugAMP
A	AMP connector

Cable type

E	PVC cable with shield by Oki Electric Cable Co., 0.20mm ² x 8P, 3P
---	---

Cable length

0030	3m
0050	5m
0100	10m
0200	20m

Type classification

MFECA : Encoder cable

Motor cable

1	2	3	4	5	6	7	8	9	10	11	12
M	F	M	C	A	O	O	5	2	F	C	T

Cable end at driver side

D	Phoenix contact plus crimp terminal for MINAS A4
T	Crimp terminal

Cable end at motor side

E	4 pole AMP connector
C	4 pin S type cannon plug

Cable type

E	ROBOTOP 4-wire by Daiden Co., Ltd
F	ROBOTOP 6-wire by Daiden Co., Ltd
G	ROBOTOP 2-wire by Daiden Co., Ltd

Cross section of cable core

0	0.75mm ²
1	1.25mm ²
2	2.0mm ²
3	3.5mm ²

Type classification

A	Standard
B	Special
:	Design order

003	3m
005	5m
010	10m
020	20m

AC servo motor cable

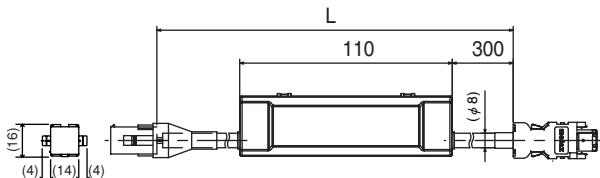
Options

Encoder cable

MFECA00EAE**

MSMD50W - 750W, MQMA100W - 400W, MAMA100W - 750W

17-bit absolute encoder, with battery holder



Title	Part No. (Manufacturer's)	Manufacturer
Connector	55100-0600 or 55100-0670	Molex Inc.
	172161-1	
Connector pin	170365-1	Tyco Electronics, AMP
	Cable	
	0.20mm ² ×4P	Oki Electric Cable Co.

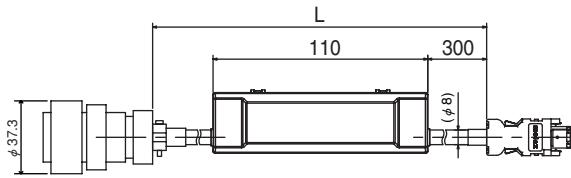
L(m)	Part No.
3	MFECA0030EAE
5	MFECA0050EAE
10	MFECA0100EAE
20	MFECA0200EAE

Note) Battery for absolute encoder is an option.

MFECA00ESE**

MSMA, MDMA, MHMA, MGMA, MFMA

17-bit absolute encode, with battery holder



Title	Part No. (Manufacturer's)	Manufacturer
Connector	55100-0600 or 55100-0670	Molex Inc.
	172161-1	
Straight plug	MS3106B20-29S	Japan Aviation Electronics Industry Ltd.
	MS3057-12A	
Cable	0.20mm ² ×4P	Oki Electric Cable Co.

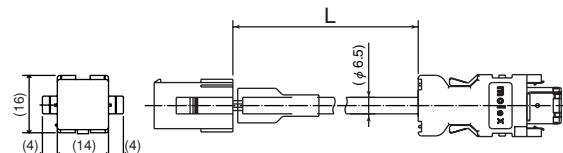
L(m)	Part No.
3	MFECA0030ESE
5	MFECA0050ESE
10	MFECA0100ESE
20	MFECA0200ESE

Note) Battery for absolute encoder is an option.

MFECA00EAD**

MSMD50W - 750W, MQMA100W - 400W, MAMA100W - 750W

17-bit incremental encode, without battery holder



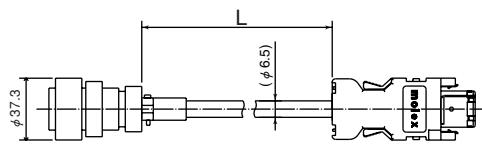
Title	Part No. (Manufacturer's)	Manufacturer
Connector	55100-0600 or 55100-0670	Molex Inc.
	172161-1	
Connector pin	170365-1	Tyco Electronics, AMP
	Cable	
	0.20mm ² ×3P	Oki Electric Cable Co.

L(m)	Part No.
3	MFECA0030EAD
5	MFECA0050EAD
10	MFECA0100EAD
20	MFECA0200EAD

MFECA00ESD**

MSMA, MDMA, MHMA, MGMA, MFMA

17-bit incremental/2500P/r encode, without battery holder



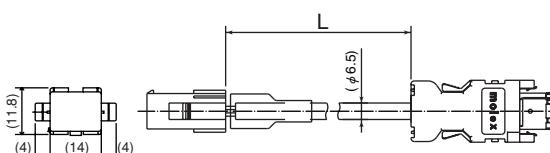
Title	Part No. (Manufacturer's)	Manufacturer
Connector	55100-0600 or 55100-0670	Molex Inc.
	172161-1	
Straight plug	MS3106B20-29S	Japan Aviation Electronics Industry Ltd.
	MS3057-12A	
Cable	0.20mm ² ×3P	Oki Electric Cable Co.

L(m)	Part No.
3	MFECA0030ESD
5	MFECA0050ESD
10	MFECA0100ESD
20	MFECA0200ESD

MFECA00EAM**

MSMD50W - 750W, MQMA100W - 400W, MAMA100W - 750W

2500P/r encode, without battery holder



Title	Part No. (Manufacturer's)	Manufacturer
Connector	55100-0600 or 55100-0670	Molex Inc.
	172160-1	
Connector pin	170365-1	Tyco Electronics, AMP
	Cable	
	0.20mm ² ×3P	Oki Electric Cable Co.

L(m)	Part No.
3	MFECA0030EAM
5	MFECA0050EAM
10	MFECA0100EAM
20	MFECA0200EAM

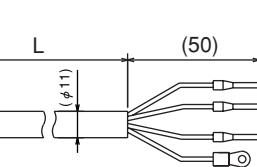
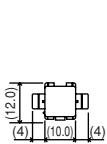
Options

Motor cable (ROBO TOP® 105°C, 600V, DP)

ROBO TOP® is a trade mark of Daiden Co., Ltd

MFMCA0**0EED

MSMD50W - 750W, MQMA100W - 400W, MAMA100W - 750W

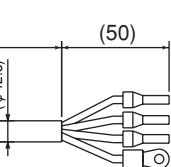
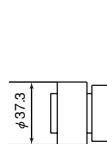


Title	Part No. (Manufacturer's)	Manufacturer
Connector	172159-1	Tyco Electronics, AMP
Connector pin	170366-1	
Rod terminal	A10.75-8GY	Phoenix
Vinyl insulated roundterminal	N1.25-M4	J.S.T. Mfg. Co., Ltd.
Cable	ROBO-TOP 600V 0.75mm²	Daiden Co., Ltd

L(m)	Part No.
3	MFMCA0030EED
5	MFMCA0050EED
10	MFMCA0100EED
20	MFMCA0200EED

MFMCD0**2ECD

MSMA1.0kW - 1.5kW, MDMA1.0kW - 1.5kW
MHMA500W - 1.5kW, MGMA900W

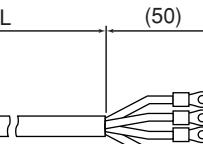
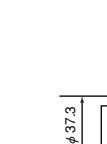


Title	Part No. (Manufacturer's)	Manufacturer
Straight plug	JL04V-6A20-4SE-EB	Japan Aviation
Cable clamp	JL04-2022CK(14)	Electronics Industry Ltd.
Rod terminal	A12.5-8BU	Phoenix
Vinyl insulated roundterminal	N2-M4	J.S.T. Mfg. Co., Ltd.
Cable	ROBO-TOP 600V 2.0mm²	Daiden Co., Ltd

L(m)	Part No.
3	MFMCD0032ECD
5	MFMCD0052ECD
10	MFMCD0102ECD
20	MFMCD0202ECD

MFMCD0**2ECT

MSMA2.0kW, MDMA2.0kW

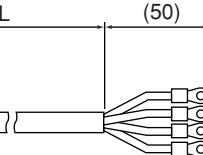
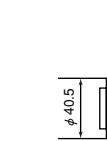


Title	Part No. (Manufacturer's)	Manufacturer
Straight plug	JL04V-6A20-4SE-EB	Japan Aviation
Cable clamp	JL04-2022CK(14)	Electronics Industry Ltd.
Vinyl insulated roundterminal	N2-5	J.S.T. Mfg. Co., Ltd.
Cable	ROBO-TOP 600V 2.0mm²	Daiden Co., Ltd

L(m)	Part No.
3	MFMCD0032ECT
5	MFMCD0052ECT
10	MFMCD0102ECT
20	MFMCD0202ECT

MFMCA0**3ECT

MSMA3.0kW - 5.0kW, MDMA3.0kW - 5.0kW
MHMA2.0kW - 5.0kW, MGMA2.0kW - 4.5kW

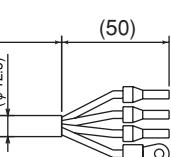
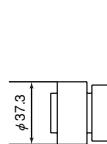


Title	Part No. (Manufacturer's)	Manufacturer
Straight plug	JL04V-6A22-22SE-EB	Japan Aviation
Cable clamp	JL04-2022CK(14)	Electronics Industry Ltd.
Vinyl insulated roundterminal	N5.5-5	J.S.T. Mfg. Co., Ltd.
Cable	ROBO-TOP 600V 3.5mm²	Daiden Co., Ltd

L(m)	Part No.
3	MFMCA0033ECT
5	MFMCA0053ECT
10	MFMCA0103ECT
20	MFMCA0203ECT

MFMCA0**2ECD

MFMA400W - 1.5kW

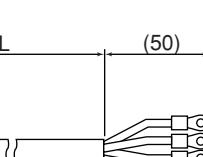
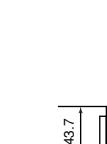


Title	Part No. (Manufacturer's)	Manufacturer
Straight plug	JL04V-6A20-18SE-EB	Japan Aviation
Cable clamp	JL04-2022CK(14)	Electronics Industry Ltd.
Rod terminal	A12.5-8BU	Phoenix
Vinyl insulated roundterminal	N2-M4	J.S.T. Mfg. Co., Ltd.
Cable	ROBO-TOP 600V 2.0mm²	Daiden Co., Ltd

L(m)	Part No.
3	MFMCA0032ECD
5	MFMCA0052ECD
10	MFMCA0102ECD
20	MFMCA0202ECD

MFMCD0**3ECT

MFMA2.5kW - 4.5kW



Title	Part No. (Manufacturer's)	Manufacturer
Straight plug	JL04V-6A24-11SE-EB	Japan Aviation
Cable clamp	JL04-2428CK(17)	Electronics Industry Ltd.
Rod terminal	A12.5-8BU	Phoenix
Vinyl insulated roundterminal	N5.5-5	J.S.T. Mfg. Co., Ltd.
Cable	ROBO-TOP 600V 3.5mm²	Daiden Co., Ltd

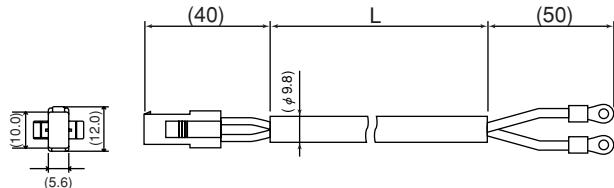
L(m)	Part No.
3	MFMCD0033ECT
5	MFMCD0053ECT
10	MFMCD0103ECT
20	MFMCD0203ECT

Options

Brake cable (ROBO TOP® 105°C, 600V, DP)

MFMCB0**0GET

MSMD 50W - 750W
MQMA 100W - 400W
MAMA 100W - 750W



Title	Part No. (Manufacturer's)	Manufacturer
Connector	172157-1	Japan Aviation
Connector pin	170366-1, 170362-1	Electronics Industry Ltd.
Vinyl insulated roundterminal	N1.25-M4	J.S.T. Mfg. Co., Ltd.
Cable	ROBO-TOP 600V 0.75mm²	Daiden Co., Ltd

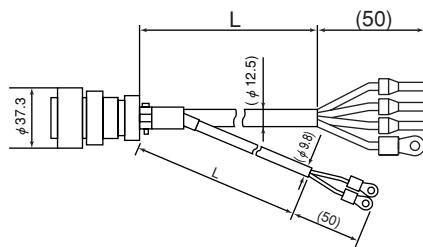
L(m)	Part No.
3	MFMCB0030GET
5	MFMCB0050GET
10	MFMCB0100GET
20	MFMCB0200GET

Motor cable (with brake) (ROBO TOP® 105°C, 600V, DP)

ROBO TOP® is a trade mark of Daiden Co., Ltd

MFMCAO**2FCD

MSMA1.0kW-1.5kW, MDMA1.0kW - 1.5kW
MHMA 500W-1.5kW, MFMA 400W - 1.5kW
MGMA 900W

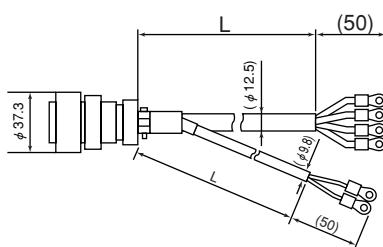


Title	Part No. (Manufacturer's)	Manufacturer
Straight plug	JL04V-6A20-18SE-EB	Japan Aviation
Cable clamp	JL04-2022CK(14)	Electronics Industry Ltd.
Rod terminal	A12.5-BU	Phoenix
Vinyl insulated roundterminal	N2-M4 N1.25-M4	J.S.T. Mfg. Co., Ltd.
Cable	ROBO-TOP 600V 2.0mm² or ROBO-TOP 600V 0.75mm²	Daiden Co., Ltd

L(m)	Part No.
3	MFMCA0032FCD
5	MFMCA0052FCD
10	MFMCA0102FCD
20	MFMCA0202FCD

MFMCAO**2FCT

MSMA2.0kW, MDMA2.0kW

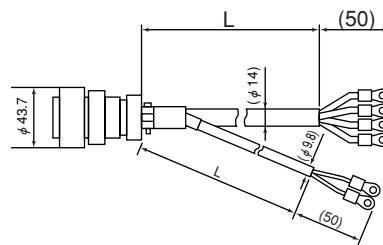


Title	Part No. (Manufacturer's)	Manufacturer
Straight plug	JL04V-6A20-18SE-EB	Japan Aviation
Cable clamp	JL04-2022CK(14)	Electronics Industry Ltd.
Vinyl insulated roundterminal	N2-5 N1.25-M4	J.S.T. Mfg. Co., Ltd.
Cable	ROBO-TOP 600V 2.0mm² or ROBO-TOP 600V 0.75mm²	Daiden Co., Ltd

L(m)	Part No.
3	MFMCA0032FCT
5	MFMCA0052FCT
10	MFMCA0102FCT
20	MFMCA0202FCT

MFMCA0**3FCT

MSMA 3.0kW - 5.0kW, MDMA 3.0kW - 5.0kW
MHMA 2.0kW - 5.0kW, MFMA 2.5kW - 4.5kW
MGMA 2.0kW - 4.5kW



Title	Part No. (Manufacturer's)	Manufacturer
Straight plug	JL04V-6A24-11SE-EB	Japan Aviation
Cable clamp	JL04-2428CK(17)	Electronics Industry Ltd.
Vinyl insulated roundterminal	N5.5-5 N1.25-M4	J.S.T. Mfg. Co., Ltd.
Cable	ROBO-TOP 600V 3.5mm² or ROBO-TOP 600V 0.75mm²	Daiden Co., Ltd

L(m)	Part No.
3	MFMCA0033FCT
5	MFMCA0053FCT
10	MFMCA0103FCT
20	MFMCA0203FCT

Options

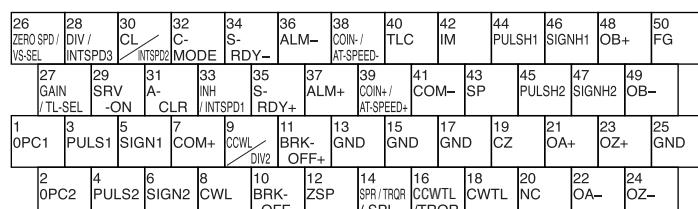
Connector kit for external peripheral equipments

1) Part No. **DVOP4350**

2) Components

Title	Part No.	Number	Manufacturer	Note
Connector	54306-5011 or 54306-5019	1	Molex Inc.	For CN X5 (50-pins)
Connector cover	54331-0501			

3) Pin disposition(50-pins) (viewed from the soldering side)



<Cautions>

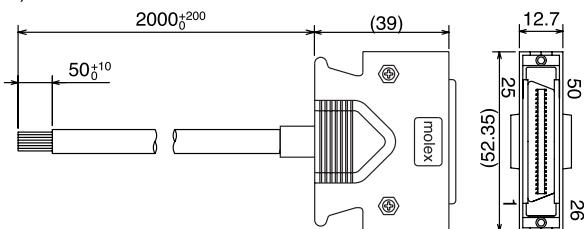
1. Check the stamped pin No. on the connector body while making a wiring.
2. For the function of each signal title or its symbol, refer to the wiring example of connector, CN I/F.

Interface cable

Cable of 2m is connected.

1) Part No. **DVOP4360**

2) Dimensions



<Remarks>

Color designation of the cable

e.g.) Pin-1 Cable color : Orange
(Red1) : One red dot on the cable

3) Table for wiring

Pin No.	color	Pin No.	color	Pin No.	color	Pin No.	color	Pin No.	color
1	Orange (Red1)	11	Orange (Black2)	21	Orange (Red3)	31	Orange (Red4)	41	Orange (Red5)
2	Orange (Black1)	12	Yellow (Black1)	22	Orange (Black3)	32	Orange (Black4)	42	Orange (Black5)
3	Gray (Red1)	13	Gray (Red2)	23	Gray (Red3)	33	Gray (Red4)	43	Gray (Red5)
4	Gray (Black1)	14	Gray (Black2)	24	Gray (Black3)	34	White (Red4)	44	White (Red5)
5	White (Red1)	15	White (Red2)	25	White (Red3)	35	White (Black4)	45	White (Black5)
6	White (Black1)	16	Yellow (Red2)	26	White (Black3)	36	Yellow (Red4)	46	Yellow (Red5)
7	Yellow (Red1)	17	Yel(Blk2)/Pink(Blk2)	27	Yellow (Red3)	37	Yellow (Black4)	47	Yellow (Black5)
8	Pink (Red1)	18	Pink (Red2)	28	Yellow (Black3)	38	Pink (Red4)	48	Pink (Red5)
9	Pink (Black1)	19	White (Black2)	29	White (Red3)	39	Pink (Black4)	49	Pink (Black5)
10	Orange (Red2)	20	N/A	30	Pink (Black3)	40	Gray (Black4)	50	Gray (Black5)

Connector kit for motor/encoder connection

Applicable motor models : **MSMD 50W - 750W**
MQMA 100W - 400W
MAMA 100W - 750W

**17-bit
incremental encoder**

These are required when you make your own encoder and motor cable. (For brake, use our option.)

1) Part No. **DVOP4290**

2) Components

Title	Part No.	Number	Manufacturer	Note
Connector	55100 - 0600 or 55100 - 0670	1	Molex Inc.	For CN X6 (6-pins)
Connector	172161-1	1	Tyco Electronics AMP	For junction cable to encoder (9-pins)
Connector Pin	170365-1	9		
Connector	172159-1	1	Tyco Electronics AMP	For junction cable to motor (4-pins)
Connector Pin	170366-1	4		

* Refer to Page A4-94, "When you make your own encoder cable for 17-bit absolute encoder", when you connect the battery for absolute encoder.

Options

Applicable motor models : MSMD 50W - 750W
MQMA 100W - 400W
MAMA 100W - 750W

2500P/r incremental encoder

These are required when you make your own encoder and motor cable.
(For brake, use our option.)

- 1) Part No. **DVOP4380**
- 2) Components

Title	Part No.	Number	Manufacturer	Note
Connector	55100 - 0600 or 55100 - 0670	1	Molex Inc.	For CN X6 (6-pins)
Connector	172160-1	1	Tyco Electronics AMP	For junction cable to encoder (9-pins)
Connector Pin	170365-1	6		
Connector	172159-1	1	Tyco Electronics AMP	For junction cable to motor (4-pins)
Connector Pin	170366-1	4		

For DVOP2490, DVOP3480,
recommended manual crimp tool
(to be prepared by customer)

Title	Part No.	Manufacturer
For junction cable to encoder	755330 - 1	Tyco Electronics AMP
For junction cable to motor	755331 - 1	

Applicable motor models : MSMA 1.0kW - 2.0kW
MDMA 1.0kW - 2.0kW
MHMA 500W - 1.5kW
MGMA 900W

17-bit incremental encoder,
2500P/r incremental encoder

No brake

- 1) Part No. **DVOP4310**
- 2) Components

Title	Part No.	Number	Manufacturer	Note
Connector	55100 - 0600 or 55100 - 0670	1	Molex Inc.	For CN X6 (6-pins)
Straight plug	MS3106B20-29S	1	Japan Aviation Electronics Industry Ltd.	For junction cable to encoder
Cable clamp	MS3057-12A	1		
Straight plug	MS3106B20-4S	1	Japan Aviation Electronics Industry Ltd.	For junction cable to motor
Cable clamp	MS3057-12A	1		

Applicable motor models : MSMA 3.0kW - 5.0kW
MDMA 3.0kW - 5.0kW
MHMA 2.0kW - 5.0kW
MGMA 2.0kW - 4.5kW

17-bit Incremental encoder,
2500P/r incremental encoder

No brake

- 1) Part No. **DVOP4320**
- 2) Components

Title	Part No.	Number	Manufacturer	Note
Connector	55100 - 0600 or 55100 - 0670	1	Molex Inc.	For CN X6 (6-pins)
Straight plug	MS3106B-20-29S	1	Japan Aviation Electronics Industry Ltd.	For junction cable to encoder (6-pins)
Cable clamp	MS3057-12A	1		
Straight plug	MS3106B22-22S	1	Japan Aviation Electronics Industry Ltd.	For junction cable to motor power (4-pins)
Cable clamp	MS3057-12A	1		

Options

Applicable motor models :	MSMA 1.0kW - 2.0kW MDMA 1.0kW - 2.0kW MHMA 0.5kW - 1.5kW MGMA 900W	[17-bit incremental encoder, 2500P/r incremental encoder]	With brake
	MFMA 0.4kW - 1.5kW	[17-bit incremental encoder, 2500P/r incremental encoder]	[Without brake With brake]

1) Part No. **DV0P4330**

2) Components

Title	Part No.	Number	Manufacturer	Note
Connector	55100 - 0600 or 55100 - 0670	1	Molex Inc.	For CN X6 (6-pins)
Straight plug	MS3106B20-29S	1	Japan Aviation Electronics Industry Ltd.	For junction cable to encoder
Cable clamp	MS3057-12A	1		
Straight plug	MS3106B20-18S	1	Japan Aviation Electronics Industry Ltd.	For junction cable to motor
Cable clamp	MS3057-12A	1		

Applicable motor models :	MSMA 3.0kW - 5.0kW MDMA 3.0kW - 5.0kW MHMA 2.0kW - 5.0kW MGMA 2.0kW - 4.5kW	[17-bit incremental encoder, 2500P/r incremental encoder]	With brake
	MFMA 2.5kW - 4.5kW	[17-bit incremental encoder, 2500P/r incremental encoder]	[Without brake With brake]

1) Part No. **DV0P4340**

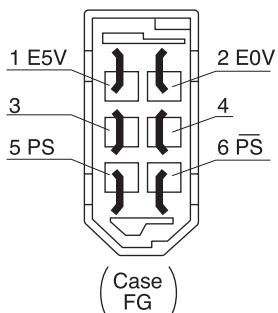
2) Components

Title	Part No.	Number	Manufacturer	Note
Connector	55100 - 0600 or 55100 - 0670	1	Molex Inc.	For CN X6 (6-pins)
Straight plug	MS3106B20-29S	1	Japan Aviation Electronics Industry Ltd.	For junction cable to encoder
Cable clamp	MS3057-12A	1		
Straight plug	MS3106B24-11S	1	Japan Aviation Electronics Industry Ltd.	For junction cable to motor
Cable clamp	MS3057-16A	1		

<Notes>

We may use other manufacturer's components which are equivalent to the parts in the above tables.

Pin disposition of connector, CN X6



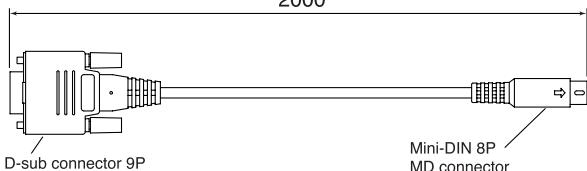
<Caution>

1. This table shows the pin disposition viewed from the soldering side. Check the pin No. stamped on the connector body to avoid miswiring.
2. Connect the shield of the wire to the case (FG) without fail.
3. For wiring and connection, refer to page, A4-77.

Communication cable (for connection with PC)

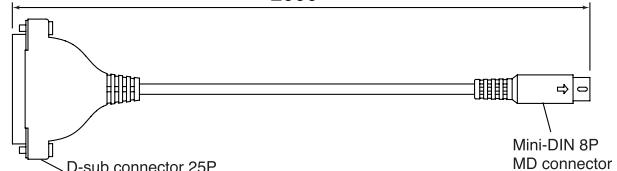
1) Part No. **DV0P4330** (DOS/V machine)

2000



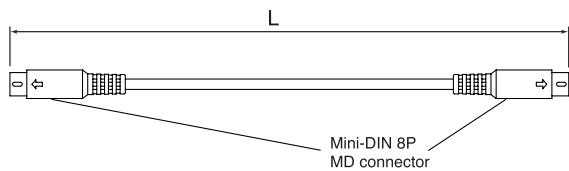
2) Part No. **DV0P1160** (PC98 series)

2000



Options

Communication cable (for RS485)



Part No.	L[mm]
DV0P1970	200
DV0P1971	500
DV0P1972	1000

Setup support software "PANATERM®" Ver.3.7

- 1) Part No. **DV0P4230** (Japanese version), **DV0P4240** (English version) <Caution>
 2) Supply media : 3.5 inch FD
 For setup circumstance, refer to the Instruction Manual of "PANATERM®".

Mounting bracket

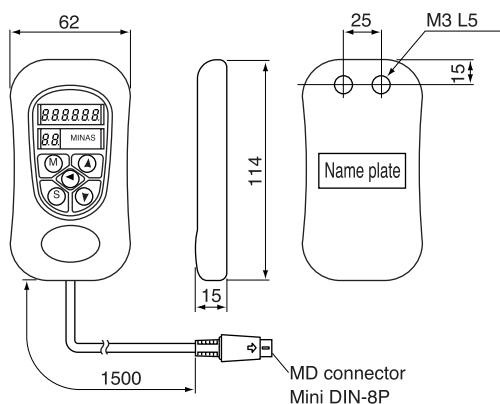
Frame symbol of applicable driver	part No.	Mounting screw	Dimensions	
			Upper side	Bottom side
Frame A	DV0P 4271	M4 x L6 Pan head 4pcs	 	
Frame B	DV0P 4272	M4 x L6 Pan head 4pcs	 	
Frame C	DV0P 4273	M4 x L6 Pan head 4pcs	 	
Frame D	DV0P 4274	M4 x L6 Pan head 4pcs	 	

<Caution> For Frame E, F you can make a front end and back end mounting by changing the mounting direction of L-shape bracket (attachment).

Options

Console

Part No. DVOP3690



Reactor

Fig.1

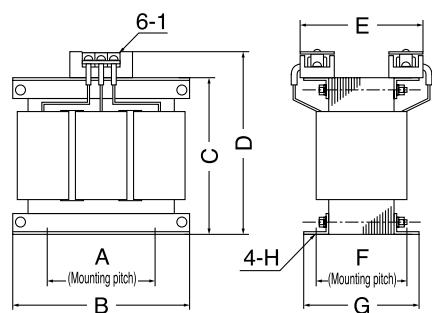
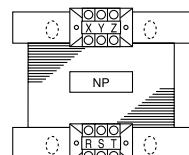
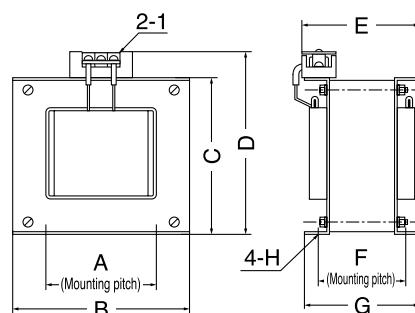


Fig.2



	Part No.	A	B	C	D	E	F	G	H	I	Inductance (mH)	Rated current (A)
Fig. 1	DVOP220	65	125	83	118	145	70	85	7(w) x 12 (l)	M4	6.81	3
	DVOP221	60	150	113	137	120	60	75	7(w) x 12 (l)	M4	4.02	5
	DVOP222	60	150	113	137	130	70	95	7(w) x 12 (l)	M4	2	8
	DVOP223	60	150	113	137	140	79	95	7(w) x 12 (l)	M4	1.39	11
	DVOP224	60	150	113	137	145	84	100	7(w) x 12 (l)	M4	0.848	16
	DVOP225	60	150	113	137	160	100	115	7(w) x 12 (l)	M5	0.557	25
Fig. 2	DVOP226	55	80	68	90	90	41	55	φ 7	M4	6.81	3
	DVOP227	55	80	68	90	90	41	55	φ 7	M4	4.02	5
	DVOP228	55	80	68	90	95	46	60	φ 7	M4	2	8

· Agency of National Resources and Energy of Ministry of Economy, Trade and Industry (METI, formerly MITI) has established a High Harmonics Suppression Guidelines in September 1944. The Guidelines says,

- 1) Drivers with 4.0kW or smaller capacity are subject to "Higher harmonics suppression guidelines for home appliances and general purpose appliances".
 - 2) Drivers with 4.0kW or larger capacity are subject to "Higher harmonics suppression guidelines for high voltage and special customers".
- Measures to suppress the harmonics generation is a strong request from METI.

For drivers with 4.0kW or smaller capacity, connect a power factor improving reactor (L) to conform to this regulation level.

For drivers with 4.0kW or larger capacity, verify the suppression level based on the guidelines and take a necessary measure.

<References>

"Harmonics suppression technical guideline" by JEAG 9702-1995, Japan Electric Association

"Harmonic current calculation procedures for general purpose inverter at special customers" by JEM-TR201-1996, Japan Electrical Manufacturers' Association

Options

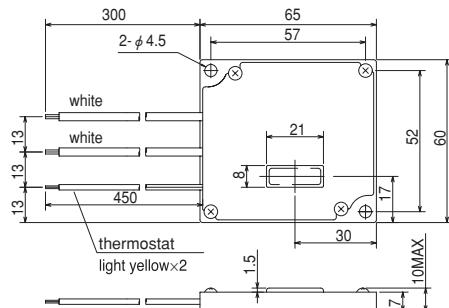
External regenerative resistor

Part No.	Manufacturer's part No.	Specifications				Activation temperature of built-in thermostat	Activation temperature of built-in thermal fuse		
		Resistance	Rated power (reference)*						
			Free air	with fan[W]					
DV0P4280	RF70M	50Ω	10W	25	35	45			
DV0P4281	RF70M	100Ω	10W	25	35	45			
DV0P4282	RF180B	25Ω	17W	50	60	75			
DV0P4283	RF180B	50Ω	17W	50	60	75			
DV0P4284	RF240	30Ω	40W	100	120	150			
DV0P4285	RH450F	20Ω	52W	130	160	200			

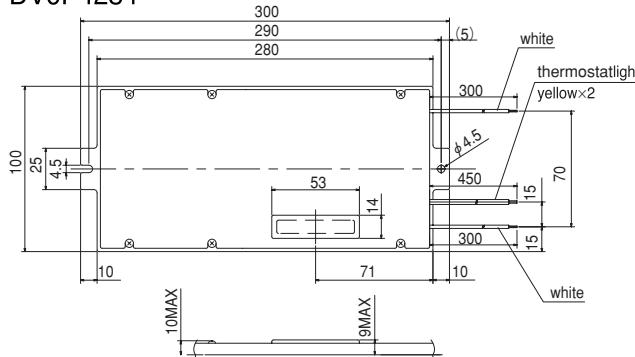
*Power with which the driver can be used without activating the built-in thermostat.

Manufacturer : Iwaki Musen Kenkyusho

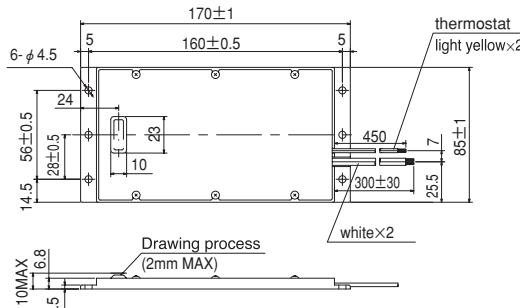
DV0P4280,DV0P4281



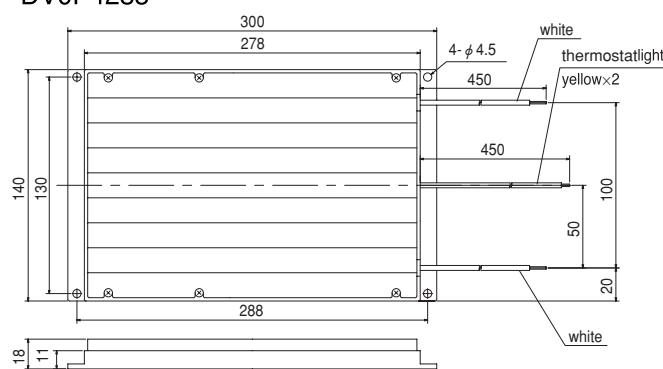
DV0P4284



DV0P4282,DV0P4283



DV0P4285



<Remarks>

Thermal fuse and thermostat are installed for safety. Compose the circuit so that the power will be turned off when the thermostat is activated. The thermal fuse may blow due to heat dissipating condition, working temperature, supply voltage or load fluctuation.

Make it sure that the surface temperature of the resistor may not exceed 100°C at the worst running conditions with the machine, which brings large regeneration (such case as high supply voltage, load inertia is large or deceleration time is short) Install a fan for a forced cooling if necessary.

<Caution>

Regenerative resistor gets very hot.

Take preventive measures for fire and burns.
Avoid the installation near inflammable objects,
and easily accessible place by hand.

Battery for absolute encoder

Battery (Frame A, F)

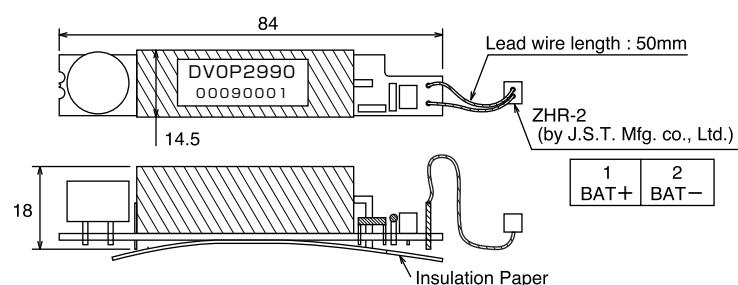
1) Part No. **DV0P2990**

2) Lithium battery by Toshiba Battery Co.

ER6V, 3.6V 2000mAh

<Caution>

This battery is categorized as hazardous substance, and you may be required to present an application of hazardous substance when you transport by air (both passenger and cargo airlines).



Recommended components

Surge absorber for motor brake

Motor	Surge absorber for motor brake
MSMD 50W - 750W	· Z15D271 Ishizuka Electronics Co.
MAMA 100W - 750W	
MHMA 2.0kW - 5.0kW	
MGMA 900W - 2.0kW	· Z15D151 Ishizuka Electronics Co.
MSMA 1.0kW - 5.0kW	
MDMA 4.0kW - 5.0kW	
MFMA 1.5kW	
MGMA 3.0kW - 4.5kW	
MDMA 1.0kW - 3.0kW	
MFMA 400W	· TNR9V820K Nippon Chemi_Con Co.
MFMA 2.5kW - 4.5kW	
MHMA 500W - 1.5kW	

List of Manufacturers for peripheral equipments

(reference only)

Peripheral components	Manufacturer	Tel No./Home Page
Non-fuse breaker Magnetic contactor Surge absorber	Automation Controls Company Matsushita Electric Works, Ltd.	81-6-6908-1131 http://www.mew.co.jp
Regenerative resistor	Iwaki Musen Kenkyusho Co., Ltd.	81-44-833-4311 http://www.iwakimusen.co.jp/
Surge absorber for holding brake	Nippon Chemi_Con Corp. Ishizuka Electronics Corp.	81-3-5436-7608 http://www.chemi_con.co.jp/ 81-3-3621-2703 http://www.semitec.co.jp/
Noise filter for signal lines	TDK Corp.	81-3-5201-7229 http://www.tdk.co.jp/
Surge absorber/Noise filter	Okaya Electric Industries Co. Ltd.	81-3-3424-8120 http://www.okayatec.co.jp/
Connector	Japan Aviation Electronics Industry, Ltd.	81-3-3780-2717 http://www.jae.co.jp
	Sumitomo 3M	81-3-5716-7290 http://www.mmmco.jp
	Tyco Electronics AMP k.k,	81-44-844-8111 http://www.tycoelectronics.com/japan/amp
	Japan Molex Inc.	81-462-65-2313 http://www.molex.co.jp
	Hirose Electric Co., Ltd.	81-3-3492-2161 http://www.hirose.co.jp/
	J.S.T. Mfg. Co., Ltd.	81-45-543-1271 http://www.jst-mfg.com/index_i.html
Cable	Daiden Co., Ltd.	81-3-5805-5880 http://www.dyden.co.jp/
Linear scale	Mitsutoyo Corp.	81-44-813-5410 http://www.mitutoyo.co.jp

* The above list is for reference only. We may change the manufacturer without notice.

When you make your own cable for 17-bit absolute encoder

When you make your own cable for 17-bit absolute encoder, connect the optional battery for absolute encoder, DV0P2990 as per the wiring diagram below. Connector of the battery for absolute encoder to be provided by customer.

<Caution>

Install and fix the battery securely. If the installation and fixing of the battery is not appropriate, it may cause the wire breakdown or damage of the battery.

Refer to the instruction manual of the battery for handling of the battery.

■ where to install the battery

(1) indoors, where the products are not subjected to rain or direct sun beam
 (2) where the products are not subjected to corrosive atmospheres such as hydrogen sulfide, sulfurous acid, chlorine, ammonia, chloric gas, acid, alkaline, salt and so on, and free from splash of inflammable gas, grinding oil, oil mist, iron powder or chips and etc.

(3) well-ventilated and humid and dust free place

(4) vibration-free place

Wiring Diagram

