Panasonic
ideas for life

AC Servo
MINAS A5 series
2009/10
Catalog

http://www.eusens.com/

High performance, multi function and easy use,
all advanced.


DIGITAL AC SERVO MOTOR & DRIVER

MINAS A5

A small step for axis.
Large step ahead for system motion.

# MINAS A5 Series

## Five industry-leading advantages supported by a variety of new technologies and new features.

**1 Quick**
- 2.0 kHz frequency response
- 20 bits/revolution
- Low cogging torque
- The input/output pulse 4 Mpps

**2 Smart**
- Highly functional real-time auto-gain tuning
- Manual/auto notch filter
- Manual/auto damping filter
- Motion simulation

**3 Light**
- New structure
- Innovative core
- Innovative encoder

**4 Safe**
- Complies with European safety standards
- Low noise
- IP67 enclosure rating

**5 Easy**
- Set-up support software
  Localized in 4 languages
  Service life prediction
  Encoder temperature monitor

## Contents



MINAS A5 series Line-up

# 1 Quick

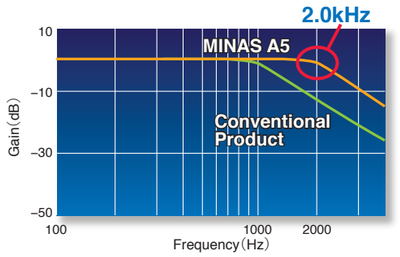
## 2.0 kHz frequency response

2.0kHz

**Example application** Semiconductor production equipment, packaging, etc.

**Achieves the industry's fastest frequency response of 2.0 kHz.**

Operation speed up by new developed LSI and high responsible control. **By the industry's fastest speed and positioning response, a highly advanced system can be created. What's more, the shorter response delay will realize an to extremely lower vibration.**



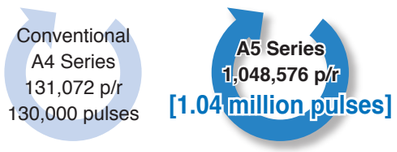

## 20 bits/revolution, 1.04 million pulses

20 bits/rev

**Example application** Machine tools, textile machinery, etc.

**Ensures smoother operation and reduced vibration at stopping.**
**Ensures accurate positioning in a short time.**

New proprietary signal processing technology achieves 1.04 million pulses with a 20-bit encoder.



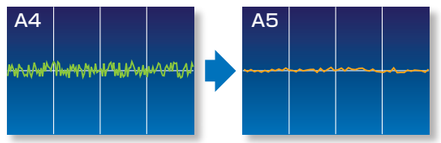

## Low cogging torque (Excluding MSMD, MHMD type)

Low cogging

**Example application** Semiconductor production equipment, textile machinery, etc.

**For the industry's most stable speed and lowest cogging**

We've achieved the industry's lowest cogging by minimizing the pulse width by a new design incorporating a 10-pole rotor for the motor and a magnetic field parsing technique. **Positioning and stability are greatly improved by the minimal torque variation. This results to improved speed stability and positioning of motor rotation.**




Vibration reduced to only **1/8**

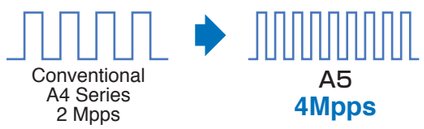
## The input/output pulse 4 Mpps

4 Mpps

**Example application** Semiconductor production equipment, machine tools, etc.

**Accommodates the industry's leading positioning resolution commands (with pulse train commands).**

The command input and feedback output operate at the high speed of 4 Mpps. Accommodates high-resolution and high-speed operation, including standard full closed operation.






# 2 Smart

## Highly Functional Real-time Auto-Gain Tuning

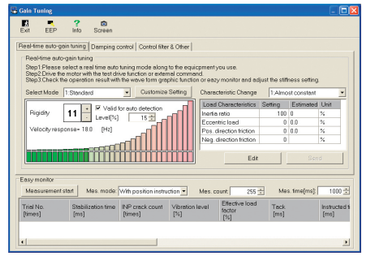
Auto tuning

**Example application** Semiconductor production equipment, food processing machinery, etc.

**Incorporates the industry's quickest high-performance real-time auto-gain tuning featuring simple setup.**

After installation, tuning is completed automatically in several operations. When the response is adjusted, **simple tuning** is supported with a change to one parameter value. Use of the gain adjustment mode in the setup support software contributes to optimum adjustment. **The built-in auto vibration suppression function reduces equipment damage.** Appropriate modes are provided for various machines such as **vertical axis machines and high friction machines with belts**.

This makes it possible to perform simple optimal adjustments simply by selecting the mode and stiffness.



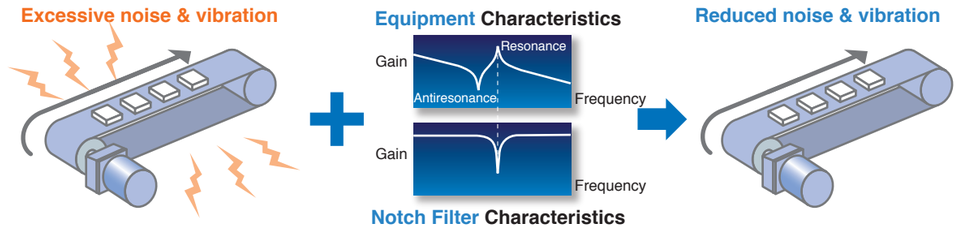

## Manual/Auto Notch Filters

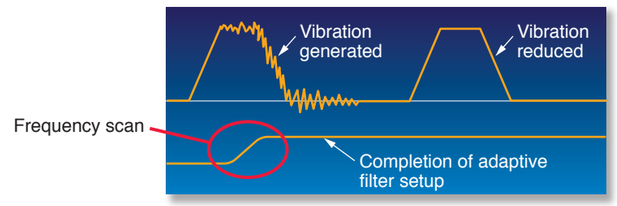
Nocth filters

**Example application** Semiconductor production equipment, food processing machinery, etc.

**Equipped with auto-setting notch filters for greater convenience.**

Now there is no need to measure troublesome vibration frequencies. Our notch filters automatically detect vibration and provide simple auto-setting. These notch filters greatly reduce noise and vibration caused by equipment resonance and respond quickly during operation. The A5 Series features an industry-largest total of four notch filters with setup frequencies of 50 to 5,000 Hz. This approach enables depth adjustment within this frequency range. (Two of the filters share the auto set-up.)



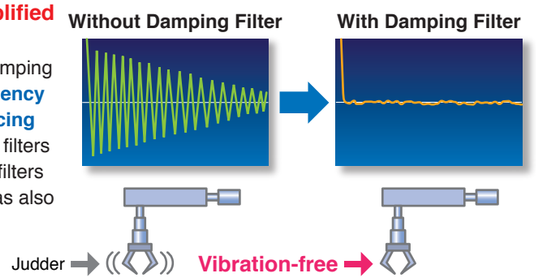
## Manual/Auto Damping Filter

Damping filter

Example application: Chip mounters, food processing machinery, robots, general production machinery, etc.

**Equipped with a damping filter featuring simplified automatic setup.**

The setup software features automatic setup of the damping filter. **This filter removes the natural vibration frequency component from the command input, greatly reducing vibration of the axis when stopping.** The number of filters has been increased to four from the conventional two filters (two for simultaneous use). The adaptive frequency has also been significantly expanded from 1 to 200 Hz.



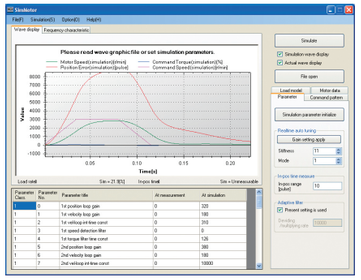

## Motion Simulation

Simulation

Example application: General production machinery, etc.

**Equipped with a simplified machine simulation function.**

The setup software uses frequency response data acquired from the actual machine. In addition, it features a machine simulation function for performing simulated operation. **This allows you to easily confirm the effects of gain and various filters without adjusting the actual equipment.**



3 Light

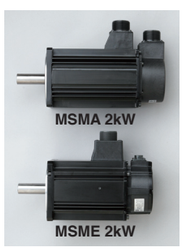
## New Structure/ Innovative Core/ Innovative Encoder (Excluding MSMD, MHMD type)

New structure
Innovative core
Innovative encoder

Example application: Robots, chip mounters, general production machinery, etc.

**Featuring significantly reduced weight and a more compact motor**

We've developed new designs for both compact motors and large motors. The new design used for the core has succeeded in compact. **The addition of an innovative compact encoder has contributed to a 10% to 25% (1 to 6 kg) reduction in motor weight in the 1 kW and larger class when compared with conventional motors.**




[Examples for MSM or MDM]

| | A4 Series | A5 Series | Weight Reduction |
|---|---|---|---|
| MSM 1kW | 4.5kg | 3.5kg | ▲1kg |
| MSM 2kW | 6.5kg | 5.3kg | ▲1.2kg |
| MDM 1kW | 6.8kg | 5.2kg | ▲1.6kg |
| MDM 2kW | 10.6kg | 8.0kg | ▲2.6kg |



4 Safe

## Complies with European Safety Standards. (A5E series doesn't correspond to the safety standard.)

Safe torque off

Example application: Semiconductor and LCD production equipment, etc.

**Complies with the latest European safety standards.**

Features non-software-based (hardware-based?) independent redundant circuitry for motor power isolation. This obviates the need for magnetic contactors to isolate the required motor in order to accommodate low-voltage machinery commands. (The final safety compliance must be applied as machine.)

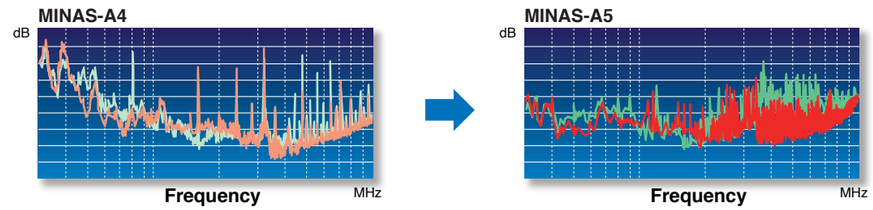
## Low noise

Low noise

Example application: Semiconductor and LCD production equipment, etc. general production machinery for export to the European market

**Complies with the European EMC Directive**

By incorporating the latest circuit technology, A5 series achieves a further noise reduction of 3dB compared with the conventional A4 Series, which also features noise suppression. (The A4 Series also conforms to the EMC Directive.)



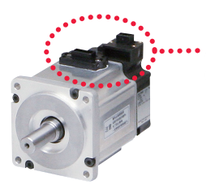

## IP67 Enclosure Rating (Excluding MSMD, MHMD type)

IP67

Example application: Machine tools, robots, printing machines, etc.

**IP67 enclosure rating for increased environmental resistance**

Our improved motor seals and direct-mount connectors in the motor power supply and encoder input-output areas contribute to this unit's IP67 enclosure rating.



Adoption of direct-mount connector

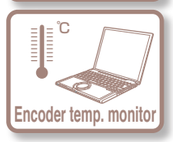
**IP67**

- Protection against dust
  - Protected against dust penetration when in full contact
- Protection against water
  - Protection against temporary immersion in water

IP65: MSMD, MHMD series

5 Easy






## PANATERM Set-up Support Software

**Introducing the new PANATERM Set-up Support Software, now with many added features.**

### Localized in 4 languages

Choose either **English, Japanese, Chinese, or Korean***-language display.
* The Korean-language version is scheduled for release in December.

### Service Life Prediction

The service life prediction function considers the internal temperature for main components such as the fan and condenser. If the rated value is exceeded, an alarm is displayed. **This approach prevents unexpected suspension of operation and allows for planning of systemized maintenance.**
Note: The life span prediction value should be considered as a guide only.

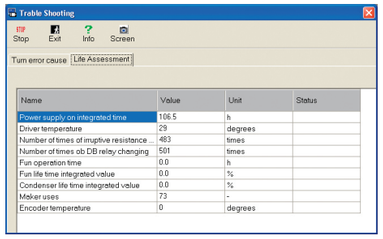
### Encoder Temperature Monitor

The Encoder Temperature Monitor is a new function capable of **real-time measurement of the interior temperature of the encoder, something that has been difficult to achieve in the past**. It is valuable for monitoring the motor and can be used as a diagnostic in the event of a malfunction (provided with 20-bit encoder only).

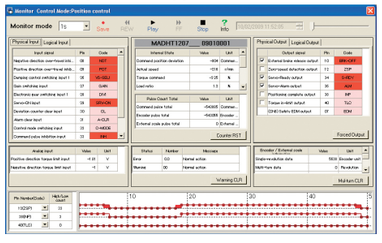
### Other New Function

The software offers a wide range of convenient features including motor and driver data such as load factor, voltage, and driver temperature. Moreover, the logging function records the interface history. As well, the trial run function supports positioning with a Z-phase search and software limit as well as a non-rotating contributing factor display function.

・**Service Life Prediction function**
(Screen shown for reference only.)




・**The Data Logging function handles a variety of data types.**





Other Functions

### Command Control Mode (Excluding A5E Series)

- Command control mode is available for Position, Speed (including eight internal gears) and Torque.
- Using parameter settings, you can set up one optional command control mode or two command control modes by switching.
- With a suitable application utility, you can choose an optional command control mode.

### Full closed Control (Excluding A5E Series)

You can use the AB-phase linear scale (for general all-purpose products) or the serial scale (for products with Panasonic□s exclusive format) for supported scales (see table below).

### SEMI F47

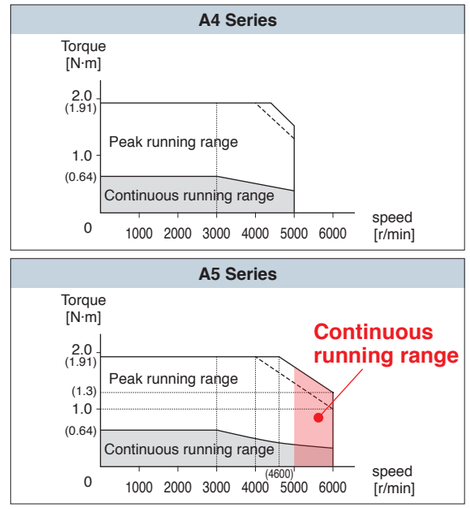
- Includes a function in compliance with the SEMI F47 standard for voltage sag immunity under no load or light load.
- Ideal for the semiconductor and LCD industries.

Notes:
1) Excluding the single-phase 100-V type.
2) Please verify the actual compliance of your machine with the F47 standard for voltage sag immunity.

### 6,000-rpm capability

The MSME motor (under 750 W) can accommodate a maximum speed of 6,000 r/min.

[Comparison of new and conventional 200 W]




### Inrush Current Preventive Function

- This driver is equipped with a rush current preventive resistor to prevent the circuit breaker from shutting off the power supply as a result of inrush current occurring at power-on.

**Table 1**

| Applicable Linear Scale | Manufacturer | Model No. | Resolution [μs] | Maximum Speed (m/s) * |
|---|---|---|---|---|
| Parallel Type (AB-phase) | General | — | Maximum speed after 4 × multiplication: 4 Mpps | |
| Serial Type (Incremental) | Sony Manufacturing Systems Corporation | SR75 | 0.01 | 3.3 |
| | | SR85 | 0.01 | 3.3 |
| | | SL700/PL101-RP | 0.1 | 10 |
| | | SL710/PL101-RP | 0.1 | 10 |
| Serial Type (Absolute) | Mitutoyo Corporation | AT573A | 0.05 | 2 |
| | | ST771A(L) | 0.5 | 5 |
| | | ST773A(L) | 0.1 | 4 |
| | Sony Manufacturing Systems Corporation | SR77 | 0.01 | 3.3 |
| | | SR87 | 0.01 | 3.3 |

* The maximum speed is a characteristic of the driver. It is limited by the configuration of the machine and the system.

## Regenerative Energy Discharge

- A regenerative resistor is used to discharge regenerative energy, which is the energy generated when stopping a load with a large moment of inertia or when using this unit in vertical operation. This energy is returned to the driver from the motor.
- Frame A and Frame B model drivers do not contain a regenerative resistor. We recommend that you connect an optional regenerative resistor.
- Frame C to Frame F model drivers contain one regenerative resistor; however, adding an optional regenerative resistor provides additional regeneration capability.

## Dynamic Braking

- With parameter settings, you can select dynamic braking, which shorts servomotor windings U, V and W at Servo-OFF, during positive direction/ negative direction over-travel inhibition, and during power shutdown and tripping of the circuit breaker.
- The desired action sequence can be set up to accommodate your machine requirements.

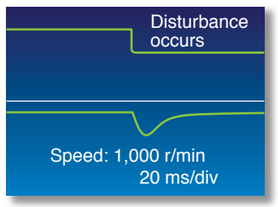
## Parameter Initialization

Using the front panel or by connecting a PC, you can restore the parameters to the factory settings.

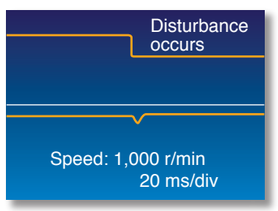
## Disturbance Observer

By using a disturbance observer to add an estimated disturbance torque value to the torque canceling command, this function diminishes the impact of the disturbance torque, reduces vibration, and offsets any speed decline.

Disturbance observer function not in effect




Disturbance observer function in effect




## Torque Feed Forward

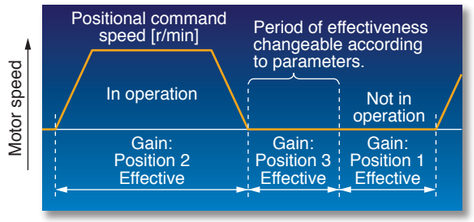
The Torque Feed Forward function performs a comparison with feedback and calculates the amount of torque to add to the necessary torque command in the command for actuation.

## Friction Torque Compensation

This function reduces the effect of machine-related friction and improves responsiveness. Two kinds of friction compensation can be set up: unbalanced load compensation, which compensates with a constant operational offset torque; and kinetic friction, which changes direction in response to the direction of movement.

## 3-Step Gain

A 3-step gain switch is available in addition to the normal gain switch.
This chooses appropriate gain tunings at both stopping and running.
The 3-step gain switch gives you choices of 3 diffent tunings for normal running, stopping for faster positioning and at stopping.
The right gaing tunings achieve lower vibration and quicker positioning time of your application.




## Inertia Ratio Conversion

You can adjust right inertia ratio by Inertia Ratio Conversion input(J-SEL).
When you have significant load inertia changes, it can adjust unbalanced speed and position gain turning conbination.
It ends up quicker response of your system.

## Input/Output Signal Assignment

**You can use the parameters to arbitrarily allocate the universal 10 inputs and 6 outputs.** (Inputs can be selected as either A contacts or B contacts). The Panaterm setup software provides an exclusive screen for a more simplified setup.

## Torque Limiter Switching

You can use the I/Os to set up torque limits. These can be used for applications such as simplified pressure, tension control, and sensor-less homing.

## Applicable overseas safety standards

| | | Driver | Motor |
|---|---|---|---|
| EC Directives | EMC Directives | EN55011<br>EN61000-6-2<br>IEC61800-3 | — |
| | Low-Voltage Directives | EN61800-5-1 | EN60034-1<br>EN60034-5 |
| | Functional safety | EN954-1(CAT3)<br>ISO13849-1(PL-D)<br>EN61508(SIL2)<br>EN62061(SIL2)<br>EN61800-5-2(STO)<br>IEC61326-3-1 | — |
| UL Standards | | UL508C (E164620) | UL1004-1 (E327868: Small type)<br>UL1004 (E166557: Large type) |
| CSA Standards | | C22.2 No.14 | C22.2 No.100 |

IEC : International Electrotechnical Commission
EN : Europaischen Normen
EMC : Electromagnetic Compatibility
UL : Underwriters Laboratories
CSA : Canadian Standards Association

Pursuant to the directive 2004/108/EC, article 9(2)
Panasonic Testing Centre
Panasonic Service Europe, a division of
Panasonic Marketing Europe GmbH
Winsbergring 15, 22525 Hamburg, F.R. Germany

* When export this product, follow statutory provisions of the destination country.
* A5E series doesn't correspond to the functional safety standard.

MEMO

# Motor Line-up/ Driver and Motor Combination

## Motor Line-up

| | | Low inertia | | | Middle inertia | | High inertia | |
|---|---|---|---|---|---|---|---|---|
| | | MSMD (Small type) | MSME (Small type) | MSME (Large type) | MDME | MGME (Low speed/ High torque type) | MHMD | MHME |
| Motor | |  |  |  |  |  |  |  |
| Rated output (kW) | | 0.05 0.1 0.2 0.4 0.75 | 0.05 0.1 0.2 0.4 0.75 | 1.0 1.5 2.0 3.0 4.0 5.0 | 1.0 1.5 2.0 3.0 4.0 5.0 | 0.9 2.0 3.0 | 0.2 0.4 0.75 | 1.0 1.5 2.0 3.0 4.0 5.0 |
| Rated rotational speed (Max. speed) (r/min) | | 3000 (5000) For 750W 3000 (4500) | 3000 (6000) | 3000 (5000) For 4.0kW and 5.0kW 3000 (4500) | 2000 (3000) | 1000 (2000) | 3000 (5000) For 750W 3000 (4500) | 2000 (3000) |
| Rotary encoder | 20-bit incremental | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| | 17-bit absolute | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Enclosure | | IP65 (*) | IP67 (*) | IP67 (*) | IP67 (*) | IP67 (*) | IP65 (*) | IP67 (*) |
| Features | | • Leadwire type<br>• Small capacity<br>• Suitable for high speed application<br>• Suitable for all applications | • Small capacity<br>• Suitable for high speed application<br>• Suitable for all applications | • Middle capacity<br>• Suitable for the machines directly coupled with ball screw and high stiffness and high repetitive | • Middle capacity<br>• Suitable for low stiffness machines with belt driven | • Middle capacity<br>• Flat type and suitable for machines with space limitation | • Leadwire type<br>• Small capacity<br>• Suitable for low stiffness machines with belt driven | • Middle capacity<br>• Suitable for low stiffness machines with belt driven, and large load moment of inertia |
| Applications | | • Bonder<br>• Semiconductor production equipment<br>• Packing machines etc | | • SMT machines<br>• Food machines<br>• LCD production equipment | • Conveyors<br>• Robots<br>• Machine tool etc | • Conveyors<br>• Robots<br>• Textile machines etc | • Conveyors<br>• Robots | • Conveyors<br>• Robots<br>• LCD manufacturing equipment etc |

(*) Except for output shaft, and connector.

## Driver and Motor Combination

| Driver | | Motor | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Frame | Part No. | MSMD | MSME | MSME | MDME | MGME | MHMD | MHME |
| A-Frame | MADHT1105 | MSMD5AZ✻✻✻ | MSME5AZ✻✻✻ | | | | | |
| | MADHT1107 | MSMD011✻✻✻ | MSME011✻✻✻ | | | | | |
| | MADHT1505 | MSMD5AZ✻✻✻ | MSME5AZ✻✻✻ | | | | | |
| | | MSMD012✻✻✻ | MSME012✻✻✻ | | | | | |
| | MADHT1507 | MSMD022✻✻✻ | MSME022✻✻✻ | | | | MHMD022✻✻✻ | |
| B-Frame | MBDHT2110 | MSMD021✻✻✻ | MSME021✻✻✻ | | | | MHMD021✻✻✻ | |
| | MBDHT2510 | MSMD042✻✻✻ | MSME042✻✻✻ | | | | MHMD042✻✻✻ | |
| C-Frame | MCDHT3120 | MSMD041✻✻✻ | MSME041✻✻✻ | | | | MHMD041✻✻✻ | |
| | MCDHT3520 | MSMD082✻✻✻ | MSME082✻✻✻ | | | | MHMD082✻✻✻ | |
| D-Frame | MDDHT3530 | | | | MDME102✻✻✻ | | | MHME102✻✻✻ |
| | MDDHT2412 | | | | MDME104✻✻✻ | | | MHME104✻✻✻ |
| | MDDHT5540 | | | MSME102✻✻✻ | MDME152✻✻✻ | MGME092✻✻✻ | | MHME152✻✻✻ |
| | | | | MSME152✻✻✻ | | | | |
| | MDDHT3420 | | | MSME104✻✻✻ | MDME154✻✻✻ | MGME094✻✻✻ | | MHME154✻✻✻ |
| | | | | MSME154✻✻✻ | | | | |
| E-Frame | MEDHT7364 | | | MSME202✻✻✻ | MDME202✻✻✻ | | | MHME202✻✻✻ |
| | MEDHT4430 | | | MSME204✻✻✻ | MDME204✻✻✻ | | | MHME204✻✻✻ |
| F-Frame | MFDHTA390 | | | MSME302✻✻✻ | MDME302✻✻✻ | MGME202✻✻✻ | | MHME302✻✻✻ |
| | MFDHT5440 | | | MSME304✻✻✻ | MDME304✻✻✻ | MGME204✻✻✻ | | MHME304✻✻✻ |
| | MFDHTB3A2 | | | MSME402✻✻✻ | MDME402✻✻✻ | MGME302✻✻✻ | | MHME402✻✻✻ |
| | | | | MSME502✻✻✻ | MDME502✻✻✻ | | | MHME502✻✻✻ |
| | MFDHTA464 | | | MSME404✻✻✻ | MDME404✻✻✻ | MGME304✻✻✻ | | MHME404✻✻✻ |
| | | | | MSME504✻✻✻ | MDME504✻✻✻ | | | MHME504✻✻✻ |

**Motor (Scheduled to be released.)**
- MDME 7.5kW, 11kW, 15kW
- MHME 7.5kW
- MGME 4.5kW, 6.0kW
- MFME 1.5kW, 2.5kW, 4.5kW
- Motor with Gear Reduce: 100W, 200W, 400W, 750W

* A5E series (dedicated for position control) drivers are also used in combination with motors show above.





# Model Designation

## Servo Motor

M S M E 5 A Z G 1 S ✻ ✻

| Symbol | Type |
|---|---|
| MSMD | Low inertia (50W to 750W) |
| MSME | Low inertia (50W to 5.0kW) |
| MDME | Middle inertia (1.0kW to 5.0kW) |
| MGME | Middle inertia (0.9kW to 3.0kW) |
| MHMD | High inertia (200W to 750W) |
| MHME | High inertia (1.0kW to 5.0kW) |

**Motor rated output**

| Symbol | Rated output | Symbol | Rated output |
|---|---|---|---|
| 5A | 50W | 10 | 1.0kW |
| 01 | 100W | 15 | 1.5kW |
| 02 | 200W | 20 | 2.0kW |
| 04 | 400W | 30 | 3.0kW |
| 08 | 750W | 40 | 4.0kW |
| 09 | 0.9kW | 50 | 5.0kW |

**Voltage specifications**

| Symbol | Specifications |
|---|---|
| 1 | 100V |
| 2 | 200V |
| 4 | 400V |
| Z | 100V/200V common (50W only) |

**Rotary encoder specifications**

| Symbol | Format | Pulse counts | Resolution | Wires |
|---|---|---|---|---|
| G | Incremental | 20-bit | 1,048,576 | 5 |
| S | Absolute | 17-bit | 131,072 | 7 |

* S: can be used in incremental.

**Design order**
**1 : Standard**

**Special specifications**

**Motor specifications**
**MSME(50W to 750W), MSMD, MHMD**

| Symbol | Shaft | | Holding brake | | Oil seal | |
|---|---|---|---|---|---|---|
| | Round | Key-way, center tap | without | with | without | with |
| A | ● | | ● | | ● | |
| B | ● | | | ● | ● | |
| C | ● | | ● | | | ● |
| D | ● | | | ● | | ● |
| S | | ● | ● | | ● | |
| T | | ● | | ● | ● | |
| U | | ● | ● | | | ● |
| V | | ● | | ● | | ● |

**MSME(1.0kW to 5.0kW), MDME, MGME, MHME**

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

## Motor with reduction gear

M S M E 0 1 1 G 3 1 N

| Symbol | Type |
|---|---|
| MSME | Low inertia (50W to 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 |
|---|---|---|---|---|
| G | Incremental | 20-bit | 1,048,576 | 5 |
| S | Absolute | 17-bit | 131,072 | 7 |

* S: can be used in incremental.

**Gear ratio, gear type**

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

**Motor structure**

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

## Servo Driver

**Standard type** M A D H T 1 5 0 5 ✻ ✻ ✻ — **Special specifications**

**Positioning type** M A D H T 1 5 0 5 E ✻ ✻ — **Special specifications**

**Only position control**

**Frame symbol**

| Symbol | Frame |
|---|---|
| MADH | Frame A |
| MBDH | Frame B |
| MCDH | Frame C |
| MDDH | Frame D |
| MEDH | Frame E |
| MFDH | Frame F |

**Power device Max. current rating**

| Symbol | Current rating |
|---|---|
| T1 | 10A |
| T2 | 15A |
| T3 | 30A |
| T4 | 35A |
| T5 | 50A |
| T7 | 75A |
| TA | 100A |
| TB | 150A |

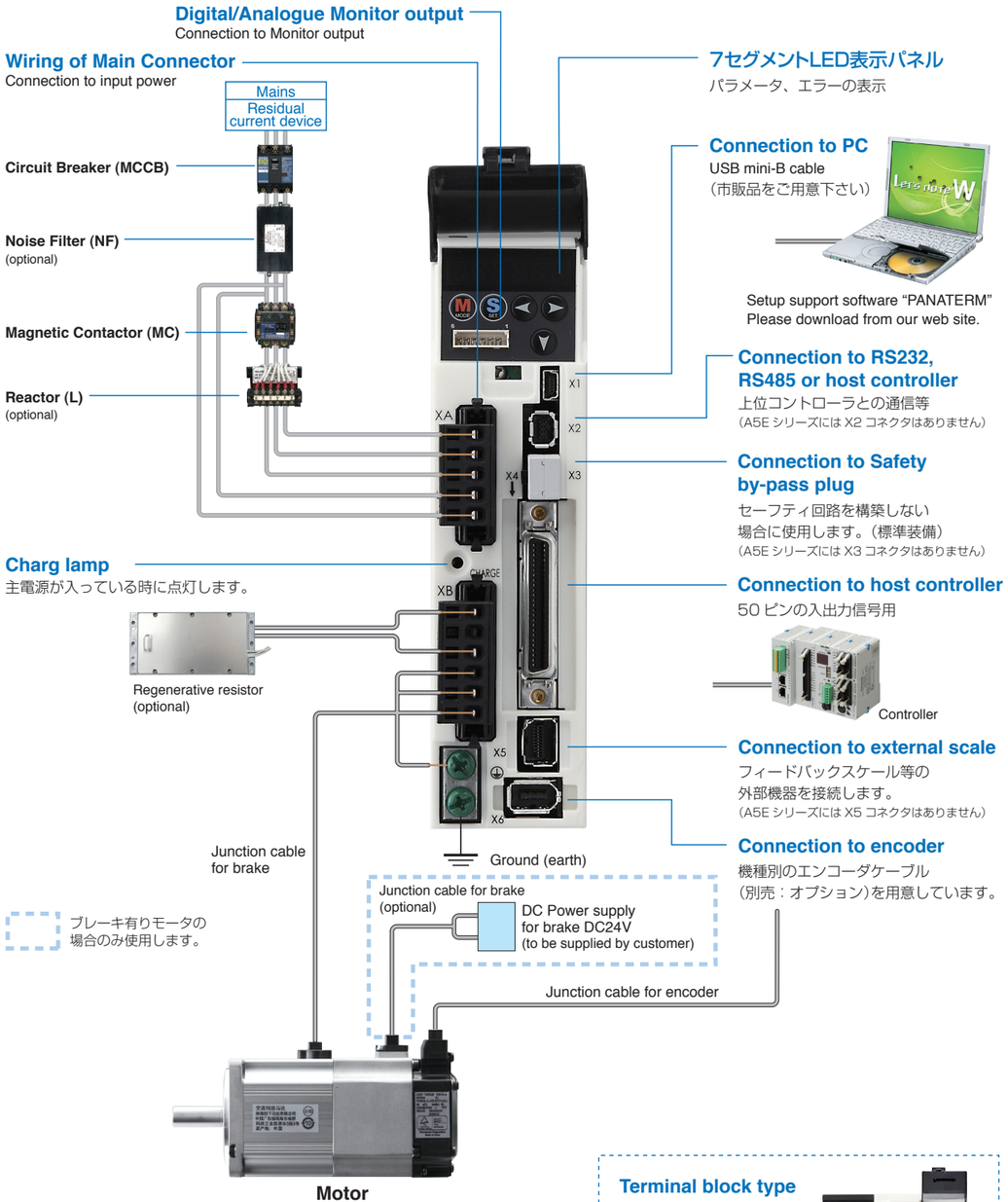
**Supply voltage specifications**

| Symbol | Specifications |
|---|---|
| 1 | Single phase, 100V |
| 3 | 3-phase, 200V |
| 4 | 3-phase, 400V |
| 5 | Single/3-phase, 200V |

**Current detector current rating**

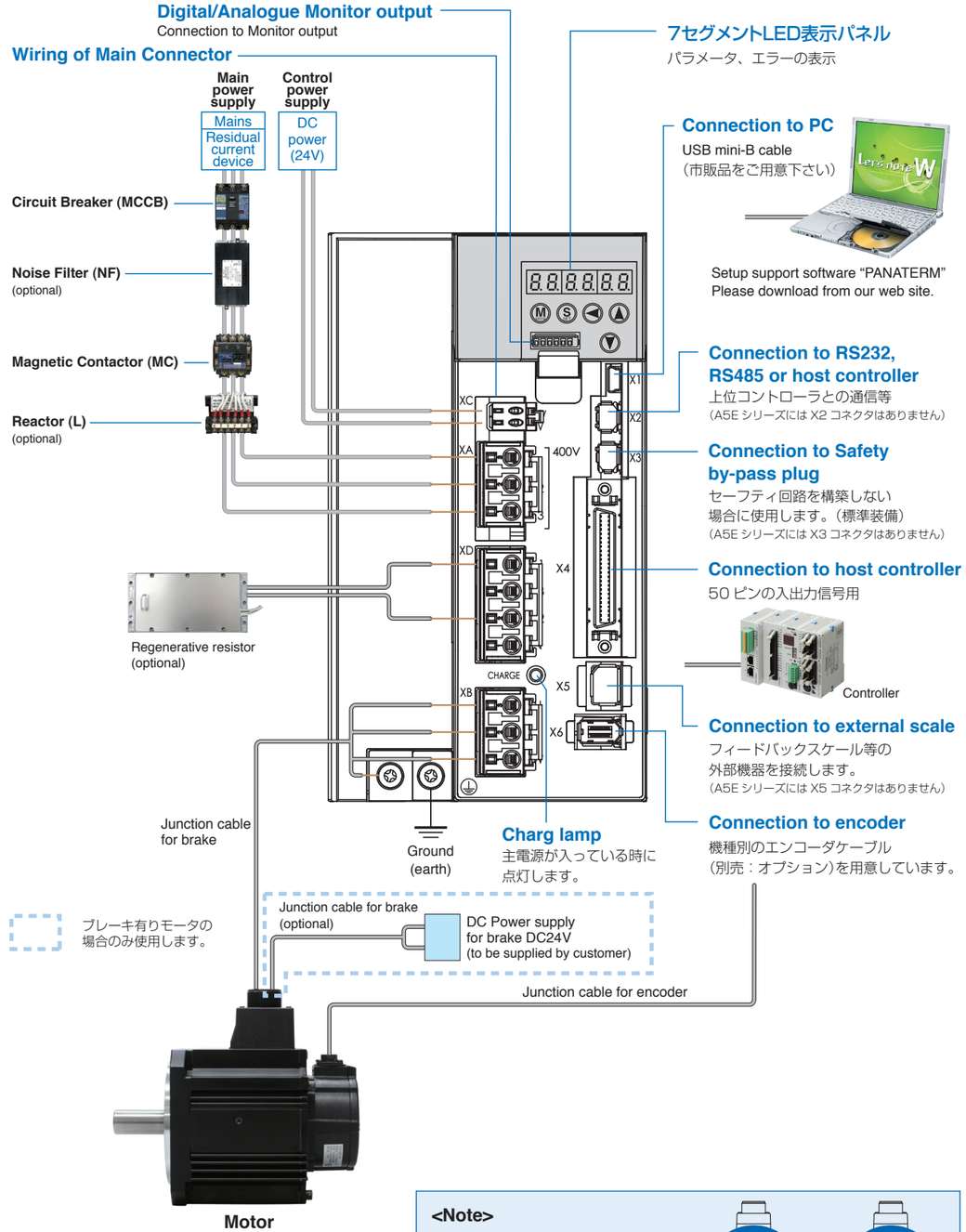
| Symbol | Current rating |
|---|---|
| 05 | 5A |
| 07 | 7.5A |
| 10 | 10A |
| 12 | 12A |
| 20 | 20A |
| 30 | 30A |
| 40 | 40A |
| 64 | 64A |
| 90 | 90A |
| A2 | 120A |

## [Connector type (A to E-frame)]



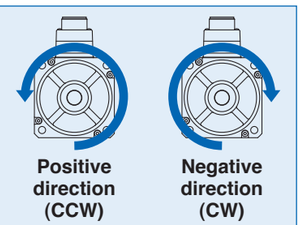

**Terminal block type (F-frame)**

## [Connector type (D, E-frame 400V)]




**<Caution>**
製品の取り付けネジの締付トルクは使用されるネジの強度、取り付け先の材質を考慮し、緩みや破損の無い様に適切に選定してください。
例）鋼材への鋼材ネジ（M5）での締付けの場合、2.7～3.3N·m。

**<Note>**
回転方向の初期設定を正方向(CCW)、負方向(CW)と定義しています。
ご注意ください。



# Driver and List of Applicable Peripheral Equipments

| Driver | Applicable motor | Voltage | Rated output | Required Power (at the rated load) | Circuit breaker (rated current) | Surge absorber | Noise filter for signal | Magnetic contactor (定格通電電流／開放熱電流) | Cable diameter (main circuit) | Cable diameter (control circuit) | Connection |
|---|---|---|---|---|---|---|---|---|---|---|---|
| MADH | MSMD<br>MSME<br>MHMD | Single phase, 100V | 50W to 100W | approx. 0.4kVA | 10A | DV0P4190 | DV0P1460 | 20A | 0.75mm²/ AWG18 to 2.0mm²/ AWG14 | 0.75mm²/ AWG18 | Connection to exclusive connector |
| | | Single/3-phase, 200V | 50W to 200W | approx. 0.5kVA | | DV0P4190<br>DV0P1450 | | | | | |
| MBDH | MSMD<br>MSME<br>MHMD | Single phase, 100V | 200W | approx. 0.5kVA | | DV0P4190 | | | | | |
| | | Single/3-phase, 200V | 400W | approx. 0.9kVA | | DV0P4190<br>DV0P1450 | | | | | |
| MCDH | MSMD<br>MSME<br>MHMD | Single phase, 100V | 400W | approx. 0.9kVA | | DV0P4190 | | | | | |
| | | Single/3-phase, 200V | 750W | approx. 1.3kVA | 15A | DV0P4190<br>DV0P1450 | | | | | |
| MDDH | MDME | Single/3-phase, 200V | 1.0kW | approx. 1.8kVA | | | | 30A | 2.0mm²/ AWG14 | 0.5mm²/ AWG 20～24 | |
| | MHME | | | | | | | | | | |
| | MGME | | 900W | approx. 1.8kVA | 20A | | | | | | |
| | MSME | | 1.0kW | approx. 1.8kVA | | | | | | | |
| | MHME | | 1.5kW | approx. 2.3kVA | | | | | | | |
| | MDME | | | | | | | | | | |
| | MSME | | | | | | | | | | |
| | MSME | 3-phase, 400V | 1.0kW | approx. 1.8kVA | 10A | DV0PM20050 | | 20A | | | |
| | MDME | | | | | | | | | | |
| | MHME | | | | | | | | | | |
| | MGME | | 0.9kW | | | | | | | | |
| | MSME | | 1.5kW | approx. 2.3kVA | | | | | | | |
| | MDME | | | | | | | | | | |
| | MHME | | | | | | | | | | |
| MEDH | MDME<br>MSME<br>MHME | 3-phase, 200V | 2.0kW | approx. 3.3kVA | 30A | DV0P1450 | | 60A | | 0.75mm²/ AWG18 | |
| | MSME<br>MDME<br>MHME | 3-phase, 400V | 2.0kW | approx. 3.3kVA | 15A | DV0PM20050 | | 30A | | 0.5mm²/ AWG 20～24 | |
| MFDH | MGME | 3-phase, 200V | 2.0kW | approx. 3.8kVA | 50A | DV0P1450 | | 60A | 3.5mm²/ AWG12 | 0.75mm²/ AWG18 | 11mm or smaller φ5.3 Terminal block M5 |
| | MDME | | 3.0kW | approx. 4.5kVA | | | | | | | |
| | MHME | | | | | | | | | | |
| | MSME | | | | | | | | | | |
| | MGME | | | | | | | 100A | | | |
| | MDME | | 4.0kW | approx. 6kVA | | | | | 5.3mm²/ AWG10 | | |
| | MHME | | | | | | | | | | |
| | MSME | | | | | | | | | | |
| | MDME | | 5.0kW | approx. 7.5kVA | | | | | | | |
| | MHME | | | | | | | | | | |
| | MSME | | | | | | | | | | |
| | MGME | 3-phase, 400V | 2.0kW | approx. 3.8kVA | 30A | DV0PM20050 | | 60A | 3.5mm²/ AWG12 | | |
| | MSME | | 3.0kW | approx. 4.5kVA | | | | | | | |
| | MDME | | | | | | | | | | |
| | MGME | | | | | | | | | | |
| | MHME | | | | | | | | | | |
| | MSME | | 4.0kW | approx. 6.8kVA | | | | | | | |
| | MDME | | | | | | | | | | |
| | MHME | | | | | | | | | | |
| | MSME | | 5.0kW | approx. 7.5kVA | | | | | | | |
| | MDME | | | | | | | | | | |
| | MHME | | | | | | | | | | |



- Select peripheral equipments for single/3phase common specification according to the power source.
- About circuit breaker and magnetic contactor

  **To comply to EC Directives, install a circuit breaker between the power and the noise filter without fail, and the circuit breaker should conform to IEC Standards and UL recognized (Listed and Ⓤ marked).**

  Suitable for use on a circuit capable of delivering not more than 5,000 rms symmetrical amperes, below the maximum input voltage of the product.

  If the short-circuit current of the power supply exceeds this value, install a current limit device (current limiting fuse, current limiting circuit breaker, transformer, etc.) to limit the short-circuit current.

**<Remarks>**

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

  Use a copper conductor cables with temperature rating of 75˚C or higher.

  The screws of protective earth terminals for Frame A to D are M4 (Fastening torque: 0.7 to 0.8N·m) and M5 (Fastening torque: 1.4 to 1.6N·m) for Frame E, F.

  Fastening torque of earth screws.

  Tighten the terminal block screw on frame F with a torque between 1.0 and 2.0 N·m. Application of overtorque (more than 2.0 N·m) will cause damage to terminal block. Maximum allowable torque to the screw securing terminal block cover is 0.19 to 0.21 N·m.
- The cable diameter of an earth cable.

  Use an earth cable with the same diameter or larger as that of the main circuit cable.

  If the diameter of the main circuit cable is 1.6mm² or less, use an earth cable with a diameter of 2.0mm² (AWG14).
- Use the attached exclusive connector for A to E-frame, and maintain the peeled off length of 8 to 9mm.
- Tighten the screws of the connector, Connector X4 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.

**<Caution>**

Do not turn on power without tightening all terminal block screws properly, otherwise, loose contacts may generate heat (smoking, firing).

# Table of Part Numbers and Options

| Motor | | | | | | Driver | | | Power capacity (atrated load) | Optional parts | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Motor series | | Power supply | Output (W) | Part No. Note) 1 | Rating/ Spec. (page) | Part No. (Standard type) | Part No. (Positioning type) | Frame | | Encoder cable: 20-bit Incremental Note) 2 | Encoder cable: 17-bit Absolute Note) 2 | Motor cable: without brake Note) 2 | Motor cable: with brake Note) 2 | Brake cable Note) 2 | Regenerative resistor | Reactor | Noise filter |
| Low inertia | MSMD (Leadwire type) 3000r/min | Single phase 100V | 50 | MSMD5AZ□1✻ | 66 | MADHT1105 | MADHT1105E | A-frame | Approx. 0.4kVA | MFECA 0**0EAM | MFECA 0**0EAE | MFMCA 0**0EED | — | MFMCB 0**0GET | DV0P4280 | DV0P227 | DV0P4170 |
| | | | 100 | MSMD011□1✻ | 68 | MADHT1107 | MADHT1107E | | Approx. 0.4kVA | | | | | | | | |
| | | | 200 | MSMD021□1✻ | 70 | MBDHT2110 | MBDHT2110E | B-frame | Approx. 0.5kVA | | | | | | DV0P4283 | DV0P228 | |
| | | | 400 | MSMD041□1✻ | 72 | MCDHT3120 | MCDHT3120E | C-frame | Approx. 0.9kVA | | | | | | DV0P4282 | | DV0P20042 |
| | | Single phase/ 3-phase 200V | 50 | MSMD5AZ□1✻ | 67 | MADHT1505 | MADHT1505E | A-frame | Approx. 0.5kVA | | | | | | DV0P4281 | DV0P220 | |
| | | | 100 | MSMD012□1✻ | 69 | MADHT1505 | MADHT1505E | | Approx. 0.5kVA | | | | | | | | |
| | | | 200 | MSMD022□1✻ | 71 | MADHT1507 | MADHT1507E | | Approx. 0.5kVA | | | | | | | | DV0PM20042 |
| | | | 400 | MSMD042□1✻ | 73 | MBDHT2510 | MBDHT2510E | B-frame | Approx. 0.9kVA | | | | | | DV0P4283 | DV0P221 | |
| | | | 750 | MSMD082□1✻ | 74 | MCDHT3520 | MCDHT3520E | C-frame | Approx. 1.3kVA | | | | | | | | |
| | MSME 3000r/min | Single phase 100V | 50 | MSME5AZ□1✻ | 36 | MADHT1105 | MADHT1105E | A-frame | Approx. 0.4kVA | MFECA 0**0MJD | MFECA 0**0MJE | MFMCA 0**0NJD | — | MFMCB 0**0PJT | DV0P4280 | DV0P227 | DV0P4170 |
| | | | 100 | MSME011□1✻ | 38 | MADHT1107 | MADHT1107E | | Approx. 0.4kVA | | | | | | | | |
| | | | 200 | MSME021□1✻ | 40 | MBDHT2110 | MBDHT2110E | B-frame | Approx. 0.5kVA | | | | | | DV0P4283 | DV0P228 | |
| | | | 400 | MSME041□1✻ | 42 | MCDHT3120 | MCDHT3120E | C-frame | Approx. 0.9kVA | | | | | | DV0P4282 | | DV0PM20042 |
| | | Single phase/ 3-phase 200V | 50 | MSME5AZ□1✻ | 37 | MADHT1505 | MADHT1505E | A-frame | Approx. 0.5kVA | | | | | | DV0P4281 | DV0P220 | |
| | | | 100 | MSME012□1✻ | 39 | MADHT1505 | MADHT1505E | | Approx. 0.5kVA | | | | | | | | |
| | | | 200 | MSME022□1✻ | 41 | MADHT1507 | MADHT1507E | | Approx. 0.5kVA | | | | | | | | DV0PM20042 |
| | | | 400 | MSME042□1✻ | 43 | MBDHT2510 | MBDHT2510E | B-frame | Approx. 0.9kVA | | | | | | DV0P4283 | DV0P221 | |
| | | | 750 | MSME082□1✻ | 44 | MCDHT3520 | MCDHT3520E | C-frame | Approx. 1.3kVA | | | | | | | | |
| | MSME 3000r/min | Single phase/ 3-phase 200V | 1000 | MSME102□1✻ | 45 | MDDHT5540 | MDDHT5540E | D-frame | Approx. 1.8kVA | MFECA 0**0ETD | MFECA 0**0ETE | MFMCD 0**2ECD | MFMCA 0**2FCD | — | DV0P4284 | DV0P222 | DV0P4220 |
| | | | 1500 | MSME152□1✻ | 46 | MDDHT5540 | MDDHT5540E | | Approx. 2.3kVA | | | | | | | | |
| | | 3-phase 200V | 2000 | MSME202□1✻ | 47 | MEDHT7364 | MEDHT7364E | E-frame | Approx. 3.3kVA | | | | | | DV0P4285 | DV0P223 | DV0PM20043 |
| | | | 3000 | MSME302□1✻ | 48 | MFDHTA390 | MFDHTA390E | | Approx. 4.5kVA | | | | | | | DV0P224 | |
| | | | 4000 | MSME402□1✻ | 49 | MFDHTB3A2 | MFDHTB3A2E | F-frame | Approx. 6kVA | | | MFMCA 0**3ECT | MFMCA 0**3FCT | | DV0P4285 × 2 in parallel | DV0P225 | DV0P3410 |
| | | | 5000 | MSME502□1✻ | 50 | MFDHTB3A2 | MFDHTB3A2E | | Approx. 7.5kVA | | | | | | | — | |
| | | 3-phase 400V | 1000 | MSME104□1✻ | 82 | MDDHT3420 | MDDHT3420E | D-frame | Approx. 1.8kVA | | | MFMCD 0**2ECD | MFMCE 0**2FCD | | DV0PM20048 | — | — |
| | | | 1500 | MSME154□1✻ | 83 | MDDHT3420 | MDDHT3420E | | Approx. 2.3kVA | | | | | | | | |
| | | | 2000 | MSME204□1✻ | 84 | MEDHT4430 | MEDHT4430E | E-frame | Approx. 3.3kVA | | | | | | DV0PM20049 | | |
| | | | 3000 | MSME304□1✻ | 85 | MFDHT5440 | MFDHT5440E | F-frame | Approx. 4.5kVA | | | MFMCA 0**3ECT | MFMCA 0**3FCT | | DV0PM20049 × 2 in parallel | | |
| | | | 4000 | MSME404□1✻ | 86 | MFDHTA464 | MFDHTA464E | | Approx. 6.8kVA | | | | | | | | |
| | | | 5000 | MSME504□1✻ | 87 | MFDHTA464 | MFDHTA464E | | Approx. 7.5kVA | | | | | | | | |
| Middle inertia | MDME 2000r/min | Single phase/ 3-phase 200V | 1000 | MDME102□1✻ | 51 | MDDHT3530 | MDDHT3530E | D-frame | Approx. 1.8kVA | MFECA 0**0ETD | MFECA 0**0ETE | MFMCD 0**2ECD | MFMCA 0**2FCD | — | DV0P4284 | DV0P222 | DV0P4220 |
| | | | 1500 | MDME152□1✻ | 52 | MDDHT5540 | MDDHT5540E | | Approx. 2.3kVA | | | | | | | | |
| | | 3-phase 200V | 2000 | MDME202□1✻ | 53 | MEDHT7364 | MEDHT7364E | E-frame | Approx. 3.3kVA | | | | | | DV0P4285 | DV0P223 | DV0PM20043 |
| | | | 3000 | MDME302□1✻ | 54 | MFDHTA390 | MFDHTA390E | | Approx. 4.5kVA | | | | | | | DV0P224 | |
| | | | 4000 | MDME402□1✻ | 55 | MFDHTB3A2 | MFDHTB3A2E | F-frame | Approx. 6kVA | | | MFMCA 0**3ECT | MFMCA 0**3FCT | | DV0P4285 × 2 in parallel | DV0P225 | DV0P3410 |
| | | | 5000 | MDME502□1✻ | 56 | MFDHTB3A2 | MFDHTB3A2E | | Approx. 7.5kVA | | | | | | | — | |
| | | 3-phase 400V | 1000 | MDME104□1✻ | 88 | MDDHT2412 | MDDHT2412E | D-frame | Approx. 1.8kVA | | | MFMCD 0**2ECD | MFMCE 0**2FCD | | DV0PM20048 | — | — |
| | | | 1500 | MDME154□1✻ | 89 | MDDHT3420 | MDDHT3420E | | Approx. 2.3kVA | | | | | | | | |
| | | | 2000 | MDME204□1✻ | 90 | MEDHT4430 | MEDHT4430E | E-frame | Approx. 3.3kVA | | | | | | DV0PM20049 | | |
| | | | 3000 | MDME304□1✻ | 91 | MFDHT5440 | MFDHT5440E | F-frame | Approx. 4.5kVA | | | MFMCA 0**3ECT | MFMCA 0**3FCT | | DV0PM20049 × 2 in parallel | | |
| | | | 4000 | MDME404□1✻ | 92 | MFDHTA464 | MFDHTA464E | | Approx. 6.8kVA | | | | | | | | |
| | | | 5000 | MDME504□1✻ | 93 | MFDHTA464 | MFDHTA464E | | Approx. 7.5kVA | | | | | | | | |
| | MGME 1000r/min | Single phase/ 3-phase 200V | 900 | MGME092□1✻ | 57 | MDDHT5540 | MDDHT5540E | D-frame | Approx. 1.8kVA | MFECA 0**0ETD | MFECA 0**0ETE | MFMCD0**2ECD | MFMCA0**2FCD | — | DV0P4284 | DV0P222 | DV0P4220 |
| | | 3-phase 200V | 2000 | MGME202□1✻ | 58 | MFDHTA390 | MFDHTA390E | F-frame | Approx. 3.8kVA | | | MFMCA 0**3ECT | MFMCA 0**3FCT | | DV0P4285 × 2 in parallel | DV0P223 | DV0P3410 |
| | | | 3000 | MGME302□1✻ | 59 | MFDHTB3A2 | MFDHTB3A2E | | Approx. 4.5kVA | | | | | | | DV0P224 | |
| | | 3-phase 400V | 900 | MGME094□1✻ | 94 | MDDHT3420 | MDDHT3420E | D-frame | Approx. 1.8kVA | | | MFMCD0**2ECD | MFMCE0**2FCD | | DV0PM20048 | — | — |
| | | | 2000 | MGME204□1✻ | 95 | MFDHT5440 | MFDHT5440E | F-frame | Approx. 3.8kVA | | | MFMCA 0**3ECT | MFMCA 0**3FCT | | DV0PM20049 × 2 in parallel | | |
| | | | 3000 | MGME304□1✻ | 96 | MFDHTA464 | MFDHTA464E | | Approx. 4.5kVA | | | | | | | | |
| High inertia | MHMD (Leadwire type) 3000r/min | Single phase 100V | 200 | MHMD021□1✻ | 76 | MBDHT2110 | MBDHT2110E | B-frame | Approx. 0.5kVA | MFECA 0**0EAM | MFECA 0**0EAE | MFMCA 0**0EED | — | MFMCB 0**0GET | DV0P4283 | DV0P228 | DV0P4170 |
| | | | 400 | MHMD041□1✻ | 78 | MCDHT3120 | MCDHT3120E | C-frame | Approx. 0.9kVA | | | | | | DV0P4282 | | DV0PM20042 |
| | | Single phase/ 3-phase 200V | 200 | MHMD022□1✻ | 77 | MADHT1507 | MADHT1507E | A-frame | Approx. 0.5kVA | | | | | | DV0P4283 | DV0P220 | DV0PM20042 |
| | | | 400 | MHMD042□1✻ | 79 | MBDHT2510 | MBDHT2510E | B-frame | Approx. 0.9kVA | | | | | | | DV0P221 | |
| | | | 750 | MHMD082□1✻ | 80 | MCDHT3520 | MCDHT3520E | C-frame | Approx. 1.3kVA | | | | | | | | |
| | MHME 2000r/min | Single phase/ 3-phase 200V | 1000 | MHME102□1✻ | 60 | MDDHT3530 | MDDHT3530E | D-frame | Approx. 1.8kVA | MFECA 0**0ETD | MFECA 0**0ETE | MFMCD 0**2ECD | MFMCA 0**2FCD | — | DV0P4284 | DV0P222 | DV0P4220 |
| | | | 1500 | MHME152□1✻ | 61 | MDDHT5540 | MDDHT5540E | | Approx. 2.3kVA | | | | | | | | |
| | | 3-phase 200V | 2000 | MHME202□1✻ | 62 | MEDHT7364 | MEDHT7364E | E-frame | Approx. 3.3kVA | | | MFMCE0**2ECD | MFMCE0**2FCD | | DV0P4285 | DV0P223 | DV0PM20043 |
| | | | 3000 | MHME302□1✻ | 63 | MFDHTA390 | MFDHTA390E | F-frame | Approx. 4.5kVA | | | | | | | DV0P224 | |
| | | | 4000 | MHME402□1✻ | 64 | MFDHTB3A2 | MFDHTB3A2E | | Approx. 6kVA | | | MFMCA 0**3ECT | MFMCA 0**3FCT | | DV0P4285 × 2 in parallel | DV0P225 | DV0P3410 |
| | | | 5000 | MHME502□1✻ | 65 | MFDHTB3A2 | MFDHTB3A2E | | Approx. 7.5kVA | | | | | | | — | |
| | | 3-phase 400V | 1000 | MHME104□1✻ | 98 | MDDHT2412 | MDDHT2412E | D-frame | Approx. 1.8kVA | | | MFMCD 0**2ECD | MFMCE 0**2FCD | | DV0PM20048 | — | — |
| | | | 1500 | MHME154□1✻ | 99 | MDDHT3420 | MDDHT3420E | | Approx. 2.3kVA | | | | | | | | |
| | | | 2000 | MHME204□1✻ | 100 | MEDHT4430 | MEDHT4430E | E-frame | Approx. 3.3kVA | | | MFMCE0**2ECD | | | DV0PM20048 | | |
| | | | 3000 | MHME304□1✻ | 101 | MFDHT5440 | MFDHT5440E | F-frame | Approx. 4.5kVA | | | MFMCA 0**3ECT | MFMCA 0**3FCT | | DV0PM20049 × 2 in parallel | | |
| | | | 4000 | MHME404□1✻ | 102 | MFDHTA464 | MFDHTA464E | | Approx. 6.8kVA | | | | | | | | |
| | | | 5000 | MHME504□1✻ | 103 | MFDHTA464 | MFDHTA464E | | Approx. 7.5kVA | | | | | | | | |

note)1 Rotary encoder specifications: □ Motor specification: ✻ (refer to P.13)

note)2 Cable length: ** (03: 3m, 05: 5m, 10: 10m, 20: 20m)

## · Options

| Title | 構成品名 | | Part No. | Page |
|---|---|---|---|---|
| Interface cable | | | DV0P4360 | 118 |
| Interface Connector | | | DV0P4350 | 118 |
| Connector for Power Supply Input Connection | A to D-frame (100V/ 200V) | Single row type | DV0PM20032 | 120 |
| | | Double row type | DV0PM20033 | 120 |
| | E-frame (200V) | | DV0PM20044 | 120 |
| | D-frame (400V) | | DV0PM20051 | 121 |
| | E-frame (400V) | | DV0PM20052 | 121 |
| Connector for Control Power Supply Input Connection | D, E-frame (400V) | | DV0PM20053 | 121 |
| Connector for Motor Connection | A to D-frame | | DV0PM20034 | 121 |
| | E-frame (200V) | | DV0PM20046 | 122 |
| | D-frame (400V) | | DV0PM20054 | 122 |
| Connector for Regenerative Resistor | E-frame | | DV0PM20045 | 121 |
| | D-frame (400V) | | DV0PM20055 | 121 |
| Connector Kit for Motor/Encoder Connection | | | DV0P4290 | 122 |
| | | | DV0P4380 | 122 |
| | | | DV0PM20035 | 123 |
| | | | DV0PM20036 | 123 |
| | | | DV0PM20037 | 123 |
| | | | DV0PM20038 | 124 |
| | | | DV0PM20039 | 124 |
| Connector Kit for Motor/Brake Connection | | | DV0PM20040 | 124 |
| Connector | RS485, RS232 | | DV0PM20024 | 119 |
| | Safety | | DV0PM20025 | 119 |
| | External Scale | | DV0PM20026 | 119 |
| | Encoder | | DV0PM20010 | 119 |
| | Analog Monitor Signal | | DV0PM20031 | 120 |
| Battery For Absolute Encoder | | | DV0P2990 | 125 |
| Battery Box | | | DV0P4430 | 125 |
| Mounting bracket | A-frame | | DV0PM20027 | 126 |
| | B-frame | | DV0PM20028 | 126 |
| | C-frame | | DV0PM20029 | 126 |
| | D-frame | | DV0PM20030 | 126 |
| Junction Cable for Encoder | without Buttery Box | | MFECA0**0EAM | 112 |
| | | | MFECA0**0MJD | 112 |
| | | | MFECA0**0ETD | 113 |
| | with Buttery Box | | MFECA0**0EAE | 112 |
| | | | MFECA0**0MJE | 113 |
| | | | MFECA0**0ETE | 113 |
| Junction Cable for Motor | without Brake | | MFMCA0**0EED | 114 |
| | | | MFMCA0**0NJD | 114 |
| | | | MFMCD0**2ECD | 114 |
| | | | MFMCE0**2ECD | 115 |
| | | | MFMCA0**3ECT | 115 |
| | with Brake | | MFMCA0**2FCD | 116 |
| | | | MFMCE0**2FCD | 116 |
| | | | MFMCA0**3FCT | 116 |
| Junction Cable for Brake | | | MFMCB0**0GET | 117 |
| | | | MFMCB0**0PJT | 117 |
| External Regenerative Resistor | 50Ω 25W | | DV0P4280 | 128 |
| | 100Ω 25W | | DV0P4281 | 128 |
| | 25Ω 50W | | DV0P4282 | 128 |
| | 50Ω 50W | | DV0P4283 | 128 |
| | 30Ω 100W | | DV0P4284 | 128 |
| | 20Ω 130W | | DV0P4285 | 128 |
| | 120Ω 35W | | DV0PM20048 | 128 |
| | 80Ω 65W | | DV0PM20049 | 128 |
| Reactor | DV0P220, DV0P221, DV0P222, DV0P223, DV0P224, DV0P225, DV0P227, DV0P228 | | | 127 |
| Noise Filter | DV0P4170, DV0PM20042 DV0P4220, DV0PM20043 DV0P3410 | | | 108 |
| Surge absorber | Single phase | | DV0P4190 | 109 |
| | 3-phase (200V) | | DV0P1450 | 109 |
| | 3-phase (400V) | | DV0PM20050 | 109 |
| Noise Filter for Signal Lines | | | DV0P1460 | 109 |

# A5 series (Standard type)

## Basic Specifications

| | | | | |
|---|---|---|---|---|
| Input power | 100V | Main circuit | | Single phase, 100 to 120V +10% –15% 50/60Hz |
| | | Control circuit | | Single phase, 100 to 120V +10% –15% 50/60Hz |
| | 200V | Main circuit | A to D-frame | Single/3-phase, 200 to 240V +10% –15% 50/60Hz |
| | | | E to F-frame | 3-phase, 200 to 230V +10% –15% 50/60Hz |
| | | Control circuit | A to D-frame | Single phase, 200 to 240V +10% –15% 50/60Hz |
| | | | E to F-frame | Single phase, 200 to 230V +10% –15% 50/60Hz |
| | 400V | Main circuit | D to F-frame | Single phase, 380 to 480V +10% –15% 50/60Hz |
| | | Control circuit | D to F-frame | DC 24V ± 15% |
| Withstand voltage | | | | Primary to earth: withstand 1500 VAC, 1 min,(sensed current: 20 mA) |
| Environment | | temperature | | Ambient temperature: 0˚C to 55˚C (free from freezing)<br>Storage temperature: –20˚C to 65˚C (Max.temperature guarantee: 80˚C for 72 hours) |
| | | humidity | | Both operating and storage : 20 to 85%RH or less (free from condensation) |
| | | Altitude | | Lower than 1000m |
| | | 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 encoder, 7-wire serial<br>20-bit (1048576 resolution) incremental encoder, 5-wire serial |
| Feedback scale feedback | | | | A/B phase, initialization signal defferential input.<br>Manufacturers that support serial communication scale:<br>Mitsutoyo Corp.<br>Sony Manufacturing Systems Corp. |
| Control signal | | Input | | General purpose 10 inputs<br>The function of general-purpose input is selected by parameters. |
| | | Output | | General purpose 6 outputs<br>The function of general-purpose input is selected by parameters. |
| Analog /Digital signal | | Input | | 3 inputs (16Bit A/D : 1 input, 12Bit A/D : 2 inputs) |
| | | Output | | 3 outputs (Analog monitor: 2 output, Digital monitor: 1 output) |
| Pulse signal | | Input | | 2 inputs (Photo-coupler input, Line receiver input)<br>Photocoupler input is compatible with both line driver I/F and open collector I/F.<br>Line receiver input is compatible with line driver I/F. |
| | | Output | | 4 outputs ( Line driver: 3 output, open collector: 1 output)<br>Feed out the encoder pulse (A, B and Z-phase) or feedback 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 | | USB | | Connection with PC etc. |
| | | RS232 | | 1 : 1 communication to a host with RS23 interface is enabled. |
| | | RS485 | | 1 : n communication up to 15 axes to a host with RS485 interface is enabled. |
| Safety function | | | | Used for IEC61800-5-2: STO. |
| Front panel | | | | (1) 5 keys (MODE, SET, UP, DOWN, SHIFT) (2) LED (6-digit)<br>(3) Analog monitor output (2ch) (4) Digital monitor output (1ch) |
| Regeneration | | | | A, B-frame: no built-in regenerative resistor (external resistor only)<br>C to F-frame: Built-in regenerative resistor (external resistor is also enabled.) |
| Dynamic brake | | | | Built-in |
| Control mode | | | | Switching among the following 7 mode is enabled,<br>(1) Position control (2) Velocity control (3) Toque control (4) Position/Velocity control<br>(5) Position/Torque control (6) Velocity/Torque control (7) Full-closed control |

## Function

| | | | |
|---|---|---|---|
| Position control | Control input | | (1) Deviation counter clear (2) Command pulse inhibition<br>(3) Command dividing gradual increase switching<br>(4) Damping control switching etc. |
| | Control output | | Positioning complete (In-position) etc. |
| | Pulse input | Max. command pulse frequency | Exclusive interface for Photo-coupler: 500kpps<br>Exclusive interface for line driver : 4Mpps |
| | | Input pulse signal format | Differential input. Selectable with parameter. ((1) Positive and Negative direction,<br>(2) A and B-phase, (3) Command and direction) |
| | | Electronic gear (Division/ Multiplication of command pulse) | Process command pulse frequency × electronic gear ratio $\left(\frac{1 \text{ to } 2^{30}}{1 \text{ to } 2^{30}}\right)$ as positional command input. Use electronic gear ratio in the range 1/1000 to 1000 times. |
| | | Smoothing filter | Primary delay filter or FIR type filter is adaptable to the command input |
| | Analog input | Torque limit command input | Individual torque limit for both positive and negative direction is enabled. (3V/rated torque) |
| | Instantaneous Speed Observer | | Available |
| | Damping Control | | Available |
| Velocity control | Control input | | (1) Selection of internal velocity setup 1 (2) Selection of internal velocity setup 2<br>(3) Selection of internal velocity setup 3 (4) Speed zero clamp etc. |
| | Control output | | Speed arrival etc. |
| | Analog input | Velocity command input | Speed command input can be provided by means of analog voltage.<br>Parameters are used for scale setting and command polarity. |
| | | Torque limit command input | Individual torque limit for both positive and negative direction is enabled. (3V/rated torque) |
| | Internal velocity command | | Switching the internal 8speed is enabled by command input. |
| | Soft-start/down function | | Individual setup of acceleration and deceleration is enabled, with 0 to 10s/1000r/min.<br>Sigmoid acceleration/deceleration is also enabled. |
| | Zero-speed clamp | | 0-clamp of internal velocity command with speed zero clamp input is enabled. |
| | Instantaneous Speed Observer | | Available |
| | Velocity Control filter | | Available |
| Torque control | Control input | | Speed zero clamp, Torque command sign input etc. |
| | Control output | | Speed arrival etc. |
| | Analog input | Torque command input | Speed command input can be provided by means of analog voltage.<br>Parameters are used for scale setting and command polarity. |
| | Speed limit function | | Speed limit value with parameter t is enabled. |
| Full-closed control | Control input | | (1) Deviation counter clear (2) Command pulse inhibition<br>(3) Command dividing gradual increase switching (4) Damping control switching etc. |
| | Control output | | Full-closed positioning complete etc. |
| | Pulse input | Max. command pulse frequency | Exclusive interface for Photo-coupler: 500kpps<br>Exclusive interface for line driver : 4Mpps |
| | | Input pulse signal format | Differential input. Selectable with parameter. ((1) Positive and Negative direction, (2) A and B-phase, (3) Command and direction) |
| | | Electronic gear (Division/ Multiplication of command pulse) | Process command pulse frequency × electronic gear ratio $\left(\frac{1 \text{ to } 2^{30}}{1 \text{ to } 2^{30}}\right)$ as positional command input. Use electronic gear ratio in the range 1/1000 to 1000 times. |
| | | Smoothing filter | Primary delay filter or FIR type filter is adaptable to the command input |
| | Analog input | Torque limit command input | Individual torque limit for both positive and negative direction is enabled. (3V/rated torque) |
| | Setup range of division/ multiplication of feedback scale | | 1/40 to 160 times<br>The ratio of encoder pulse (numerator) to external scale pulse (denominator) can be set to 1 to $2^{20}$ (numerator) to 1 to $2^{20}$ (denominator), but should be set to a ratio within the range shown above. |
| Common | Auto tuning | | The load inertia is identified in real time by the driving state of the motor operating according to the command given by the controlling device and set up support software “PANATERM”.<br>The gain is set automatically in accordance with the rigidity setting. |
| | Division of encoder feedback pulse | | Set up of any value is enabled (encoder pulses count is the max.). |
| | Protective function | Hard error | Over-voltage, under-voltage, over-speed, over-load,<br>over-heat, over-current and encoder error etc. |
| | | Soft error | Excess position deviation, command pulse division error, EEPROM error etc. |
| | Traceability of alarm data | | The alarm data history can be referred to. |

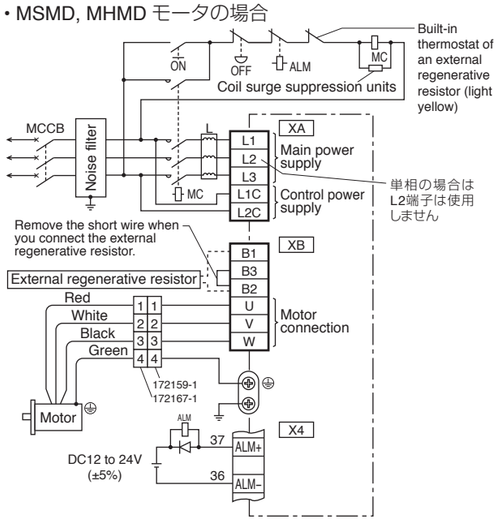
| | | | | |
|---|---|---|---|---|
| Basic Specifications | Input power | 100V | Main circuit | Single phase, 100 to 120V +10% –15% 50/60Hz |
| | | | Control circuit | Single phase, 100 to 120V +10% –15% 50/60Hz |
| | | 200V | Main circuit A to D-frame | Single/3-phase, 200 to 240V +10% –15% 50/60Hz |
| | | | Main circuit E to F-frame | 3-phase, 200 to 230V +10% –15% 50/60Hz |
| | | | Control circuit A to D-frame | Single phase, 200 to 240V +10% –15% 50/60Hz |
| | | | Control circuit E to F-frame | Single phase, 200 to 230V +10% –15% 50/60Hz |
| | | 400V | Main circuit D to F-frame | Single phase, 380 to 480V +10% –15% 50/60Hz |
| | | | Control circuit D to F-frame | DC 24V ± 15% |
| | Withstand voltage | | | Primary to earth: withstand 1500 VAC, 1 min,(sensed current: 20 mA) |
| | Environment | temperature | | Ambient temperature: 0˚C to 55˚C (free from freezing)<br>Storage temperature: –20˚C to 65˚C (Max.temperature guarantee: 80˚C for 72 hours) |
| | | humidity | | Both operating and storage : 20 to 85%RH or less (free from condensation) |
| | | Altitude | | Lower than 1000m |
| | | 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 encoder, 7-wire serial<br>20-bit (1048576 resolution) incremental encoder, 5-wire serial |
| | Control signal | Input | | General purpose 10 inputs<br>The function of general-purpose input is selected by parameters. |
| | | Output | | General purpose 6 outputs<br>The function of general-purpose input is selected by parameters. |
| | Analog /Digital signal | Input | | 3 inputs (16Bit A/D : 1 input, 12Bit A/D : 2 inputs) |
| | | Output | | 3 outputs (Analog monitor: 2 output, Digital monitor: 1 output) |
| | Pulse signal | Input | | 2 inputs (Photo-coupler input, Line receiver input)<br>Photocoupler input is compatible with both line driver I/F and open collector I/F.<br>Line receiver input is compatible with line driver I/F. |
| | | Output | | 4 outputs ( Line driver: 3 output, open collector: 1 output)<br>Feed out the encoder pulse (A, B and Z-phase) or feedback 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 | USB | | Connection with PC etc. |
| | Safety function | | | Used for IEC61800-5-2: STO. |
| | Front panel | | | (1) 5 keys (MODE, SET, UP, DOWN, SHIFT) (2) LED (6-digit)<br>(3) Analog monitor output (2ch) (4) Digital monitor output (1ch) |
| | Regeneration | | | A, B-frame: no built-in regenerative resistor (external resistor only)<br>C to F-frame: Built-in regenerative resistor (external resistor is also enabled.) |
| | Dynamic brake | | | Built-in |
| | Control mode | | | Position control |

| | | | | |
|---|---|---|---|---|
| Function | Position control | Control input | | (1) Deviation counter clear (2) Command pulse inhibition<br>(3) Command dividing gradual increase switching<br>(4) Damping control switching etc. |
| | | Control output | | Positioning complete (In-position) etc. |
| | | Pulse input | Max. command pulse frequency | Exclusive interface for Photo-coupler: 500kpps<br>Exclusive interface for line driver : 4Mpps |
| | | | Input pulse signal format | Differential input. Selectable with parameter. ((1) Positive and Negative direction, (2) A and B-phase, (3) Command and direction) |
| | | | Electronic gear (Division/ Multiplication of command pulse) | Process command pulse frequency × electronic gear ratio $\left(\frac{1 \text{ to } 2^{30}}{1 \text{ to } 2^{30}}\right)$ as positional command input. Use electronic gear ratio in the range 1/1000 to 1000 times. |
| | | | Smoothing filter | Primary delay filter or FIR type filter is adaptable to the command input |
| | | Instantaneous Speed Observer | | Available |
| | | Damping Control | | Available |
| | Common | Auto tuning | | The load inertia is identified in real time by the driving state of the motor operating according to the command given by the controlling device and set up support software “PANATERM”.<br>The gain is set automatically in accordance with the rigidity setting. |
| | | Division of encoder feedback pulse | | Set up of any value is enabled (encoder pulses count is the max.). |
| | | Protective function | Hard error | Over-voltage, under-voltage, over-speed, over-load, over-heat, over-current and encoder error etc. |
| | | | Soft error | Excess position deviation, command pulse division error, EEPROM error etc. |
| | | Traceability of alarm data | | The alarm data history can be referred to. |

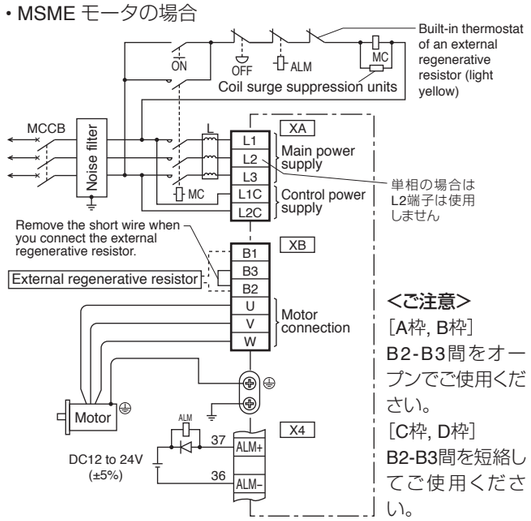
# Wiring to Connector, XA, XB, XC, XD

## In Case of Single Phase, A to D-frame, 100 V / 200 V type and 3-Phase, A to D-frame, 200 V type

• MSMD, MHMD モータの場合

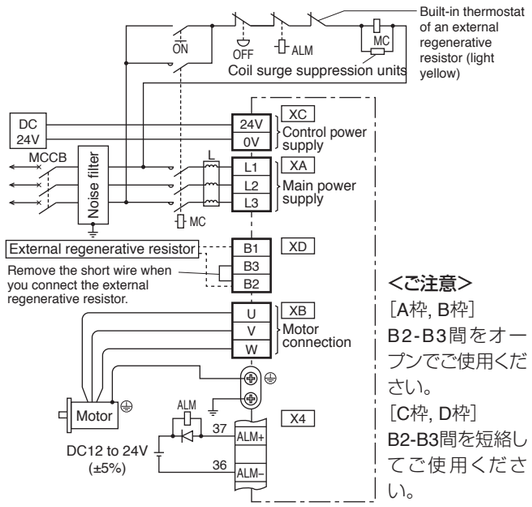



• MSME モータの場合



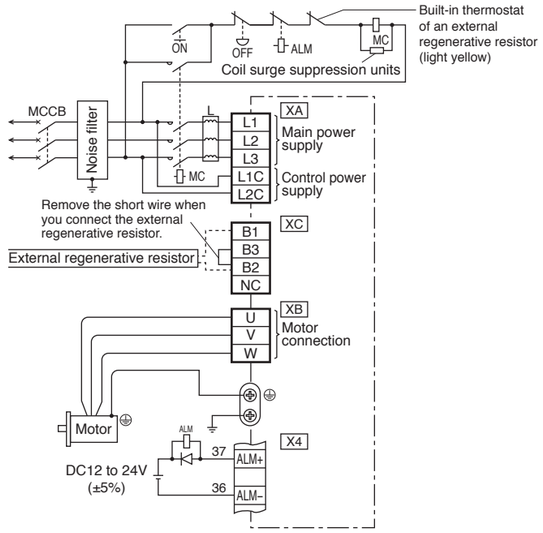

**<ご注意>**
[A枠, B枠]
B2-B3間をオープンでご使用ください。
[C枠, D枠]
B2-B3間を短絡してご使用ください。

## In Case of 3-Phase, D-frame, 400 V type

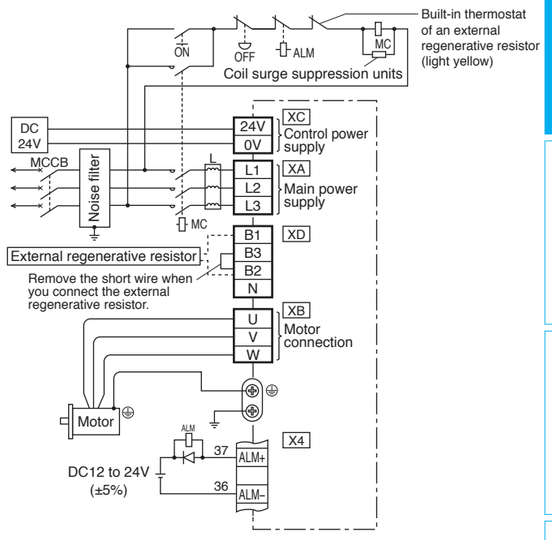



**<ご注意>**
[A枠, B枠]
B2-B3間をオープンでご使用ください。
[C枠, D枠]
B2-B3間を短絡してご使用ください。

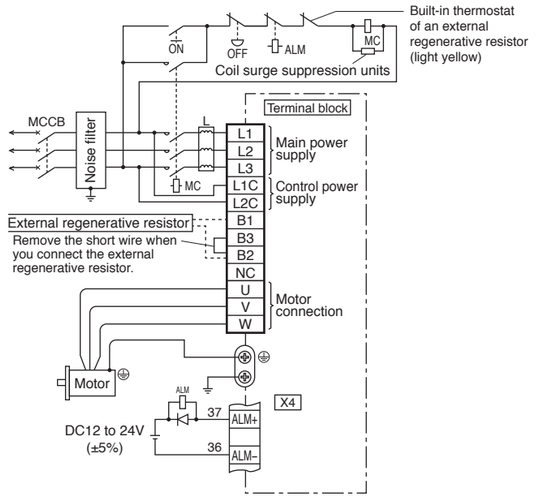
## In Case of 3-Phase, E-frame, 200 V type



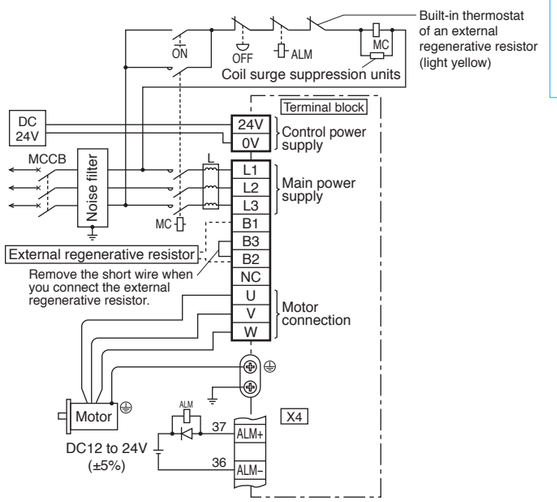

## In Case of 3-Phase, E-frame, 400 V type




## In Case of 3-Phase, F-frame, 200 V type




## In Case of 3-Phase, F-frame, 400 V type




## Specifications of Motor connector (The figures show connectors for the motor.)

• When the motors of <MSMD, MHMD> are used, they are connected as shown below.
Connector: Made by Tyco Electronics AMP

**<Motor>**


172167-1

| PIN No. | Application |
|---|---|
| 1 | U-phase |
| 2 | V-phase |
| 3 | W-phase |
| 4 | Ground |

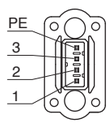
**<Brake>**


172165-1

| PIN No. | Application |
|---|---|
| 1 | Brake |
| 2 | Brake |

• When the motors of <MSME (50 W to 750 W)> are used, they are connected as shown below.
Connector: Made by Japan Aviation Electronics Industry, Ltd.

**<Motor>**




JN8AT04NJ1

| PIN No. | Application |
|---|---|
| 1 | U-phase |
| 2 | V-phase |
| 3 | W-phase |
| PE | Ground |

Tightening torque of the screw (M2) 0.085 to 0.095 N·m (screwed to plastic)

**<Brake>**


JN4AT02PJM-R

| PIN No. | Application |
|---|---|
| 1 | Brake |
| 2 | Brake |

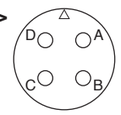
Tightening torque of the screw(M2) 0.19 to 0.21 N·m

* Be sure to use only the screw supplied with the connector, to avoid damage.

• When the motors of <MSME (1.0 kW to 5.0 kW), MDME, MGME, MHME> are used, they are connected as shown below.
Connector: Made by Japan Aviation Electronics Industry, Ltd.

* For detail of Applicable model, refer to P.111 “Specifications of Motor connector”.

**<without Brake>**



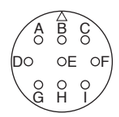

JL04V-2E20-4PE-B-R
JL04HV-2E22-22PE-B-R

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

**<with Brake>**


JL04V-2E20-18PE-B-R

| PIN No. | Application |
|---|---|
| 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-R

| PIN No. | Application |
|---|---|
| A | Brake |
| B | Brake |
| C | NC |
| D | U-phase |
| E | V-phase |
| F | W-phase |
| G | Ground |
| H | Ground |
| I | NC |

<Remarks> Do not connect anything to NC.

# Safety function　Wiring to the connector, X3 (Excluding A5E Series)

上位コントローラを接続して、セーフティ機能をコントロールするセーフティ回路を構築することができます。
セーフティ回路を構築しない場合は、付属のセーフティバイパスプラグをご使用ください。

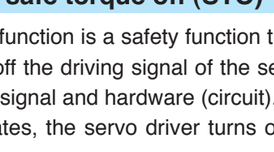
## Outline description of safe torque off (STO)

The safe torque off (STO) function is a safety function that shuts the motor current and turns off motor output torque by forcibly turning off the driving signal of the servo driver internal power transistor. For this purpose, the STO uses safety input signal and hardware (circuit).
When STO function operates, the servo driver turns off the servo ready output signal (S-RDY) and enters safety state.
This is an alarm condition and the 7-seg LED on the front panel displays the error code number.

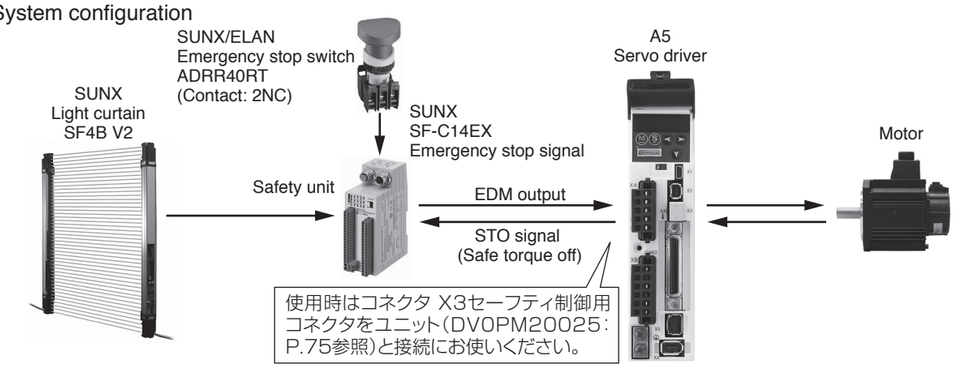
## Safety precautions

- When using the STO function, be sure to perform equipment risk assessment to ensure that the system conforms to the safety requirements.
- Even while the STO function is working, the following potential safety hazards exist. Check safety in risk assessment.
  - The motor may move when eternal force (e.g. gravity force on vertical axis) is exerted on it. Provide an external brake, etc., as necessary to secure the motor. Note that the purpose of motor with brake is holding and it cannot be used for braking application.
  - When parameter Pr5.10 Sequence at alarm is set to free run (disable dynamic brake), the motor is free run state and requires longer stop distance even if no external force is applied. Make sure that this does not cause any problem.
  - When power transistor, etc., becomes defective, the motor will move to the extent equivalent of 180 electrical angle (max.). Make sure that this does not cause any problem.
  - The STO turns off the current to the motor but does not turn off power to the servo driver and does not isolate it. When starting maintenance service on the servo driver, turn off the driver by using a different disconnecting device.
- External device monitor (hereafter EDM) output signal is not a safety signal. Do not use it for an application other than failure monitoring.
- Dynamic brake and external brake release signal output are not related to safety function. When designing the system, make sure that the failure of external brake release during STO condition does not result in danger condition.
- When using STO function, connect equipment conforming to the safety standards.

[Connector pin assignment]
(Viewed from cable)



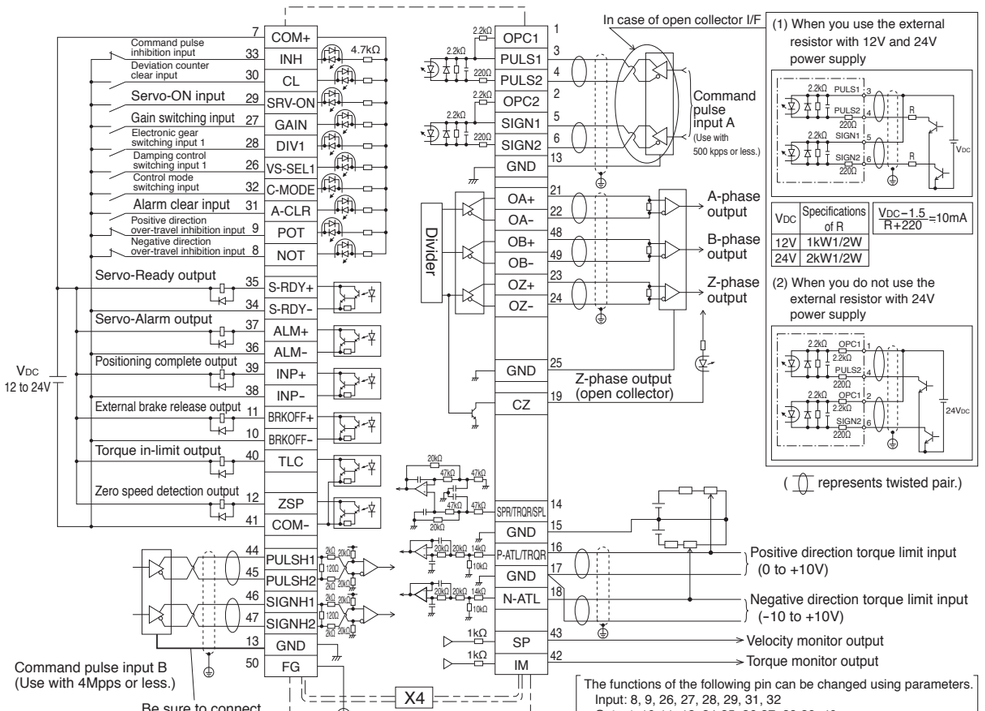

- System configuration





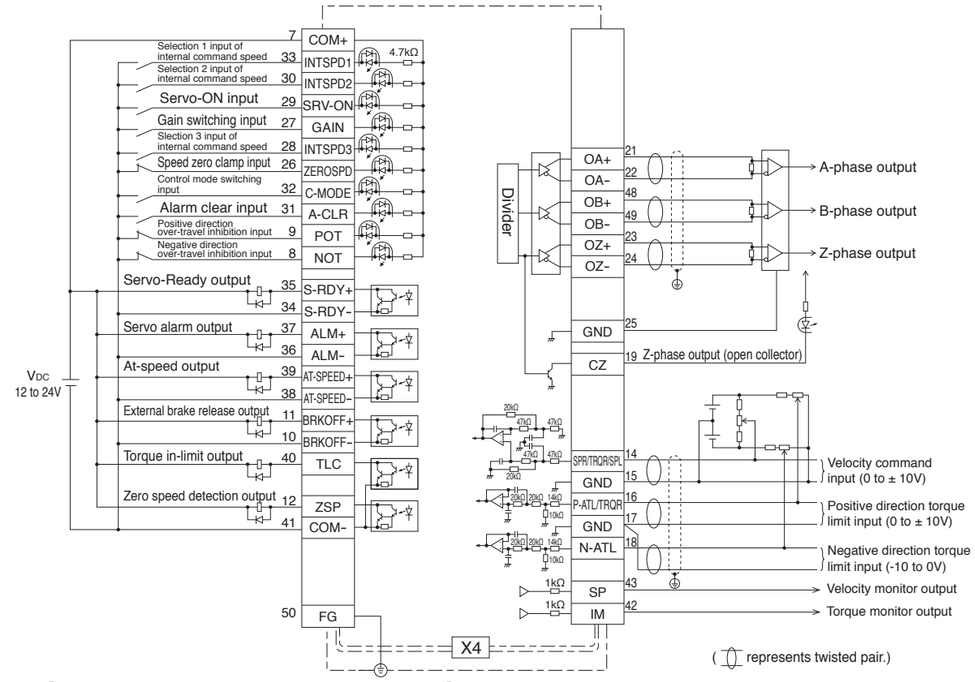

# Control Circuit Diagram　Wiring to the connector, X4

## Wiring Example of Position Control Mode




* For detail of connector, refer to P.118.

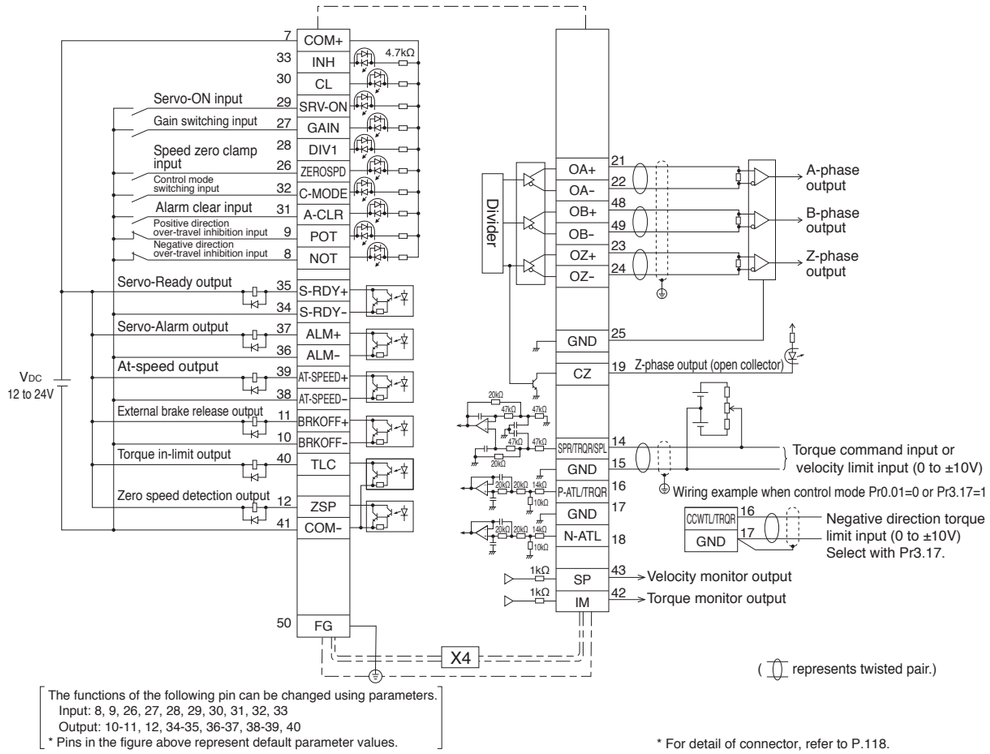
## Wiring Example of Velocity Control Mode (Excluding A5E Series)




* For detail of connector, refer to P.118.

# Wiring to the connector, X4

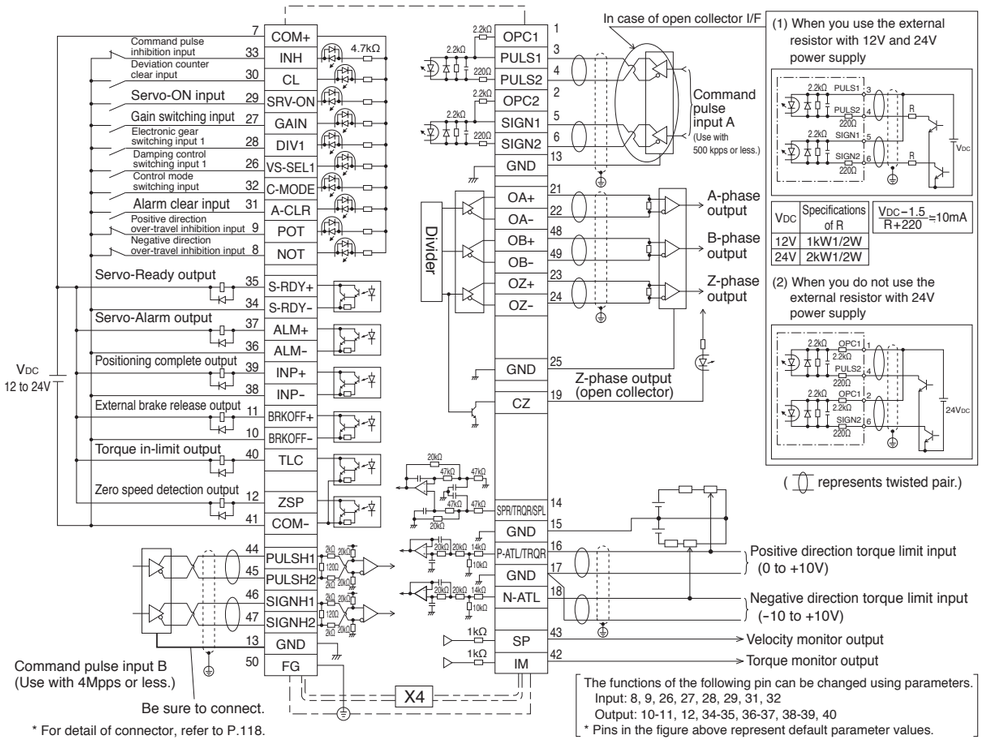
## Wiring Example of Torque Control Mode (Excluding A5E Series)




The functions of the following pin can be changed using parameters.
Input: 8, 9, 26, 27, 28, 29, 30, 31, 32, 33
Output: 10-11, 12, 34-35, 36-37, 38-39, 40
* Pins in the figure above represent default parameter values.

* For detail of connector, refer to P.118.

## Wiring Example of Full-closed Control Mode (Excluding A5E Series)




The functions of the following pin can be changed using parameters.
Input: 8, 9, 26, 27, 28, 29, 31, 32
Output: 10-11, 12, 34-35, 36-37, 38-39, 40
* Pins in the figure above represent default parameter values.

* For detail of connector, refer to P.118.





# Wiring to the connector, X5 (Excluding A5E Series)

## Applicable external scale

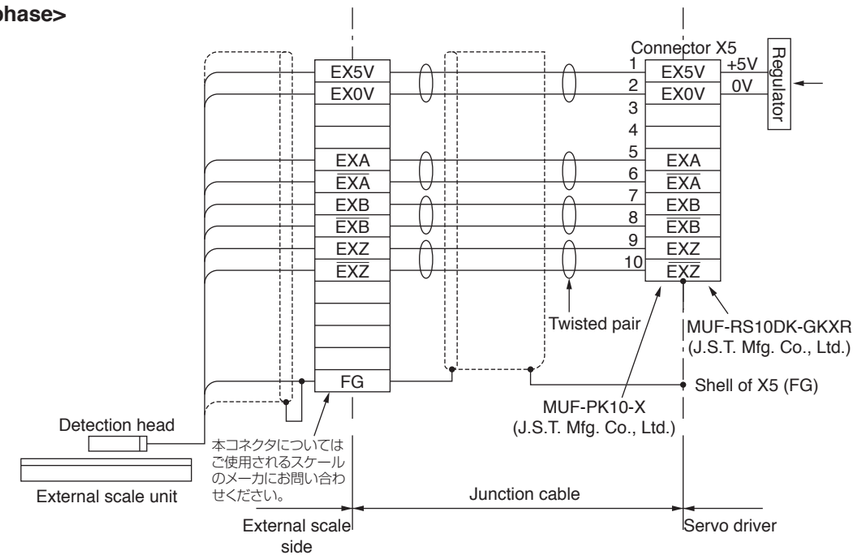
The manufacturers applicable external scales for this product are as follows.

- Mitutoyo Corp.
  ST771A(L), ST773A(L), AT573A
- Sony Manufacturing Systems Corp.
  SR75, SR85, SR77, SR87, SL700 · PL101-RP, SL710 · PL101-RP

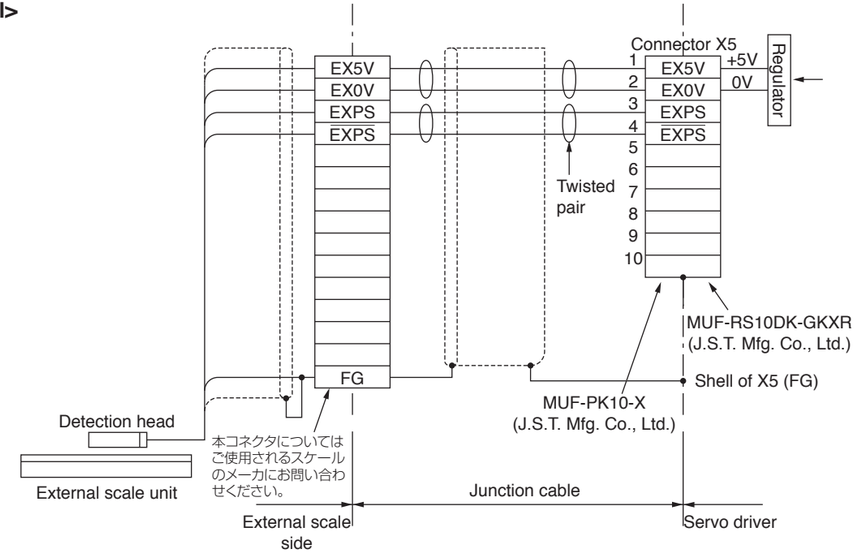
* For the details of the external scale product, contact each company.

## Wiring Diagram of X5

**<A/B-phase>**



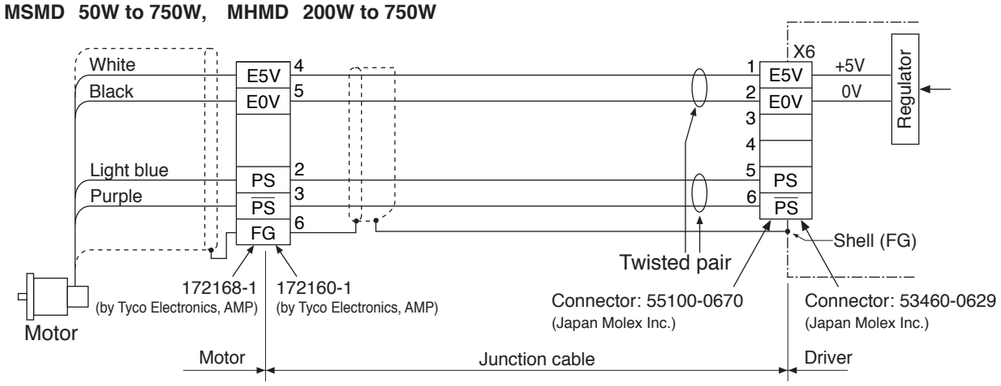

**<Serial>**



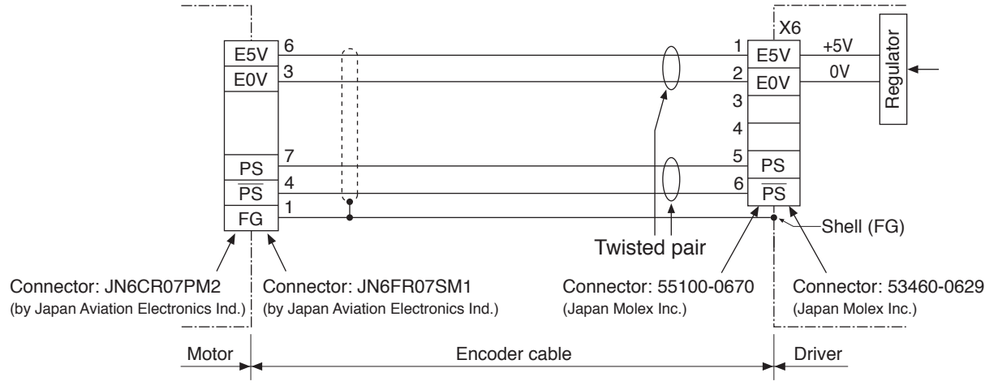
# Wiring to the connector, X6

## In case of 20-bit incremental encoder

**MSMD 50W to 750W, MHMD 200W to 750W**




**MSME 50W to 750W**

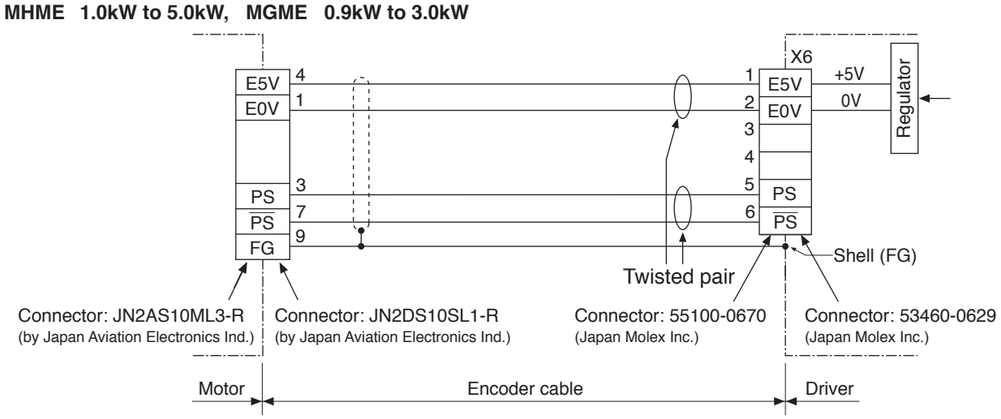



Tighten the motor connector mounting screw (M2) with a torque between 0.19 and 0.21 N·m. To avoid damage, be sure to use only the screw supplied with the connector.

[Connector pin assignment (Motor side)]


(Viewed from cable)

**MSME 1.0kW to 5.0kW, MDME 1.0kW to 5.0kW**
**MHME 1.0kW to 5.0kW, MGME 0.9kW to 3.0kW**



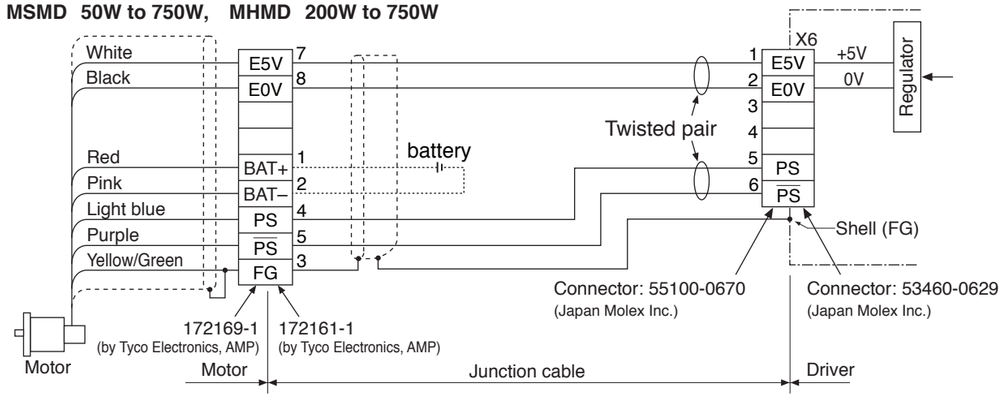

[Connector pin assignment]

Refer to P.111 “Specifications of Motor connector”.

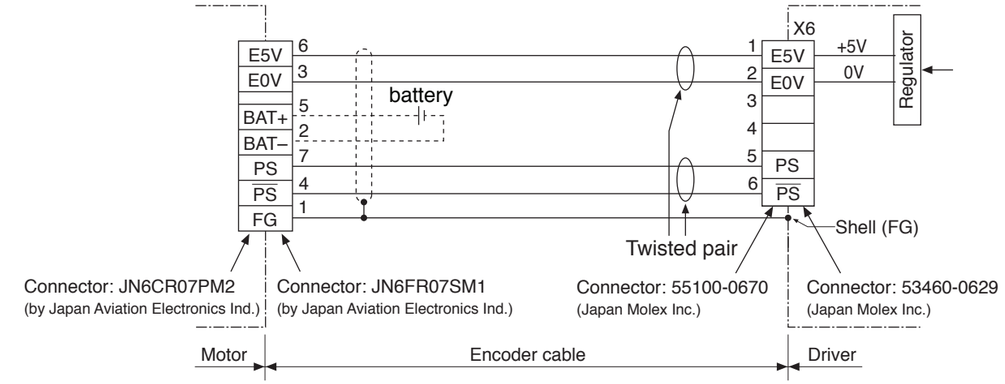


## In case of 17-bit absolute encoder

**MSMD 50W to 750W, MHMD 200W to 750W**




**MSME 50W to 750W**

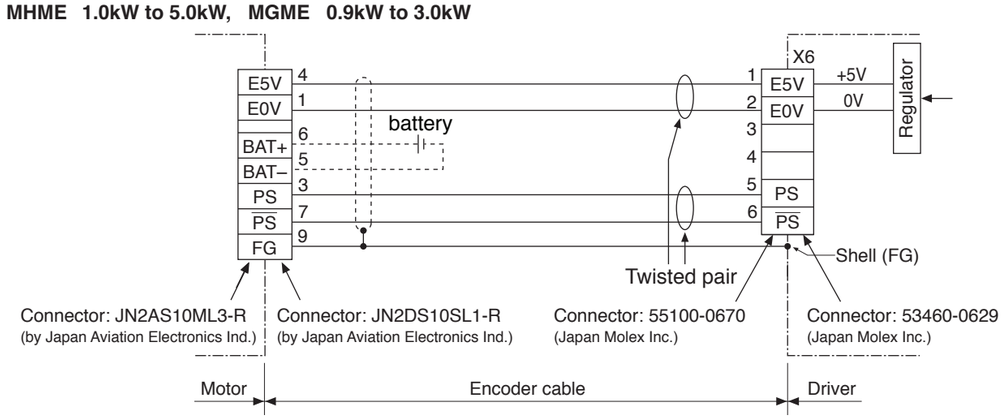



Tighten the motor connector mounting screw (M2) with a torque between 0.19 and 0.21 N·m. To avoid damage, be sure to use only the screw supplied with the connector.

[Connector pin assignment (Motor side)]


(Viewed from cable)

**MSME 1.0kW to 5.0kW, MDME 1.0kW to 5.0kW**
**MHME 1.0kW to 5.0kW, MGME 0.9kW to 3.0kW**

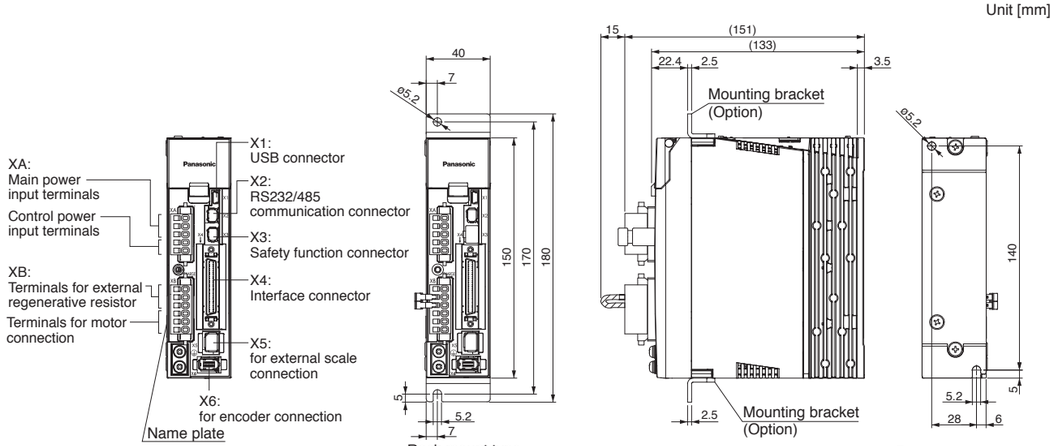


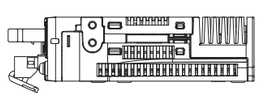

[Connector pin assignment]

Refer to P.111 “Specifications of Motor connector”.

## A-frame

Unit [mm]



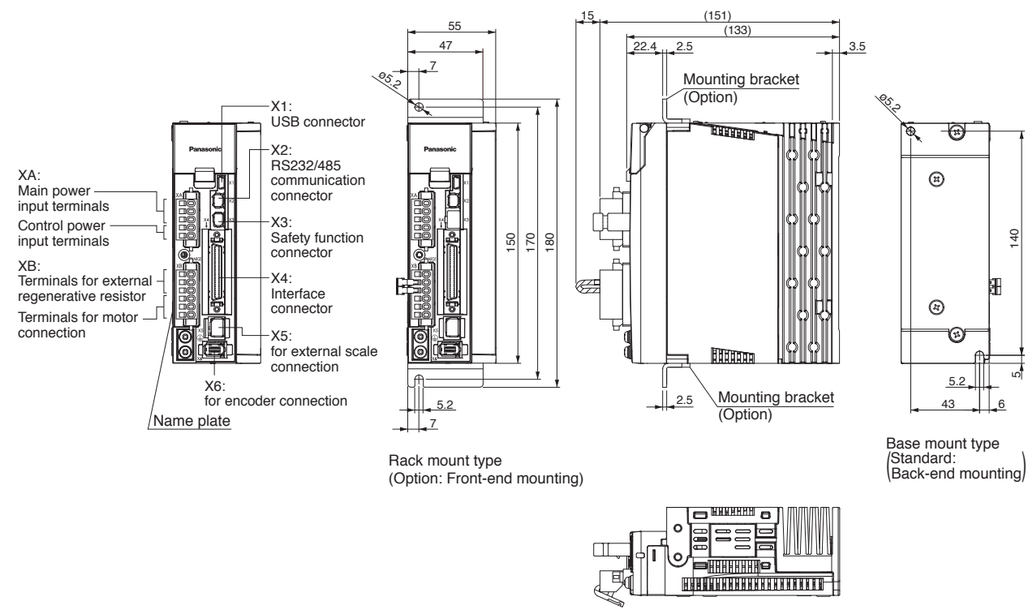



| Connector of driver side | | |
|---|---|---|
| Connector XA | S05B-F32SK-GGXR | J.S.T. Mfg. Co., Ltd. |
| Connector XB | S06B-F32SK-GGXR | J.S.T. Mfg. Co., Ltd. |
| Connector X1 | UB-M5BR-DMP14-4S (or equivalent) | J.S.T. Mfg. Co., Ltd. |
| Connector X2 | 1-2040537-1 (or equivalent) | Tyco Electronics AMP k.k, |
| Connector X3 | 2040537-1 (or equivalent) | Tyco Electronics AMP k.k, |
| Connector X4 | 529865079 (or equivalent) | Japan Molex Inc. |
| Connector X5 | MUF-RS10DK-GKXR (or equivalent) | J.S.T. Mfg. Co., Ltd. |
| Connector X6 | 53460-0629 (or equivalent) | Japan Molex Inc. |
| Connector X7 | 530140610 (or equivalent) | Japan Molex Inc. |
| **Connector of power and motor side**（アンプ本体に同梱） | | |
| Connector XA | 05JFAT-SAXGF | J.S.T. Mfg. Co., Ltd. |
| Connector XB | 06JFAT-SAXGF | J.S.T. Mfg. Co., Ltd. |

Mass: 0.8kg

## B-frame

Unit [mm]





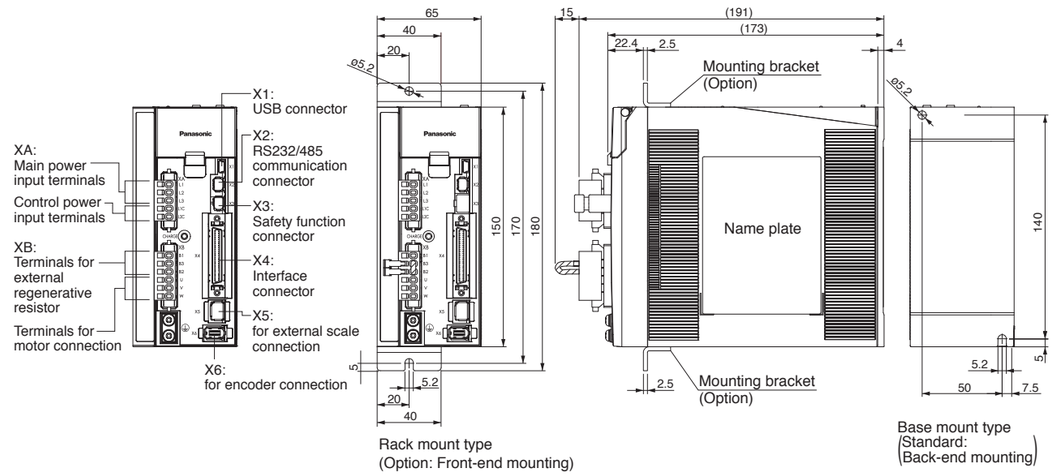

※アンプ側コネクタ及び電源側、モータ側コネクタは
A 枠と同じですので、A 枠の表をご覧ください。

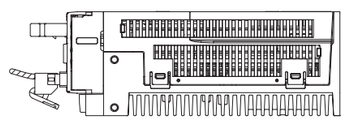
Mass: 1.0kg



## C-frame

Unit [mm]



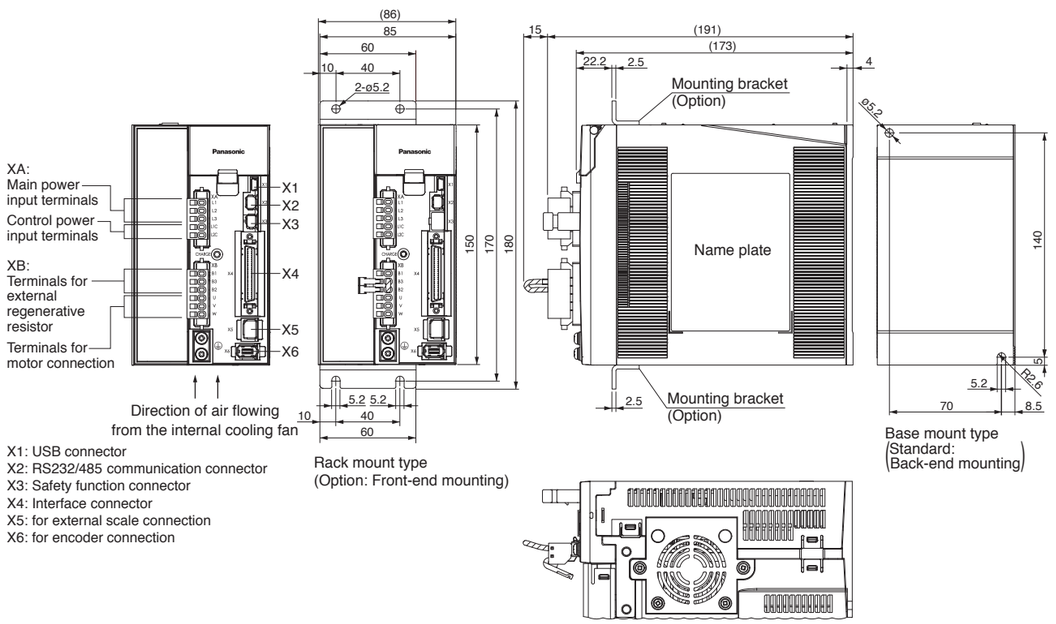



※アンプ側コネクタ及び電源側、モータ側コネクタは
A 枠と同じですので、A 枠の表をご覧ください。

Mass: 1.6kg

## D-frame (200V)

Unit [mm]



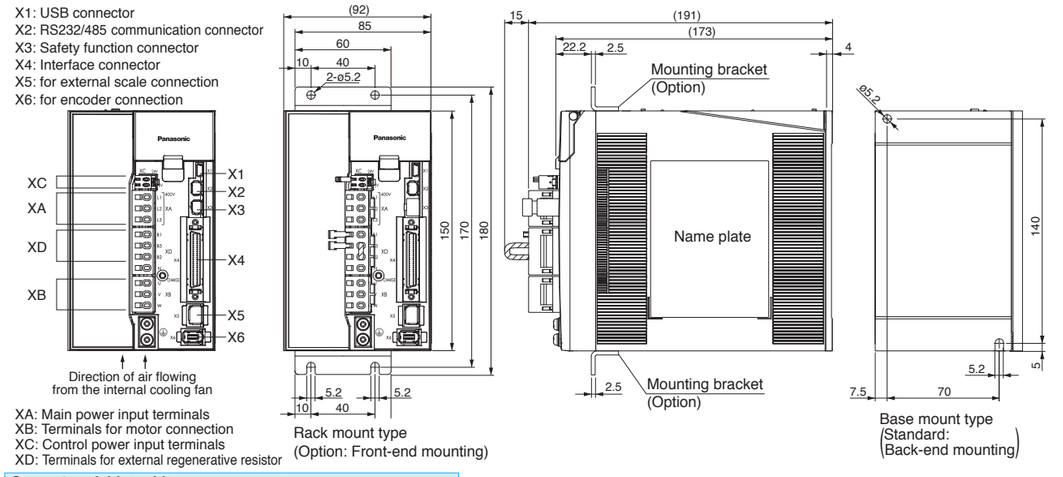

X1: USB connector
X2: RS232/485 communication connector
X3: Safety function connector
X4: Interface connector
X5: for external scale connection
X6: for encoder connection

※アンプ側コネクタ及び電源側、モータ側コネクタは
A 枠と同じですので、A 枠の表をご覧ください。

Mass: 1.8kg

## D-frame (400V)

Unit [mm]




XA: Main power input terminals
XB: Terminals for motor connection
XC: Control power input terminals
XD: Terminals for external regenerative resistor

| Connector of driver side | | |
|---|---|---|
| Connector XA | S03B-JTSMSS-GSANYR | J.S.T. Mfg. Co., Ltd. |
| Connector XB | S03B-JTSMSK-GSANXR | J.S.T. Mfg. Co., Ltd. |
| Connector XC | S02B-J25SK-GGR | J.S.T. Mfg. Co., Ltd. |
| Connector XD | S04B-JTSMSK-GSANXR | J.S.T. Mfg. Co., Ltd. |
| **Connector of power and motor side**（アンプ本体に同梱） | | |
| Connector XA | 03JFAT-SAYGSA-M | J.S.T. Mfg. Co., Ltd. |
| Connector XB | 03JFAT-SAXGSA-M | J.S.T. Mfg. Co., Ltd. |
| Connector XC | 02MJFAT-SAGF | J.S.T. Mfg. Co., Ltd. |
| Connector XD | 04JFAT-SAXGSA-M | J.S.T. Mfg. Co., Ltd. |

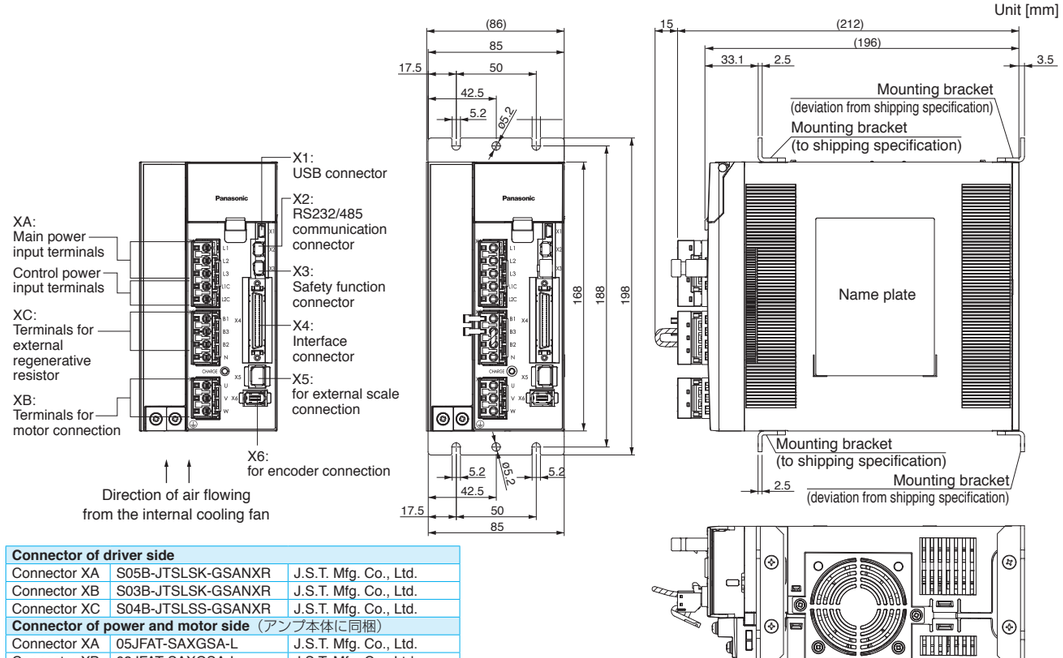
※コネクタ X1 ～ X7 のアンプ側コネクタは、A 枠と同じですので、A 枠の表をご覧ください。

Mass: 1.9kg



## E-frame (200V)

Unit [mm]



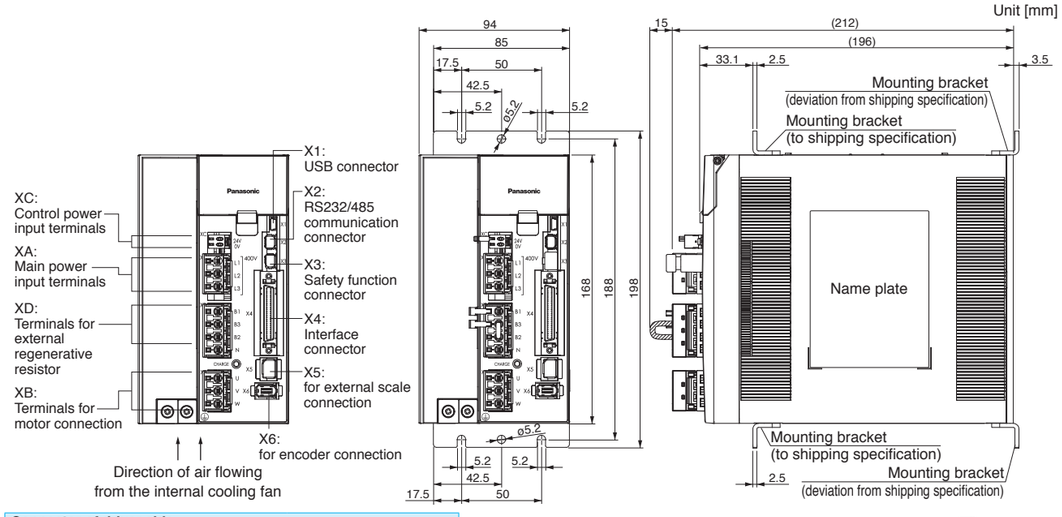

| Connector of driver side | | |
|---|---|---|
| Connector XA | S05B-JTSLSK-GSANXR | J.S.T. Mfg. Co., Ltd. |
| Connector XB | S03B-JTSLSK-GSANXR | J.S.T. Mfg. Co., Ltd. |
| Connector XC | S04B-JTSLSS-GSANXR | J.S.T. Mfg. Co., Ltd. |
| **Connector of power and motor side**（アンプ本体に同梱） | | |
| Connector XA | 05JFAT-SAXGSA-L | J.S.T. Mfg. Co., Ltd. |
| Connector XB | 03JFAT-SAXGSA-L | J.S.T. Mfg. Co., Ltd. |
| Connector XC | 04JFAT-SAXGSA-L | J.S.T. Mfg. Co., Ltd. |

※コネクタ X1 ～ X7 のアンプ側コネクタは、A 枠と同じですので、A 枠の表をご覧ください。

Mass: 2.7kg

## E-frame (400V)

Unit [mm]



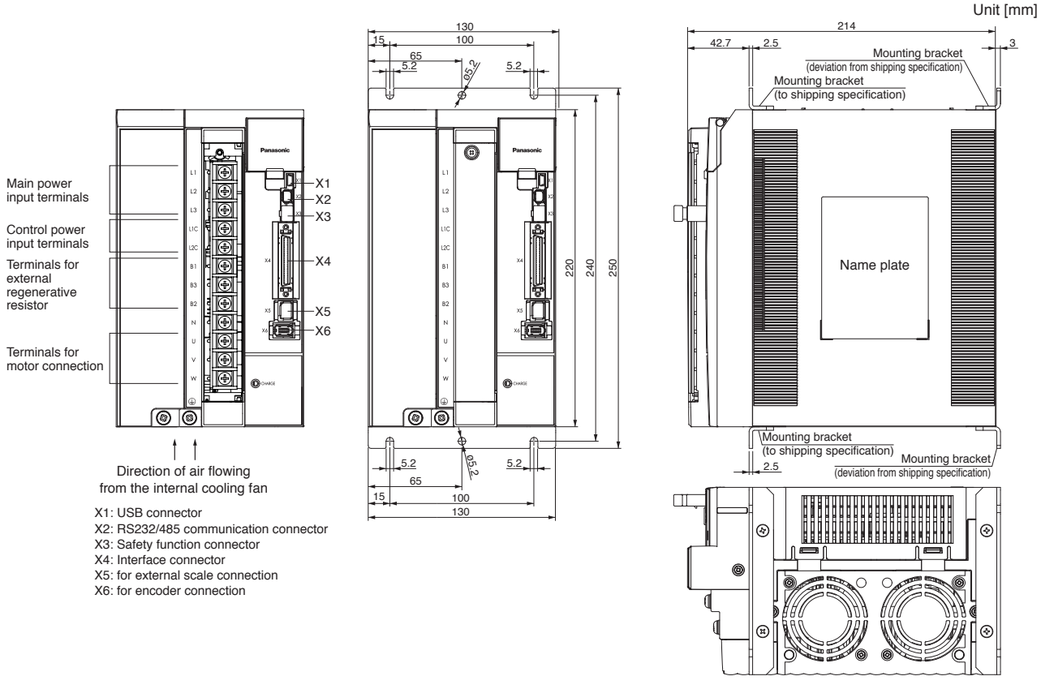

| Connector of driver side | | |
|---|---|---|
| Connector XA | S03B-JTSLSS-GSANYR | J.S.T. Mfg. Co., Ltd. |
| Connector XB | S03B-JTSLSK-GSANXR | J.S.T. Mfg. Co., Ltd. |
| Connector XC | S02B-J25SK-GGR | J.S.T. Mfg. Co., Ltd. |
| Connector XD | S04B-JTSLSK-GSANXR | J.S.T. Mfg. Co., Ltd. |
| **Connector of power and motor side**（アンプ本体に同梱） | | |
| Connector XA | 03JFAT-SAYGSA-L | J.S.T. Mfg. Co., Ltd. |
| Connector XB | 03JFAT-SAXGSA-L | J.S.T. Mfg. Co., Ltd. |
| Connector XC | 02MJFAT-SAGF | J.S.T. Mfg. Co., Ltd. |
| Connector XD | 04JFAT-SAXGSA-L | J.S.T. Mfg. Co., Ltd. |

※コネクタ X1 ～ X7 のアンプ側コネクタは、A 枠と同じですので、A 枠の表をご覧ください。

Mass: 2.7kg

## F-frame (200V)

Unit [mm]



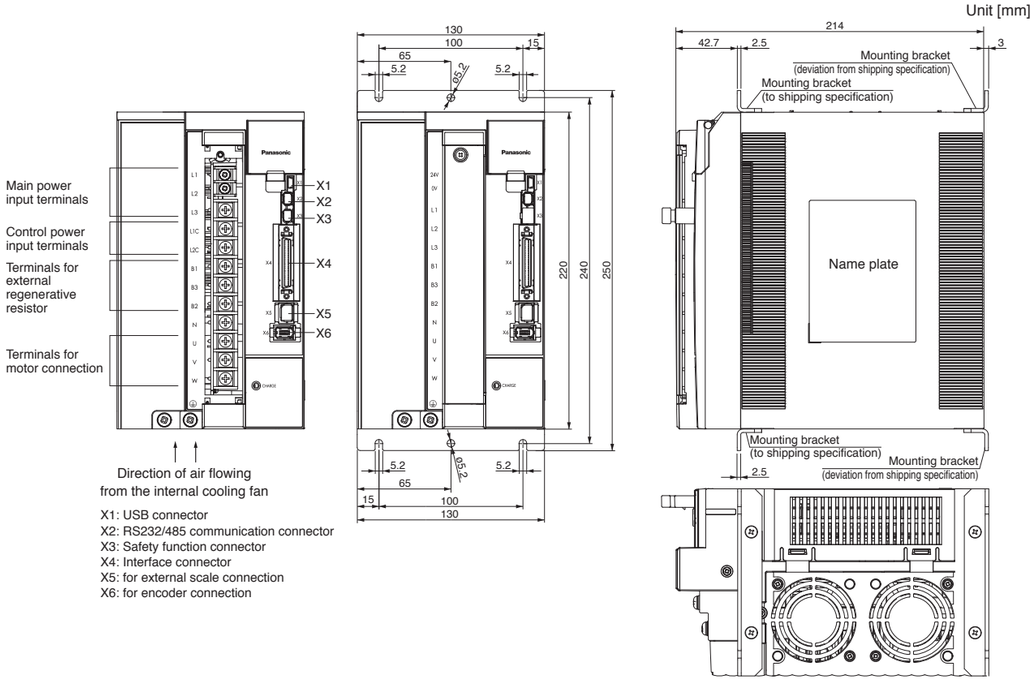

X1: USB connector
X2: RS232/485 communication connector
X3: Safety function connector
X4: Interface connector
X5: for external scale connection
X6: for encoder connection

Mass: 4.8kg

※アンプ側コネクタは、A 枠と同じですので、A 枠の表をご覧ください。

## F-frame (400V)

Unit [mm]




X1: USB connector
X2: RS232/485 communication connector
X3: Safety function connector
X4: Interface connector
X5: for external scale connection
X6: for encoder connection

Mass: 4.7kg

※アンプ側コネクタは、A 枠と同じですので、A 枠の表をご覧ください。





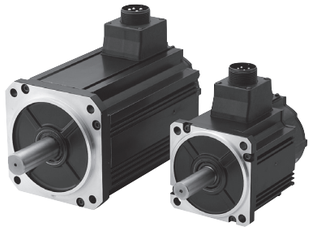
## Features

- Line-up: 50W to 5.0kW
- Max speed: 6000r/min (MSME 50W to 750W)
- Low inertia (MSME) to High inertia (MHME).
- Low cogging torque: Rated torque ratio 0.5% (typical value).
- 20-bit incremental encoder (1,048,576 pulse)
- 17-bit absolute encoder (131,072 pulse).
- Enclosure rating: IP67 (M*ME), IP65 (M*MD)
- Compact & Light weight

Small capacity type

[MSME (50W to 750W)]

Middle capacity type



[MSME (1.0kW to 5.0kW)]

**Motor (Scheduled to be released.)**

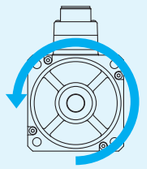
- MDME 7.5kW, 11kW, 15kW
- MHME 7.5kW
- MGME 4.5kW, 6.0kW
- MFME 1.5kW, 2.5kW, 4.5kW
- Motor with Gear Reduce: 100W, 200W, 400W, 750W

## Environmental Conditions

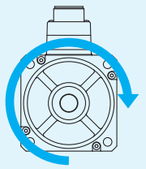
| Item | | Conditions |
|---|---|---|
| Ambient temperature *1 | | 0˚C to 40˚C (free from freezing) |
| Ambient humidity | | 20% to 85% RH (free from condensation) |
| Storage temperature *2 | | –20˚C to 65˚C (Max.temperature guarantee: 80˚C for 72 hours) |
| Storage humidity | | 20% to 85% RH (free from condensation) |
| Vibration | Motor only | Lower than 49m/s$^2$ (5G) at running, 24.5m/s$^2$ (2.5G) at stall |
| Impact | Motor only | Lower than 98m/s$^2$ (10G) |
| Enclosure rating (Motor only) | Leadwire type *3 | IP65 (except rotating portion of output shaft and readwire end.) |
| | Connector type *3*4 | IP67 (except rotating portion of output shaft and connecting pin part of the motor connector and the encoder connector) |
| Altitude | | Lower than 1000m |

*1 Ambient temperature to be measured at 5cm away from the motor.
*2 Permissible temperature for short duration such as transportation.
*3 These motors conform to the test conditions specified in EN standards (EN60529, EN60034-5). Do not use these motors in application where water proof performance is required such as continuous wash-down operation.
*4 This condition is applied when the connector mounting screw in case of motor 750W or less are tightened to the recommended tightening torque (Refer to 1-16, 2-18, 2-00). Be sure to use mounting screw supplied with the connector.

**<Note>**
回転方向の初期設定を
正方向(CCW)、
負方向(CW)と
定義しています。
ご注意ください。



**Positive direction (CCW)**



**Negative direction (CW)**

# Motor Specifications 100V MSME 50W [Low inertia, Small capacity]

## Specifications

| | | | AC100V | |
|---|---|---|---|---|
| Motor model *1 | | MSME | 5AZG1□ | 5AZS1□ |
| Applicable driver *2 | Model No. | A5 series | MADHT1105 | |
| | | A5E series | MADHT1105E | |
| | Frame symbol | | A-frame | |
| Power supply capacity | | (kVA) | 0.4 | |
| Rated output | | (W) | 50 | |
| Rated torque | | (N·m) | 0.16 | |
| Momentary Max. peak torque | | (N·m) | 0.48 | |
| Rated current | | (A(rms)) | 1.1 | |
| Max. current | | (A(o-p)) | 4.7 | |
| Regenerative brake frequency (times/min) Note)1 | Without option | | No limit Note)2 | |
| | DV0P4280 | | No limit Note)2 | |
| Rated rotational speed | | (r/min) | 3000 | |
| Max. rotational speed | | (r/min) | 6000 | |
| Moment of inertia of rotor ($\times10^{-4}$kg·m$^2$) | Without brake | | 0.025 | |
| | With brake | | 0.027 | |
| Recommended moment of inertia ratio of the load and the rotor Note)3 | | | 30 times or less | |
| Rotary encoder specifications Note)5 | | | 20-bit Incremental | 17-bit Absolute |
| | Resolution per single turn | | 1,048,576 | 131,072 |

**• Brake specifications** (For details, refer to P.105)
(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 or more |
| Engaging time (ms) | 35 or less |
| Releasing time (ms) Note)4 | 20 or less |
| Exciting current (DC) (A) | 0.3 |
| Releasing voltage (DC) (V) | 1 or more |
| Exciting voltage (DC) (V) | 24±1.2 |

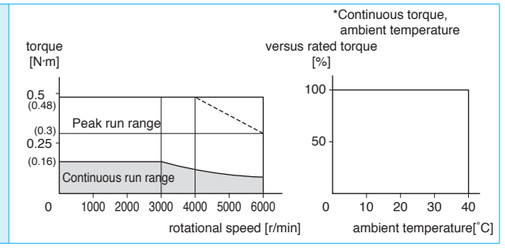
**• Permissible load** (For details, refer to P.104)

| | | |
|---|---|---|
| During assembly | Radial load P-direction (N) | 147 |
| | Thrust load A-direction (N) | 88 |
| | Thrust load B-direction (N) | 117.6 |
| During operation | Radial load P-direction (N) | 68.6 |
| | Thrust load A, B-direction (N) | 58.8 |

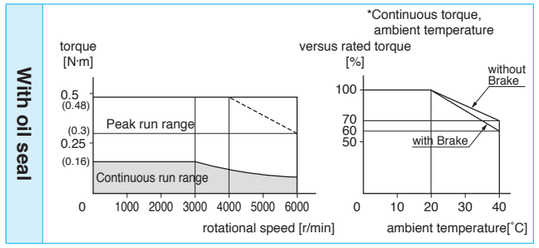
• For details of Note 1 to Note 5, refer to P.104.
• Dimensions of Driver, refer to P.30.
*1 Rotaly encoder specifications: □
*2 The product that the end of driver model designation has "E" is "positioning type".
Detail of model designation, refer to P.11.

## Torque characteristics (at AC100V of power voltage <Dotted line represents the torque at 10% less supply voltage.>)

Without oil seal



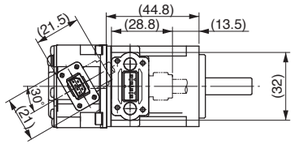

With oil seal



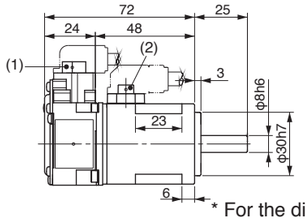

## Dimensions

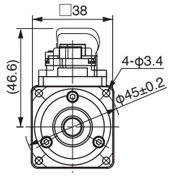
<Without Brake>

Mass (kg)/ 0.32

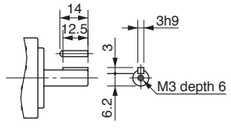



(1) Encoder connector
(2) Motor connector




Key way dimensions




* For the dimensions of with brake, refer to the right page.

**<Cautions>** Reduce the moment of inertia ratio if high speed response operation is required.
Dimensions are subject to change without notice. Contact us or a dealer for the latest information.
Read the Instruction Manual carefully and understand all precautions and remarks before using the products.



# Motor Specifications 200V MSME 50W [Low inertia, Small capacity]

## Specifications

| | | | AC200V | |
|---|---|---|---|---|
| Motor model *1 | | MSME | 5AZG1□ | 5AZS1□ |
| Applicable driver *2 | Model No. | A5 series | MADHT1505 | |
| | | A5E series | MADHT1505E | |
| | Frame symbol | | A-frame | |
| Power supply capacity | | (kVA) | 0.5 | |
| Rated output | | (W) | 50 | |
| Rated torque | | (N·m) | 0.16 | |
| Momentary Max. peak torque | | (N·m) | 0.48 | |
| Rated current | | (A(rms)) | 1.1 | |
| Max. current | | (A(o-p)) | 4.7 | |
| Regenerative brake frequency (times/min) Note)1 | Without option | | No limit Note)2 | |
| | DV0P4280 | | No limit Note)2 | |
| Rated rotational speed | | (r/min) | 3000 | |
| Max. rotational speed | | (r/min) | 6000 | |
| Moment of inertia of rotor ($\times10^{-4}$kg·m$^2$) | Without brake | | 0.025 | |
| | With brake | | 0.027 | |
| Recommended moment of inertia ratio of the load and the rotor Note)3 | | | 30 times or less | |
| Rotary encoder specifications Note)5 | | | 20-bit Incremental | 17-bit Absolute |
| | Resolution per single turn | | 1,048,576 | 131,072 |

**• Brake specifications** (For details, refer to P.105)
(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 or more |
| Engaging time (ms) | 35 or less |
| Releasing time (ms) Note)4 | 20 or less |
| Exciting current (DC) (A) | 0.3 |
| Releasing voltage (DC) (V) | 1 or more |
| Exciting voltage (DC) (V) | 24±1.2 |

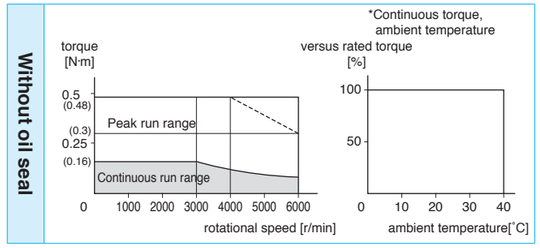
**• Permissible load** (For details, refer to P.104)

| | | |
|---|---|---|
| During assembly | Radial load P-direction (N) | 147 |
| | Thrust load A-direction (N) | 88 |
| | Thrust load B-direction (N) | 117.6 |
| During operation | Radial load P-direction (N) | 68.6 |
| | Thrust load A, B-direction (N) | 58.8 |

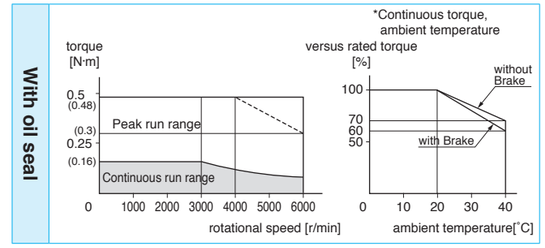
• For details of Note 1 to Note 5, refer to P.104.
• Dimensions of Driver, refer to P.30.
*1 Rotaly encoder specifications: □
*2 The product that the end of driver model designation has "E" is "positioning type".
Detail of model designation, refer to P.11.

## Torque characteristics (at AC200V of power voltage <Dotted line represents the torque at 10% less supply voltage.>)

Without oil seal



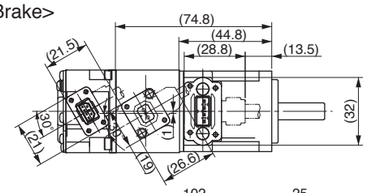

With oil seal



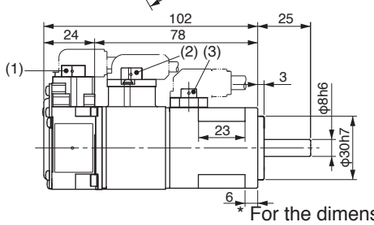

## Dimensions

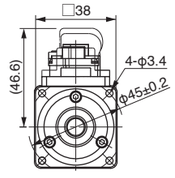
<With Brake>

Mass (kg)/ 0.53

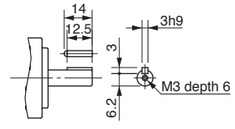



(1) Encoder connector
(2) Brake connector
(3) Motor connector




Key way dimensions




* For the dimensions of without brake, refer to the left page.

**<Cautions>** Reduce the moment of inertia ratio if high speed response operation is required.
Dimensions are subject to change without notice. Contact us or a dealer for the latest information.
Read the Instruction Manual carefully and understand all precautions and remarks before using the products.

# Motor Specifications 100V MSME 100W [Low inertia, Small capacity]

## Specifications

| | | | AC100V | |
|---|---|---|---|---|
| Motor model *1 | | MSME | 011G1□ | 011S1□ |
| Applicable driver *2 | Model No. | A5 series | MADHT1107 | |
| | | A5E series | MADHT1107E | |
| | Frame symbol | | A-frame | |
| Power supply capacity | | (kVA) | 0.4 | |
| Rated output | | (W) | 100 | |
| Rated torque | | (N·m) | 0.32 | |
| Momentary Max. peak torque | | (N·m) | 0.95 | |
| Rated current | | (A(rms)) | 1.6 | |
| Max. current | | (A(o-p)) | 6.9 | |
| Regenerative brake frequency (times/min) Note)1 | Without option | | No limit Note)2 | |
| | DV0P4280 | | No limit Note)2 | |
| Rated rotational speed | | (r/min) | 3000 | |
| Max. rotational speed | | (r/min) | 6000 | |
| Moment of inertia of rotor ($\times10^{-4}$kg·m$^2$) | Without brake | | 0.051 | |
| | With brake | | 0.054 | |
| Recommended moment of inertia ratio of the load and the rotor Note)3 | | | 30 times or less | |
| Rotary encoder specifications Note)5 | | | 20-bit Incremental | 17-bit Absolute |
| | Resolution per single turn | | 1,048,576 | 131,072 |

**• Brake specifications** (For details, refer to P.105)
(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 or more |
| Engaging time (ms) | 35 or less |
| Releasing time (ms) Note)4 | 20 or less |
| Exciting current (DC) (A) | 0.3 |
| Releasing voltage (DC) (V) | 1 or more |
| Exciting voltage (DC) (V) | 24±1.2 |

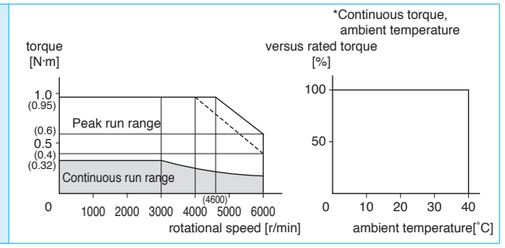
**• Permissible load** (For details, refer to P.104)

| | | |
|---|---|---|
| During assembly | Radial load P-direction (N) | 147 |
| | Thrust load A-direction (N) | 88 |
| | Thrust load B-direction (N) | 117.6 |
| During operation | Radial load P-direction (N) | 68.6 |
| | Thrust load A, B-direction (N) | 58.8 |

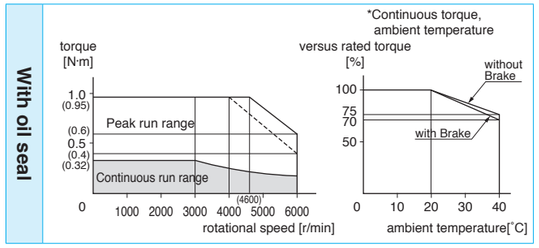
• For details of Note 1 to Note 5, refer to P.104.
• Dimensions of Driver, refer to P.30.
*1 Rotaly encoder specifications: □
*2 The product that the end of driver model designation has "E" is "positioning type".
Detail of model designation, refer to P.11.

## Torque characteristics (at AC100V of power voltage <Dotted line represents the torque at 10% less supply voltage.>)

Without oil seal



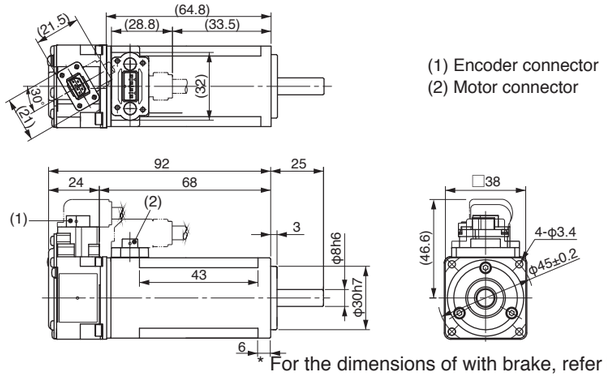

With oil seal




## Dimensions

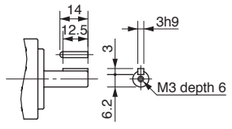
<Without Brake>

Mass (kg)/ 0.47




(1) Encoder connector
(2) Motor connector

Key way dimensions




* For the dimensions of with brake, refer to the right page.

**<Cautions>** Reduce the moment of inertia ratio if high speed response operation is required.
Dimensions are subject to change without notice. Contact us or a dealer for the latest information.
Read the Instruction Manual carefully and understand all precautions and remarks before using the products.



# Motor Specifications 200V MSME 100W [Low inertia, Small capacity]

## Specifications

| | | | AC200V | |
|---|---|---|---|---|
| Motor model *1 | | MSME | 012G1□ | 012S1□ |
| Applicable driver *2 | Model No. | A5 series | MADHT1505 | |
| | | A5E series | MADHT1505E | |
| | Frame symbol | | A-frame | |
| Power supply capacity | | (kVA) | 0.5 | |
| Rated output | | (W) | 100 | |
| Rated torque | | (N·m) | 0.32 | |
| Momentary Max. peak torque | | (N·m) | 0.95 | |
| Rated current | | (A(rms)) | 1.1 | |
| Max. current | | (A(o-p)) | 4.7 | |
| Regenerative brake frequency (times/min) Note)1 | Without option | | No limit Note)2 | |
| | DV0P4280 | | No limit Note)2 | |
| Rated rotational speed | | (r/min) | 3000 | |
| Max. rotational speed | | (r/min) | 6000 | |
| Moment of inertia of rotor ($\times10^{-4}$kg·m$^2$) | Without brake | | 0.051 | |
| | With brake | | 0.054 | |
| Recommended moment of inertia ratio of the load and the rotor Note)3 | | | 30 times or less | |
| Rotary encoder specifications Note)5 | | | 20-bit Incremental | 17-bit Absolute |
| | Resolution per single turn | | 1,048,576 | 131,072 |

**• Brake specifications** (For details, refer to P.105)
(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 or more |
| Engaging time (ms) | 35 or less |
| Releasing time (ms) Note)4 | 20 or less |
| Exciting current (DC) (A) | 0.3 |
| Releasing voltage (DC) (V) | 1 or more |
| Exciting voltage (DC) (V) | 24±1.2 |

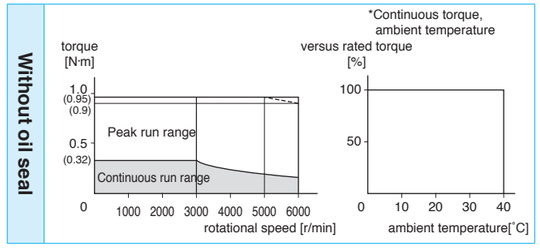
**• Permissible load** (For details, refer to P.104)

| | | |
|---|---|---|
| During assembly | Radial load P-direction (N) | 147 |
| | Thrust load A-direction (N) | 88 |
| | Thrust load B-direction (N) | 117.6 |
| During operation | Radial load P-direction (N) | 68.6 |
| | Thrust load A, B-direction (N) | 58.8 |

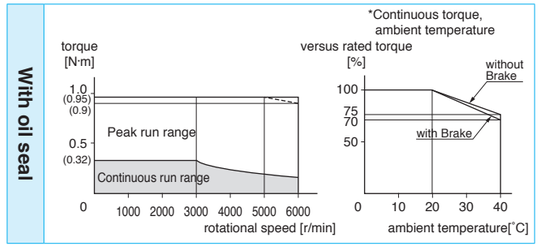
• For details of Note 1 to Note 5, refer to P.104.
• Dimensions of Driver, refer to P.30.
*1 Rotaly encoder specifications: □
*2 The product that the end of driver model designation has "E" is "positioning type".
Detail of model designation, refer to P.11.

## Torque characteristics (at AC200V of power voltage <Dotted line represents the torque at 10% less supply voltage.>)

Without oil seal



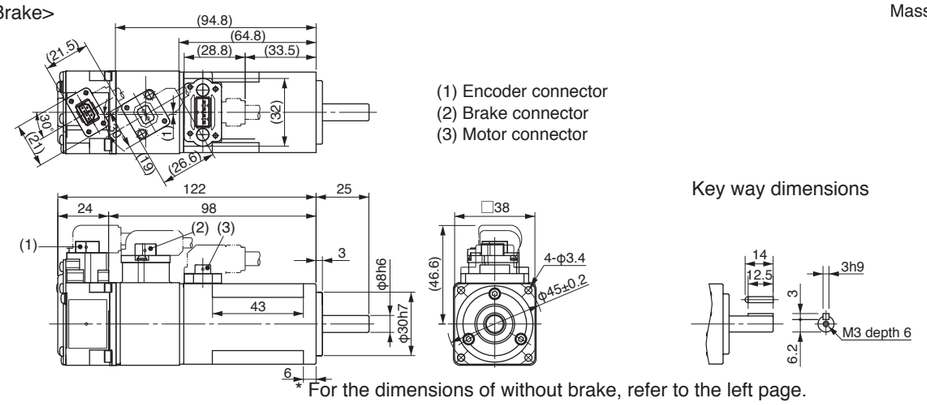

With oil seal




## Dimensions

<With Brake>

Mass (kg)/ 0.68




(1) Encoder connector
(2) Brake connector
(3) Motor connector

Key way dimensions




* For the dimensions of without brake, refer to the left page.

**<Cautions>** Reduce the moment of inertia ratio if high speed response operation is required.
Dimensions are subject to change without notice. Contact us or a dealer for the latest information.
Read the Instruction Manual carefully and understand all precautions and remarks before using the products.

# Motor Specifications 100V MSME 200W [Low inertia, Small capacity]

## Specifications

| | | | AC100V | |
|---|---|---|---|---|
| Motor model *1 | | MSME | 021G1□ | 021S1□ |
| Applicable driver *2 | Model No. | A5 series | MBDHT2110 | |
| | | A5E series | MBDHT2110E | |
| | Frame symbol | | B-frame | |
| Power supply capacity | | (kVA) | 0.5 | |
| Rated output | | (W) | 200 | |
| Rated torque | | (N·m) | 0.64 | |
| Momentary Max. peak torque | | (N·m) | 1.91 | |
| Rated current | | (A(rms)) | 2.5 | |
| Max. current | | (A(o-p)) | 10.6 | |
| Regenerative brake frequency (times/min) Note)1 | Without option | | No limit Note)2 | |
| | DV0P4283 | | No limit Note)2 | |
| Rated rotational speed | | (r/min) | 3000 | |
| Max. rotational speed | | (r/min) | 6000 | |
| Moment of inertia of rotor ($\times10^{-4}$kg·m$^2$) | Without brake | | 0.14 | |
| | With brake | | 0.16 | |
| Recommended moment of inertia ratio of the load and the rotor Note)3 | | | 30 times or less | |
| Rotary encoder specifications Note)5 | | | 20-bit Incremental | 17-bit Absolute |
| | Resolution per single turn | | 1,048,576 | 131,072 |

**• Brake specifications** (For details, refer to P.105)

(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 or more |
| Engaging time (ms) | 50 or less |
| Releasing time (ms) Note)4 | 15 or less |
| Exciting current (DC) (A) | 0.36 |
| Releasing voltage (DC) (V) | 1 or more |
| Exciting voltage (DC) (V) | 24±1.2 |

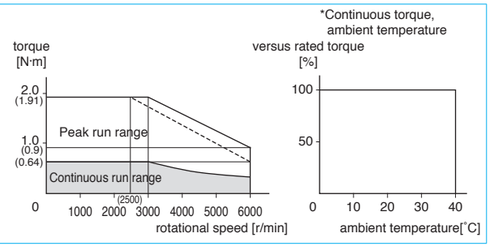
**• Permissible load** (For details, refer to P.104)

| | | |
|---|---|---|
| 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, B-direction (N) | 98 |

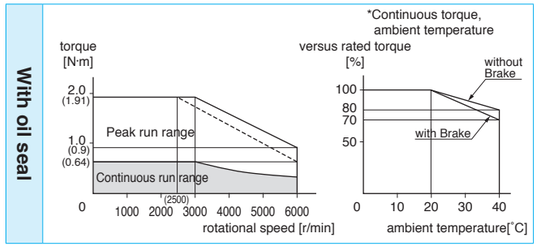
• For details of Note 1 to Note 5, refer to P.104.
• Dimensions of Driver, refer to P.30.
*1 Rotaly encoder specifications: □
*2 The product that the end of driver model designation has "E" is "positioning type".
Detail of model designation, refer to P.11.

## Torque characteristics (at AC100V of power voltage <Dotted line represents the torque at 10% less supply voltage.>)

Without oil seal



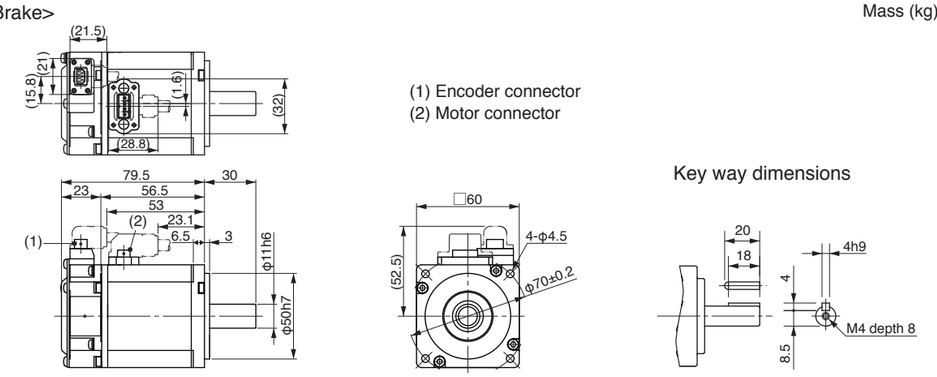

With oil seal




## Dimensions

<Without Brake>

Mass (kg)/ 0.82




(1) Encoder connector
(2) Motor connector

* For the dimensions of with brake, refer to the right page.

**<Cautions>** Reduce the moment of inertia ratio if high speed response operation is required.
Dimensions are subject to change without notice. Contact us or a dealer for the latest information.
Read the Instruction Manual carefully and understand all precautions and remarks before using the products.



# Motor Specifications 200V MSME 200W [Low inertia, Small capacity]

## Specifications

| | | | AC200V | |
|---|---|---|---|---|
| Motor model *1 | | MSME | 022G1□ | 022S1□ |
| Applicable driver *2 | Model No. | A5 series | MADHT1507 | |
| | | A5E series | MADHT1507E | |
| | Frame symbol | | A-frame | |
| Power supply capacity | | (kVA) | 0.5 | |
| Rated output | | (W) | 200 | |
| Rated torque | | (N·m) | 0.64 | |
| Momentary Max. peak torque | | (N·m) | 1.91 | |
| Rated current | | (A(rms)) | 1.5 | |
| Max. current | | (A(o-p)) | 6.5 | |
| Regenerative brake frequency (times/min) Note)1 | Without option | | No limit Note)2 | |
| | DV0P4283 | | No limit Note)2 | |
| Rated rotational speed | | (r/min) | 3000 | |
| Max. rotational speed | | (r/min) | 6000 | |
| Moment of inertia of rotor ($\times10^{-4}$kg·m$^2$) | Without brake | | 0.14 | |
| | With brake | | 0.16 | |
| Recommended moment of inertia ratio of the load and the rotor Note)3 | | | 30 times or less | |
| Rotary encoder specifications Note)5 | | | 20-bit Incremental | 17-bit Absolute |
| | Resolution per single turn | | 1,048,576 | 131,072 |

**• Brake specifications** (For details, refer to P.105)

(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 or more |
| Engaging time (ms) | 50 or less |
| Releasing time (ms) Note)4 | 15 or less |
| Exciting current (DC) (A) | 0.36 |
| Releasing voltage (DC) (V) | 1 or more |
| Exciting voltage (DC) (V) | 24±1.2 |

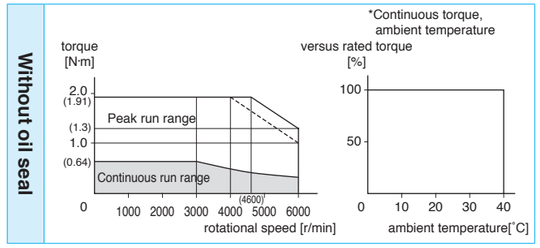
**• Permissible load** (For details, refer to P.104)

| | | |
|---|---|---|
| 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, B-direction (N) | 98 |

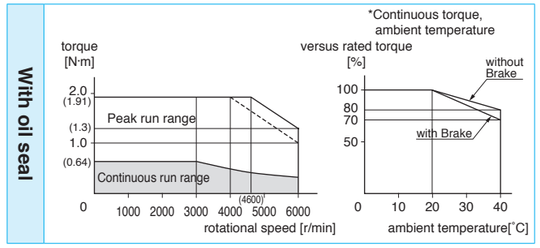
• For details of Note 1 to Note 5, refer to P.104.
• Dimensions of Driver, refer to P.30.
*1 Rotaly encoder specifications: □
*2 The product that the end of driver model designation has "E" is "positioning type".
Detail of model designation, refer to P.11.

## Torque characteristics (at AC200V of power voltage <Dotted line represents the torque at 10% less supply voltage.>)

Without oil seal



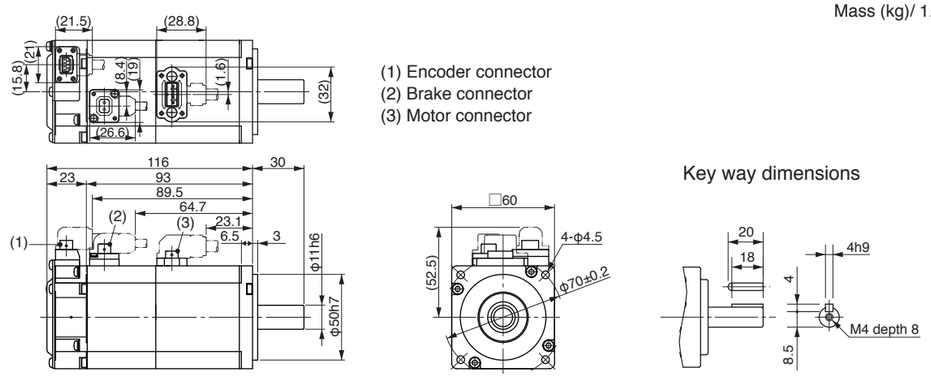

With oil seal




## Dimensions

<With Brake>

Mass (kg)/ 1.30




(1) Encoder connector
(2) Brake connector
(3) Motor connector

* For the dimensions of without brake, refer to the left page.

**<Cautions>** Reduce the moment of inertia ratio if high speed response operation is required.
Dimensions are subject to change without notice. Contact us or a dealer for the latest information.
Read the Instruction Manual carefully and understand all precautions and remarks before using the products.

# Motor Specifications 100V MSME 400W [Low inertia, Small capacity]

## Specifications

| | | | AC100V | |
|---|---|---|---|---|
| Motor model *1 | | MSME | 041G1□ | 041S1□ |
| Applicable driver *2 | Model No. | A5 series | MCDHT3120 | |
| | | A5E series | MCDHT3120E | |
| | Frame symbol | | C-frame | |
| Power supply capacity | | (kVA) | 0.9 | |
| Rated output | | (W) | 400 | |
| Rated torque | | (N·m) | 1.3 | |
| Momentary Max. peak torque | | (N·m) | 3.8 | |
| Rated current | | (A(rms)) | 4.6 | |
| Max. current | | (A(o-p)) | 19.5 | |
| Regenerative brake frequency (times/min) Note)1 | Without option | | No limit Note)2 | |
| | DV0P4282 | | No limit Note)2 | |
| Rated rotational speed | | (r/min) | 3000 | |
| Max. rotational speed | | (r/min) | 6000 | |
| Moment of inertia of rotor ($\times10^{-4}$kg·m$^2$) | Without brake | | 0.26 | |
| | With brake | | 0.28 | |
| Recommended moment of inertia ratio of the load and the rotor Note)3 | | | 30 times or less | |
| Rotary encoder specifications Note)5 | | | 20-bit Incremental | 17-bit Absolute |
| | Resolution per single turn | | 1,048,576 | 131,072 |

**• Brake specifications** (For details, refer to P.105)

(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 or more |
| Engaging time (ms) | 50 or less |
| Releasing time (ms) Note)4 | 15 or less |
| Exciting current (DC) (A) | 0.36 |
| Releasing voltage (DC) (V) | 1 or more |
| Exciting voltage (DC) (V) | 24±1.2 |

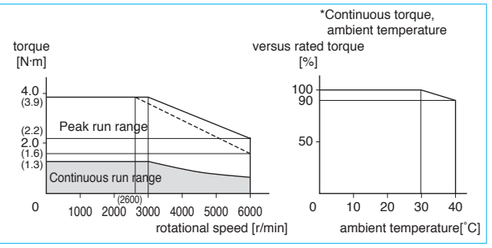
**• Permissible load** (For details, refer to P.104)

| | | |
|---|---|---|
| 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, B-direction (N) | 98 |

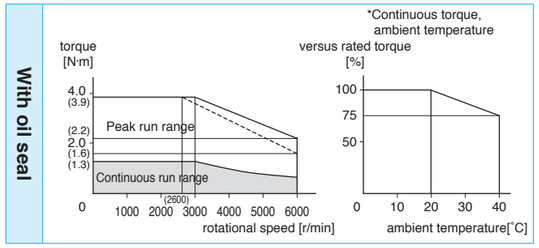
• For details of Note 1 to Note 5, refer to P.104.
• Dimensions of Driver, refer to P.31.
*1 Rotaly encoder specifications: □
*2 The product that the end of driver model designation has "E" is "positioning type".
Detail of model designation, refer to P.11.

## Torque characteristics (at AC100V of power voltage <Dotted line represents the torque at 10% less supply voltage.>)

Without oil seal



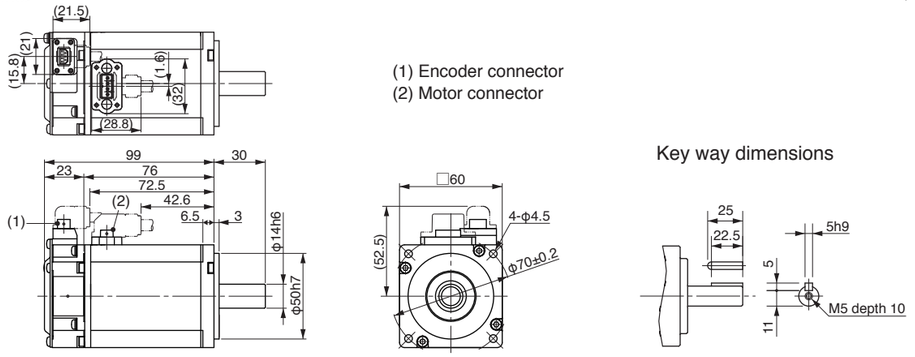

With oil seal




## Dimensions

<Without Brake>

Mass (kg)/ 1.2




(1) Encoder connector
(2) Motor connector

Key way dimensions

* For the dimensions of with brake, refer to the right page.

**<Cautions>** Reduce the moment of inertia ratio if high speed response operation is required.
Dimensions are subject to change without notice. Contact us or a dealer for the latest information.
Read the Instruction Manual carefully and understand all precautions and remarks before using the products.



# Motor Specifications 200V MSME 400W [Low inertia, Small capacity]

## Specifications

| | | | AC200V | |
|---|---|---|---|---|
| Motor model *1 | | MSME | 042G1□ | 042S1□ |
| Applicable driver *2 | Model No. | A5 series | MBDHT2510 | |
| | | A5E series | MBDHT2510E | |
| | Frame symbol | | B-frame | |
| Power supply capacity | | (kVA) | 0.9 | |
| Rated output | | (W) | 400 | |
| Rated torque | | (N·m) | 1.3 | |
| Momentary Max. peak torque | | (N·m) | 3.8 | |
| Rated current | | (A(rms)) | 2.4 | |
| Max. current | | (A(o-p)) | 10.2 | |
| Regenerative brake frequency (times/min) Note)1 | Without option | | No limit Note)2 | |
| | DV0P4283 | | No limit Note)2 | |
| Rated rotational speed | | (r/min) | 3000 | |
| Max. rotational speed | | (r/min) | 6000 | |
| Moment of inertia of rotor ($\times10^{-4}$kg·m$^2$) | Without brake | | 0.26 | |
| | With brake | | 0.28 | |
| Recommended moment of inertia ratio of the load and the rotor Note)3 | | | 30 times or less | |
| Rotary encoder specifications Note)5 | | | 20-bit Incremental | 17-bit Absolute |
| | Resolution per single turn | | 1,048,576 | 131,072 |

**• Brake specifications** (For details, refer to P.105)

(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 or more |
| Engaging time (ms) | 50 or less |
| Releasing time (ms) Note)4 | 15 or less |
| Exciting current (DC) (A) | 0.36 |
| Releasing voltage (DC) (V) | 1 or more |
| Exciting voltage (DC) (V) | 24±1.2 |

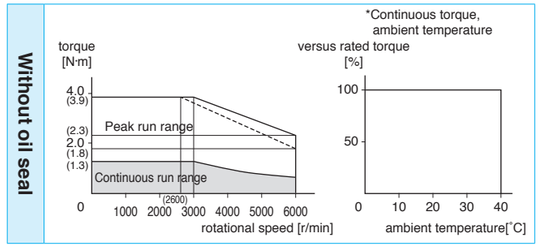
**• Permissible load** (For details, refer to P.104)

| | | |
|---|---|---|
| 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, B-direction (N) | 98 |

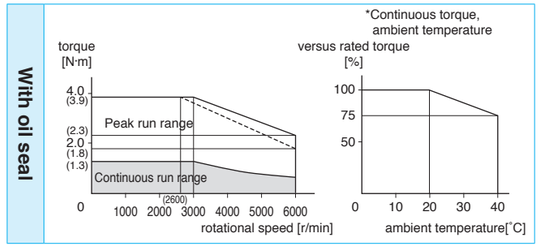
• For details of Note 1 to Note 5, refer to P.104.
• Dimensions of Driver, refer to P.30.
*1 Rotaly encoder specifications: □
*2 The product that the end of driver model designation has "E" is "positioning type".
Detail of model designation, refer to P.11.

## Torque characteristics (at AC200V of power voltage <Dotted line represents the torque at 10% less supply voltage.>)

Without oil seal



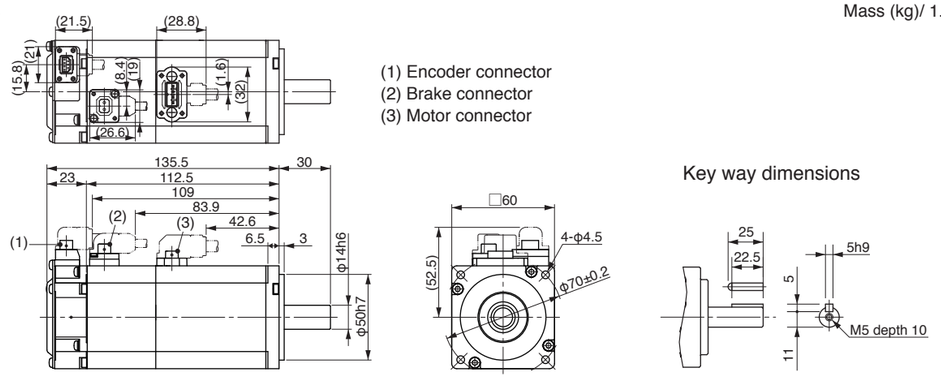

With oil seal




## Dimensions

<With Brake>

Mass (kg)/ 1.7




(1) Encoder connector
(2) Brake connector
(3) Motor connector

Key way dimensions

* For the dimensions of without brake, refer to the left page.

**<Cautions>** Reduce the moment of inertia ratio if high speed response operation is required.
Dimensions are subject to change without notice. Contact us or a dealer for the latest information.
Read the Instruction Manual carefully and understand all precautions and remarks before using the products.

# Motor Specifications 200V MSME 750W [Low inertia, Small capacity]

## Specifications

| | | | AC200V | |
|---|---|---|---|---|
| Motor model *1 | | MSME | 082G1□ | 082S1□ |
| Applicable driver *2 | Model No. | A5 series | MCDHT3520 | |
| | | A5E series | MCDHT3520E | |
| | Frame symbol | | C-frame | |
| Power supply capacity | | (kVA) | 1.3 | |
| Rated output | | (W) | 750 | |
| Rated torque | | (N·m) | 2.4 | |
| Momentary Max. peak torque | | (N·m) | 7.1 | |
| Rated current | | (A(rms)) | 4.1 | |
| Max. current | | (A(o-p)) | 17.4 | |
| Regenerative brake frequency (times/min) Note)1 | Without option | | No limit Note)2 | |
| | DV0P4283 | | No limit Note)2 | |
| Rated rotational speed | | (r/min) | 3000 | |
| Max. rotational speed | | (r/min) | 6000 | |
| Moment of inertia of rotor ($\times10^{-4}$kg·m$^2$) | Without brake | | 0.87 | |
| | With brake | | 0.97 | |
| Recommended moment of inertia ratio of the load and the rotor Note)3 | | | 20 times or less | |
| Rotary encoder specifications Note)5 | | | 20-bit Incremental | 17-bit Absolute |
| | Resolution per single turn | | 1,048,576 | 131,072 |

**• Brake specifications** (For details, refer to P.105)

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

| | |
|---|---|
| Static friction torque (N·m) | 2.45 or more |
| Engaging time (ms) | 70 or less |
| Releasing time (ms) Note)4 | 20 or less |
| Exciting current (DC) (A) | 0.42 |
| Releasing voltage (DC) (V) | 1 or more |
| Exciting voltage (DC) (V) | 24±1.2 |

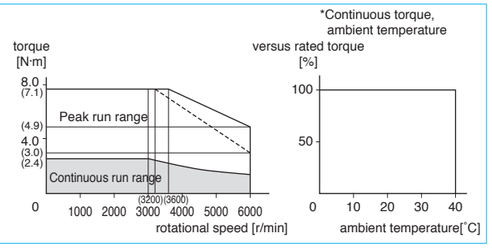
**• Permissible load** (For details, refer to P.104)

| | | |
|---|---|---|
| During assembly | Radial load P-direction (N) | 686 |
| | Thrust load A-direction (N) | 294 |
| | Thrust load B-direction (N) | 392 |
| During operation | Radial load P-direction (N) | 392 |
| | Thrust load A, B-direction (N) | 147 |

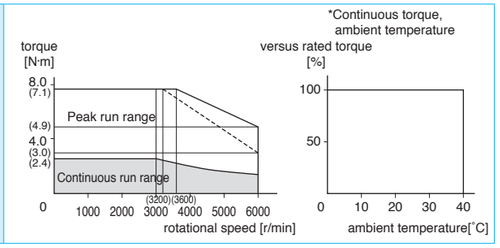
• For details of Note 1 to Note 5, refer to P.104.
• Dimensions of Driver, refer to P.31.
*1 Rotaly encoder specifications: □
*2 The product that the end of driver model designation has "E" is "positioning type".
Detail of model designation, refer to P.11.

## Torque characteristics (at AC200V of power voltage <Dotted line represents the torque at 10% less supply voltage.>)

Without oil seal



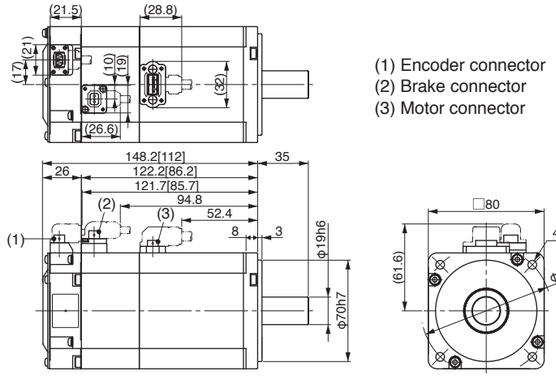

With oil seal




## Dimensions

<With Brake>

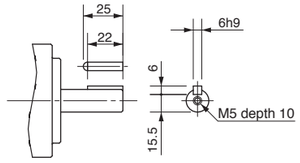
Mass (kg)/ Without brake: 2.3
With brake: 3.1




(1) Encoder connector
(2) Brake connector
(3) Motor connector




Key way dimensions




* Figures in [ ] represent the dimensions of with brake.

**<Cautions>** Reduce the moment of inertia ratio if high speed response operation is required.
Dimensions are subject to change without notice. Contact us or a dealer for the latest information.
Read the Instruction Manual carefully and understand all precautions and remarks before using the products.



# Motor Specifications 200V MSME 1.0kW [Low inertia, Middle capacity]

## Specifications

| | | | AC200V | |
|---|---|---|---|---|
| Motor model *1 | | MSME | 102G1□ | 102S1□ |
| Applicable driver *2 | Model No. | A5 series | MDDHT5540 | |
| | | A5E series | MDDHT5540E | |
| | Frame symbol | | D-frame | |
| Power supply capacity | | (kVA) | 1.8 | |
| Rated output | | (W) | 1.0 | |
| Rated torque | | (N·m) | 3.18 | |
| Momentary Max. peak torque | | (N·m) | 9.55 | |
| Rated current | | (A(rms)) | 6.6 | |
| Max. current | | (A(o-p)) | 28 | |
| Regenerative brake frequency (times/min) Note)1 | Without option | | No limit Note)2 | |
| | DV0P4284 | | No limit Note)2 | |
| Rated rotational speed | | (r/min) | 3000 | |
| Max. rotational speed | | (r/min) | 5000 | |
| Moment of inertia of rotor ($\times10^{-4}$kg·m$^2$) | Without brake | | 2.03 | |
| | With brake | | 2.35 | |
| Recommended moment of inertia ratio of the load and the rotor Note)3 | | | 15 times or less | |
| Rotary encoder specifications Note)5 | | | 20-bit Incremental | 17-bit Absolute |
| | Resolution per single turn | | 1,048,576 | 131,072 |

**• Brake specifications** (For details, refer to P.105)

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

| | |
|---|---|
| Static friction torque (N·m) | 7.8 or more |
| Engaging time (ms) | 50 or less |
| Releasing time (ms) Note)4 | 15 or less |
| Exciting current (DC) (A) | 0.81±10% |
| Releasing voltage (DC) (V) | 2 or more |
| Exciting voltage (DC) (V) | 24±2.4 |

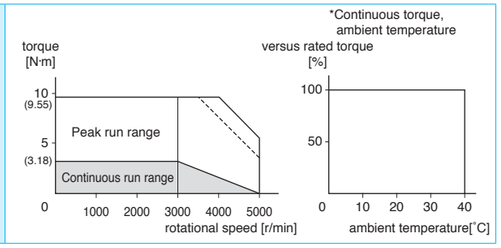
**• Permissible load** (For details, refer to P.104)

| | | |
|---|---|---|
| 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, B-direction (N) | 196 |

• For details of Note 1 to Note 5, refer to P.104.
• Dimensions of Driver, refer to P.32.
*1 Rotaly encoder specifications: □
*2 The product that the end of driver model designation has "E" is "positioning type".
Detail of model designation, refer to P.11.

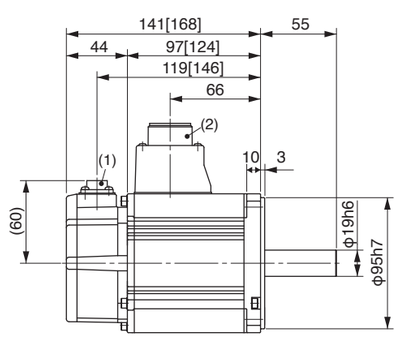
## Torque characteristics (at AC200V of power voltage <Dotted line represents the torque at 10% less supply voltage.>)

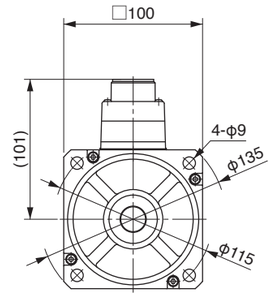
With oil seal



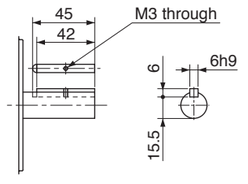

## Dimensions

Mass (kg)/ Without brake: 3.5
With brake: 4.5




Key way dimensions




(1) Encoder connector
(2) Motor/Brake connector

* Figures in [ ] represent the dimensions of with brake.

**<Cautions>** Reduce the moment of inertia ratio if high speed response operation is required.
Dimensions are subject to change without notice. Contact us or a dealer for the latest information.
Read the Instruction Manual carefully and understand all precautions and remarks before using the products.

# Motor Specifications 200V MSME 1.5kW [Low inertia, Middle capacity]

## Specifications

| | | | AC200V | |
|---|---|---|---|---|
| Motor model *1 | | MSME | 152G1□ | 152S1□ |
| Applicable driver *2 | Model No. | A5 series | MDDHT5540 | |
| | | A5E series | MDDHT5540E | |
| | Frame symbol | | D-frame | |
| Power supply capacity | | (kVA) | 2.3 | |
| Rated output | | (W) | 1.5 | |
| Rated torque | | (N·m) | 4.77 | |
| Momentary Max. peak torque | | (N·m) | 14.3 | |
| Rated current | | (A(rms)) | 8.2 | |
| Max. current | | (A(o-p)) | 35 | |
| Regenerative brake frequency (times/min) Note)1 | Without option | | No limit Note)2 | |
| | DV0P4284 | | No limit Note)2 | |
| Rated rotational speed | | (r/min) | 3000 | |
| Max. rotational speed | | (r/min) | 5000 | |
| Moment of inertia of rotor ($\times10^{-4}$kg·m$^2$) | Without brake | | 2.84 | |
| | With brake | | 3.17 | |
| Recommended moment of inertia ratio of the load and the rotor Note)3 | | | 15 times or less | |
| Rotary encoder specifications Note)5 | | | 20-bit Incremental | 17-bit Absolute |
| | Resolution per single turn | | 1,048,576 | 131,072 |

**• Brake specifications** (For details, refer to P.105)

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

| | |
|---|---|
| Static friction torque (N·m) | 7.8 or more |
| Engaging time (ms) | 50 or less |
| Releasing time (ms) Note)4 | 15 or less |
| Exciting current (DC) (A) | 0.81±10% |
| Releasing voltage (DC) (V) | 2 or more |
| Exciting voltage (DC) (V) | 24±2.4 |

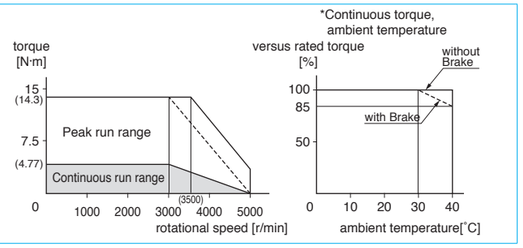
**• Permissible load** (For details, refer to P.104)

| | | |
|---|---|---|
| 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, B-direction (N) | 196 |

• For details of Note 1 to Note 5, refer to P.104.
• Dimensions of Driver, refer to P.32.
*1 Rotaly encoder specifications: □
*2 The product that the end of driver model designation has "E" is "positioning type".
Detail of model designation, refer to P.11.

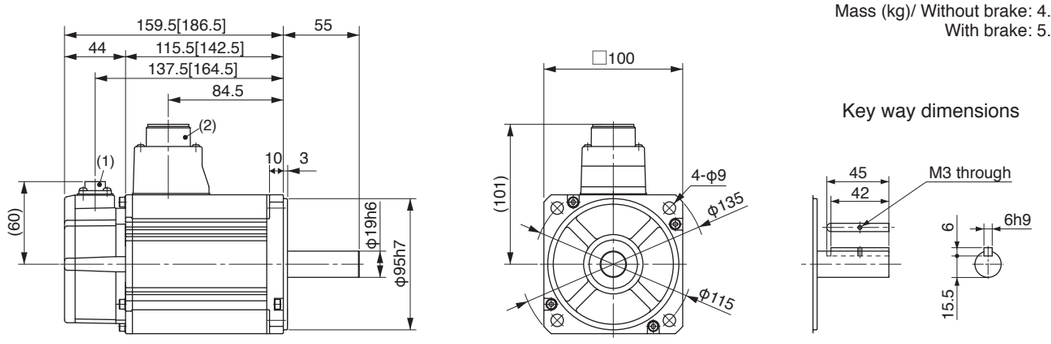
## Torque characteristics (at AC200V of power voltage <Dotted line represents the torque at 10% less supply voltage.>)

With oil seal




## Dimensions

Mass (kg)/ Without brake: 4.4
With brake: 5.4




(1) Encoder connector
(2) Motor/Brake connector

* Figures in [ ] represent the dimensions of with brake.

**<Cautions>** Reduce the moment of inertia ratio if high speed response operation is required.
Dimensions are subject to change without notice. Contact us or a dealer for the latest information.
Read the Instruction Manual carefully and understand all precautions and remarks before using the products.



# Motor Specifications 200V MSME 2.0kW [Low inertia, Middle capacity]

## Specifications

| | | | AC200V | |
|---|---|---|---|---|
| Motor model *1 | | MSME | 202G1□ | 202S1□ |
| Applicable driver *2 | Model No. | A5 series | MEDHT7364 | |
| | | A5E series | MEDHT7364E | |
| | Frame symbol | | E-frame | |
| Power supply capacity | | (kVA) | 3.3 | |
| Rated output | | (W) | 2.0 | |
| Rated torque | | (N·m) | 6.37 | |
| Momentary Max. peak torque | | (N·m) | 19.1 | |
| Rated current | | (A(rms)) | 11.3 | |
| Max. current | | (A(o-p)) | 48 | |
| Regenerative brake frequency (times/min) Note)1 | Without option | | No limit Note)2 | |
| | DV0P4285 | | No limit Note)2 | |
| Rated rotational speed | | (r/min) | 3000 | |
| Max. rotational speed | | (r/min) | 5000 | |
| Moment of inertia of rotor ($\times10^{-4}$kg·m$^2$) | Without brake | | 3.68 | |
| | With brake | | 4.01 | |
| Recommended moment of inertia ratio of the load and the rotor Note)3 | | | 15 times or less | |
| Rotary encoder specifications Note)5 | | | 20-bit Incremental | 17-bit Absolute |
| | Resolution per single turn | | 1,048,576 | 131,072 |

**• Brake specifications** (For details, refer to P.105)

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

| | |
|---|---|
| Static friction torque (N·m) | 7.8 or more |
| Engaging time (ms) | 50 or less |
| Releasing time (ms) Note)4 | 15 or less |
| Exciting current (DC) (A) | 0.81±10% |
| Releasing voltage (DC) (V) | 2 or more |
| Exciting voltage (DC) (V) | 24±2.4 |

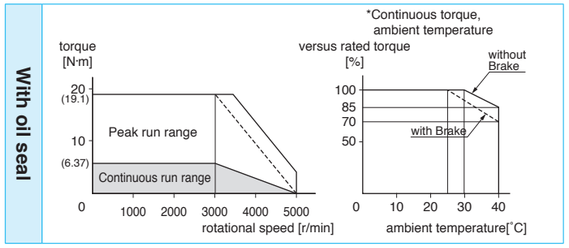
**• Permissible load** (For details, refer to P.104)

| | | |
|---|---|---|
| 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, B-direction (N) | 196 |

• For details of Note 1 to Note 5, refer to P.104.
• Dimensions of Driver, refer to P.33.
*1 Rotaly encoder specifications: □
*2 The product that the end of driver model designation has "E" is "positioning type".
Detail of model designation, refer to P.11.

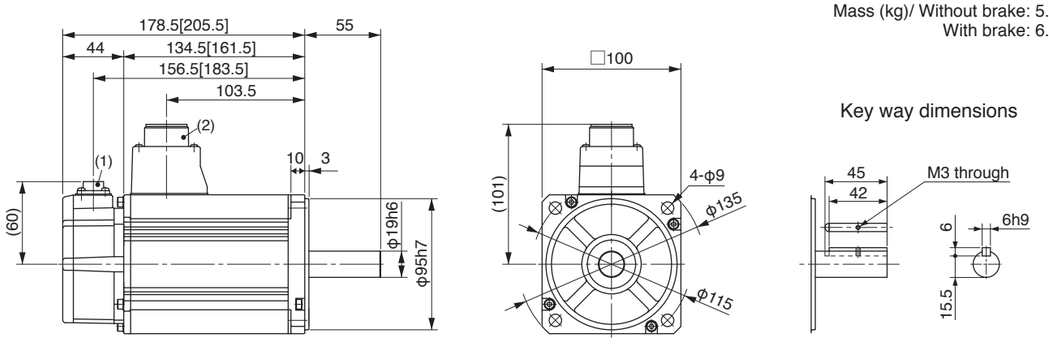
## Torque characteristics (at AC200V of power voltage <Dotted line represents the torque at 10% less supply voltage.>)

With oil seal




## Dimensions

Mass (kg)/ Without brake: 5.3
With brake: 6.3




(1) Encoder connector
(2) Motor/Brake connector

* Figures in [ ] represent the dimensions of with brake.

**<Cautions>** Reduce the moment of inertia ratio if high speed response operation is required.
Dimensions are subject to change without notice. Contact us or a dealer for the latest information.
Read the Instruction Manual carefully and understand all precautions and remarks before using the products.

# Motor Specifications 200V MSME 3.0kW [Low inertia, Middle capacity]

## Specifications

| | | | AC200V | |
|---|---|---|---|---|
| Motor model *1 | | MSME | 302G1□ | 302S1□ |
| Applicable driver *2 | Model No. | A5 series | MFDHTA390 | |
| | | A5E series | MFDHTA390E | |
| | Frame symbol | | F-frame | |
| Power supply capacity | | (kVA) | 4.5 | |
| Rated output | | (W) | 3.0 | |
| Rated torque | | (N·m) | 9.55 | |
| Momentary Max. peak torque | | (N·m) | 28.6 | |
| Rated current | | (A(rms)) | 18.1 | |
| Max. current | | (A(o-p)) | 77 | |
| Regenerative brake frequency (times/min) Note)1 | Without option | | 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 ($\times10^{-4}$kg·m$^2$) | Without brake | | 6.50 | |
| | With brake | | 7.85 | |
| Recommended moment of inertia ratio of the load and the rotor Note)3 | | | 15 times or less | |
| Rotary encoder specifications Note)5 | | | 20-bit Incremental | 17-bit Absolute |
| | Resolution per single turn | | 1,048,576 | 131,072 |

**• Brake specifications** (For details, refer to P.105)

(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 or more |
| Engaging time (ms) | 80 or less |
| Releasing time (ms) Note)4 | 15 or less |
| Exciting current (DC) (A) | 0.81±10% |
| Releasing voltage (DC) (V) | 2 or more |
| Exciting voltage (DC) (V) | 24±2.4 |

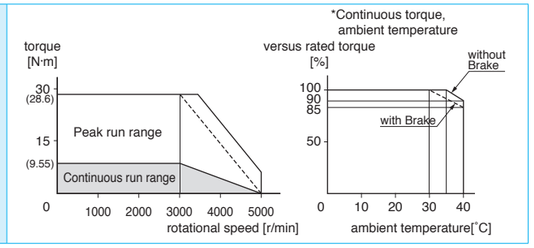
**• Permissible load** (For details, refer to P.104)

| | | |
|---|---|---|
| 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, B-direction (N) | 196 |

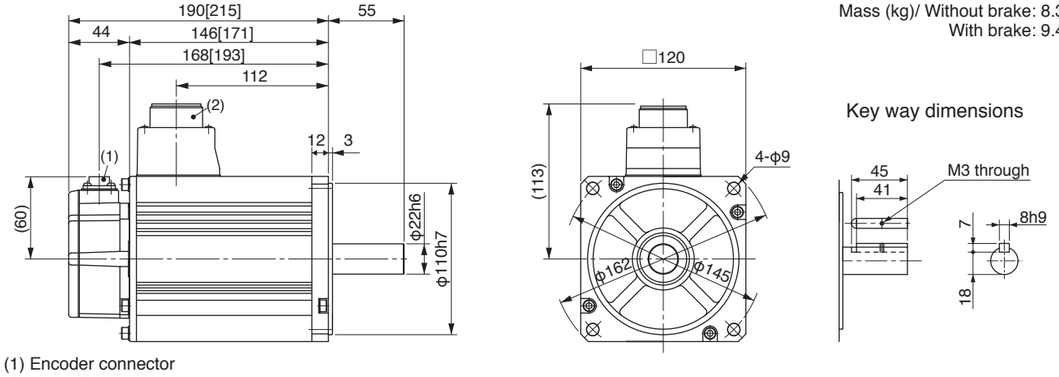
• For details of Note 1 to Note 5, refer to P.104.
• Dimensions of Driver, refer to P.34.
*1 Rotaly encoder specifications: □
*2 The product that the end of driver model designation has "E" is "positioning type".
Detail of model designation, refer to P.11.

## Torque characteristics (at AC200V of power voltage <Dotted line represents the torque at 10% less supply voltage.>)

With oil seal




## Dimensions




Mass (kg)/ Without brake: 8.3
With brake: 9.4

Key way dimensions

(1) Encoder connector
(2) Motor/Brake connector

* Figures in [ ] represent the dimensions of with brake.

**<Cautions>** Reduce the moment of inertia ratio if high speed response operation is required.
Dimensions are subject to change without notice. Contact us or a dealer for the latest information.
Read the Instruction Manual carefully and understand all precautions and remarks before using the products.



# Motor Specifications 200V MSME 4.0kW [Low inertia, Middle capacity]

## Specifications

| | | | AC200V | |
|---|---|---|---|---|
| Motor model *1 | | MSME | 402G1□ | 402S1□ |
| Applicable driver *2 | Model No. | A5 series | MFDHTB3A2 | |
| | | A5E series | MFDHTB3A2E | |
| | Frame symbol | | F-frame | |
| Power supply capacity | | (kVA) | 6.0 | |
| Rated output | | (W) | 4.0 | |
| Rated torque | | (N·m) | 12.7 | |
| Momentary Max. peak torque | | (N·m) | 38.2 | |
| Rated current | | (A(rms)) | 19.6 | |
| Max. current | | (A(o-p)) | 83 | |
| Regenerative brake frequency (times/min) Note)1 | Without option | | No limit Note)2 | |
| | DV0P4285×2 | | No limit Note)2 | |
| Rated rotational speed | | (r/min) | 3000 | |
| Max. rotational speed | | (r/min) | 4500 | |
| Moment of inertia of rotor ($\times10^{-4}$kg·m$^2$) | Without brake | | 12.9 | |
| | With brake | | 14.2 | |
| Recommended moment of inertia ratio of the load and the rotor Note)3 | | | 15 times or less | |
| Rotary encoder specifications Note)5 | | | 20-bit Incremental | 17-bit Absolute |
| | Resolution per single turn | | 1,048,576 | 131,072 |

**• Brake specifications** (For details, refer to P.105)

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

| | |
|---|---|
| Static friction torque (N·m) | 16.1 or more |
| Engaging time (ms) | 110 or less |
| Releasing time (ms) Note)4 | 50 or less |
| Exciting current (DC) (A) | 0.90±10% |
| Releasing voltage (DC) (V) | 2 or more |
| Exciting voltage (DC) (V) | 24±2.4 |

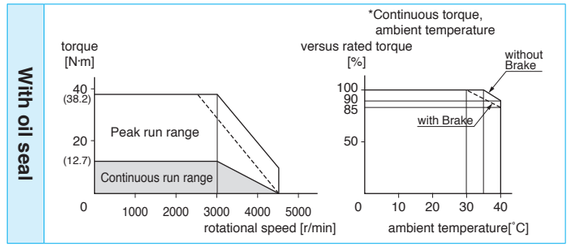
**• Permissible load** (For details, refer to P.104)

| | | |
|---|---|---|
| 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) | 784 |
| | Thrust load A, B-direction (N) | 343 |

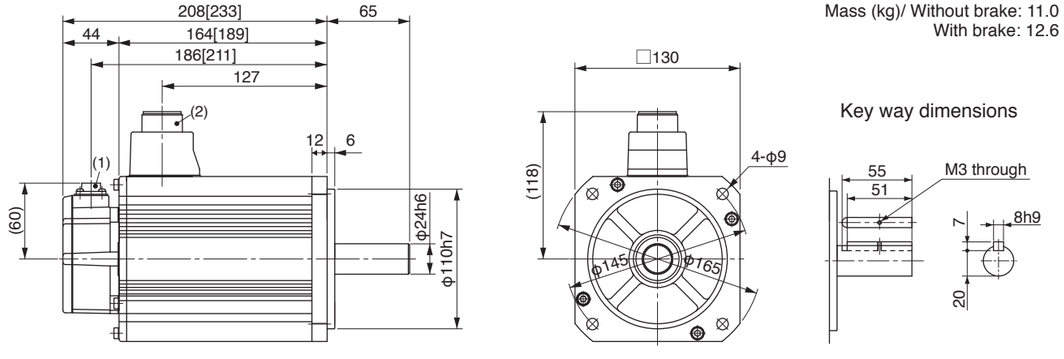
• For details of Note 1 to Note 5, refer to P.104.
• Dimensions of Driver, refer to P.34.
*1 Rotaly encoder specifications: □
*2 The product that the end of driver model designation has "E" is "positioning type".
Detail of model designation, refer to P.11.

## Torque characteristics (at AC200V of power voltage <Dotted line represents the torque at 10% less supply voltage.>)

With oil seal




## Dimensions




Mass (kg)/ Without brake: 11.0
With brake: 12.6

Key way dimensions

(1) Encoder connector
(2) Motor/Brake connector

* Figures in [ ] represent the dimensions of with brake.

**<Cautions>** Reduce the moment of inertia ratio if high speed response operation is required.
Dimensions are subject to change without notice. Contact us or a dealer for the latest information.
Read the Instruction Manual carefully and understand all precautions and remarks before using the products.

# Motor Specifications 200V MSME 5.0kW [Low inertia, Middle capacity]

## Specifications

| | | | AC200V | |
|---|---|---|---|---|
| Motor model *1 | | MSME | 502G1□ | 502S1□ |
| Applicable driver *2 | Model No. | A5 series | MFDHTB3A2 | |
| | | A5E series | MFDHTB3A2E | |
| | Frame symbol | | F-frame | |
| Power supply capacity | | (kVA) | 7.5 | |
| Rated output | | (W) | 5.0 | |
| Rated torque | | (N·m) | 15.9 | |
| Momentary Max. peak torque | | (N·m) | 47.7 | |
| Rated current | | (A(rms)) | 24.0 | |
| Max. current | | (A(o-p)) | 102 | |
| Regenerative brake frequency (times/min) Note)1 | Without option | | 357 | |
| | DV0P4285×2 | | No limit Note)2 | |
| Rated rotational speed | | (r/min) | 3000 | |
| Max. rotational speed | | (r/min) | 4500 | |
| Moment of inertia of rotor ($\times10^{-4}$kg·m$^2$) | Without brake | | 17.4 | |
| | With brake | | 18.6 | |
| Recommended moment of inertia ratio of the load and the rotor Note)3 | | | 15 times or less | |
| Rotary encoder specifications Note)5 | | | 20-bit Incremental | 17-bit Absolute |
| | Resolution per single turn | | 1,048,576 | 131,072 |

**• Brake specifications** (For details, refer to P.105)
(This brake will be released when it is energized. Do not use this for braking the motor in motion.)

| | |
|---|---|
| Static friction torque (N·m) | 16.1 or more |
| Engaging time (ms) | 110 or less |
| Releasing time (ms) Note)4 | 50 or less |
| Exciting current (DC) (A) | 0.90±10% |
| Releasing voltage (DC) (V) | 2 or more |
| Exciting voltage (DC) (V) | 24±2.4 |

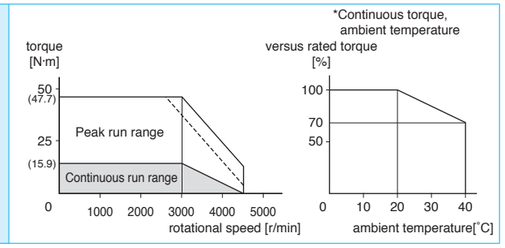
**• Permissible load** (For details, refer to P.104)

| | | |
|---|---|---|
| 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) | 784 |
| | Thrust load A, B-direction (N) | 343 |

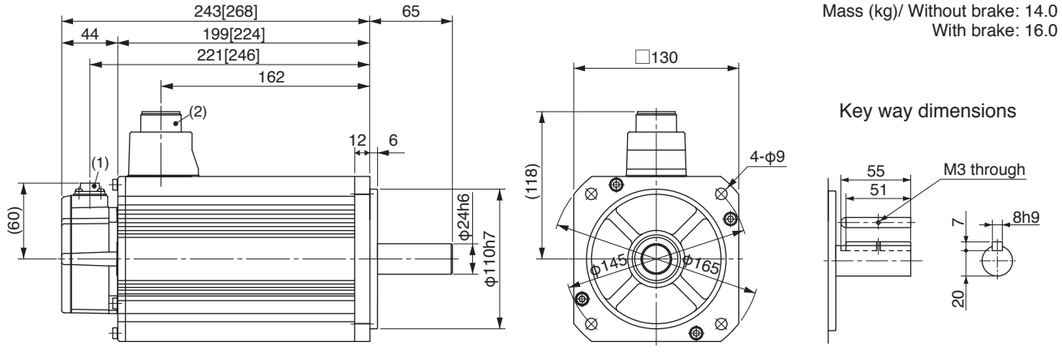
• For details of Note 1 to Note 5, refer to P.104.
• Dimensions of Driver, refer to P.34.
*1 Rotaly encoder specifications: □
*2 The product that the end of driver model designation has "E" is "positioning type".
Detail of model designation, refer to P.11.

## Torque characteristics (at AC200V of power voltage <Dotted line represents the torque at 10% less supply voltage.>)

With oil seal




## Dimensions




Mass (kg)/ Without brake: 14.0
With brake: 16.0

(1) Encoder connector
(2) Motor/Brake connector

* Figures in [ ] represent the dimensions of with brake.

**<Cautions>** Reduce the moment of inertia ratio if high speed response operation is required.
Dimensions are subject to change without notice. Contact us or a dealer for the latest information.
Read the Instruction Manual carefully and understand all precautions and remarks before using the products.



# Motor Specifications 200V MDME 1.0kW [Middle inertia, Middle capacity]

## Specifications

| | | | AC200V | |
|---|---|---|---|---|
| Motor model *1 | | MDME | 102G1□ | 102S1□ |
| Applicable driver *2 | Model No. | A5 series | MDDHT3530 | |
| | | A5E series | MDDHT3530E | |
| | Frame symbol | | D-frame | |
| Power supply capacity | | (kVA) | 1.8 | |
| Rated output | | (W) | 1.0 | |
| Rated torque | | (N·m) | 4.77 | |
| Momentary Max. peak torque | | (N·m) | 14.3 | |
| Rated current | | (A(rms)) | 5.7 | |
| Max. current | | (A(o-p)) | 24 | |
| Regenerative brake frequency (times/min) Note)1 | Without option | | No limit Note)2 | |
| | DV0P4284 | | No limit Note)2 | |
| Rated rotational speed | | (r/min) | 2000 | |
| Max. rotational speed | | (r/min) | 3000 | |
| Moment of inertia of rotor ($\times10^{-4}$kg·m$^2$) | Without brake | | 4.60 | |
| | With brake | | 5.90 | |
| Recommended moment of inertia ratio of the load and the rotor Note)3 | | | 10 times or less | |
| Rotary encoder specifications Note)5 | | | 20-bit Incremental | 17-bit Absolute |
| | Resolution per single turn | | 1,048,576 | 131,072 |

**• Brake specifications** (For details, refer to P.105)
(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 or more |
| Engaging time (ms) | 80 or less |
| Releasing time (ms) Note)4 | 70 or less |
| Exciting current (DC) (A) | 0.59±10% |
| Releasing voltage (DC) (V) | 2 or more |
| Exciting voltage (DC) (V) | 24±2.4 |

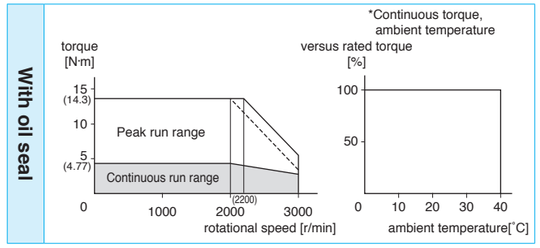
**• Permissible load** (For details, refer to P.104)

| | | |
|---|---|---|
| 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, B-direction (N) | 196 |

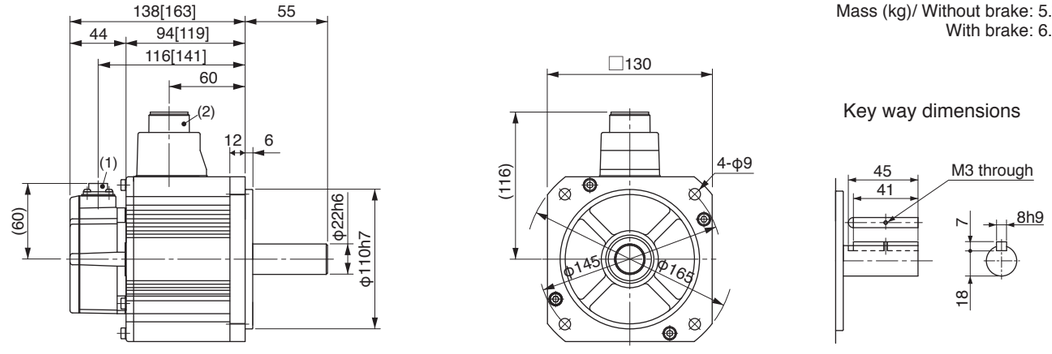
• For details of Note 1 to Note 5, refer to P.104.
• Dimensions of Driver, refer to P.32.
*1 Rotaly encoder specifications: □
*2 The product that the end of driver model designation has "E" is "positioning type".
Detail of model designation, refer to P.11.

## Torque characteristics (at AC200V of power voltage <Dotted line represents the torque at 10% less supply voltage.>)

With oil seal




## Dimensions




Mass (kg)/ Without brake: 5.2
With brake: 6.7

(1) Encoder connector
(2) Motor/Brake connector

* Figures in [ ] represent the dimensions of with brake.

**<Cautions>** Reduce the moment of inertia ratio if high speed response operation is required.
Dimensions are subject to change without notice. Contact us or a dealer for the latest information.
Read the Instruction Manual carefully and understand all precautions and remarks before using the products.

# Motor Specifications 200V MDME 1.5kW [Middle inertia, Middle capacity]

## Specifications

| | | | AC200V | |
|---|---|---|---|---|
| Motor model *1 | | MDME | 152G1□ | 152S1□ |
| Applicable driver *2 | Model No. | A5 series | MDDHT5540 | |
| | | A5E series | MDDHT5540E | |
| | Frame symbol | | D-frame | |
| Power supply capacity | | (kVA) | 2.3 | |
| Rated output | | (W) | 1.5 | |
| Rated torque | | (N·m) | 7.16 | |
| Momentary Max. peak torque | | (N·m) | 21.5 | |
| Rated current | | (A(rms)) | 9.4 | |
| Max. current | | (A(o-p)) | 40 | |
| Regenerative brake frequency (times/min) Note)1 | Without option | | No limit Note)2 | |
| | DV0P4284 | | No limit Note)2 | |
| Rated rotational speed | | (r/min) | 2000 | |
| Max. rotational speed | | (r/min) | 3000 | |
| Moment of inertia of rotor ($\times10^{-4}$kg·m$^2$) | Without brake | | 6.70 | |
| | With brake | | 7.99 | |
| Recommended moment of inertia ratio of the load and the rotor Note)3 | | | 10 times or less | |
| Rotary encoder specifications Note)5 | | | 20-bit Incremental | 17-bit Absolute |
| | Resolution per single turn | | 1,048,576 | 131,072 |

**• Brake specifications** (For details, refer to P.105)
(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 or more |
| Engaging time (ms) | 100 or less |
| Releasing time (ms) Note)4 | 50 or less |
| Exciting current (DC) (A) | 0.79±10% |
| Releasing voltage (DC) (V) | 2 or more |
| Exciting voltage (DC) (V) | 24±2.4 |

**• Permissible load** (For details, refer to P.104)

| | | |
|---|---|---|
| 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, B-direction (N) | 196 |

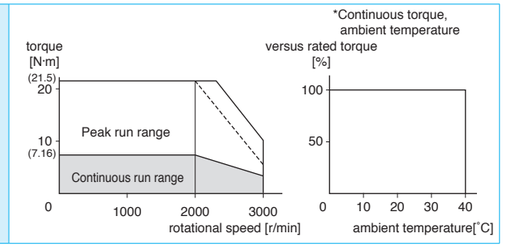
- For details of Note 1 to Note 5, refer to P.104.
- Dimensions of Driver, refer to P.32.

*1 Rotaly encoder specifications: □

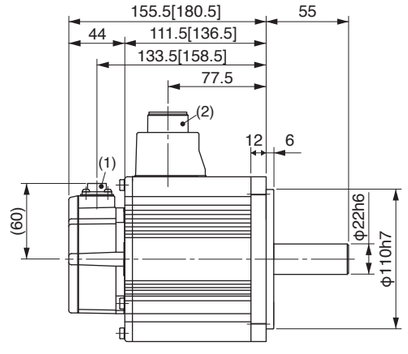
*2 The product that the end of driver model designation has "E" is "positioning type".
Detail of model designation, refer to P.11.

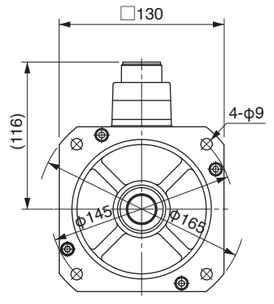
## Torque characteristics (at AC200V of power voltage <Dotted line represents the torque at 10% less supply voltage.>)

With oil seal



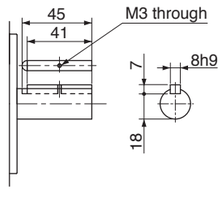

## Dimensions




Mass (kg)/ Without brake: 6.7
With brake: 8.2

Key way dimensions




(1) Encoder connector
(2) Motor/Brake connector

* Figures in [ ] represent the dimensions of with brake.

**<Cautions>** Reduce the moment of inertia ratio if high speed response operation is required.
Dimensions are subject to change without notice. Contact us or a dealer for the latest information.
Read the Instruction Manual carefully and understand all precautions and remarks before using the products.



# Motor Specifications 200V MDME 2.0kW [Middle inertia, Middle capacity]

## Specifications

| | | | AC200V | |
|---|---|---|---|---|
| Motor model *1 | | MDME | 202G1□ | 202S1□ |
| Applicable driver *2 | Model No. | A5 series | MEDHT7364 | |
| | | A5E series | MEDHT7364E | |
| | Frame symbol | | E-frame | |
| Power supply capacity | | (kVA) | 3.3 | |
| Rated output | | (W) | 2.0 | |
| Rated torque | | (N·m) | 9.55 | |
| Momentary Max. peak torque | | (N·m) | 28.6 | |
| Rated current | | (A(rms)) | 11.5 | |
| Max. current | | (A(o-p)) | 49 | |
| Regenerative brake frequency (times/min) Note)1 | Without option | | No limit Note)2 | |
| | DV0P4285 | | No limit Note)2 | |
| Rated rotational speed | | (r/min) | 2000 | |
| Max. rotational speed | | (r/min) | 3000 | |
| Moment of inertia of rotor ($\times10^{-4}$kg·m$^2$) | Without brake | | 8.72 | |
| | With brake | | 10.0 | |
| Recommended moment of inertia ratio of the load and the rotor Note)3 | | | 10 times or less | |
| Rotary encoder specifications Note)5 | | | 20-bit Incremental | 17-bit Absolute |
| | Resolution per single turn | | 1,048,576 | 131,072 |

**• Brake specifications** (For details, refer to P.105)
(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 or more |
| Engaging time (ms) | 100 or less |
| Releasing time (ms) Note)4 | 50 or less |
| Exciting current (DC) (A) | 0.79±10% |
| Releasing voltage (DC) (V) | 2 or more |
| Exciting voltage (DC) (V) | 24±2.4 |

**• Permissible load** (For details, refer to P.104)

| | | |
|---|---|---|
| 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, B-direction (N) | 196 |

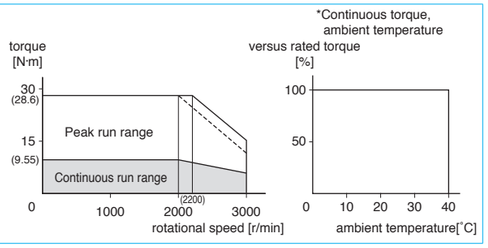
- For details of Note 1 to Note 5, refer to P.104.
- Dimensions of Driver, refer to P.33.

*1 Rotaly encoder specifications: □

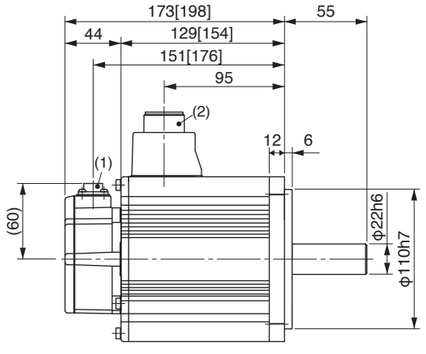
*2 The product that the end of driver model designation has "E" is "positioning type".
Detail of model designation, refer to P.11.

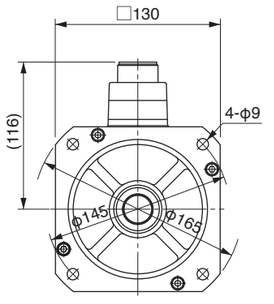
## Torque characteristics (at AC200V of power voltage <Dotted line represents the torque at 10% less supply voltage.>)

With oil seal



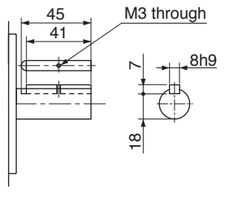

## Dimensions




Mass (kg)/ Without brake: 8.0
With brake: 9.5

Key way dimensions




(1) Encoder connector
(2) Motor/Brake connector

* Figures in [ ] represent the dimensions of with brake.

**<Cautions>** Reduce the moment of inertia ratio if high speed response operation is required.
Dimensions are subject to change without notice. Contact us or a dealer for the latest information.
Read the Instruction Manual carefully and understand all precautions and remarks before using the products.

# Motor Specifications 200V MDME 3.0kW [Middle inertia, Middle capacity]

## Specifications

| | | | AC200V | |
|---|---|---|---|---|
| Motor model *1 | | MDME | 302G1□ | 302S1□ |
| Applicable driver *2 | Model No. | A5 series | MFDHTA390 | |
| | | A5E series | MFDHTA390E | |
| | Frame symbol | | F-frame | |
| Power supply capacity | | (kVA) | 4.5 | |
| Rated output | | (W) | 3.0 | |
| Rated torque | | (N·m) | 14.3 | |
| Momentary Max. peak torque | | (N·m) | 43.0 | |
| Rated current | | (A(rms)) | 17.4 | |
| Max. current | | (A(o-p)) | 74 | |
| Regenerative brake frequency (times/min) Note)1 | Without option | | No limit Note)2 | |
| | DV0P4285×2 | | No limit Note)2 | |
| Rated rotational speed | | (r/min) | 2000 | |
| Max. rotational speed | | (r/min) | 3000 | |
| Moment of inertia of rotor ($\times10^{-4}$kg·m$^2$) | Without brake | | 12.9 | |
| | With brake | | 14.2 | |
| Recommended moment of inertia ratio of the load and the rotor Note)3 | | | 10 times or less | |
| Rotary encoder specifications Note)5 | | | 20-bit Incremental | 17-bit Absolute |
| | Resolution per single turn | | 1,048,576 | 131,072 |

**• Brake specifications** (For details, refer to P.105)
(This brake will be released when it is energized.
Do not use this for braking the motor in motion.)

| | |
|---|---|
| Static friction torque (N·m) | 16.2 or more |
| Engaging time (ms) | 110 or less |
| Releasing time (ms) Note)4 | 50 or less |
| Exciting current (DC) (A) | 0.90±10% |
| Releasing voltage (DC) (V) | 2 or more |
| Exciting voltage (DC) (V) | 24±2.4 |

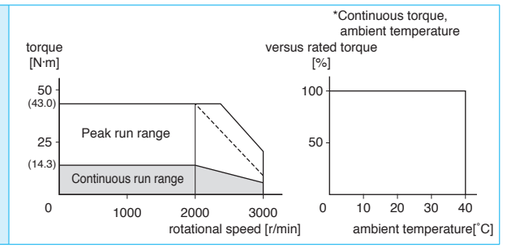
**• Permissible load** (For details, refer to P.104)

| | | |
|---|---|---|
| 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) | 784 |
| | Thrust load A, B-direction (N) | 343 |

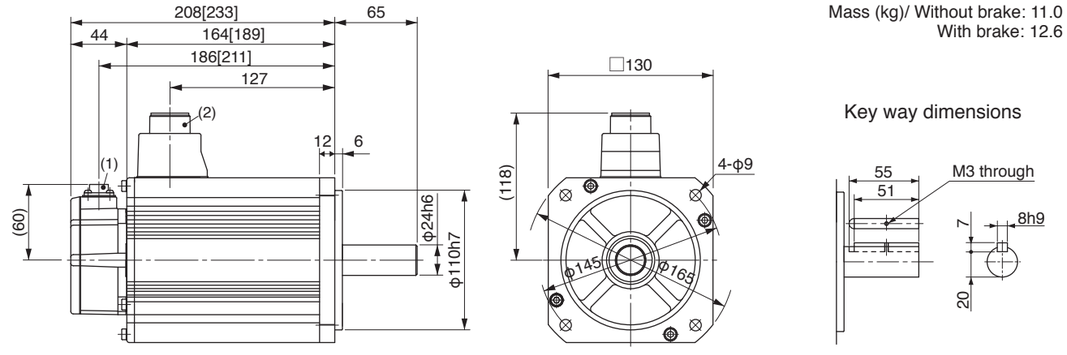
• For details of Note 1 to Note 5, refer to P.104.
• Dimensions of Driver, refer to P.34.
*1 Rotaly encoder specifications: □
*2 The product that the end of driver model designation has "E" is "positioning type".
Detail of model designation, refer to P.11.

## Torque characteristics (at AC200V of power voltage <Dotted line represents the torque at 10% less supply voltage.>)

With oil seal




## Dimensions




Mass (kg)/ Without brake: 11.0
With brake: 12.6

Key way dimensions




(1) Encoder connector
(2) Motor/Brake connector

* Figures in [ ] represent the dimensions of with brake.

**<Cautions>** Reduce the moment of inertia ratio if high speed response operation is required.
Dimensions are subject to change without notice. Contact us or a dealer for the latest information.
Read the Instruction Manual carefully and understand all precautions and remarks before using the products.



# Motor Specifications 200V MDME 4.0kW [Middle inertia, Middle capacity]

## Specifications

| | | | AC200V | |
|---|---|---|---|---|
| Motor model *1 | | MDME | 402G1□ | 402S1□ |
| Applicable driver *2 | Model No. | A5 series | MFDHTB3A2 | |
| | | A5E series | MFDHTB3A2E | |
| | Frame symbol | | F-frame | |
| Power supply capacity | | (kVA) | 6.0 | |
| Rated output | | (W) | 4.0 | |
| Rated torque | | (N·m) | 19.1 | |
| Momentary Max. peak torque | | (N·m) | 57.3 | |
| Rated current | | (A(rms)) | 21.0 | |
| Max. current | | (A(o-p)) | 89 | |
| Regenerative brake frequency (times/min) Note)1 | Without option | | No limit Note)2 | |
| | DV0P4285×2 | | No limit Note)2 | |
| Rated rotational speed | | (r/min) | 2000 | |
| Max. rotational speed | | (r/min) | 3000 | |
| Moment of inertia of rotor ($\times10^{-4}$kg·m$^2$) | Without brake | | 37.6 | |
| | With brake | | 38.6 | |
| Recommended moment of inertia ratio of the load and the rotor Note)3 | | | 10 times or less | |
| Rotary encoder specifications Note)5 | | | 20-bit Incremental | 17-bit Absolute |
| | Resolution per single turn | | 1,048,576 | 131,072 |

**• Brake specifications** (For details, refer to P.105)
(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 or more |
| Engaging time (ms) | 80 or less |
| Releasing time (ms) Note)4 | 25 or less |
| Exciting current (DC) (A) | 1.3±10% |
| Releasing voltage (DC) (V) | 2 or more |
| Exciting voltage (DC) (V) | 24±2.4 |

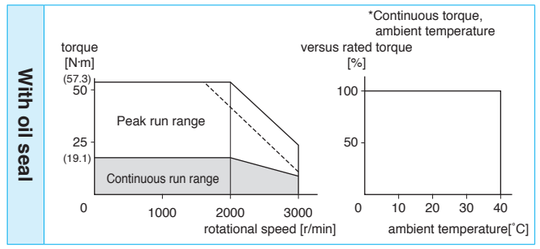
**• Permissible load** (For details, refer to P.104)

| | | |
|---|---|---|
| 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, B-direction (N) | 343 |

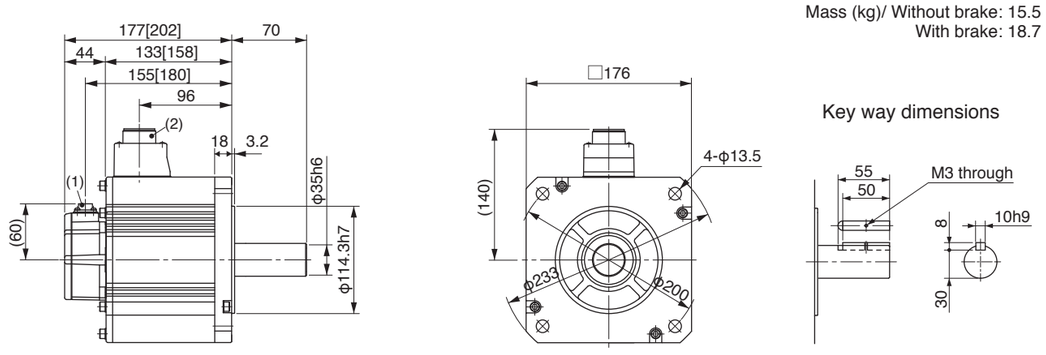
• For details of Note 1 to Note 5, refer to P.104.
• Dimensions of Driver, refer to P.34.
*1 Rotaly encoder specifications: □
*2 The product that the end of driver model designation has "E" is "positioning type".
Detail of model designation, refer to P.11.

## Torque characteristics (at AC200V of power voltage <Dotted line represents the torque at 10% less supply voltage.>)

With oil seal




## Dimensions




Mass (kg)/ Without brake: 15.5
With brake: 18.7

Key way dimensions




(1) Encoder connector
(2) Motor/Brake connector

* Figures in [ ] represent the dimensions of with brake.

**<Cautions>** Reduce the moment of inertia ratio if high speed response operation is required.
Dimensions are subject to change without notice. Contact us or a dealer for the latest information.
Read the Instruction Manual carefully and understand all precautions and remarks before using the products.

# Motor Specifications 200V MDME 5.0kW [Middle inertia, Middle capacity]

## Specifications

| | | | AC200V | |
|---|---|---|---|---|
| Motor model *1 | | MDME | 502G1□ | 502S1□ |
| Applicable driver *2 | Model No. | A5 series | MFDHTB3A2 | |
| | | A5E series | MFDHTB3A2E | |
| | Frame symbol | | F-frame | |
| Power supply capacity | | (kVA) | 7.5 | |
| Rated output | | (W) | 5.0 | |
| Rated torque | | (N·m) | 23.9 | |
| Momentary Max. peak torque | | (N·m) | 71.6 | |
| Rated current | | (A(rms)) | 25.9 | |
| Max. current | | (A(o-p)) | 110 | |
| Regenerative brake frequency (times/min) Note)1 | Without option | | 120 | |
| | DV0P4285×2 | | No limit Note)2 | |
| Rated rotational speed | | (r/min) | 2000 | |
| Max. rotational speed | | (r/min) | 3000 | |
| Moment of inertia of rotor ($\times10^{-4}$kg·m$^2$) | Without brake | | 48.0 | |
| | With brake | | 48.8 | |
| Recommended moment of inertia ratio of the load and the rotor Note)3 | | | 10 times or less | |
| Rotary encoder specifications Note)5 | | | 20-bit Incremental | 17-bit Absolute |
| | Resolution per single turn | | 1,048,576 | 131,072 |

**• Brake specifications** (For details, refer to P.105)

(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 or more |
| Engaging time (ms) | 80 or less |
| Releasing time (ms) Note)4 | 25 or less |
| Exciting current (DC) (A) | 1.3±10% |
| Releasing voltage (DC) (V) | 2 or more |
| Exciting voltage (DC) (V) | 24±2.4 |

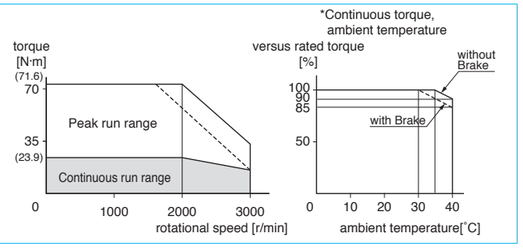
**• Permissible load** (For details, refer to P.104)

| | | |
|---|---|---|
| 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, B-direction (N) | 343 |

• For details of Note 1 to Note 5, refer to P.104.
• Dimensions of Driver, refer to P.34.
*1 Rotaly encoder specifications: □
*2 The product that the end of driver model designation has "E" is "positioning type".
Detail of model designation, refer to P.11.

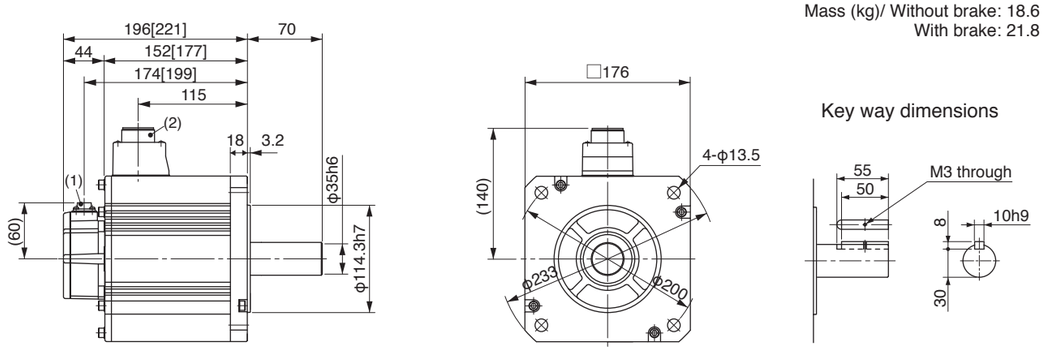
## Torque characteristics (at AC200V of power voltage <Dotted line represents the torque at 10% less supply voltage.>)

With oil seal




## Dimensions

Mass (kg)/ Without brake: 18.6
With brake: 21.8




(1) Encoder connector
(2) Motor/Brake connector

* Figures in [ ] represent the dimensions of with brake.

**<Cautions>** Reduce the moment of inertia ratio if high speed response operation is required.
Dimensions are subject to change without notice. Contact us or a dealer for the latest information.
Read the Instruction Manual carefully and understand all precautions and remarks before using the products.



# Motor Specifications 200V MGME 0.9kW [Middle inertia, Middle capacity]

## Specifications

| | | | AC200V | |
|---|---|---|---|---|
| Motor model *1 | | MGME | 092G1□ | 092S1□ |
| Applicable driver *2 | Model No. | A5 series | MDDHT5540 | |
| | | A5E series | MDDHT5540E | |
| | Frame symbol | | D-frame | |
| Power supply capacity | | (kVA) | 1.8 | |
| Rated output | | (W) | 0.9 | |
| Rated torque | | (N·m) | 8.59 | |
| Momentary Max. peak torque | | (N·m) | 19.3 | |
| Rated current | | (A(rms)) | 7.6 | |
| Max. current | | (A(o-p)) | 24 | |
| Regenerative brake frequency (times/min) Note)1 | Without option | | No limit Note)2 | |
| | DV0P4284 | | No limit Note)2 | |
| Rated rotational speed | | (r/min) | 1000 | |
| Max. rotational speed | | (r/min) | 2000 | |
| Moment of inertia of rotor ($\times10^{-4}$kg·m$^2$) | Without brake | | 6.70 | |
| | With brake | | 7.99 | |
| Recommended moment of inertia ratio of the load and the rotor Note)3 | | | 10 times or less | |
| Rotary encoder specifications Note)5 | | | 20-bit Incremental | 17-bit Absolute |
| | Resolution per single turn | | 1,048,576 | 131,072 |

**• Brake specifications** (For details, refer to P.105)

(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 or more |
| Engaging time (ms) | 100 or less |
| Releasing time (ms) Note)4 | 50 or less |
| Exciting current (DC) (A) | 0.79±10% |
| Releasing voltage (DC) (V) | 2 or more |
| Exciting voltage (DC) (V) | 24±2.4 |

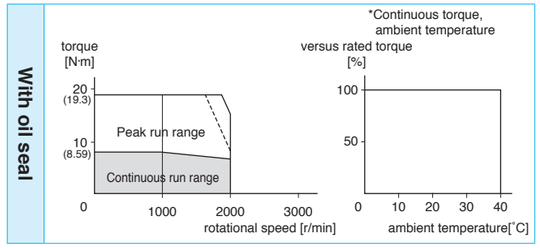
**• Permissible load** (For details, refer to P.104)

| | | |
|---|---|---|
| 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) | 686 |
| | Thrust load A, B-direction (N) | 196 |

• For details of Note 1 to Note 5, refer to P.104.
• Dimensions of Driver, refer to P.32.
*1 Rotaly encoder specifications: □
*2 The product that the end of driver model designation has "E" is "positioning type".
Detail of model designation, refer to P.11.

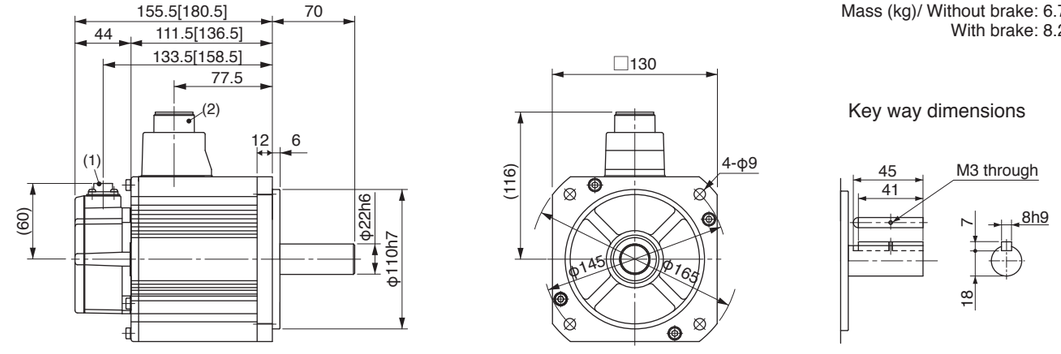
## Torque characteristics (at AC200V of power voltage <Dotted line represents the torque at 10% less supply voltage.>)

With oil seal




## Dimensions

Mass (kg)/ Without brake: 6.7
With brake: 8.2




(1) Encoder connector
(2) Motor/Brake connector

* Figures in [ ] represent the dimensions of with brake.

**<Cautions>** Reduce the moment of inertia ratio if high speed response operation is required.
Dimensions are subject to change without notice. Contact us or a dealer for the latest information.
Read the Instruction Manual carefully and understand all precautions and remarks before using the products.

# Motor Specifications 200V MGME 2.0kW [Middle inertia, Middle capacity]

## Specifications

| | | | AC200V | |
|---|---|---|---|---|
| Motor model *1 | | MGME | 202G1□ | 202S1□ |
| Applicable driver *2 | Model No. | A5 series | MFDHTA390 | |
| | | A5E series | MFDHTA390E | |
| | Frame symbol | | F-frame | |
| Power supply capacity | | (kVA) | 3.8 | |
| Rated output | | (W) | 2.0 | |
| Rated torque | | (N·m) | 19.1 | |
| Momentary Max. peak torque | | (N·m) | 47.7 | |
| Rated current | | (A(rms)) | 17.0 | |
| Max. current | | (A(o-p)) | 60 | |
| 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 ($\times10^{-4}$kg·m$^2$) | Without brake | | 30.3 | |
| | With brake | | 31.4 | |
| Recommended moment of inertia ratio of the load and the rotor Note)3 | | | 10 times or less | |
| Rotary encoder specifications Note)5 | | | 20-bit Incremental | 17-bit Absolute |
| | Resolution per single turn | | 1,048,576 | 131,072 |

**• Brake specifications** (For details, refer to P.105)

(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 or more |
| Engaging time (ms) | 80 or less |
| Releasing time (ms) Note)4 | 25 or less |
| Exciting current (DC) (A) | 1.3±10% |
| Releasing voltage (DC) (V) | 2 or more |
| Exciting voltage (DC) (V) | 24±2.4 |

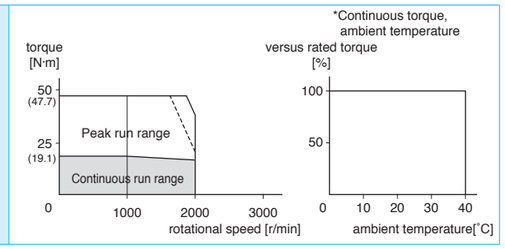
**• Permissible load** (For details, refer to P.104)

| | | |
|---|---|---|
| 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) | 1176 |
| | Thrust load A, B-direction (N) | 490 |

• For details of Note 1 to Note 5, refer to P.104.
• Dimensions of Driver, refer to P.34.
*1 Rotaly encoder specifications: □
*2 The product that the end of driver model designation has "E" is "positioning type".
Detail of model designation, refer to P.11.

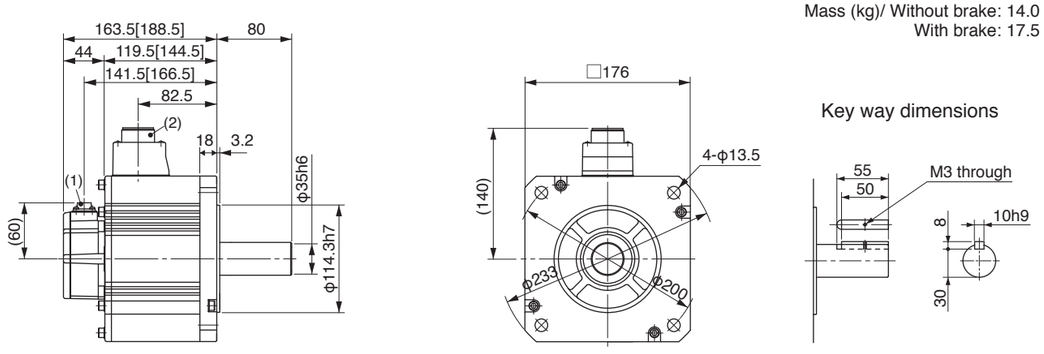
## Torque characteristics (at AC200V of power voltage <Dotted line represents the torque at 10% less supply voltage.>)

With oil seal




## Dimensions

Mass (kg)/ Without brake: 14.0
With brake: 17.5




(1) Encoder connector
(2) Motor/Brake connector

* Figures in [ ] represent the dimensions of with brake.

**<Cautions>** Reduce the moment of inertia ratio if high speed response operation is required.
Dimensions are subject to change without notice. Contact us or a dealer for the latest information.
Read the Instruction Manual carefully and understand all precautions and remarks before using the products.



# Motor Specifications 200V MGME 3.0kW [Middle inertia, Middle capacity]

## Specifications

| | | | AC200V | |
|---|---|---|---|---|
| Motor model *1 | | MGME | 302G1□ | 302S1□ |
| Applicable driver *2 | Model No. | A5 series | MFDHTB3A2 | |
| | | A5E series | MFDHTB3A2E | |
| | Frame symbol | | F-frame | |
| Power supply capacity | | (kVA) | 4.5 | |
| Rated output | | (W) | 3.0 | |
| Rated torque | | (N·m) | 28.7 | |
| Momentary Max. peak torque | | (N·m) | 71.7 | |
| Rated current | | (A(rms)) | 22.6 | |
| Max. current | | (A(o-p)) | 80 | |
| 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 ($\times10^{-4}$kg·m$^2$) | Without brake | | 48.4 | |
| | With brake | | 49.2 | |
| Recommended moment of inertia ratio of the load and the rotor Note)3 | | | 10 times or less | |
| Rotary encoder specifications Note)5 | | | 20-bit Incremental | 17-bit Absolute |
| | Resolution per single turn | | 1,048,576 | 131,072 |

**• Brake specifications** (For details, refer to P.105)

(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 or more |
| Engaging time (ms) | 150 or less |
| Releasing time (ms) Note)4 | 50 or less |
| Exciting current (DC) (A) | 1.4±10% |
| Releasing voltage (DC) (V) | 2 or more |
| Exciting voltage (DC) (V) | 24±2.4 |

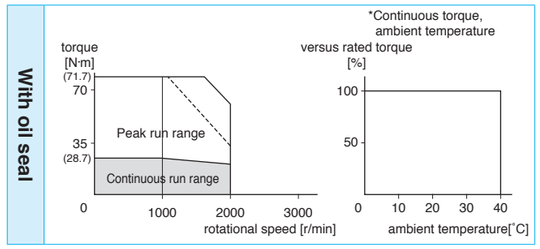
**• Permissible load** (For details, refer to P.104)

| | | |
|---|---|---|
| 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, B-direction (N) | 490 |

• For details of Note 1 to Note 5, refer to P.104.
• Dimensions of Driver, refer to P.34.
*1 Rotaly encoder specifications: □
*2 The product that the end of driver model designation has "E" is "positioning type".
Detail of model designation, refer to P.11.

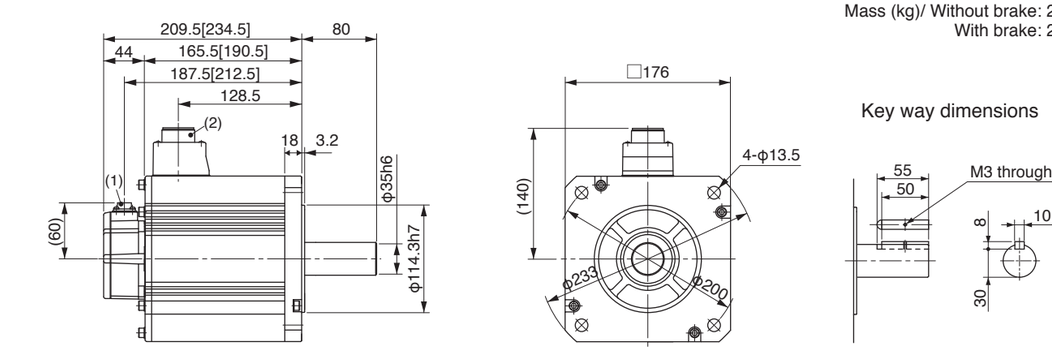
## Torque characteristics (at AC200V of power voltage <Dotted line represents the torque at 10% less supply voltage.>)

With oil seal




## Dimensions

Mass (kg)/ Without brake: 20.0
With brake: 23.5




(1) Encoder connector
(2) Motor/Brake connector

* Figures in [ ] represent the dimensions of with brake.

**<Cautions>** Reduce the moment of inertia ratio if high speed response operation is required.
Dimensions are subject to change without notice. Contact us or a dealer for the latest information.
Read the Instruction Manual carefully and understand all precautions and remarks before using the products.

# Motor Specifications 200V MHME 1.0kW [High inertia, Middle capacity]

## Specifications

| | | | AC200V | |
|---|---|---|---|---|
| Motor model *1 | | MHME | 102G1□ | 102S1□ |
| Applicable driver *2 | Model No. | A5 series | MDDHT3530 | |
| | | A5E series | MDDHT3530E | |
| | Frame symbol | | D-frame | |
| Power supply capacity | | (kVA) | 1.8 | |
| Rated output | | (W) | 1.0 | |
| Rated torque | | (N·m) | 4.77 | |
| Momentary Max. peak torque | | (N·m) | 14.3 | |
| Rated current | | (A(rms)) | 5.7 | |
| Max. current | | (A(o-p)) | 24 | |
| Regenerative brake frequency (times/min) Note)1 | Without option | | 83 | |
| | DV0P4284 | | No limit Note)2 | |
| Rated rotational speed | | (r/min) | 2000 | |
| Max. rotational speed | | (r/min) | 3000 | |
| Moment of inertia of rotor ($\times10^{-4}$kg·m$^2$) | Without brake | | 24.7 | |
| | With brake | | 26.0 | |
| Recommended moment of inertia ratio of the load and the rotor Note)3 | | | 5 times or less | |
| Rotary encoder specifications Note)5 | | | 20-bit Incremental | 17-bit Absolute |
| | Resolution per single turn | | 1,048,576 | 131,072 |

**• Brake specifications** (For details, refer to P.105)
(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 |
| Engaging time (ms) | 80 or less |
| Releasing time (ms) Note)4 | 70 or less |
| Exciting current (DC) (A) | 0.59±10% |
| Releasing voltage (DC) (V) | 2 or more |
| Exciting voltage (DC) (V) | 24±2.4 |

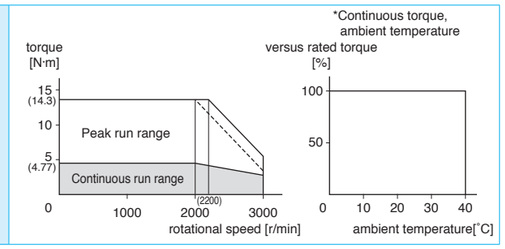
**• Permissible load** (For details, refer to P.104)

| | | |
|---|---|---|
| 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, B-direction (N) | 196 |

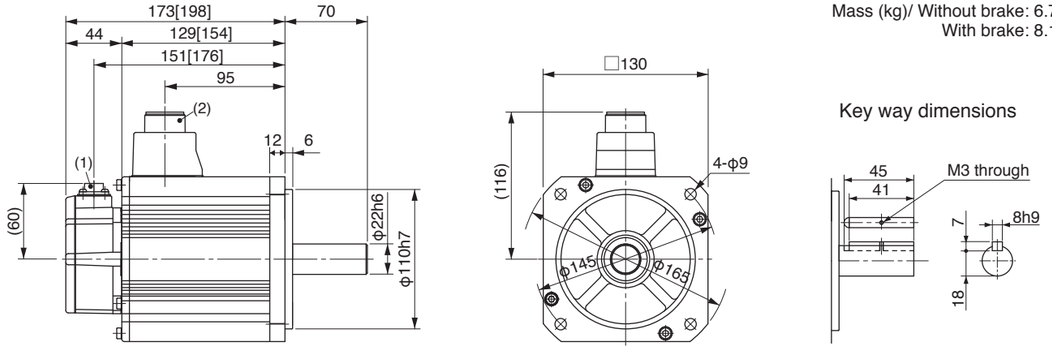
• For details of Note 1 to Note 5, refer to P.104.
• Dimensions of Driver, refer to P.32.
*1 Rotaly encoder specifications: □
*2 The product that the end of driver model designation has "E" is "positioning type".
Detail of model designation, refer to P.11.

## Torque characteristics (at AC200V of power voltage <Dotted line represents the torque at 10% less supply voltage.>)

With oil seal




## Dimensions




Mass (kg)/ Without brake: 6.7
With brake: 8.1

(1) Encoder connector
(2) Motor/Brake connector

* Figures in [ ] represent the dimensions of with brake.

**<Cautions>** Reduce the moment of inertia ratio if high speed response operation is required.
Dimensions are subject to change without notice. Contact us or a dealer for the latest information.
Read the Instruction Manual carefully and understand all precautions and remarks before using the products.



# Motor Specifications 200V MHME 1.5kW [High inertia, Middle capacity]

## Specifications

| | | | AC200V | |
|---|---|---|---|---|
| Motor model *1 | | MHME | 152G1□ | 152S1□ |
| Applicable driver *2 | Model No. | A5 series | MDDHT5540 | |
| | | A5E series | MDDHT5540E | |
| | Frame symbol | | D-frame | |
| Power supply capacity | | (kVA) | 2.3 | |
| Rated output | | (W) | 1.5 | |
| Rated torque | | (N·m) | 7.16 | |
| Momentary Max. peak torque | | (N·m) | 21.5 | |
| Rated current | | (A(rms)) | 9.4 | |
| Max. current | | (A(o-p)) | 40 | |
| Regenerative brake frequency (times/min) Note)1 | Without option | | 22 | |
| | DV0P4284 | | 130 | |
| Rated rotational speed | | (r/min) | 2000 | |
| Max. rotational speed | | (r/min) | 3000 | |
| Moment of inertia of rotor ($\times10^{-4}$kg·m$^2$) | Without brake | | 37.1 | |
| | With brake | | 38.4 | |
| Recommended moment of inertia ratio of the load and the rotor Note)3 | | | 5 times or less | |
| Rotary encoder specifications Note)5 | | | 20-bit Incremental | 17-bit Absolute |
| | Resolution per single turn | | 1,048,576 | 131,072 |

**• Brake specifications** (For details, refer to P.105)
(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 or more |
| Engaging time (ms) | 100 or less |
| Releasing time (ms) Note)4 | 50 or less |
| Exciting current (DC) (A) | 0.79±10% |
| Releasing voltage (DC) (V) | 2 or more |
| Exciting voltage (DC) (V) | 24±2.4 |

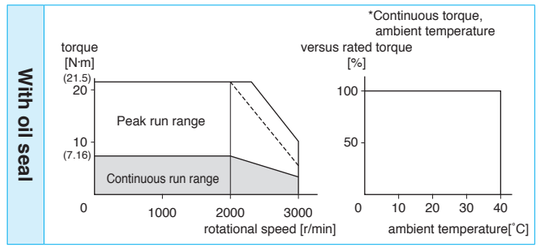
**• Permissible load** (For details, refer to P.104)

| | | |
|---|---|---|
| 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, B-direction (N) | 196 |

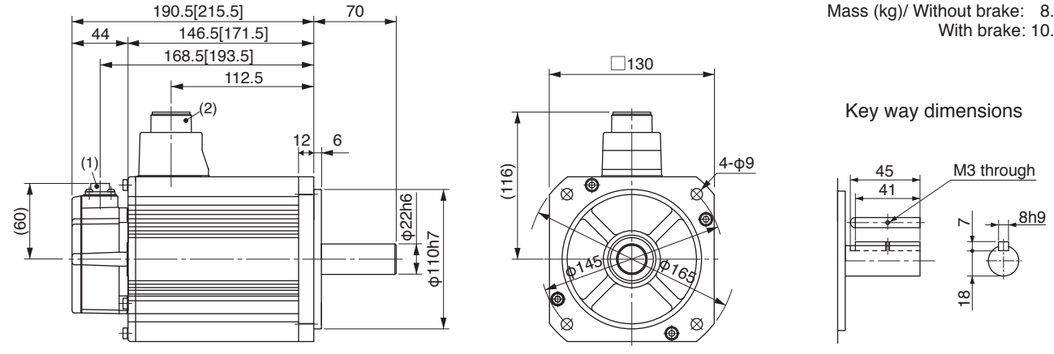
• For details of Note 1 to Note 5, refer to P.104.
• Dimensions of Driver, refer to P.32.
*1 Rotaly encoder specifications: □
*2 The product that the end of driver model designation has "E" is "positioning type".
Detail of model designation, refer to P.11.

## Torque characteristics (at AC200V of power voltage <Dotted line represents the torque at 10% less supply voltage.>)

With oil seal




## Dimensions




Mass (kg)/ Without brake: 8.6
With brake: 10.1

(1) Encoder connector
(2) Motor/Brake connector

* Figures in [ ] represent the dimensions of with brake.

**<Cautions>** Reduce the moment of inertia ratio if high speed response operation is required.
Dimensions are subject to change without notice. Contact us or a dealer for the latest information.
Read the Instruction Manual carefully and understand all precautions and remarks before using the products.

# Motor Specifications 200V MHME 2.0kW [High inertia, Middle capacity]

## Specifications

| | | | AC200V | |
|---|---|---|---|---|
| Motor model *1 | | MHME | 202G1□ | 202S1□ |
| Applicable driver *2 | Model No. | A5 series | MEDHT7364 | |
| | | A5E series | MEDHT7364E | |
| | Frame symbol | | E-frame | |
| Power supply capacity | | (kVA) | 3.3 | |
| Rated output | | (W) | 2.0 | |
| Rated torque | | (N·m) | 9.55 | |
| Momentary Max. peak torque | | (N·m) | 28.6 | |
| Rated current | | (A(rms)) | 11.1 | |
| Max. current | | (A(o-p)) | 47 | |
| Regenerative brake frequency (times/min) Note)1 | Without option | | 45 | |
| | DV0P4285 | | 142 | |
| Rated rotational speed | | (r/min) | 2000 | |
| Max. rotational speed | | (r/min) | 3000 | |
| Moment of inertia of rotor ($\times10^{-4}$kg·m$^2$) | Without brake | | 57.8 | |
| | With brake | | 59.6 | |
| Recommended moment of inertia ratio of the load and the rotor Note)3 | | | 5 times or less | |
| Rotary encoder specifications Note)5 | | | 20-bit Incremental | 17-bit Absolute |
| | Resolution per single turn | | 1,048,576 | 131,072 |

**• Brake specifications** (For details, refer to P.105)

(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 or more |
| Engaging time (ms) | 80 or less |
| Releasing time (ms) Note)4 | 25 or less |
| Exciting current (DC) (A) | 1.3±10% |
| Releasing voltage (DC) (V) | 2 or more |
| Exciting voltage (DC) (V) | 24±2.4 |

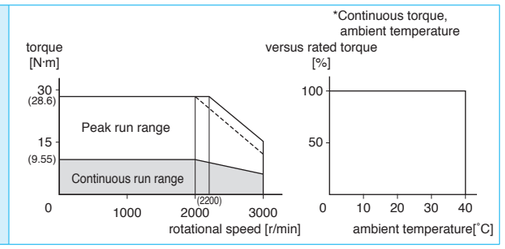
**• Permissible load** (For details, refer to P.104)

| | | |
|---|---|---|
| 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, B-direction (N) | 343 |

• For details of Note 1 to Note 5, refer to P.104.
• Dimensions of Driver, refer to P.33.
*1 Rotaly encoder specifications: □
*2 The product that the end of driver model designation has "E" is "positioning type".
Detail of model designation, refer to P.11.

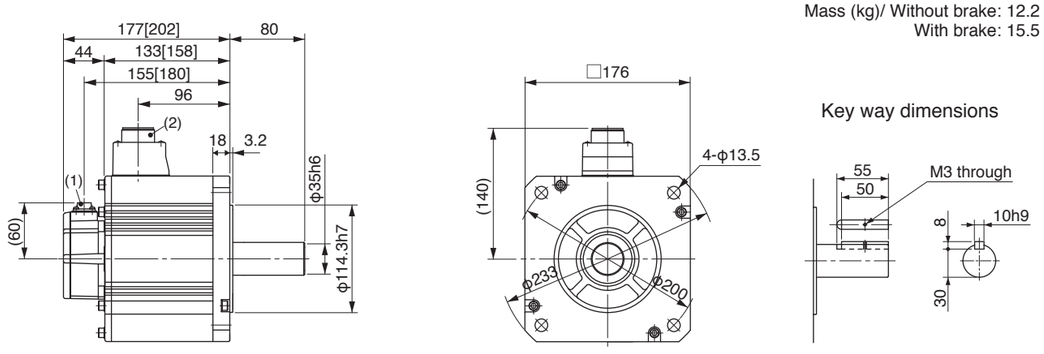
## Torque characteristics (at AC200V of power voltage <Dotted line represents the torque at 10% less supply voltage.>)

With oil seal




## Dimensions

Mass (kg)/ Without brake: 12.2
With brake: 15.5




(1) Encoder connector
(2) Motor/Brake connector

* Figures in [ ] represent the dimensions of with brake.

**<Cautions>** Reduce the moment of inertia ratio if high speed response operation is required.
Dimensions are subject to change without notice. Contact us or a dealer for the latest information.
Read the Instruction Manual carefully and understand all precautions and remarks before using the products.



# Motor Specifications 200V MHME 3.0kW [High inertia, Middle capacity]

## Specifications

| | | | AC200V | |
|---|---|---|---|---|
| Motor model *1 | | MHME | 302G1□ | 302S1□ |
| Applicable driver *2 | Model No. | A5 series | MFDHTA390 | |
| | | A5E series | MFDHTA390E | |
| | Frame symbol | | F-frame | |
| Power supply capacity | | (kVA) | 4.5 | |
| Rated output | | (W) | 3.0 | |
| Rated torque | | (N·m) | 14.3 | |
| Momentary Max. peak torque | | (N·m) | 43.0 | |
| Rated current | | (A(rms)) | 16.0 | |
| Max. current | | (A(o-p)) | 68 | |
| Regenerative brake frequency (times/min) Note)1 | Without option | | 19 | |
| | DV0P4285×2 | | 142 | |
| Rated rotational speed | | (r/min) | 2000 | |
| Max. rotational speed | | (r/min) | 3000 | |
| Moment of inertia of rotor ($\times10^{-4}$kg·m$^2$) | Without brake | | 90.5 | |
| | With brake | | 92.1 | |
| Recommended moment of inertia ratio of the load and the rotor Note)3 | | | 5 times or less | |
| Rotary encoder specifications Note)5 | | | 20-bit Incremental | 17-bit Absolute |
| | Resolution per single turn | | 1,048,576 | 131,072 |

**• Brake specifications** (For details, refer to P.105)

(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 or more |
| Engaging time (ms) | 80 or less |
| Releasing time (ms) Note)4 | 25 or less |
| Exciting current (DC) (A) | 1.3±10% |
| Releasing voltage (DC) (V) | 2 or more |
| Exciting voltage (DC) (V) | 24±2.4 |

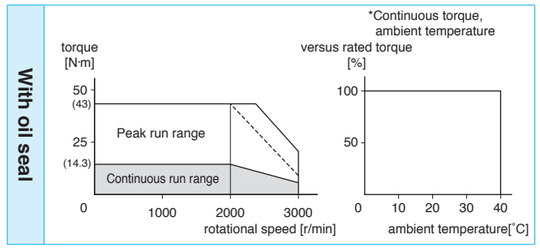
**• Permissible load** (For details, refer to P.104)

| | | |
|---|---|---|
| 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, B-direction (N) | 343 |

• For details of Note 1 to Note 5, refer to P.104.
• Dimensions of Driver, refer to P.34.
*1 Rotaly encoder specifications: □
*2 The product that the end of driver model designation has "E" is "positioning type".
Detail of model designation, refer to P.11.

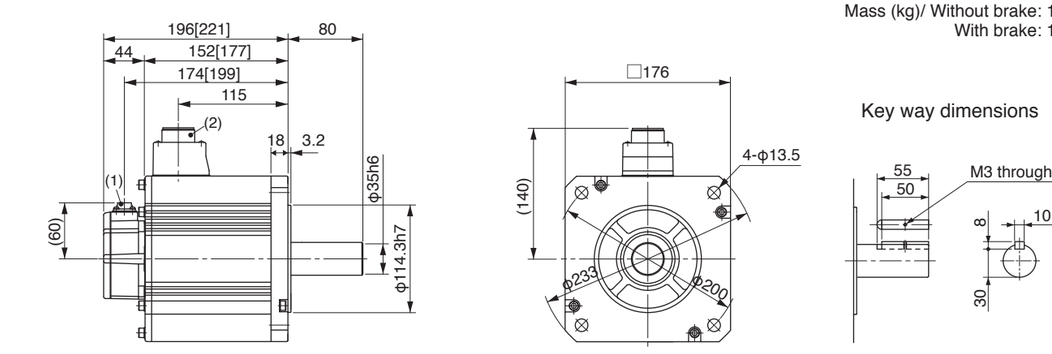
## Torque characteristics (at AC200V of power voltage <Dotted line represents the torque at 10% less supply voltage.>)

With oil seal




## Dimensions

Mass (kg)/ Without brake: 16.0
With brake: 19.2




(1) Encoder connector
(2) Motor/Brake connector

* Figures in [ ] represent the dimensions of with brake.

**<Cautions>** Reduce the moment of inertia ratio if high speed response operation is required.
Dimensions are subject to change without notice. Contact us or a dealer for the latest information.
Read the Instruction Manual carefully and understand all precautions and remarks before using the products.

# Motor Specifications 200V MHME 4.0kW [High inertia, Middle capacity]

## Specifications

| | | | AC200V | |
|---|---|---|---|---|
| Motor model *1 | | MHME | 402G1□ | 402S1□ |
| Applicable driver *2 | Model No. | A5 series | MFDHTB3A2 | |
| | | A5E series | MFDHTB3A2E | |
| | Frame symbol | | F-frame | |
| Power supply capacity | | (kVA) | 6.0 | |
| Rated output | | (W) | 4.0 | |
| Rated torque | | (N·m) | 19.1 | |
| Momentary Max. peak torque | | (N·m) | 57.3 | |
| Rated current | | (A(rms)) | 21.0 | |
| Max. current | | (A(o-p)) | 89 | |
| Regenerative brake frequency (times/min) Note)1 | Without option | | 17 | |
| | DV0P4285×2 | | 125 | |
| Rated rotational speed | | (r/min) | 2000 | |
| Max. rotational speed | | (r/min) | 3000 | |
| Moment of inertia of rotor ($\times10^{-4}$kg·m$^2$) | Without brake | | 112 | |
| | With brake | | 114 | |
| Recommended moment of inertia ratio of the load and the rotor Note)3 | | | 5 times or less | |
| Rotary encoder specifications Note)5 | | | 20-bit Incremental | 17-bit Absolute |
| | Resolution per single turn | | 1,048,576 | 131,072 |

**• Brake specifications** (For details, refer to P.105)

(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 or more |
| Engaging time (ms) | 80 or less |
| Releasing time (ms) Note)4 | 25 or less |
| Exciting current (DC) (A) | 1.3±10% |
| Releasing voltage (DC) (V) | 2 or more |
| Exciting voltage (DC) (V) | 24±2.4 |

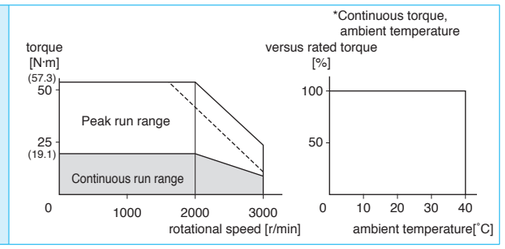
**• Permissible load** (For details, refer to P.104)

| | | |
|---|---|---|
| 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, B-direction (N) | 343 |

• For details of Note 1 to Note 5, refer to P.104.
• Dimensions of Driver, refer to P.34.
*1 Rotaly encoder specifications: □
*2 The product that the end of driver model designation has "E" is "positioning type".
Detail of model designation, refer to P.11.

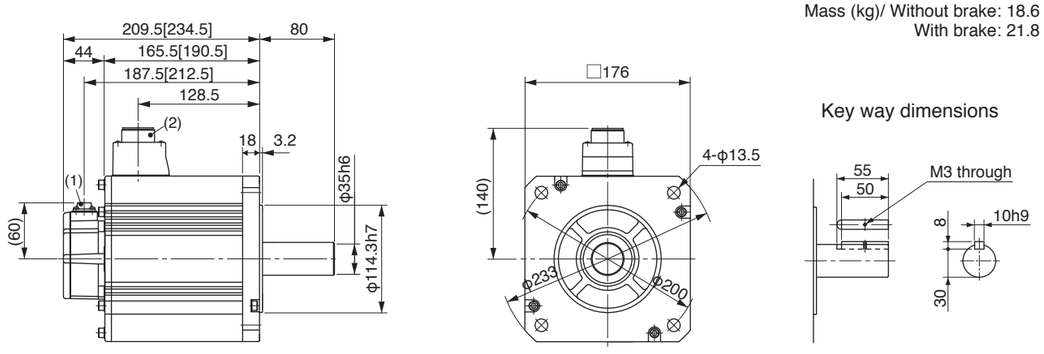
## Torque characteristics (at AC200V of power voltage <Dotted line represents the torque at 10% less supply voltage.>)

With oil seal




## Dimensions

Mass (kg)/ Without brake: 18.6
With brake: 21.8




(1) Encoder connector
(2) Motor/Brake connector

* Figures in [ ] represent the dimensions of with brake.

**<Cautions>** Reduce the moment of inertia ratio if high speed response operation is required.
Dimensions are subject to change without notice. Contact us or a dealer for the latest information.
Read the Instruction Manual carefully and understand all precautions and remarks before using the products.



# Motor Specifications 200V MHME 5.0kW [High inertia, Middle capacity]

## Specifications

| | | | AC200V | |
|---|---|---|---|---|
| Motor model *1 | | MHME | 502G1□ | 502S1□ |
| Applicable driver *2 | Model No. | A5 series | MFDHTB3A2 | |
| | | A5E series | MFDHTB3A2E | |
| | Frame symbol | | F-frame | |
| Power supply capacity | | (kVA) | 7.5 | |
| Rated output | | (W) | 5.0 | |
| Rated torque | | (N·m) | 23.9 | |
| Momentary Max. peak torque | | (N·m) | 71.6 | |
| Rated current | | (A(rms)) | 25.9 | |
| Max. current | | (A(o-p)) | 110 | |
| Regenerative brake frequency (times/min) Note)1 | Without option | | 10 | |
| | DV0P4285×2 | | 76 | |
| Rated rotational speed | | (r/min) | 2000 | |
| Max. rotational speed | | (r/min) | 3000 | |
| Moment of inertia of rotor ($\times10^{-4}$kg·m$^2$) | Without brake | | 162 | |
| | With brake | | 164 | |
| Recommended moment of inertia ratio of the load and the rotor Note)3 | | | 5 times or less | |
| Rotary encoder specifications Note)5 | | | 20-bit Incremental | 17-bit Absolute |
| | Resolution per single turn | | 1,048,576 | 131,072 |

**• Brake specifications** (For details, refer to P.105)

(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 or more |
| Engaging time (ms) | 80 or less |
| Releasing time (ms) Note)4 | 25 or less |
| Exciting current (DC) (A) | 1.3±10% |
| Releasing voltage (DC) (V) | 2 or more |
| Exciting voltage (DC) (V) | 24±2.4 |

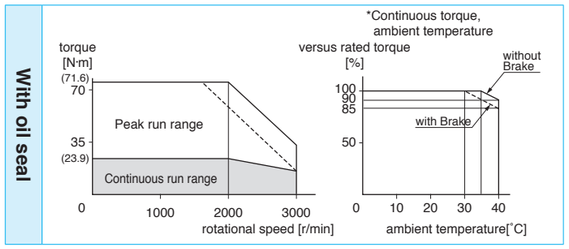
**• Permissible load** (For details, refer to P.104)

| | | |
|---|---|---|
| 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, B-direction (N) | 343 |

• For details of Note 1 to Note 5, refer to P.104.
• Dimensions of Driver, refer to P.34.
*1 Rotaly encoder specifications: □
*2 The product that the end of driver model designation has "E" is "positioning type".
Detail of model designation, refer to P.11.

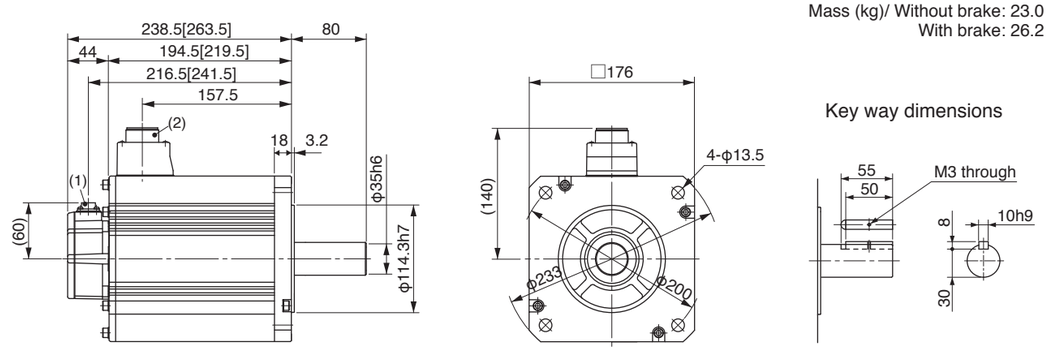
## Torque characteristics (at AC200V of power voltage <Dotted line represents the torque at 10% less supply voltage.>)

With oil seal




## Dimensions

Mass (kg)/ Without brake: 23.0
With brake: 26.2




(1) Encoder connector
(2) Motor/Brake connector

* Figures in [ ] represent the dimensions of with brake.

**<Cautions>** Reduce the moment of inertia ratio if high speed response operation is required.
Dimensions are subject to change without notice. Contact us or a dealer for the latest information.
Read the Instruction Manual carefully and understand all precautions and remarks before using the products.

# Motor Specifications 100V MSMD 50W [Low inertia, Small capacity]

## Specifications

| | | | AC100V | |
|---|---|---|---|---|
| Motor model *1 | | MSMD | 5AZG1□ | 5AZS1□ |
| Applicable driver *2 | Model No. | A5 series | MADHT1105 | |
| | | A5E series | MADHT1105E | |
| | Frame symbol | | A-frame | |
| Power supply capacity | | (kVA) | 0.5 | |
| Rated output | | (W) | 50 | |
| Rated torque | | (N·m) | 0.16 | |
| Momentary Max. peak torque | | (N·m) | 0.48 | |
| Rated current | | (A(rms)) | 1.1 | |
| Max. current | | (A(o-p)) | 4.7 | |
| Regenerative brake frequency (times/min) Note)1 | Without option | | No limit Note)2 | |
| | DV0P4280 | | No limit Note)2 | |
| Rated rotational speed | | (r/min) | 3000 | |
| Max. rotational speed | | (r/min) | 5000 | |
| Moment of inertia of rotor ($\times10^{-4}$kg·m$^2$) | Without brake | | 0.025 | |
| | With brake | | 0.027 | |
| Recommended moment of inertia ratio of the load and the rotor Note)3 | | | 30 times or less | |
| Rotary encoder specifications Note)5 | | | 20-bit Incremental | 17-bit Absolute |
| | Resolution per single turn | | 1,048,576 | 131,072 |

**• Brake specifications** (For details, refer to P.105)
(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 or more |
| Engaging time (ms) | 35 or less |
| Releasing time (ms) Note)4 | 20 or less |
| Exciting current (DC) (A) | 0.3 |
| Releasing voltage (DC) (V) | 1 or more |
| Exciting voltage (DC) (V) | 24±1.2 |

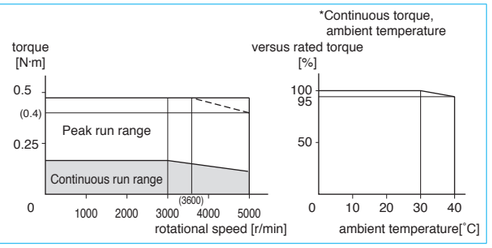
**• Permissible load** (For details, refer to P.104)

| | | |
|---|---|---|
| During assembly | Radial load P-direction (N) | 147 |
| | Thrust load A-direction (N) | 88 |
| | Thrust load B-direction (N) | 117.6 |
| During operation | Radial load P-direction (N) | 68.6 |
| | Thrust load A, B-direction (N) | 58.8 |

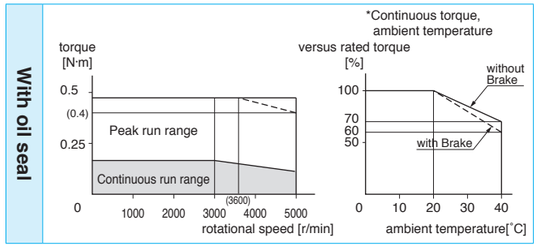
• For details of Note 1 to Note 5, refer to P.104.
• Dimensions of Driver, refer to P.30.
*1 Rotaly encoder specifications: □
*2 The product that the end of driver model designation has "E" is "positioning type".
Detail of model designation, refer to P.11.

## Torque characteristics (at AC100V of power voltage <Dotted line represents the torque at 10% less supply voltage.>)

Without oil seal



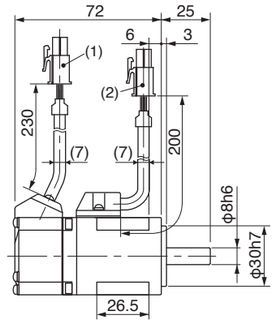

With oil seal



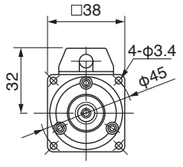

## Dimensions

<Without Brake>

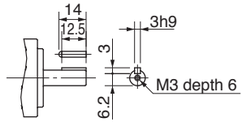
Mass (kg)/ 0.32




(1) Encoder connector
(2) Motor connector




Key way dimensions




* For the dimensions of with brake, refer to the right page.

**<Cautions>** Reduce the moment of inertia ratio if high speed response operation is required.
Dimensions are subject to change without notice. Contact us or a dealer for the latest information.
Read the Instruction Manual carefully and understand all precautions and remarks before using the products.



# Motor Specifications 200V MSMD 50W [Low inertia, Small capacity]

## Specifications

| | | | AC200V | |
|---|---|---|---|---|
| Motor model *1 | | MSMD | 5AZG1□ | 5AZS1□ |
| Applicable driver *2 | Model No. | A5 series | MADHT1505 | |
| | | A5E series | MADHT1505E | |
| | Frame symbol | | A-frame | |
| Power supply capacity | | (kVA) | 0.5 | |
| Rated output | | (W) | 50 | |
| Rated torque | | (N·m) | 0.16 | |
| Momentary Max. peak torque | | (N·m) | 0.48 | |
| Rated current | | (A(rms)) | 1.1 | |
| Max. current | | (A(o-p)) | 4.7 | |
| Regenerative brake frequency (times/min) Note)1 | Without option | | No limit Note)2 | |
| | DV0P4281 | | No limit Note)2 | |
| Rated rotational speed | | (r/min) | 3000 | |
| Max. rotational speed | | (r/min) | 5000 | |
| Moment of inertia of rotor ($\times10^{-4}$kg·m$^2$) | Without brake | | 0.025 | |
| | With brake | | 0.027 | |
| Recommended moment of inertia ratio of the load and the rotor Note)3 | | | 30 times or less | |
| Rotary encoder specifications Note)5 | | | 20-bit Incremental | 17-bit Absolute |
| | Resolution per single turn | | 1,048,576 | 131,072 |

**• Brake specifications** (For details, refer to P.105)
(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 or more |
| Engaging time (ms) | 35 or less |
| Releasing time (ms) Note)4 | 20 or less |
| Exciting current (DC) (A) | 0.3 |
| Releasing voltage (DC) (V) | 1 or more |
| Exciting voltage (DC) (V) | 24±1.2 |

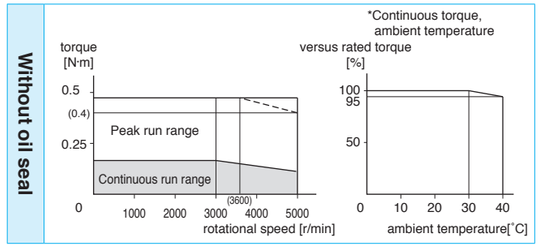
**• Permissible load** (For details, refer to P.104)

| | | |
|---|---|---|
| During assembly | Radial load P-direction (N) | 147 |
| | Thrust load A-direction (N) | 88 |
| | Thrust load B-direction (N) | 117.6 |
| During operation | Radial load P-direction (N) | 68.6 |
| | Thrust load A, B-direction (N) | 58.8 |

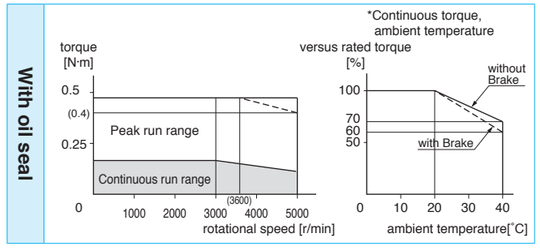
• For details of Note 1 to Note 5, refer to P.104.
• Dimensions of Driver, refer to P.30.
*1 Rotaly encoder specifications: □
*2 The product that the end of driver model designation has "E" is "positioning type".
Detail of model designation, refer to P.11.

## Torque characteristics (at AC200V of power voltage <Dotted line represents the torque at 10% less supply voltage.>)

Without oil seal



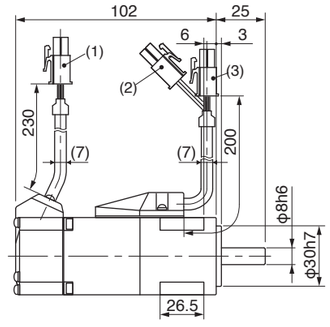

With oil seal



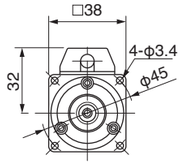

## Dimensions

<With Brake>

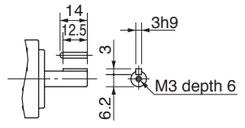
Mass (kg)/ 0.53




(1) Encoder connector
(2) Brake connector
(3) Motor connector




Key way dimensions




* For the dimensions of without brake, refer to the left page.

**<Cautions>** Reduce the moment of inertia ratio if high speed response operation is required.
Dimensions are subject to change without notice. Contact us or a dealer for the latest information.
Read the Instruction Manual carefully and understand all precautions and remarks before using the products.

# Motor Specifications 100V MSMD 100W [Low inertia, Small capacity]

## Specifications

| | | | AC100V | |
|---|---|---|---|---|
| Motor model *1 | | MSMD | 011G1□ | 011S1□ |
| Applicable driver *2 | Model No. | A5 series | MADHT1107 | |
| | | A5E series | MADHT1107E | |
| | Frame symbol | | A-frame | |
| Power supply capacity | | (kVA) | 0.4 | |
| Rated output | | (W) | 100 | |
| Rated torque | | (N·m) | 0.32 | |
| Momentary Max. peak torque | | (N·m) | 0.95 | |
| Rated current | | (A(rms)) | 1.7 | |
| Max. current | | (A(o-p)) | 7.2 | |
| Regenerative brake frequency (times/min) Note)1 | Without option | | No limit Note)2 | |
| | DV0P4280 | | No limit Note)2 | |
| Rated rotational speed | | (r/min) | 3000 | |
| Max. rotational speed | | (r/min) | 5000 | |
| Moment of inertia of rotor ($\times10^{-4}$kg·m$^2$) | Without brake | | 0.051 | |
| | With brake | | 0.054 | |
| Recommended moment of inertia ratio of the load and the rotor Note)3 | | | 30 times or less | |
| Rotary encoder specifications Note)5 | | | 20-bit Incremental | 17-bit Absolute |
| | Resolution per single turn | | 1,048,576 | 131,072 |

**• Brake specifications** (For details, refer to P.105)

(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 or more |
| Engaging time (ms) | 35 or less |
| Releasing time (ms) Note)4 | 20 or less |
| Exciting current (DC) (A) | 0.3 |
| Releasing voltage (DC) (V) | 1 or more |
| Exciting voltage (DC) (V) | 24±1.2 |

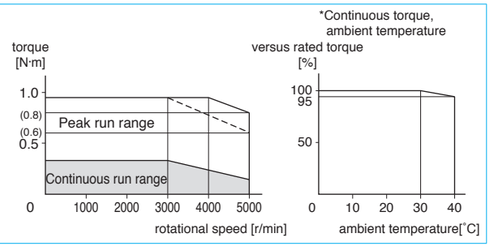
**• Permissible load** (For details, refer to P.104)

| | | |
|---|---|---|
| During assembly | Radial load P-direction (N) | 147 |
| | Thrust load A-direction (N) | 88 |
| | Thrust load B-direction (N) | 117.6 |
| During operation | Radial load P-direction (N) | 68.6 |
| | Thrust load A, B-direction (N) | 58.8 |

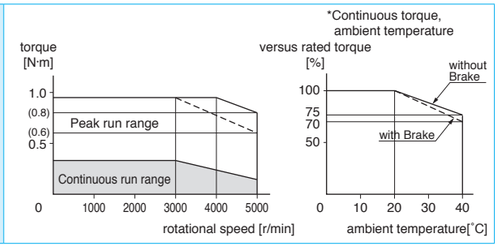
• For details of Note 1 to Note 5, refer to P.104.
• Dimensions of Driver, refer to P.30.
*1 Rotaly encoder specifications: □
*2 The product that the end of driver model designation has “E” is “positioning type”.
Detail of model designation, refer to P.11.

## Torque characteristics (at AC100V of power voltage <Dotted line represents the torque at 10% less supply voltage.>)

Without oil seal



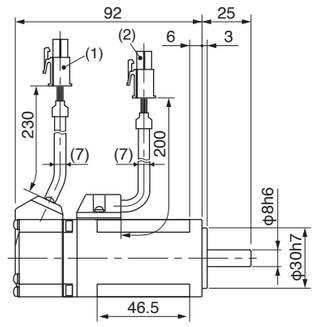

With oil seal



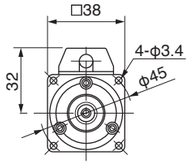

## Dimensions

<Without Brake>

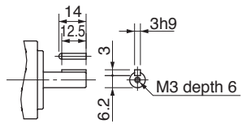
Mass (kg)/ 0.47




(1) Encoder connector
(2) Motor connector




Key way dimensions




* For the dimensions of with brake, refer to the right page.

**<Cautions>** Reduce the moment of inertia ratio if high speed response operation is required.
Dimensions are subject to change without notice. Contact us or a dealer for the latest information.
Read the Instruction Manual carefully and understand all precautions and remarks before using the products.



# Motor Specifications 200V MSMD 100W [Low inertia, Small capacity]

## Specifications

| | | | AC200V | |
|---|---|---|---|---|
| Motor model *1 | | MSMD | 012G1□ | 012S1□ |
| Applicable driver *2 | Model No. | A5 series | MADHT1505 | |
| | | A5E series | MADHT1505E | |
| | Frame symbol | | A-frame | |
| Power supply capacity | | (kVA) | 0.5 | |
| Rated output | | (W) | 100 | |
| Rated torque | | (N·m) | 0.32 | |
| Momentary Max. peak torque | | (N·m) | 0.95 | |
| Rated current | | (A(rms)) | 1.1 | |
| Max. current | | (A(o-p)) | 4.7 | |
| Regenerative brake frequency (times/min) Note)1 | Without option | | No limit Note)2 | |
| | DV0P4281 | | No limit Note)2 | |
| Rated rotational speed | | (r/min) | 3000 | |
| Max. rotational speed | | (r/min) | 5000 | |
| Moment of inertia of rotor ($\times10^{-4}$kg·m$^2$) | Without brake | | 0.051 | |
| | With brake | | 0.054 | |
| Recommended moment of inertia ratio of the load and the rotor Note)3 | | | 30 times or less | |
| Rotary encoder specifications Note)5 | | | 20-bit Incremental | 17-bit Absolute |
| | Resolution per single turn | | 1,048,576 | 131,072 |

**• Brake specifications** (For details, refer to P.105)

(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 or more |
| Engaging time (ms) | 35 or less |
| Releasing time (ms) Note)4 | 20 or less |
| Exciting current (DC) (A) | 0.3 |
| Releasing voltage (DC) (V) | 1 or more |
| Exciting voltage (DC) (V) | 24±1.2 |

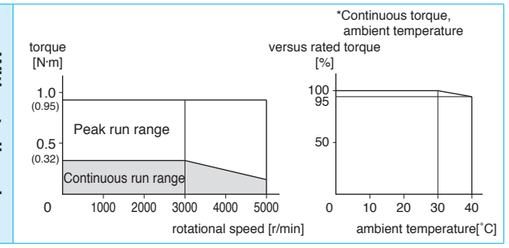
**• Permissible load** (For details, refer to P.104)

| | | |
|---|---|---|
| During assembly | Radial load P-direction (N) | 147 |
| | Thrust load A-direction (N) | 88 |
| | Thrust load B-direction (N) | 117.6 |
| During operation | Radial load P-direction (N) | 68.6 |
| | Thrust load A, B-direction (N) | 58.8 |

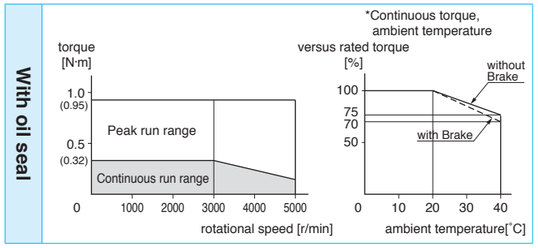
• For details of Note 1 to Note 5, refer to P.104.
• Dimensions of Driver, refer to P.30.
*1 Rotaly encoder specifications: □
*2 The product that the end of driver model designation has “E” is “positioning type”.
Detail of model designation, refer to P.11.

## Torque characteristics (at AC200V of power voltage)

Without oil seal



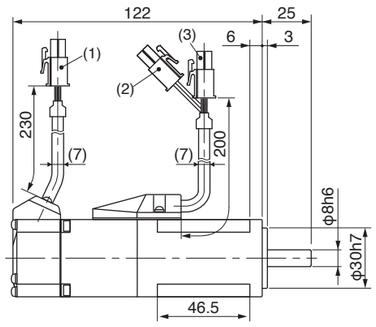

With oil seal



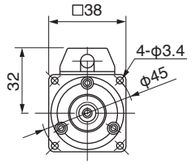

## Dimensions

<With Brake>

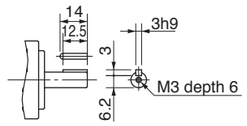
Mass (kg)/ 0.68




(1) Encoder connector
(2) Brake connector
(3) Motor connector




Key way dimensions




* For the dimensions of without brake, refer to the left page.

**<Cautions>** Reduce the moment of inertia ratio if high speed response operation is required.
Dimensions are subject to change without notice. Contact us or a dealer for the latest information.
Read the Instruction Manual carefully and understand all precautions and remarks before using the products.

# Motor Specifications 100V MSMD 200W [Low inertia, Small capacity]

## Specifications

| | | | AC100V | |
|---|---|---|---|---|
| Motor model *1 | | MSMD | 021G1□ | 021S1□ |
| Applicable driver *2 | Model No. | A5 series | MBDHT2110 | |
| | | A5E series | MBDHT2110E | |
| | Frame symbol | | B-frame | |
| Power supply capacity (kVA) | | | 0.5 | |
| Rated output (W) | | | 200 | |
| Rated torque (N·m) | | | 0.64 | |
| Momentary Max. peak torque (N·m) | | | 1.91 | |
| Rated current (A(rms)) | | | 2.5 | |
| Max. current (A(o-p)) | | | 10.6 | |
| Regenerative brake frequency (times/min) Note)1 | Without option | | No limit Note)2 | |
| | DV0P4283 | | No limit Note)2 | |
| Rated rotational speed (r/min) | | | 3000 | |
| Max. rotational speed (r/min) | | | 5000 | |
| Moment of inertia of rotor ($\times10^{-4}$kg·m$^2$) | Without brake | | 0.14 | |
| | With brake | | 0.16 | |
| Recommended moment of inertia ratio of the load and the rotor Note)3 | | | 30 times or less | |
| Rotary encoder specifications Note)5 | | | 20-bit Incremental | 17-bit Absolute |
| | Resolution per single turn | | 1,048,576 | 131,072 |

**• Brake specifications** (For details, refer to P.105)

(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 or more |
| Engaging time (ms) | 50 or less |
| Releasing time (ms) Note)4 | 15 or less |
| Exciting current (DC) (A) | 0.36 |
| Releasing voltage (DC) (V) | 1 or more |
| Exciting voltage (DC) (V) | 24±1.2 |

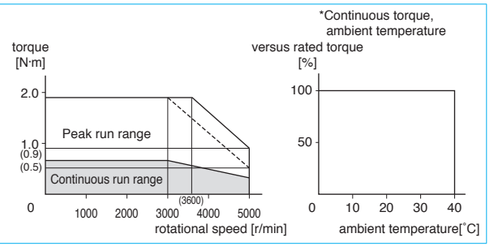
**• Permissible load** (For details, refer to P.104)

| | | |
|---|---|---|
| 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, B-direction (N) | 98 |

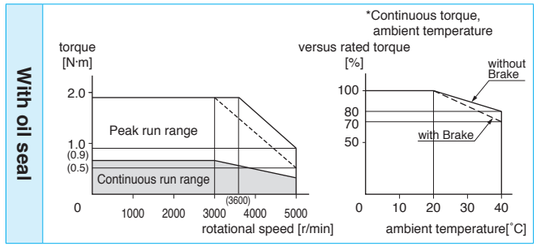
• For details of Note 1 to Note 5, refer to P.104.
• Dimensions of Driver, refer to P.30.
*1 Rotaly encoder specifications: □
*2 The product that the end of driver model designation has "E" is "positioning type".
Detail of model designation, refer to P.11.

## Torque characteristics (at AC100V of power voltage <Dotted line represents the torque at 10% less supply voltage.>)

Without oil seal



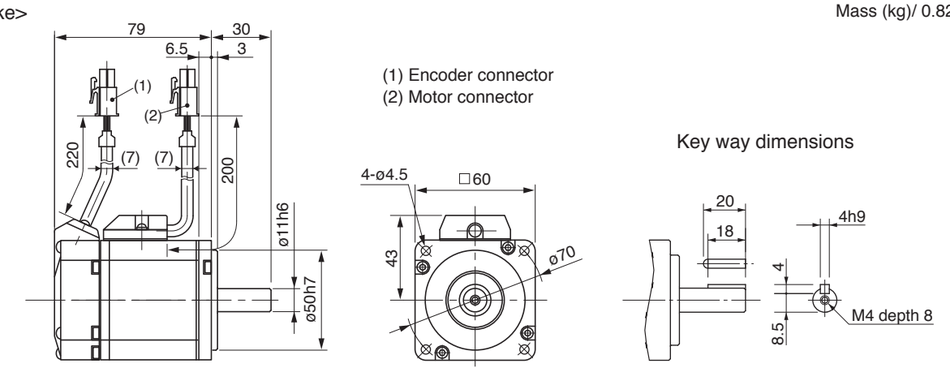

With oil seal




## Dimensions

<Without Brake>

Mass (kg)/ 0.82




* For the dimensions of with brake, refer to the right page.

**<Cautions>** Reduce the moment of inertia ratio if high speed response operation is required.
Dimensions are subject to change without notice. Contact us or a dealer for the latest information.
Read the Instruction Manual carefully and understand all precautions and remarks before using the products.



# Motor Specifications 200V MSMD 200W [Low inertia, Small capacity]

## Specifications

| | | | AC200V | |
|---|---|---|---|---|
| Motor model *1 | | MSMD | 022G1□ | 022S1□ |
| Applicable driver *2 | Model No. | A5 series | MADHT1507 | |
| | | A5E series | MADHT1507E | |
| | Frame symbol | | A-frame | |
| Power supply capacity (kVA) | | | 0.5 | |
| Rated output (W) | | | 200 | |
| Rated torque (N·m) | | | 0.64 | |
| Momentary Max. peak torque (N·m) | | | 1.91 | |
| Rated current (A(rms)) | | | 1.6 | |
| Max. current (A(o-p)) | | | 6.9 | |
| Regenerative brake frequency (times/min) Note)1 | Without option | | No limit Note)2 | |
| | DV0P4283 | | No limit Note)2 | |
| Rated rotational speed (r/min) | | | 3000 | |
| Max. rotational speed (r/min) | | | 5000 | |
| Moment of inertia of rotor ($\times10^{-4}$kg·m$^2$) | Without brake | | 0.14 | |
| | With brake | | 0.16 | |
| Recommended moment of inertia ratio of the load and the rotor Note)3 | | | 30 times or less | |
| Rotary encoder specifications Note)5 | | | 20-bit Incremental | 17-bit Absolute |
| | Resolution per single turn | | 1,048,576 | 131,072 |

**• Brake specifications** (For details, refer to P.105)

(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 or more |
| Engaging time (ms) | 50 or less |
| Releasing time (ms) Note)4 | 15 or less |
| Exciting current (DC) (A) | 0.36 |
| Releasing voltage (DC) (V) | 1 or more |
| Exciting voltage (DC) (V) | 24±1.2 |

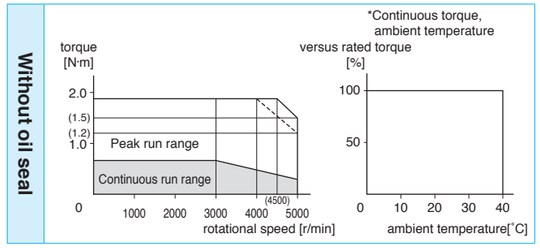
**• Permissible load** (For details, refer to P.104)

| | | |
|---|---|---|
| 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, B-direction (N) | 98 |

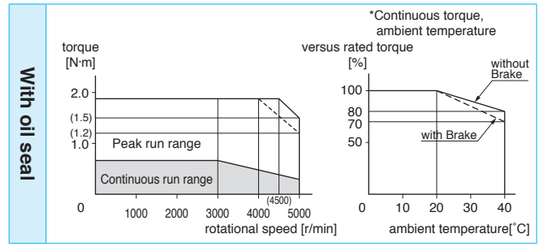
• For details of Note 1 to Note 5, refer to P.104.
• Dimensions of Driver, refer to P.30.
*1 Rotaly encoder specifications: □
*2 The product that the end of driver model designation has "E" is "positioning type".
Detail of model designation, refer to P.11.

## Torque characteristics (at AC200V of power voltage <Dotted line represents the torque at 10% less supply voltage.>)

Without oil seal



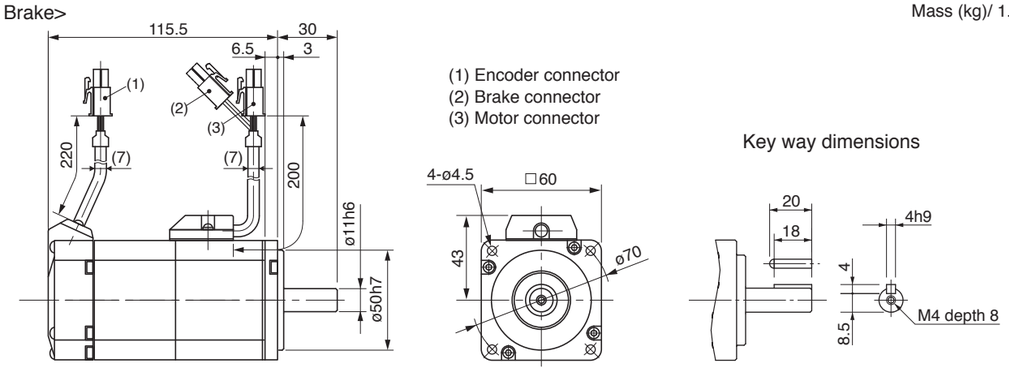

With oil seal




## Dimensions

<With Brake>

Mass (kg)/ 1.3




* For the dimensions of without brake, refer to the left page.

**<Cautions>** Reduce the moment of inertia ratio if high speed response operation is required.
Dimensions are subject to change without notice. Contact us or a dealer for the latest information.
Read the Instruction Manual carefully and understand all precautions and remarks before using the products.

# Motor Specifications 100V MSMD 400W [Low inertia, Small capacity]

## Specifications

| | | | AC100V | |
|---|---|---|---|---|
| Motor model *1 | | MSMD | 041G1□ | 041S1□ |
| Applicable driver *2 | Model No. | A5 series | MCDHT3120 | |
| | | A5E series | MCDHT3120E | |
| | Frame symbol | | C-frame | |
| Power supply capacity | | (kVA) | 0.9 | |
| Rated output | | (W) | 400 | |
| Rated torque | | (N·m) | 1.3 | |
| Momentary Max. peak torque | | (N·m) | 3.8 | |
| Rated current | | (A(rms)) | 4.6 | |
| Max. current | | (A(o-p)) | 19.5 | |
| Regenerative brake frequency (times/min) Note)1 | Without option | | No limit Note)2 | |
| | DV0P4282 | | 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 | | 0.26 | |
| | With brake | | 0.28 | |
| Recommended moment of inertia ratio of the load and the rotor Note)3 | | | 30 times or less | |
| Rotary encoder specifications Note)5 | | | 20-bit Incremental | 17-bit Absolute |
| | Resolution per single turn | | 1,048,576 | 131,072 |

**• Brake specifications** (For details, refer to P.105)
(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 or more |
| Engaging time (ms) | 50 or less |
| Releasing time (ms) Note)4 | 15 or less |
| Exciting current (DC) (A) | 0.36 |
| Releasing voltage (DC) (V) | 1 or more |
| Exciting voltage (DC) (V) | 24±1.2 |

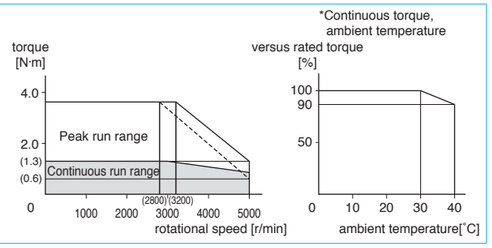
**• Permissible load** (For details, refer to P.104)

| | | |
|---|---|---|
| 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, B-direction (N) | 98 |

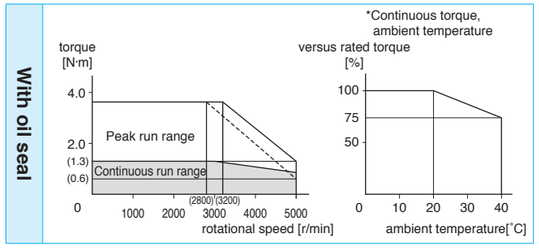
• For details of Note 1 to Note 5, refer to P.104.
• Dimensions of Driver, refer to P.31.
*1 Rotaly encoder specifications: □
*2 The product that the end of driver model designation has "E" is "positioning type".
Detail of model designation, refer to P.11.

## Torque characteristics (at AC100V of power voltage <Dotted line represents the torque at 10% less supply voltage.>)

Without oil seal



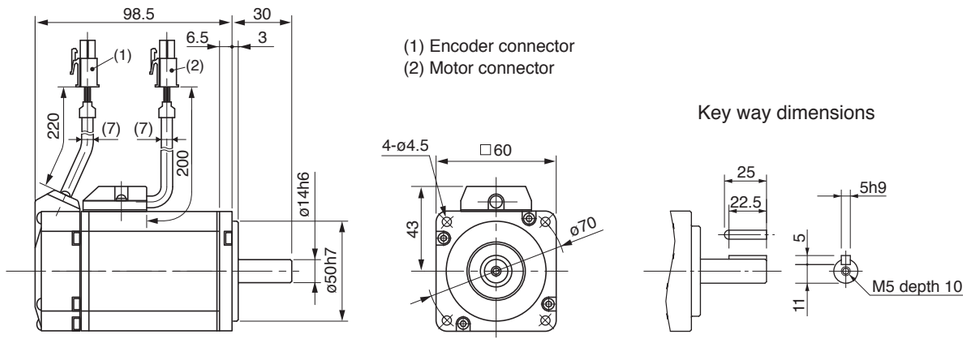

With oil seal




## Dimensions

<Without Brake>

Mass (kg)/ 1.2




* For the dimensions of with brake, refer to the right page.

**<Cautions>** Reduce the moment of inertia ratio if high speed response operation is required.
Dimensions are subject to change without notice. Contact us or a dealer for the latest information.
Read the Instruction Manual carefully and understand all precautions and remarks before using the products.



# Motor Specifications 200V MSMD 400W [Low inertia, Small capacity]

## Specifications

| | | | AC200V | |
|---|---|---|---|---|
| Motor model *1 | | MSMD | 042G1□ | 042S1□ |
| Applicable driver *2 | Model No. | A5 series | MBDHT2510 | |
| | | A5E series | MBDHT2510E | |
| | Frame symbol | | B-frame | |
| Power supply capacity | | (kVA) | 0.9 | |
| Rated output | | (W) | 400 | |
| Rated torque | | (N·m) | 1.3 | |
| Momentary Max. peak torque | | (N·m) | 3.8 | |
| Rated current | | (A(rms)) | 2.6 | |
| Max. current | | (A(o-p)) | 11.0 | |
| Regenerative brake frequency (times/min) Note)1 | Without option | | No limit Note)2 | |
| | 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 | | 0.26 | |
| | With brake | | 0.28 | |
| Recommended moment of inertia ratio of the load and the rotor Note)3 | | | 30 times or less | |
| Rotary encoder specifications Note)5 | | | 20-bit Incremental | 17-bit Absolute |
| | Resolution per single turn | | 1,048,576 | 131,072 |

**• Brake specifications** (For details, refer to P.105)
(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 or more |
| Engaging time (ms) | 50 or less |
| Releasing time (ms) Note)4 | 15 or less |
| Exciting current (DC) (A) | 0.36 |
| Releasing voltage (DC) (V) | 1 or more |
| Exciting voltage (DC) (V) | 24±1.2 |

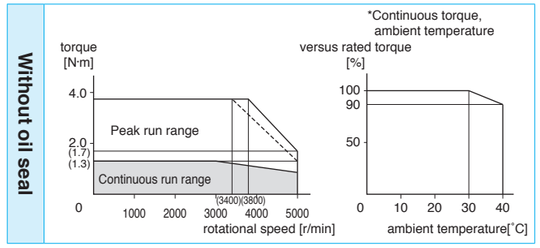
**• Permissible load** (For details, refer to P.104)

| | | |
|---|---|---|
| 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, B-direction (N) | 98 |

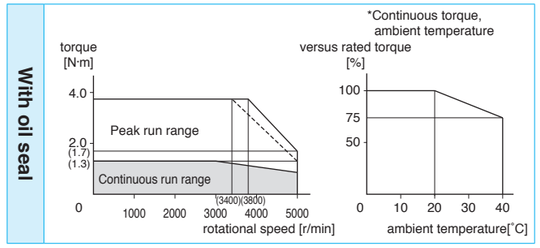
• For details of Note 1 to Note 5, refer to P.104.
• Dimensions of Driver, refer to P.30.
*1 Rotaly encoder specifications: □
*2 The product that the end of driver model designation has "E" is "positioning type".
Detail of model designation, refer to P.11.

## Torque characteristics (at AC200V of power voltage <Dotted line represents the torque at 10% less supply voltage.>)

Without oil seal



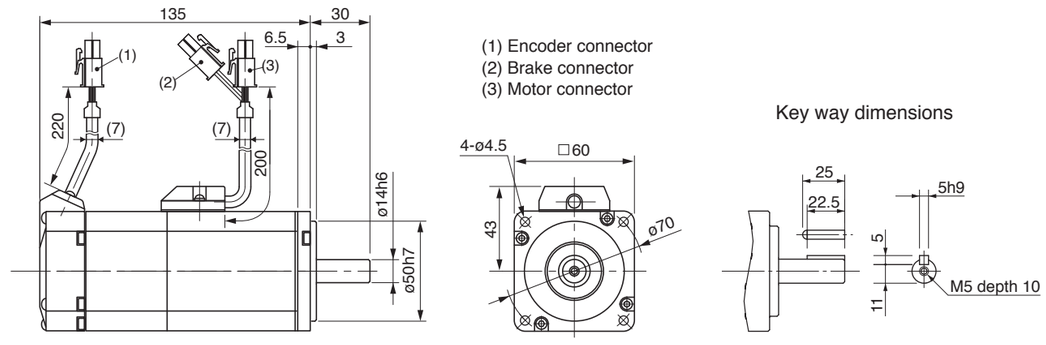

With oil seal




## Dimensions

<With Brake>

Mass (kg)/ 1.7




* For the dimensions of without brake, refer to the left page.

**<Cautions>** Reduce the moment of inertia ratio if high speed response operation is required.
Dimensions are subject to change without notice. Contact us or a dealer for the latest information.
Read the Instruction Manual carefully and understand all precautions and remarks before using the products.

## Specifications

| | | | AC200V | |
|---|---|---|---|---|
| Motor model *1 | | MSMD | 082G1□ | 082S1□ |
| Applicable driver *2 | Model No. | A5 series | MCDHT3520 | |
| | | A5E series | MCDHT3520E | |
| | Frame symbol | | C-frame | |
| Power supply capacity (kVA) | | | 1.3 | |
| Rated output (W) | | | 750 | |
| Rated torque (N·m) | | | 2.4 | |
| Momentary Max. peak torque (N·m) | | | 7.1 | |
| Rated current (A(rms)) | | | 4.0 | |
| Max. current (A(o-p)) | | | 17.0 | |
| Regenerative brake frequency (times/min) Note)1 | Without option | | No limit Note)2 | |
| | DV0P4283 | | No limit Note)2 | |
| Rated rotational speed (r/min) | | | 3000 | |
| Max. rotational speed (r/min) | | | 4500 | |
| Moment of inertia of rotor ($\times10^{-4}$kg·m$^2$) | Without brake | | 0.87 | |
| | With brake | | 0.97 | |
| Recommended moment of inertia ratio of the load and the rotor Note)3 | | | 20 times or less | |
| Rotary encoder specifications Note)5 | | | 20-bit Incremental | 17-bit Absolute |
| | Resolution per single turn | | 1,048,576 | 131,072 |

**• Brake specifications** (For details, refer to P.105)

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

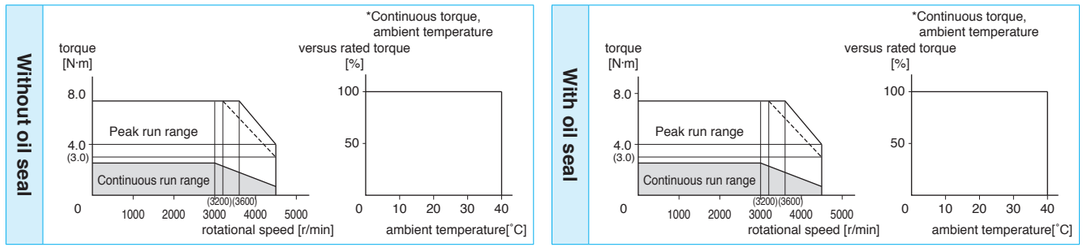
| | |
|---|---|
| Static friction torque (N·m) | 2.45 or more |
| Engaging time (ms) | 70 or less |
| Releasing time (ms) Note)4 | 20 or less |
| Exciting current (DC) (A) | 0.42 |
| Releasing voltage (DC) (V) | 1 or more |
| Exciting voltage (DC) (V) | 24±1.2 |

**• Permissible load** (For details, refer to P.104)

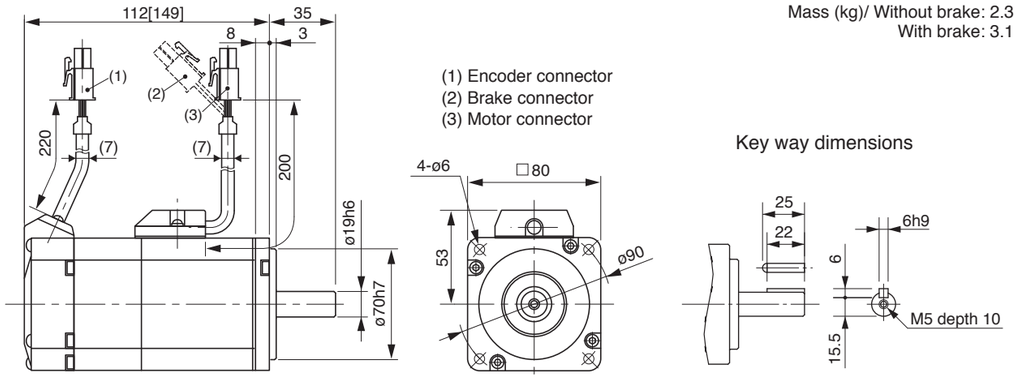
| | | |
|---|---|---|
| During assembly | Radial load P-direction (N) | 686 |
| | Thrust load A-direction (N) | 294 |
| | Thrust load B-direction (N) | 392 |
| During operation | Radial load P-direction (N) | 392 |
| | Thrust load A, B-direction (N) | 147 |

• For details of Note 1 to Note 5, refer to P.104.
• Dimensions of Driver, refer to P.31.
*1 Rotaly encoder specifications: □
*2 The product that the end of driver model designation has “E” is “positioning type”.
Detail of model designation, refer to P.11.

## Torque characteristics (at AC200V of power voltage <Dotted line represents the torque at 10% less supply voltage.>)




## Dimensions




Mass (kg)/ Without brake: 2.3
With brake: 3.1

* Figures in [ ] represent the dimensions of with brake.

**<Cautions>** Reduce the moment of inertia ratio if high speed response operation is required.
Dimensions are subject to change without notice. Contact us or a dealer for the latest information.
Read the Instruction Manual carefully and understand all precautions and remarks before using the products.



MEMO

# Motor Specifications 100V MHMD 200W [High inertia, Small capacity]

## Specifications

| | | | AC100V | |
|---|---|---|---|---|
| Motor model *1 | | MHMD | 021G1□ | 021S1□ |
| Applicable driver *2 | Model No. | A5 series | MBDHT2110 | |
| | | A5E series | MBDHT2110E | |
| | Frame symbol | | B-frame | |
| Power supply capacity | | (kVA) | 0.5 | |
| Rated output | | (W) | 200 | |
| Rated torque | | (N·m) | 0.64 | |
| Momentary Max. peak torque | | (N·m) | 1.91 | |
| Rated current | | (A(rms)) | 2.5 | |
| Max. current | | (A(o-p)) | 10.6 | |
| Regenerative brake frequency (times/min) Note)1 | Without option | | No limit Note)2 | |
| | DV0P4283 | | No limit Note)2 | |
| Rated rotational speed | | (r/min) | 3000 | |
| Max. rotational speed | | (r/min) | 5000 | |
| Moment of inertia of rotor ($\times10^{-4}$kg·m$^2$) | Without brake | | 0.42 | |
| | With brake | | 0.45 | |
| Recommended moment of inertia ratio of the load and the rotor Note)3 | | | 10 times or less | |
| Rotary encoder specifications Note)5 | | | 20-bit Incremental | 17-bit Absolute |
| | Resolution per single turn | | 1,048,576 | 131,072 |

**• Brake specifications** (For details, refer to P.105)

(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 or more |
| Engaging time (ms) | 50 or less |
| Releasing time (ms) Note)4 | 15 or less |
| Exciting current (DC) (A) | 0.36 |
| Releasing voltage (DC) (V) | 1 or more |
| Exciting voltage (DC) (V) | 24±1.2 |

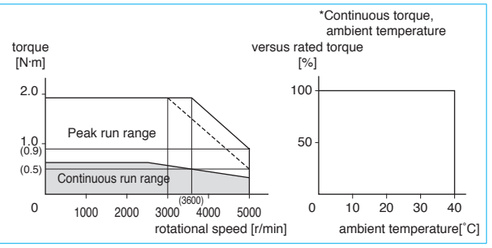
**• Permissible load** (For details, refer to P.104)

| | | |
|---|---|---|
| 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, B-direction (N) | 98 |

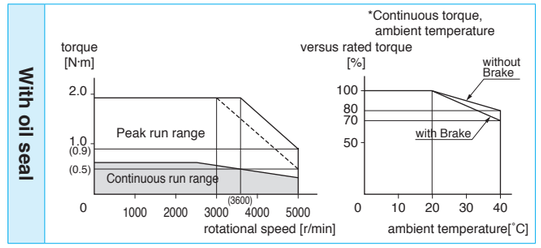
• For details of Note 1 to Note 5, refer to P.104.
• Dimensions of Driver, refer to P.30.
*1 Rotaly encoder specifications: □
*2 The product that the end of driver model designation has "E" is "positioning type".
Detail of model designation, refer to P.11.

## Torque characteristics (at AC100V of power voltage <Dotted line represents the torque at 10% less supply voltage.>)

Without oil seal



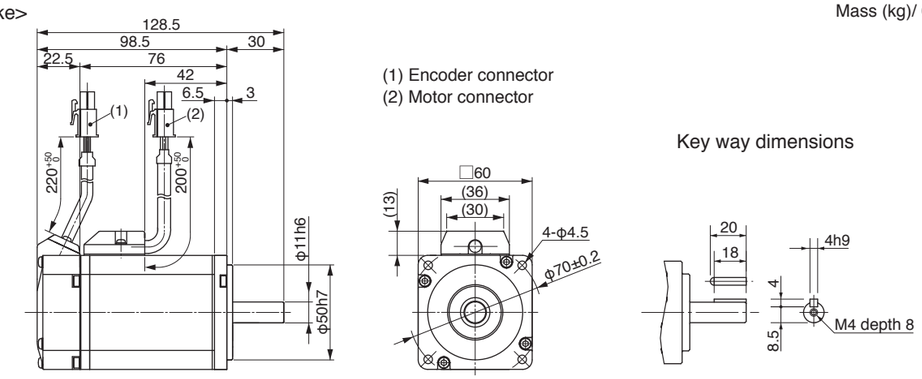

With oil seal




## Dimensions

<Without Brake>

Mass (kg)/ 0.96




* For the dimensions of with brake, refer to the right page.

**<Cautions>** Reduce the moment of inertia ratio if high speed response operation is required.
Dimensions are subject to change without notice. Contact us or a dealer for the latest information.
Read the Instruction Manual carefully and understand all precautions and remarks before using the products.



# Motor Specifications 200V MHMD 200W [High inertia, Small capacity]

## Specifications

| | | | AC200V | |
|---|---|---|---|---|
| Motor model *1 | | MHMD | 022G1□ | 022S1□ |
| Applicable driver *2 | Model No. | A5 series | MADHT1507 | |
| | | A5E series | MADHT1507E | |
| | Frame symbol | | A-frame | |
| Power supply capacity | | (kVA) | 0.5 | |
| Rated output | | (W) | 200 | |
| Rated torque | | (N·m) | 0.64 | |
| Momentary Max. peak torque | | (N·m) | 1.91 | |
| Rated current | | (A(rms)) | 1.6 | |
| Max. current | | (A(o-p)) | 6.9 | |
| Regenerative brake frequency (times/min) Note)1 | Without option | | No limit Note)2 | |
| | DV0P4283 | | No limit Note)2 | |
| Rated rotational speed | | (r/min) | 3000 | |
| Max. rotational speed | | (r/min) | 5000 | |
| Moment of inertia of rotor ($\times10^{-4}$kg·m$^2$) | Without brake | | 0.42 | |
| | With brake | | 0.45 | |
| Recommended moment of inertia ratio of the load and the rotor Note)3 | | | 10 times or less | |
| Rotary encoder specifications Note)5 | | | 20-bit Incremental | 17-bit Absolute |
| | Resolution per single turn | | 1,048,576 | 131,072 |

**• Brake specifications** (For details, refer to P.105)

(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 or more |
| Engaging time (ms) | 50 or less |
| Releasing time (ms) Note)4 | 15 or less |
| Exciting current (DC) (A) | 0.36 |
| Releasing voltage (DC) (V) | 1 or more |
| Exciting voltage (DC) (V) | 24±1.2 |

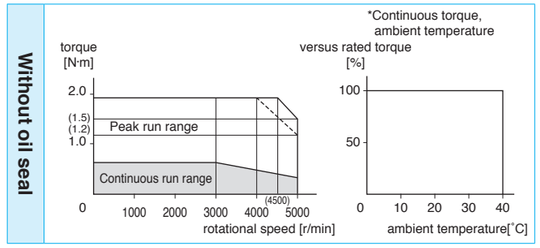
**• Permissible load** (For details, refer to P.104)

| | | |
|---|---|---|
| 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, B-direction (N) | 98 |

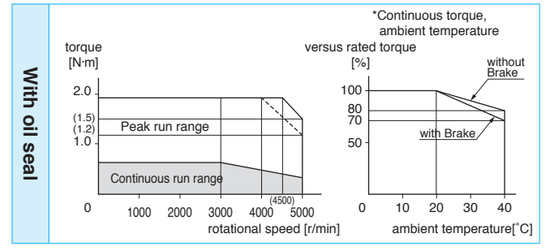
• For details of Note 1 to Note 5, refer to P.104.
• Dimensions of Driver, refer to P.30.
*1 Rotaly encoder specifications: □
*2 The product that the end of driver model designation has "E" is "positioning type".
Detail of model designation, refer to P.11.

## Torque characteristics (at AC200V of power voltage <Dotted line represents the torque at 10% less supply voltage.>)

Without oil seal



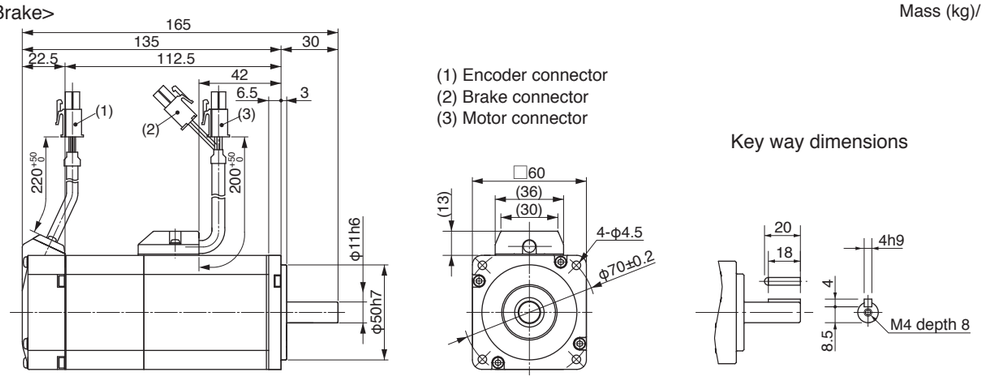

With oil seal




## Dimensions

<With Brake>

Mass (kg)/ 1.4




* For the dimensions of without brake, refer to the left page.

**<Cautions>** Reduce the moment of inertia ratio if high speed response operation is required.
Dimensions are subject to change without notice. Contact us or a dealer for the latest information.
Read the Instruction Manual carefully and understand all precautions and remarks before using the products.

# Motor Specifications 100V MHMD 400W [High inertia, Small capacity]

## Specifications

| | | | AC100V | |
|---|---|---|---|---|
| Motor model *1 | | MHMD | 041G1□ | 041S1□ |
| Applicable driver *2 | Model No. | A5 series | MCDHT3120 | |
| | | A5E series | MCDHT3120E | |
| | Frame symbol | | C-frame | |
| Power supply capacity | | (kVA) | 0.9 | |
| Rated output | | (W) | 400 | |
| Rated torque | | (N·m) | 1.3 | |
| Momentary Max. peak torque | | (N·m) | 3.8 | |
| Rated current | | (A(rms)) | 4.6 | |
| Max. current | | (A(o-p)) | 11 | |
| Regenerative brake frequency (times/min) Note)1 | Without option | | No limit Note)2 | |
| | DV0P4282 | | No limit Note)2 | |
| Rated rotational speed | | (r/min) | 3000 | |
| Max. rotational speed | | (r/min) | 5000 | |
| Moment of inertia of rotor ($\times10^{-4}$kg·m$^2$) | Without brake | | 0.67 | |
| | With brake | | 0.70 | |
| Recommended moment of inertia ratio of the load and the rotor Note)3 | | | 10 times or less | |
| Rotary encoder specifications Note)5 | | | 20-bit Incremental | 17-bit Absolute |
| | Resolution per single turn | | 1,048,576 | 131,072 |

**• Brake specifications** (For details, refer to P.105)

(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 or more |
| Engaging time (ms) | 50 or less |
| Releasing time (ms) Note)4 | 15 or less |
| Exciting current (DC) (A) | 0.36 |
| Releasing voltage (DC) (V) | 1 or more |
| Exciting voltage (DC) (V) | 24±1.2 |

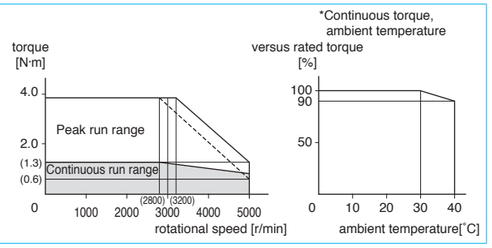
**• Permissible load** (For details, refer to P.104)

| | | |
|---|---|---|
| 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, B-direction (N) | 98 |

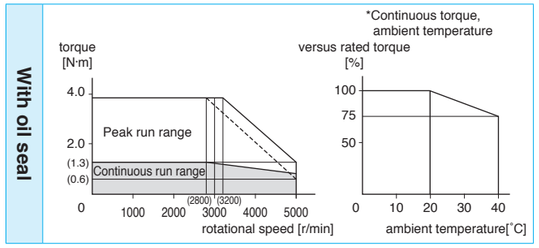
• For details of Note 1 to Note 5, refer to P.104.
• Dimensions of Driver, refer to P.31.
*1 Rotaly encoder specifications: □
*2 The product that the end of driver model designation has "E" is "positioning type".
Detail of model designation, refer to P.11.

## Torque characteristics (at AC100V of power voltage <Dotted line represents the torque at 10% less supply voltage.>)

Without oil seal



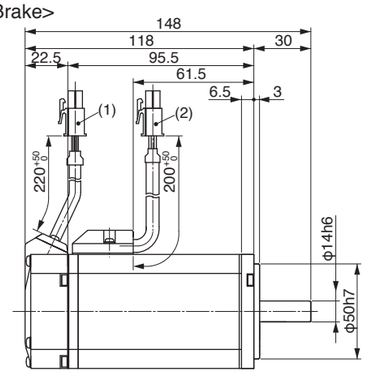

With oil seal



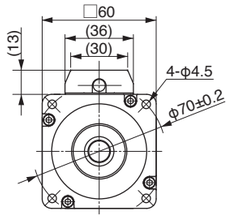

## Dimensions

<Without Brake>

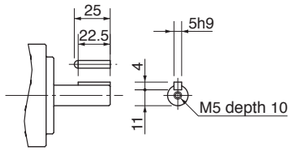
Mass (kg)/ 1.4




(1) Encoder connector
(2) Brake connector
(3) Motor connector




Key way dimensions




* For the dimensions of with brake, refer to the right page.

**<Cautions>** Reduce the moment of inertia ratio if high speed response operation is required.
Dimensions are subject to change without notice. Contact us or a dealer for the latest information.
Read the Instruction Manual carefully and understand all precautions and remarks before using the products.



# Motor Specifications 200V MHMD 400W [High inertia, Small capacity]

## Specifications

| | | | AC200V | |
|---|---|---|---|---|
| Motor model *1 | | MHMD | 042G1□ | 042S1□ |
| Applicable driver *2 | Model No. | A5 series | MBDHT2510 | |
| | | A5E series | MBDHT2510E | |
| | Frame symbol | | B-frame | |
| Power supply capacity | | (kVA) | 0.9 | |
| Rated output | | (W) | 400 | |
| Rated torque | | (N·m) | 1.3 | |
| Momentary Max. peak torque | | (N·m) | 3.8 | |
| Rated current | | (A(rms)) | 2.6 | |
| Max. current | | (A(o-p)) | 19.5 | |
| Regenerative brake frequency (times/min) Note)1 | Without option | | No limit Note)2 | |
| | DV0P4283 | | No limit Note)2 | |
| Rated rotational speed | | (r/min) | 3000 | |
| Max. rotational speed | | (r/min) | 5000 | |
| Moment of inertia of rotor ($\times10^{-4}$kg·m$^2$) | Without brake | | 0.67 | |
| | With brake | | 0.70 | |
| Recommended moment of inertia ratio of the load and the rotor Note)3 | | | 10 times or less | |
| Rotary encoder specifications Note)5 | | | 20-bit Incremental | 17-bit Absolute |
| | Resolution per single turn | | 1,048,576 | 131,072 |

**• Brake specifications** (For details, refer to P.105)

(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 or more |
| Engaging time (ms) | 50 or less |
| Releasing time (ms) Note)4 | 15 or less |
| Exciting current (DC) (A) | 0.36 |
| Releasing voltage (DC) (V) | 1 or more |
| Exciting voltage (DC) (V) | 24±1.2 |

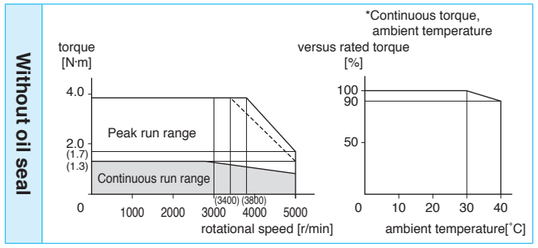
**• Permissible load** (For details, refer to P.104)

| | | |
|---|---|---|
| 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, B-direction (N) | 98 |

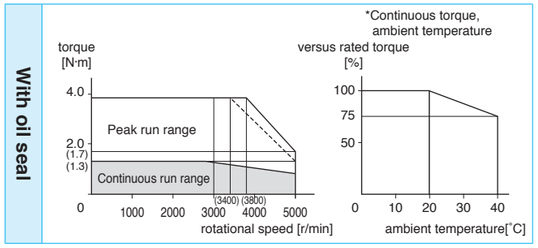
• For details of Note 1 to Note 5, refer to P.104.
• Dimensions of Driver, refer to P.30.
*1 Rotaly encoder specifications: □
*2 The product that the end of driver model designation has "E" is "positioning type".
Detail of model designation, refer to P.11.

## Torque characteristics (at AC200V of power voltage <Dotted line represents the torque at 10% less supply voltage.>)

Without oil seal



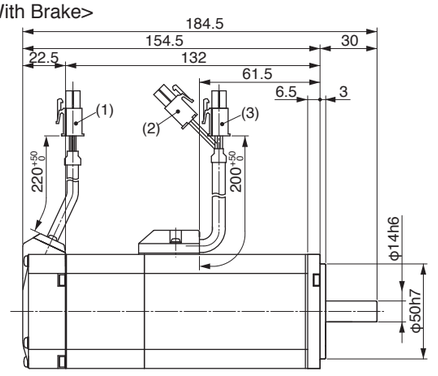

With oil seal



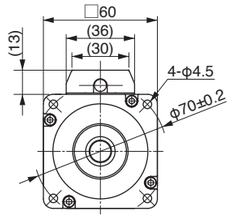

## Dimensions

<With Brake>

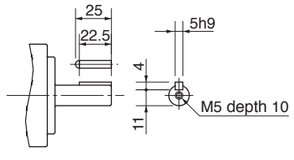
Mass (kg)/ 1.8




(1) Encoder connector
(2) Brake connector
(3) Motor connector




Key way dimensions




* For the dimensions of without brake, refer to the left page.

**<Cautions>** Reduce the moment of inertia ratio if high speed response operation is required.
Dimensions are subject to change without notice. Contact us or a dealer for the latest information.
Read the Instruction Manual carefully and understand all precautions and remarks before using the products.

# 200V MHMD 750W [High inertia, Small capacity]

## Specifications

| | | | AC200V | |
|---|---|---|---|---|
| Motor model *1 | | | MHMD | 082G1□ | 082S1□ |
| Applicable driver *2 | Model No. | A5 series | MCDHT3520 | |
| | | A5E series | MCDHT3520E | |
| | Frame symbol | | C-frame | |
| Power supply capacity | | (kVA) | 1.3 | |
| Rated output | | (W) | 750 | |
| Rated torque | | (N·m) | 2.4 | |
| Momentary Max. peak torque | | (N·m) | 7.1 | |
| Rated current | | (A(rms)) | 4.0 | |
| Max. current | | (A(o-p)) | 17.0 | |
| Regenerative brake frequency (times/min) Note)1 | Without option | | No limit Note)2 | |
| | DV0P4283 | | No limit Note)2 | |
| Rated rotational speed | | (r/min) | 3000 | |
| Max. rotational speed | | (r/min) | 4500 | |
| Moment of inertia of rotor ($\times10^{-4}$kg·m$^2$) | Without brake | | 1.51 | |
| | With brake | | 1.61 | |
| Recommended moment of inertia ratio of the load and the rotor Note)3 | | | 10 times or less | |
| Rotary encoder specifications Note)5 | | | 20-bit Incremental | 17-bit Absolute |
| | Resolution per single turn | | 1,048,576 | 131,072 |

**• Brake specifications** (For details, refer to P.105)

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

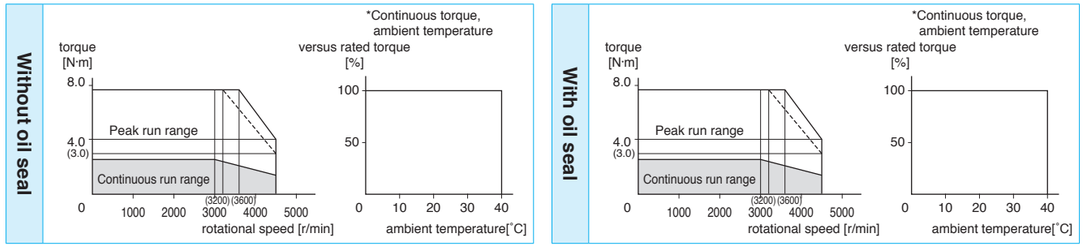
| | |
|---|---|
| Static friction torque (N·m) | 2.45 or more |
| Engaging time (ms) | 70 or less |
| Releasing time (ms) Note)4 | 20 or less |
| Exciting current (DC) (A) | 0.42 |
| Releasing voltage (DC) (V) | 1 or more |
| Exciting voltage (DC) (V) | 24±1.2 |

**• Permissible load** (For details, refer to P.104)

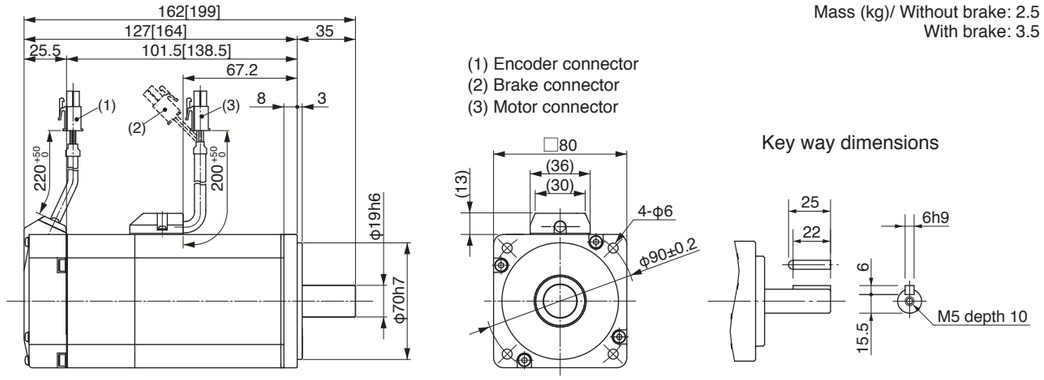
| | | |
|---|---|---|
| During assembly | Radial load P-direction (N) | 686 |
| | Thrust load A-direction (N) | 294 |
| | Thrust load B-direction (N) | 392 |
| During operation | Radial load P-direction (N) | 392 |
| | Thrust load A, B-direction (N) | 147 |

• For details of Note 1 to Note 5, refer to P.104.
• Dimensions of Driver, refer to P.31.
*1 Rotaly encoder specifications: □
*2 The product that the end of driver model designation has “E” is “positioning type”.
Detail of model designation, refer to P.11.

## Torque characteristics (at AC200V of power voltage <Dotted line represents the torque at 10% less supply voltage.>)




## Dimensions




Mass (kg)/ Without brake: 2.5
With brake: 3.5

* Figures in [ ] represent the dimensions of with brake.

**<Cautions>** Reduce the moment of inertia ratio if high speed response operation is required.
Dimensions are subject to change without notice. Contact us or a dealer for the latest information.
Read the Instruction Manual carefully and understand all precautions and remarks before using the products.



MEMO

# Motor Specifications 400V MSME 1.0kW [Low inertia, Middle capacity]

## Specifications

| | | | AC400V | |
|---|---|---|---|---|
| Motor model *1 | | MSME | 104G1□ | 104S1□ |
| Applicable driver *2 | Model No. | A5 series | MDDHT3420 | |
| | | A5E series | MDDHT3420E | |
| | Frame symbol | | D-frame | |
| Power supply capacity | | (kVA) | 1.8 | |
| Rated output | | (W) | 1.0 | |
| Rated torque | | (N·m) | 3.18 | |
| Momentary Max. peak torque | | (N·m) | 9.55 | |
| Rated current | | (A(rms)) | 3.3 | |
| Max. current | | (A(o-p)) | 14 | |
| Regenerative brake frequency (times/min) Note)1 | Without option | | No limit Note)2 | |
| | DV0PM20048 | | No limit Note)2 | |
| Rated rotational speed | | (r/min) | 3000 | |
| Max. rotational speed | | (r/min) | 5000 | |
| Moment of inertia of rotor ($\times10^{-4}$kg·m$^2$) | Without brake | | 2.03 | |
| | With brake | | 2.35 | |
| Recommended moment of inertia ratio of the load and the rotor Note)3 | | | 0 times or less | |
| Rotary encoder specifications Note)5 | | | 20-bit Incremental | 17-bit Absolute |
| | Resolution per single turn | | 1,048,576 | 131,072 |

**• Brake specifications** (For details, refer to P.105)
(This brake will be released when it is energized.
Do not use this for braking the motor in motion.)

| | |
|---|---|
| Static friction torque (N·m) | 7.8 or more |
| Engaging time (ms) | 50 or less |
| Releasing time (ms) Note)4 | 15 or less |
| Exciting current (DC) (A) | 0.81±10% |
| Releasing voltage (DC) (V) | 2 or more |
| Exciting voltage (DC) (V) | 24±2.4 |

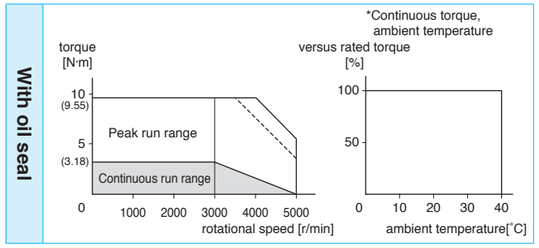
**• Permissible load** (For details, refer to P.104)

| | | |
|---|---|---|
| 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, B-direction (N) | 196 |

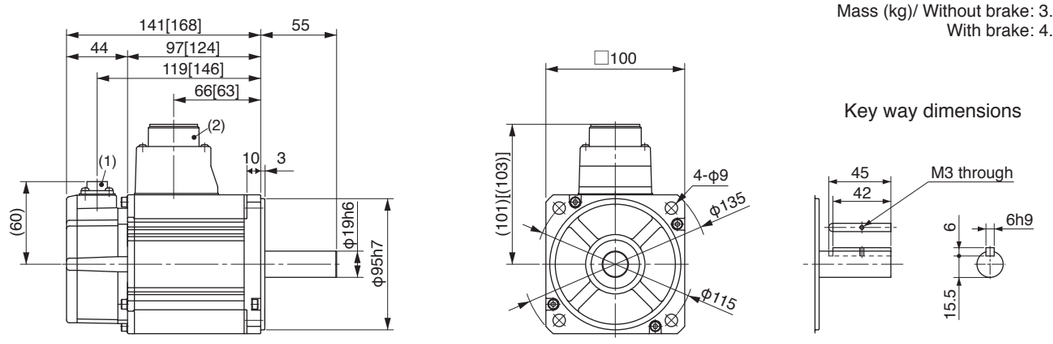
• For details of Note 1 to Note 5, refer to P.104.
• Dimensions of Driver, refer to P.32.
*1 Rotaly encoder specifications: □
*2 The product that the end of driver model designation has "E" is "positioning type".
Detail of model designation, refer to P.11.

## Torque characteristics (at AC400V of power voltage <Dotted line represents the torque at 10% less supply voltage.>)

With oil seal




## Dimensions




Mass (kg)/ Without brake: 3.5
With brake: 4.5

(1) Encoder connector
(2) Motor/Brake connector

* Figures in [ ] represent the dimensions of with brake.

**<Cautions>** Reduce the moment of inertia ratio if high speed response operation is required.
Dimensions are subject to change without notice. Contact us or a dealer for the latest information.
Read the Instruction Manual carefully and understand all precautions and remarks before using the products.



# Motor Specifications 400V MSME 1.5kW [Low inertia, Middle capacity]

## Specifications

| | | | AC400V | |
|---|---|---|---|---|
| Motor model *1 | | MSME | 154G1□ | 154S1□ |
| Applicable driver *2 | Model No. | A5 series | MDDHT3420 | |
| | | A5E series | MDDHT3420E | |
| | Frame symbol | | D-frame | |
| Power supply capacity | | (kVA) | 2.3 | |
| Rated output | | (W) | 1.5 | |
| Rated torque | | (N·m) | 4.77 | |
| Momentary Max. peak torque | | (N·m) | 14.3 | |
| Rated current | | (A(rms)) | 4.2 | |
| Max. current | | (A(o-p)) | 18 | |
| Regenerative brake frequency (times/min) Note)1 | Without option | | No limit Note)2 | |
| | DV0PM20048 | | No limit Note)2 | |
| Rated rotational speed | | (r/min) | 3000 | |
| Max. rotational speed | | (r/min) | 5000 | |
| Moment of inertia of rotor ($\times10^{-4}$kg·m$^2$) | Without brake | | 2.84 | |
| | With brake | | 3.17 | |
| Recommended moment of inertia ratio of the load and the rotor Note)3 | | | 0 times or less | |
| Rotary encoder specifications Note)5 | | | 20-bit Incremental | 17-bit Absolute |
| | Resolution per single turn | | 1,048,576 | 131,072 |

**• Brake specifications** (For details, refer to P.105)
(This brake will be released when it is energized.
Do not use this for braking the motor in motion.)

| | |
|---|---|
| Static friction torque (N·m) | 7.8 or more |
| Engaging time (ms) | 50 or less |
| Releasing time (ms) Note)4 | 15 or less |
| Exciting current (DC) (A) | 0.81±10% |
| Releasing voltage (DC) (V) | 2 or more |
| Exciting voltage (DC) (V) | 24±2.4 |

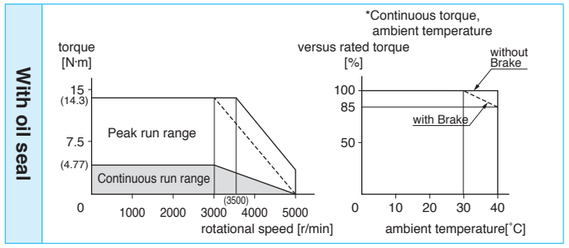
**• Permissible load** (For details, refer to P.104)

| | | |
|---|---|---|
| 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, B-direction (N) | 196 |

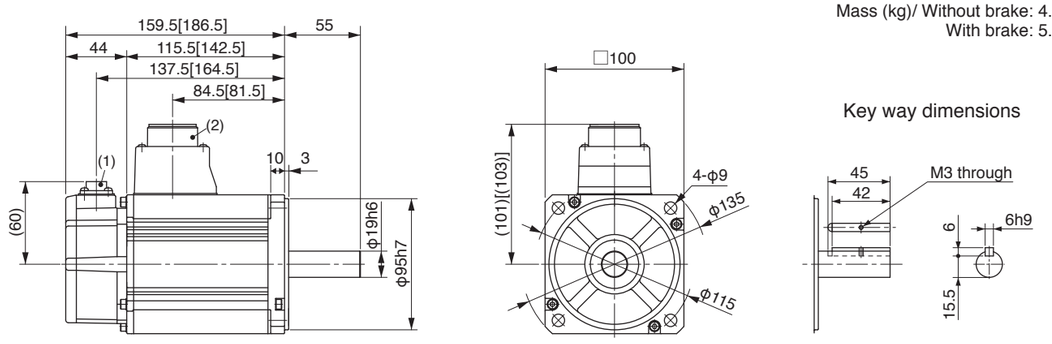
• For details of Note 1 to Note 5, refer to P.104.
• Dimensions of Driver, refer to P.32.
*1 Rotaly encoder specifications: □
*2 The product that the end of driver model designation has "E" is "positioning type".
Detail of model designation, refer to P.11.

## Torque characteristics (at AC400V of power voltage <Dotted line represents the torque at 10% less supply voltage.>)

With oil seal




## Dimensions




Mass (kg)/ Without brake: 4.4
With brake: 5.4

(1) Encoder connector
(2) Motor/Brake connector

* Figures in [ ] represent the dimensions of with brake.

**<Cautions>** Reduce the moment of inertia ratio if high speed response operation is required.
Dimensions are subject to change without notice. Contact us or a dealer for the latest information.
Read the Instruction Manual carefully and understand all precautions and remarks before using the products.

# Motor Specifications 400V MSME 2.0kW [Low inertia, Middle capacity]

## Specifications

| | | | AC400V | |
|---|---|---|---|---|
| Motor model *1 | | MSME | 204G1□ | 204S1□ |
| Applicable driver *2 | Model No. | A5 series | MEDHT4430 | |
| | | A5E series | MEDHT4430E | |
| | Frame symbol | | E-frame | |
| Power supply capacity (kVA) | | | 3.3 | |
| Rated output (W) | | | 2.0 | |
| Rated torque (N·m) | | | 6.37 | |
| Momentary Max. peak torque (N·m) | | | 19.1 | |
| Rated current (A(rms)) | | | 5.7 | |
| Max. current (A(o-p)) | | | 24 | |
| Regenerative brake frequency (times/min) Note)1 | Without option | | No limit Note)2 | |
| | DV0PM20049 | | No limit Note)2 | |
| Rated rotational speed (r/min) | | | 3000 | |
| Max. rotational speed (r/min) | | | 5000 | |
| Moment of inertia of rotor ($\times10^{-4}$kg·m$^2$) | Without brake | | 3.68 | |
| | With brake | | 4.01 | |
| Recommended moment of inertia ratio of the load and the rotor Note)3 | | | 0 times or less | |
| Rotary encoder specifications Note)5 | | | 20-bit Incremental | 17-bit Absolute |
| | Resolution per single turn | | 1,048,576 | 131,072 |

**• Brake specifications** (For details, refer to P.105)

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

| | |
|---|---|
| Static friction torque (N·m) | 7.8 or more |
| Engaging time (ms) | 50 or less |
| Releasing time (ms) Note)4 | 15 or less |
| Exciting current (DC) (A) | 0.81±10% |
| Releasing voltage (DC) (V) | 2 or more |
| Exciting voltage (DC) (V) | 24±2.4 |

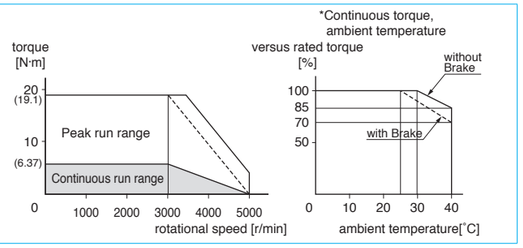
**• Permissible load** (For details, refer to P.104)

| | | |
|---|---|---|
| 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, B-direction (N) | 196 |

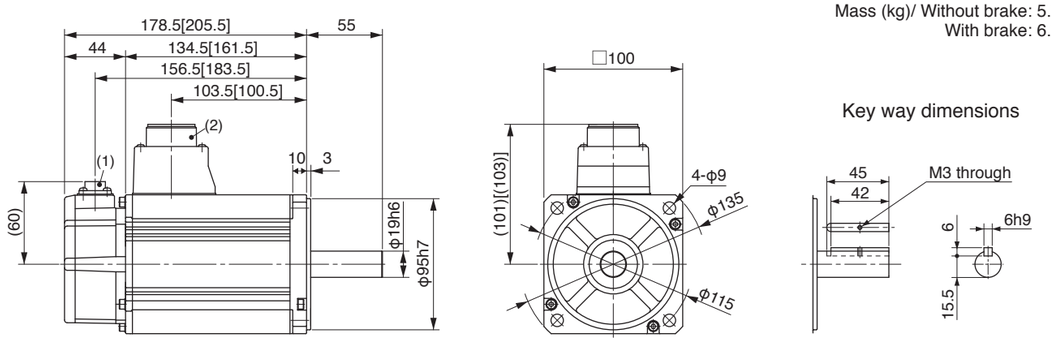
• For details of Note 1 to Note 5, refer to P.104.
• Dimensions of Driver, refer to P.33.
*1 Rotaly encoder specifications: □
*2 The product that the end of driver model designation has "E" is "positioning type".
Detail of model designation, refer to P.11.

## Torque characteristics (at AC400V of power voltage <Dotted line represents the torque at 10% less supply voltage.>)

With oil seal




## Dimensions




Mass (kg)/ Without brake: 5.3
With brake: 6.3

(1) Encoder connector
(2) Motor/Brake connector

* Figures in [ ] represent the dimensions of with brake.

**<Cautions>** Reduce the moment of inertia ratio if high speed response operation is required.
Dimensions are subject to change without notice. Contact us or a dealer for the latest information.
Read the Instruction Manual carefully and understand all precautions and remarks before using the products.



# Motor Specifications 400V MSME 3.0kW [Low inertia, Middle capacity]

## Specifications

| | | | AC400V | |
|---|---|---|---|---|
| Motor model *1 | | MSME | 304G1□ | 304S1□ |
| Applicable driver *2 | Model No. | A5 series | MFDHT5440 | |
| | | A5E series | MFDHT5440E | |
| | Frame symbol | | F-frame | |
| Power supply capacity (kVA) | | | 4.5 | |
| Rated output (kW) | | | 3.0 | |
| Rated torque (N·m) | | | 9.55 | |
| Momentary Max. peak torque (N·m) | | | 28.6 | |
| Rated current (A(rms)) | | | 9.2 | |
| Max. current (A(o-p)) | | | 39 | |
| Regenerative brake frequency (times/min) Note)1 | Without option | | No limit Note)2 | |
| | DV0PM20049×2 | | No limit Note)2 | |
| Rated rotational speed (r/min) | | | 3000 | |
| Max. rotational speed (r/min) | | | 5000 | |
| Moment of inertia of rotor ($\times10^{-4}$kg·m$^2$) | Without brake | | 6.50 | |
| | With brake | | 7.85 | |
| Recommended moment of inertia ratio of the load and the rotor Note)3 | | | 0 times or less | |
| Rotary encoder specifications Note)5 | | | 20-bit Incremental | 17-bit Absolute |
| | Resolution per single turn | | 1,048,576 | 131,072 |

**• Brake specifications** (For details, refer to P.105)

(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 or more |
| Engaging time (ms) | 80 or less |
| Releasing time (ms) Note)4 | 15 or less |
| Exciting current (DC) (A) | 0.81±10% |
| Releasing voltage (DC) (V) | 2 or more |
| Exciting voltage (DC) (V) | 24±2.4 |

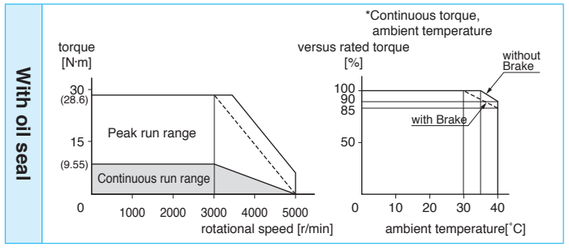
**• Permissible load** (For details, refer to P.104)

| | | |
|---|---|---|
| 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, B-direction (N) | 196 |

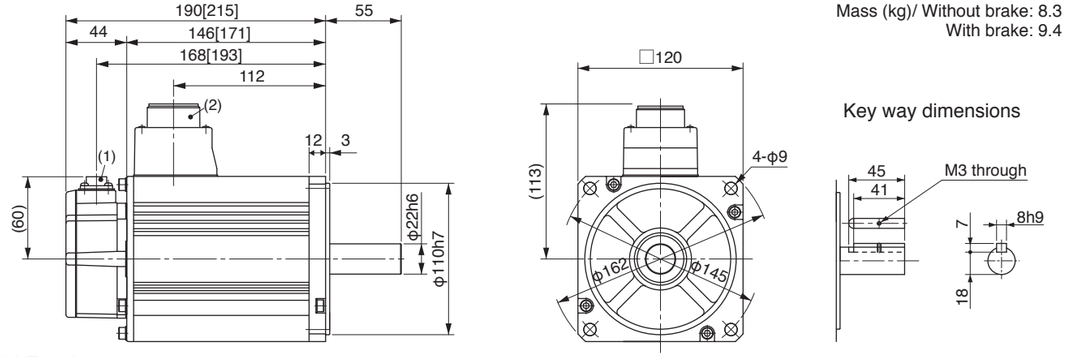
• For details of Note 1 to Note 5, refer to P.104.
• Dimensions of Driver, refer to P.34.
*1 Rotaly encoder specifications: □
*2 The product that the end of driver model designation has "E" is "positioning type".
Detail of model designation, refer to P.11.

## Torque characteristics (at AC400V of power voltage <Dotted line represents the torque at 10% less supply voltage.>)

With oil seal




## Dimensions




Mass (kg)/ Without brake: 8.3
With brake: 9.4

(1) Encoder connector
(2) Motor/Brake connector

* Figures in [ ] represent the dimensions of with brake.

**<Cautions>** Reduce the moment of inertia ratio if high speed response operation is required.
Dimensions are subject to change without notice. Contact us or a dealer for the latest information.
Read the Instruction Manual carefully and understand all precautions and remarks before using the products.

# Motor Specifications 400V MSME 4.0kW [Low inertia, Middle capacity]

## Specifications

| | | | AC400V | |
|---|---|---|---|---|
| Motor model *1 | | MSME | 404G1□ | 404S1□ |
| Applicable driver *2 | Model No. | A5 series | MFDHTA464 | |
| | | A5E series | MFDHTA464E | |
| | Frame symbol | | F-frame | |
| Power supply capacity | | (kVA) | 6.8 | |
| Rated output | | (kW) | 4.0 | |
| Rated torque | | (N·m) | 12.7 | |
| Momentary Max. peak torque | | (N·m) | 38.2 | |
| Rated current | | (A(rms)) | 9.9 | |
| Max. current | | (A(o-p)) | 42 | |
| Regenerative brake frequency (times/min) Note)1 | Without option | | No limit Note)2 | |
| | DV0PM20049×2 | | No limit Note)2 | |
| Rated rotational speed | | (r/min) | 3000 | |
| Max. rotational speed | | (r/min) | 4500 | |
| Moment of inertia of rotor ($\times10^{-4}$kg·m$^2$) | Without brake | | 12.9 | |
| | With brake | | 14.2 | |
| Recommended moment of inertia ratio of the load and the rotor Note)3 | | | 0 times or less | |
| Rotary encoder specifications Note)5 | | | 20-bit Incremental | 17-bit Absolute |
| | Resolution per single turn | | 1,048,576 | 131,072 |

**• Brake specifications** (For details, refer to P.105)
(This brake will be released when it is energized.
Do not use this for braking the motor in motion.)

| | |
|---|---|
| Static friction torque (N·m) | 16.1 or more |
| Engaging time (ms) | 110 or less |
| Releasing time (ms) Note)4 | 50 or less |
| Exciting current (DC) (A) | 0.90±10% |
| Releasing voltage (DC) (V) | 2 or more |
| Exciting voltage (DC) (V) | 24±2.4 |

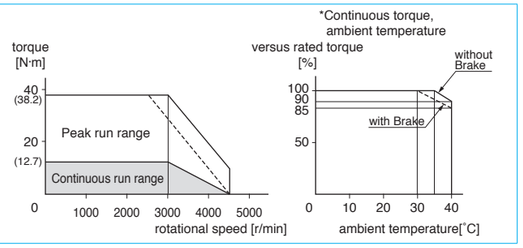
**• Permissible load** (For details, refer to P.104)

| | | |
|---|---|---|
| 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) | 784 |
| | Thrust load A, B-direction (N) | 343 |

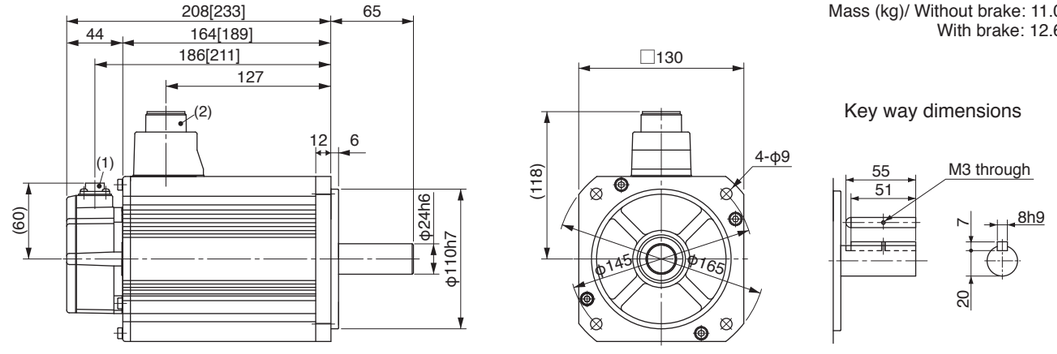
• For details of Note 1 to Note 5, refer to P.104.
• Dimensions of Driver, refer to P.34.
*1 Rotaly encoder specifications: □
*2 The product that the end of driver model designation has "E" is "positioning type".
Detail of model designation, refer to P.11.

## Torque characteristics (at AC400V of power voltage <Dotted line represents the torque at 10% less supply voltage.>)

With oil seal




## Dimensions




Mass (kg)/ Without brake: 11.0
With brake: 12.6

(1) Encoder connector
(2) Motor/Brake connector

* Figures in [ ] represent the dimensions of with brake.

**<Cautions>** Reduce the moment of inertia ratio if high speed response operation is required.
Dimensions are subject to change without notice. Contact us or a dealer for the latest information.
Read the Instruction Manual carefully and understand all precautions and remarks before using the products.



# Motor Specifications 400V MSME 5.0kW [Low inertia, Middle capacity]

## Specifications

| | | | AC400V | |
|---|---|---|---|---|
| Motor model *1 | | MSME | 504G1□ | 504S1□ |
| Applicable driver *2 | Model No. | A5 series | MFDHTA464 | |
| | | A5E series | MFDHTA464E | |
| | Frame symbol | | F-frame | |
| Power supply capacity | | (kVA) | 7.5 | |
| Rated output | | (kW) | 5.0 | |
| Rated torque | | (N·m) | 15.9 | |
| Momentary Max. peak torque | | (N·m) | 47.7 | |
| Rated current | | (A(rms)) | 12.0 | |
| Max. current | | (A(o-p)) | 51 | |
| Regenerative brake frequency (times/min) Note)1 | Without option | | 357 | |
| | DV0PM20049×2 | | No limit Note)2 | |
| Rated rotational speed | | (r/min) | 3000 | |
| Max. rotational speed | | (r/min) | 4500 | |
| Moment of inertia of rotor ($\times10^{-4}$kg·m$^2$) | Without brake | | 17.4 | |
| | With brake | | 18.6 | |
| Recommended moment of inertia ratio of the load and the rotor Note)3 | | | 0 times or less | |
| Rotary encoder specifications Note)5 | | | 20-bit Incremental | 17-bit Absolute |
| | Resolution per single turn | | 1,048,576 | 131,072 |

**• Brake specifications** (For details, refer to P.105)
(This brake will be released when it is energized.
Do not use this for braking the motor in motion.)

| | |
|---|---|
| Static friction torque (N·m) | 16.1 or more |
| Engaging time (ms) | 110 or less |
| Releasing time (ms) Note)4 | 50 or less |
| Exciting current (DC) (A) | 0.90±10% |
| Releasing voltage (DC) (V) | 2 or more |
| Exciting voltage (DC) (V) | 24±2.4 |

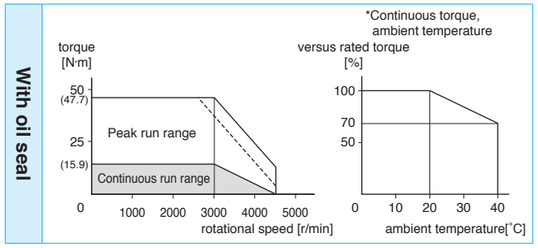
**• Permissible load** (For details, refer to P.104)

| | | |
|---|---|---|
| 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) | 784 |
| | Thrust load A, B-direction (N) | 343 |

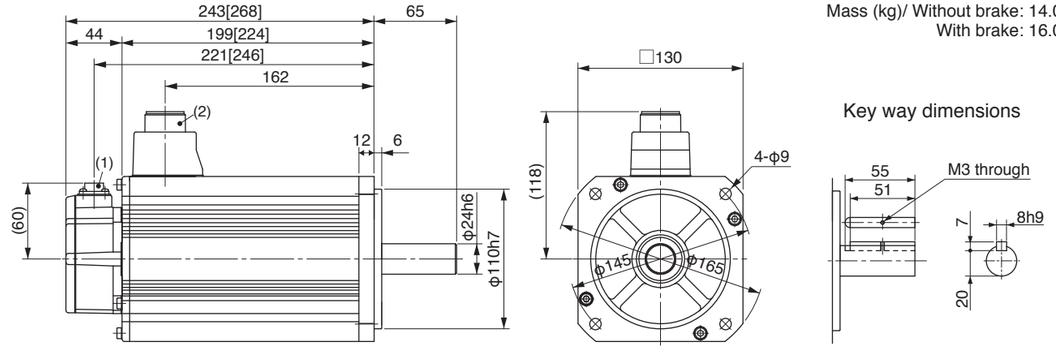
• For details of Note 1 to Note 5, refer to P.104.
• Dimensions of Driver, refer to P.34.
*1 Rotaly encoder specifications: □
*2 The product that the end of driver model designation has "E" is "positioning type".
Detail of model designation, refer to P.11.

## Torque characteristics (at AC400V of power voltage <Dotted line represents the torque at 10% less supply voltage.>)

With oil seal




## Dimensions




Mass (kg)/ Without brake: 14.0
With brake: 16.0

(1) Encoder connector
(2) Motor/Brake connector

* Figures in [ ] represent the dimensions of with brake.

**<Cautions>** Reduce the moment of inertia ratio if high speed response operation is required.
Dimensions are subject to change without notice. Contact us or a dealer for the latest information.
Read the Instruction Manual carefully and understand all precautions and remarks before using the products.

# Motor Specifications 400V MDME 1.0kW [Middle inertia, Middle capacity]

## Specifications

| | | | AC400V | |
|---|---|---|---|---|
| Motor model *1 | | MDME | 104G1□ | 104S1□ |
| Applicable driver *2 | Model No. | A5 series | MDDHT2412 | |
| | | A5E series | MDDHT2412E | |
| | Frame symbol | | D-frame | |
| Power supply capacity | | (kVA) | 1.8 | |
| Rated output | | (W) | 1.0 | |
| Rated torque | | (N·m) | 4.77 | |
| Momentary Max. peak torque | | (N·m) | 14.3 | |
| Rated current | | (A(rms)) | 2.8 | |
| Max. current | | (A(o-p)) | 12 | |
| Regenerative brake frequency (times/min) Note)1 | Without option | | No limit Note)2 | |
| | DV0PM20048 | | No limit Note)2 | |
| Rated rotational speed | | (r/min) | 2000 | |
| Max. rotational speed | | (r/min) | 3000 | |
| Moment of inertia of rotor ($\times10^{-4}$kg·m$^2$) | Without brake | | 4.60 | |
| | With brake | | 5.90 | |
| Recommended moment of inertia ratio of the load and the rotor Note)3 | | | 0 times or less | |
| Rotary encoder specifications Note)5 | | | 20-bit Incremental | 17-bit Absolute |
| | Resolution per single turn | | 1,048,576 | 131,072 |

**• Brake specifications** (For details, refer to P.105)

(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 or more |
| Engaging time (ms) | 80 or less |
| Releasing time (ms) Note)4 | 70 or less |
| Exciting current (DC) (A) | 0.59±10% |
| Releasing voltage (DC) (V) | 2 or more |
| Exciting voltage (DC) (V) | 24±2.4 |

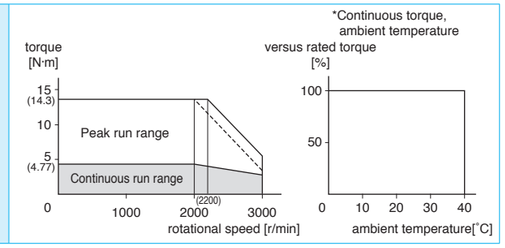
**• Permissible load** (For details, refer to P.104)

| | | |
|---|---|---|
| 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, B-direction (N) | 196 |

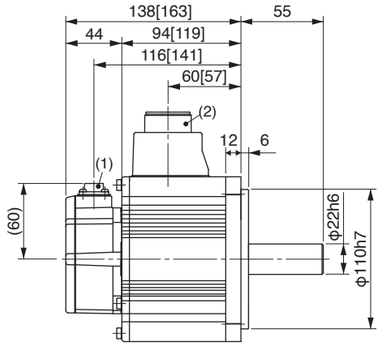
• For details of Note 1 to Note 5, refer to P.104.
• Dimensions of Driver, refer to P.32.
*1 Rotaly encoder specifications: □
*2 The product that the end of driver model designation has "E" is "positioning type".
Detail of model designation, refer to P.11.

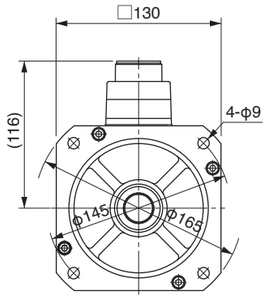
## Torque characteristics (at AC400V of power voltage <Dotted line represents the torque at 10% less supply voltage.>)

With oil seal



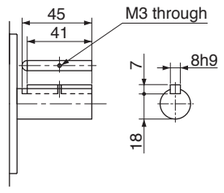

## Dimensions




Mass (kg)/ Without brake: 5.2
With brake: 6.7

Key way dimensions




(1) Encoder connector
(2) Motor/Brake connector

* Figures in [ ] represent the dimensions of with brake.

**<Cautions>** Reduce the moment of inertia ratio if high speed response operation is required.
Dimensions are subject to change without notice. Contact us or a dealer for the latest information.
Read the Instruction Manual carefully and understand all precautions and remarks before using the products.



# Motor Specifications 400V MDME 1.5kW [Middle inertia, Middle capacity]

## Specifications

| | | | AC400V | |
|---|---|---|---|---|
| Motor model *1 | | MDME | 154G1□ | 154S1□ |
| Applicable driver *2 | Model No. | A5 series | MDDHT3420 | |
| | | A5E series | MDDHT3420E | |
| | Frame symbol | | D-frame | |
| Power supply capacity | | (kVA) | 2.3 | |
| Rated output | | (W) | 1.5 | |
| Rated torque | | (N·m) | 7.16 | |
| Momentary Max. peak torque | | (N·m) | 21.5 | |
| Rated current | | (A(rms)) | 4.7 | |
| Max. current | | (A(o-p)) | 20 | |
| Regenerative brake frequency (times/min) Note)1 | Without option | | No limit Note)2 | |
| | DV0PM20048 | | No limit Note)2 | |
| Rated rotational speed | | (r/min) | 2000 | |
| Max. rotational speed | | (r/min) | 3000 | |
| Moment of inertia of rotor ($\times10^{-4}$kg·m$^2$) | Without brake | | 6.70 | |
| | With brake | | 7.99 | |
| Recommended moment of inertia ratio of the load and the rotor Note)3 | | | 0 times or less | |
| Rotary encoder specifications Note)5 | | | 20-bit Incremental | 17-bit Absolute |
| | Resolution per single turn | | 1,048,576 | 131,072 |

**• Brake specifications** (For details, refer to P.105)

(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 or more |
| Engaging time (ms) | 100 or less |
| Releasing time (ms) Note)4 | 50 or less |
| Exciting current (DC) (A) | 0.79±10% |
| Releasing voltage (DC) (V) | 2 or more |
| Exciting voltage (DC) (V) | 24±2.4 |

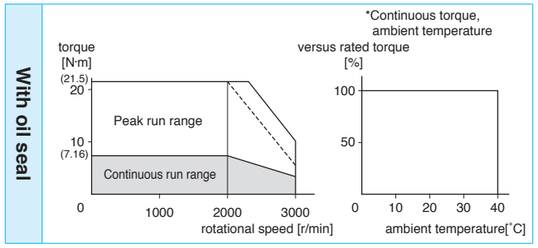
**• Permissible load** (For details, refer to P.104)

| | | |
|---|---|---|
| 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, B-direction (N) | 196 |

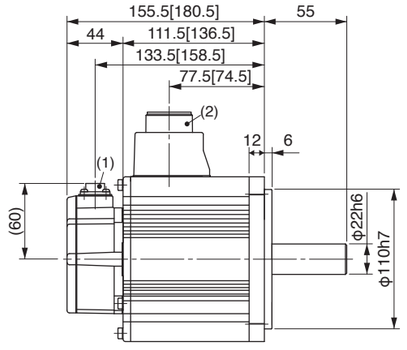
• For details of Note 1 to Note 5, refer to P.104.
• Dimensions of Driver, refer to P.32.
*1 Rotaly encoder specifications: □
*2 The product that the end of driver model designation has "E" is "positioning type".
Detail of model designation, refer to P.11.

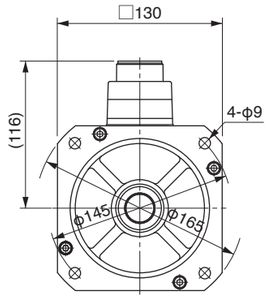
## Torque characteristics (at AC400V of power voltage <Dotted line represents the torque at 10% less supply voltage.>)

With oil seal



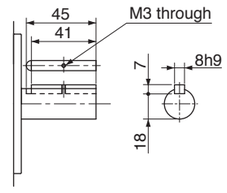

## Dimensions




Mass (kg)/ Without brake: 6.7
With brake: 8.2

Key way dimensions




(1) Encoder connector
(2) Motor/Brake connector

* Figures in [ ] represent the dimensions of with brake.

**<Cautions>** Reduce the moment of inertia ratio if high speed response operation is required.
Dimensions are subject to change without notice. Contact us or a dealer for the latest information.
Read the Instruction Manual carefully and understand all precautions and remarks before using the products.

# Motor Specifications 400V MDME 2.0kW [Middle inertia, Middle capacity]

## Specifications

| | | | AC400V | |
|---|---|---|---|---|
| Motor model *1 | | MDME | 204G1□ | 204S1□ |
| Applicable driver *2 | Model No. | A5 series | MEDHT4430 | |
| | | A5E series | MEDHT4430E | |
| | Frame symbol | | E-frame | |
| Power supply capacity | | (kVA) | 3.3 | |
| Rated output | | (W) | 2.0 | |
| Rated torque | | (N·m) | 9.55 | |
| Momentary Max. peak torque | | (N·m) | 28.6 | |
| Rated current | | (A(rms)) | 5.9 | |
| Max. current | | (A(o-p)) | 25 | |
| Regenerative brake frequency (times/min) Note)1 | Without option | | No limit Note)2 | |
| | DV0PM20049 | | No limit Note)2 | |
| Rated rotational speed | | (r/min) | 2000 | |
| Max. rotational speed | | (r/min) | 3000 | |
| Moment of inertia of rotor ($\times10^{-4}$kg·m$^2$) | Without brake | | 8.72 | |
| | With brake | | 10.0 | |
| Recommended moment of inertia ratio of the load and the rotor Note)3 | | | 0 times or less | |
| Rotary encoder specifications Note)5 | | | 20-bit Incremental | 17-bit Absolute |
| | Resolution per single turn | | 1,048,576 | 131,072 |

**• Brake specifications** (For details, refer to P.105)
(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 or more |
| Engaging time (ms) | 100 or less |
| Releasing time (ms) Note)4 | 50 or less |
| Exciting current (DC) (A) | 0.79±10% |
| Releasing voltage (DC) (V) | 2 or more |
| Exciting voltage (DC) (V) | 24±2.4 |

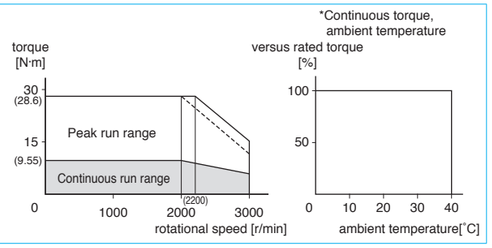
**• Permissible load** (For details, refer to P.104)

| | | |
|---|---|---|
| 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, B-direction (N) | 196 |

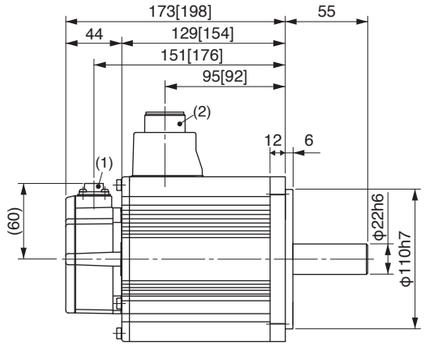
• For details of Note 1 to Note 5, refer to P.104.
• Dimensions of Driver, refer to P.33.
*1 Rotaly encoder specifications: □
*2 The product that the end of driver model designation has "E" is "positioning type".
Detail of model designation, refer to P.11.

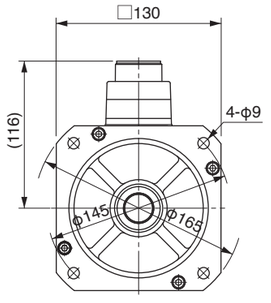
## Torque characteristics (at AC400V of power voltage <Dotted line represents the torque at 10% less supply voltage.>)

With oil seal



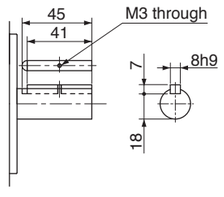

## Dimensions




Mass (kg)/ Without brake: 8.0
With brake: 9.5

Key way dimensions




(1) Encoder connector
(2) Motor/Brake connector

* Figures in [ ] represent the dimensions of with brake.

**<Cautions>** Reduce the moment of inertia ratio if high speed response operation is required.
Dimensions are subject to change without notice. Contact us or a dealer for the latest information.
Read the Instruction Manual carefully and understand all precautions and remarks before using the products.



# Motor Specifications 400V MDME 3.0kW [Middle inertia, Middle capacity]

## Specifications

| | | | AC400V | |
|---|---|---|---|---|
| Motor model *1 | | MDME | 304G1□ | 304S1□ |
| Applicable driver *2 | Model No. | A5 series | MFDHT5440 | |
| | | A5E series | MFDHT5440E | |
| | Frame symbol | | F-frame | |
| Power supply capacity | | (kVA) | 4.5 | |
| Rated output | | (W) | 3.0 | |
| Rated torque | | (N·m) | 14.3 | |
| Momentary Max. peak torque | | (N·m) | 43.0 | |
| Rated current | | (A(rms)) | 8.7 | |
| Max. current | | (A(o-p)) | 37 | |
| Regenerative brake frequency (times/min) Note)1 | Without option | | No limit Note)2 | |
| | DV0PM20049×2 | | No limit Note)2 | |
| Rated rotational speed | | (r/min) | 2000 | |
| Max. rotational speed | | (r/min) | 3000 | |
| Moment of inertia of rotor ($\times10^{-4}$kg·m$^2$) | Without brake | | 12.9 | |
| | With brake | | 14.2 | |
| Recommended moment of inertia ratio of the load and the rotor Note)3 | | | 0 times or less | |
| Rotary encoder specifications Note)5 | | | 20-bit Incremental | 17-bit Absolute |
| | Resolution per single turn | | 1,048,576 | 131,072 |

**• Brake specifications** (For details, refer to P.105)
(This brake will be released when it is energized.
Do not use this for braking the motor in motion.)

| | |
|---|---|
| Static friction torque (N·m) | 16.2 or more |
| Engaging time (ms) | 110 or less |
| Releasing time (ms) Note)4 | 50 or less |
| Exciting current (DC) (A) | 0.90±10% |
| Releasing voltage (DC) (V) | 2 or more |
| Exciting voltage (DC) (V) | 24±2.4 |

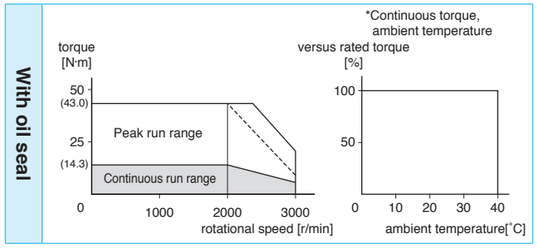
**• Permissible load** (For details, refer to P.104)

| | | |
|---|---|---|
| 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) | 784 |
| | Thrust load A, B-direction (N) | 343 |

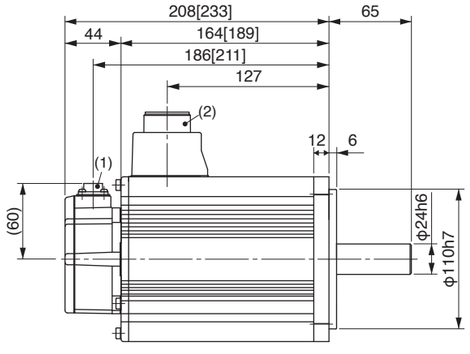
• For details of Note 1 to Note 5, refer to P.104.
• Dimensions of Driver, refer to P.34.
*1 Rotaly encoder specifications: □
*2 The product that the end of driver model designation has "E" is "positioning type".
Detail of model designation, refer to P.11.

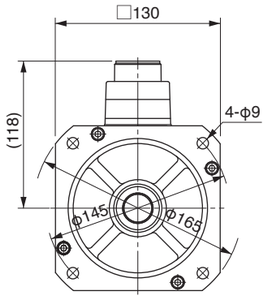
## Torque characteristics (at AC400V of power voltage <Dotted line represents the torque at 10% less supply voltage.>)

With oil seal



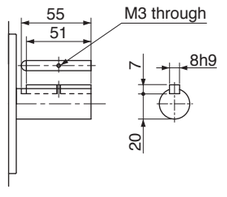

## Dimensions




Mass (kg)/ Without brake: 11.0
With brake: 12.6

Key way dimensions




(1) Encoder connector
(2) Motor/Brake connector

* Figures in [ ] represent the dimensions of with brake.

**<Cautions>** Reduce the moment of inertia ratio if high speed response operation is required.
Dimensions are subject to change without notice. Contact us or a dealer for the latest information.
Read the Instruction Manual carefully and understand all precautions and remarks before using the products.

# Motor Specifications 400V MDME 4.0kW [Middle inertia, Middle capacity]

## Specifications

| | | | AC400V | |
|---|---|---|---|---|
| Motor model *1 | | MDME | 404G1□ | 404S1□ |
| Applicable driver *2 | Model No. | A5 series | MFDHTA464 | |
| | | A5E series | MFDHTA464E | |
| | Frame symbol | | F-frame | |
| Power supply capacity | | (kVA) | 6.8 | |
| Rated output | | (W) | 4.0 | |
| Rated torque | | (N·m) | 19.1 | |
| Momentary Max. peak torque | | (N·m) | 57.3 | |
| Rated current | | (A(rms)) | 10.6 | |
| Max. current | | (A(o-p)) | 45 | |
| Regenerative brake frequency (times/min) Note)1 | Without option | | No limit Note)2 | |
| | DV0PM20049×2 | | No limit Note)2 | |
| Rated rotational speed | | (r/min) | 2000 | |
| Max. rotational speed | | (r/min) | 3000 | |
| Moment of inertia of rotor ($\times10^{-4}$kg·m$^2$) | Without brake | | 37.6 | |
| | With brake | | 38.6 | |
| Recommended moment of inertia ratio of the load and the rotor Note)3 | | | 0 times or less | |
| Rotary encoder specifications Note)5 | | | 20-bit Incremental | 17-bit Absolute |
| | Resolution per single turn | | 1,048,576 | 131,072 |

**• Brake specifications** (For details, refer to P.105)

(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 or more |
| Engaging time (ms) | 80 or less |
| Releasing time (ms) Note)4 | 25 or less |
| Exciting current (DC) (A) | 1.3±10% |
| Releasing voltage (DC) (V) | 2 or more |
| Exciting voltage (DC) (V) | 24±2.4 |

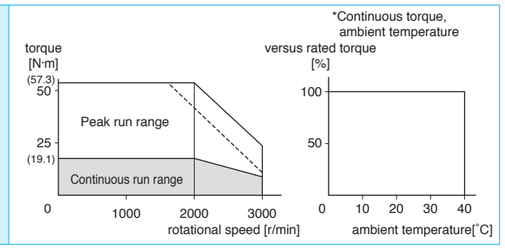
**• Permissible load** (For details, refer to P.104)

| | | |
|---|---|---|
| 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, B-direction (N) | 343 |

• For details of Note 1 to Note 5, refer to P.104.
• Dimensions of Driver, refer to P.34.
*1 Rotaly encoder specifications: □
*2 The product that the end of driver model designation has “E” is “positioning type”.
Detail of model designation, refer to P.11.

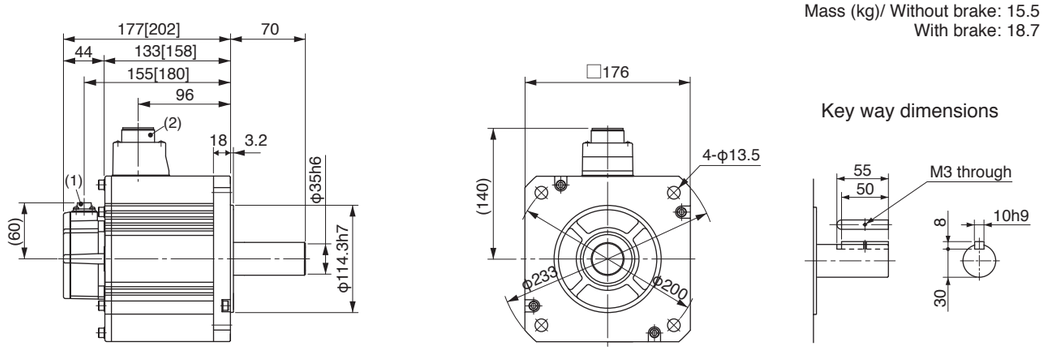
## Torque characteristics (at AC400V of power voltage <Dotted line represents the torque at 10% less supply voltage.>)

With oil seal




## Dimensions

Mass (kg)/ Without brake: 15.5
With brake: 18.7




(1) Encoder connector
(2) Motor/Brake connector

* Figures in [ ] represent the dimensions of with brake.

**<Cautions>** Reduce the moment of inertia ratio if high speed response operation is required.
Dimensions are subject to change without notice. Contact us or a dealer for the latest information.
Read the Instruction Manual carefully and understand all precautions and remarks before using the products.



# Motor Specifications 400V MDME 5.0kW [Middle inertia, Middle capacity]

## Specifications

| | | | AC400V | |
|---|---|---|---|---|
| Motor model *1 | | MDME | 504G1□ | 504S1□ |
| Applicable driver *2 | Model No. | A5 series | MFDHTA464 | |
| | | A5E series | MFDHTA464E | |
| | Frame symbol | | F-frame | |
| Power supply capacity | | (kVA) | 7.5 | |
| Rated output | | (W) | 5.0 | |
| Rated torque | | (N·m) | 23.9 | |
| Momentary Max. peak torque | | (N·m) | 71.6 | |
| Rated current | | (A(rms)) | 13.0 | |
| Max. current | | (A(o-p)) | 55 | |
| Regenerative brake frequency (times/min) Note)1 | Without option | | 120 | |
| | DV0PM20049×2 | | No limit Note)2 | |
| Rated rotational speed | | (r/min) | 2000 | |
| Max. rotational speed | | (r/min) | 3000 | |
| Moment of inertia of rotor ($\times10^{-4}$kg·m$^2$) | Without brake | | 48.0 | |
| | With brake | | 48.8 | |
| Recommended moment of inertia ratio of the load and the rotor Note)3 | | | 0 times or less | |
| Rotary encoder specifications Note)5 | | | 20-bit Incremental | 17-bit Absolute |
| | Resolution per single turn | | 1,048,576 | 131,072 |

**• Brake specifications** (For details, refer to P.105)

(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 or more |
| Engaging time (ms) | 80 or less |
| Releasing time (ms) Note)4 | 25 or less |
| Exciting current (DC) (A) | 1.3±10% |
| Releasing voltage (DC) (V) | 2 or more |
| Exciting voltage (DC) (V) | 24±2.4 |

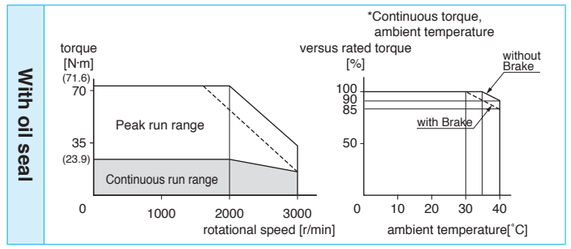
**• Permissible load** (For details, refer to P.104)

| | | |
|---|---|---|
| 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, B-direction (N) | 343 |

• For details of Note 1 to Note 5, refer to P.104.
• Dimensions of Driver, refer to P.34.
*1 Rotaly encoder specifications: □
*2 The product that the end of driver model designation has “E” is “positioning type”.
Detail of model designation, refer to P.11.

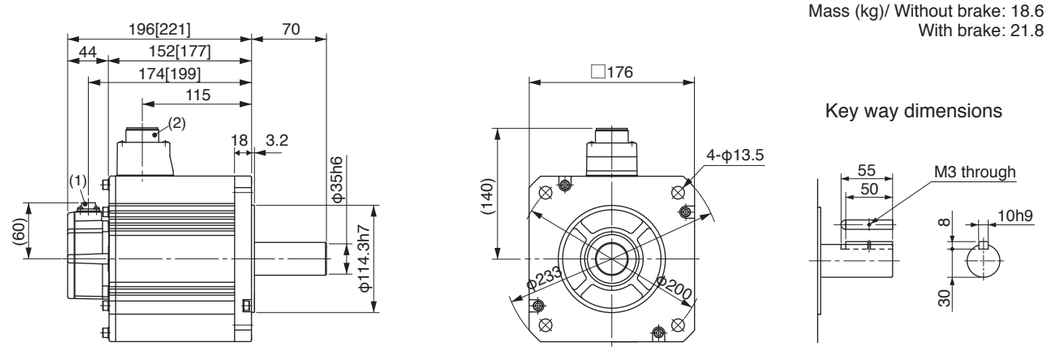
## Torque characteristics (at AC400V of power voltage <Dotted line represents the torque at 10% less supply voltage.>)

With oil seal




## Dimensions

Mass (kg)/ Without brake: 18.6
With brake: 21.8




(1) Encoder connector
(2) Motor/Brake connector

* Figures in [ ] represent the dimensions of with brake.

**<Cautions>** Reduce the moment of inertia ratio if high speed response operation is required.
Dimensions are subject to change without notice. Contact us or a dealer for the latest information.
Read the Instruction Manual carefully and understand all precautions and remarks before using the products.

# Motor Specifications 400V MGME 0.9kW [Middle inertia, Middle capacity]

## Specifications

| | | | AC400V | |
|---|---|---|---|---|
| Motor model *1 | | MGME | 094G1□ | 094S1□ |
| Applicable driver *2 | Model No. | A5 series | MDDHT3420 | |
| | | A5E series | MDDHT3420E | |
| | Frame symbol | | D-frame | |
| Power supply capacity (kVA) | | | 1.8 | |
| Rated output (W) | | | 0.9 | |
| Rated torque (N·m) | | | 8.59 | |
| Momentary Max. peak torque (N·m) | | | 19.3 | |
| Rated current (A(rms)) | | | 3.8 | |
| Max. current (A(o-p)) | | | 12 | |
| Regenerative brake frequency (times/min) Note)1 | Without option | | No limit Note)2 | |
| | DV0PM20048 | | No limit Note)2 | |
| Rated rotational speed (r/min) | | | 1000 | |
| Max. rotational speed (r/min) | | | 2000 | |
| Moment of inertia of rotor ($\times10^{-4}$kg·m$^2$) | Without brake | | 6.70 | |
| | With brake | | 7.99 | |
| Recommended moment of inertia ratio of the load and the rotor Note)3 | | | 0 times or less | |
| Rotary encoder specifications Note)5 | | | 20-bit Incremental | 17-bit Absolute |
| | Resolution per single turn | | 1,048,576 | 131,072 |

**• Brake specifications** (For details, refer to P.105)

(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 or more |
| Engaging time (ms) | 100 or less |
| Releasing time (ms) Note)4 | 50 or less |
| Exciting current (DC) (A) | 0.79±10% |
| Releasing voltage (DC) (V) | 2 or more |
| Exciting voltage (DC) (V) | 24±2.4 |

**• Permissible load** (For details, refer to P.104)

| | | |
|---|---|---|
| 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) | 686 |
| | Thrust load A, B-direction (N) | 196 |

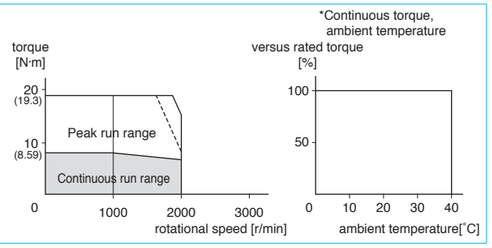
- For details of Note 1 to Note 5, refer to P.104.
- Dimensions of Driver, refer to P.32.

*1 Rotaly encoder specifications: □

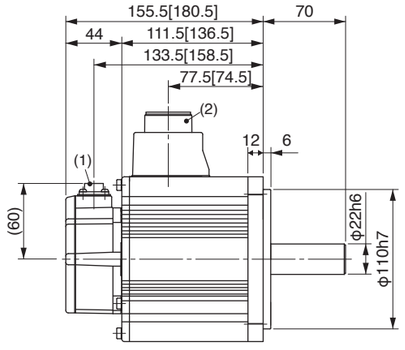
*2 The product that the end of driver model designation has "E" is "positioning type". Detail of model designation, refer to P.11.

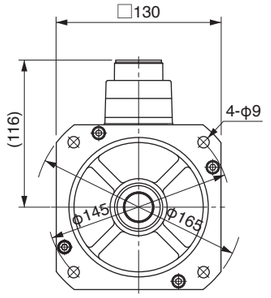
## Torque characteristics (at AC400V of power voltage <Dotted line represents the torque at 10% less supply voltage.>)

With oil seal



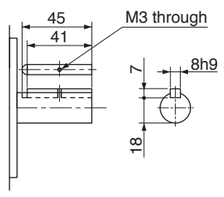

## Dimensions




Mass (kg)/ Without brake: 6.7
With brake: 8.2

Key way dimensions




(1) Encoder connector
(2) Motor/Brake connector

* Figures in [ ] represent the dimensions of with brake.

**<Cautions>** Reduce the moment of inertia ratio if high speed response operation is required.
Dimensions are subject to change without notice. Contact us or a dealer for the latest information.
Read the Instruction Manual carefully and understand all precautions and remarks before using the products.



# Motor Specifications 400V MGME 2.0kW [Middle inertia, Middle capacity]

## Specifications

| | | | AC400V | |
|---|---|---|---|---|
| Motor model *1 | | MGME | 204G1□ | 204S1□ |
| Applicable driver *2 | Model No. | A5 series | MFDHT5440 | |
| | | A5E series | MFDHT5440E | |
| | Frame symbol | | F-frame | |
| Power supply capacity (kVA) | | | 3.8 | |
| Rated output (W) | | | 2.0 | |
| Rated torque (N·m) | | | 19.1 | |
| Momentary Max. peak torque (N·m) | | | 47.7 | |
| Rated current (A(rms)) | | | 8.5 | |
| Max. current (A(o-p)) | | | 30 | |
| Regenerative brake frequency (times/min) Note)1 | Without option | | No limit Note)2 | |
| | DV0PM20049×2 | | No limit Note)2 | |
| Rated rotational speed (r/min) | | | 1000 | |
| Max. rotational speed (r/min) | | | 2000 | |
| Moment of inertia of rotor ($\times10^{-4}$kg·m$^2$) | Without brake | | 30.3 | |
| | With brake | | 31.4 | |
| Recommended moment of inertia ratio of the load and the rotor Note)3 | | | 0 times or less | |
| Rotary encoder specifications Note)5 | | | 20-bit Incremental | 17-bit Absolute |
| | Resolution per single turn | | 1,048,576 | 131,072 |

**• Brake specifications** (For details, refer to P.105)

(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 or more |
| Engaging time (ms) | 80 or less |
| Releasing time (ms) Note)4 | 25 or less |
| Exciting current (DC) (A) | 1.3±10% |
| Releasing voltage (DC) (V) | 2 or more |
| Exciting voltage (DC) (V) | 24±2.4 |

**• Permissible load** (For details, refer to P.104)

| | | |
|---|---|---|
| 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) | 1176 |
| | Thrust load A, B-direction (N) | 490 |

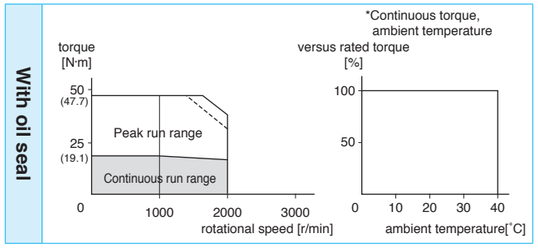
- For details of Note 1 to Note 5, refer to P.104.
- Dimensions of Driver, refer to P.34.

*1 Rotaly encoder specifications: □

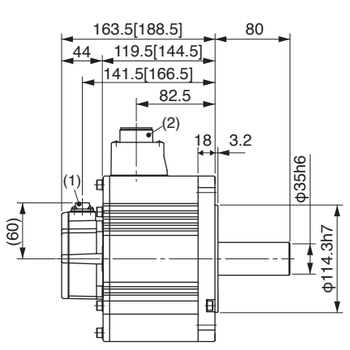
*2 The product that the end of driver model designation has "E" is "positioning type". Detail of model designation, refer to P.11.

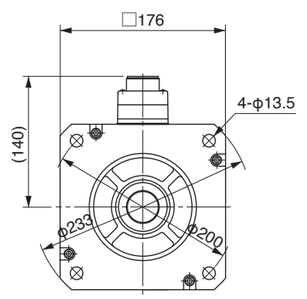
## Torque characteristics (at AC400V of power voltage <Dotted line represents the torque at 10% less supply voltage.>)

With oil seal



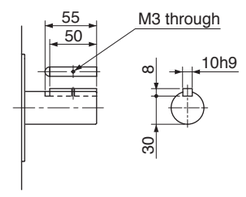

## Dimensions




Mass (kg)/ Without brake: 14.0
With brake: 17.5

Key way dimensions




(1) Encoder connector
(2) Motor/Brake connector

* Figures in [ ] represent the dimensions of with brake.

**<Cautions>** Reduce the moment of inertia ratio if high speed response operation is required.
Dimensions are subject to change without notice. Contact us or a dealer for the latest information.
Read the Instruction Manual carefully and understand all precautions and remarks before using the products.

## Specifications

| | | | AC400V | |
|---|---|---|---|---|
| Motor model *1 | | MGME | 304G1□ | 304S1□ |
| Applicable driver *2 | Model No. | A5 series | MFDHTA464 | |
| | | A5E series | MFDHTA464E | |
| | Frame symbol | | F-frame | |
| Power supply capacity (kVA) | | | 4.5 | |
| Rated output (W) | | | 3.0 | |
| Rated torque (N·m) | | | 28.7 | |
| Momentary Max. peak torque (N·m) | | | 71.7 | |
| Rated current (A(rms)) | | | 11.3 | |
| Max. current (A(o-p)) | | | 40 | |
| Regenerative brake frequency (times/min) Note)1 | Without option | | No limit Note)2 | |
| | DV0PM20049×2 | | No limit Note)2 | |
| Rated rotational speed (r/min) | | | 1000 | |
| Max. rotational speed (r/min) | | | 2000 | |
| Moment of inertia of rotor ($\times10^{-4}$kg·m$^2$) | Without brake | | 48.4 | |
| | With brake | | 49.2 | |
| Recommended moment of inertia ratio of the load and the rotor Note)3 | | | 0 times or less | |
| Rotary encoder specifications Note)5 | | | 20-bit Incremental | 17-bit Absolute |
| | Resolution per single turn | | 1,048,576 | 131,072 |

**• Brake specifications** (For details, refer to P.105)

(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 or more |
| Engaging time (ms) | 150 or less |
| Releasing time (ms) Note)4 | 50 or less |
| Exciting current (DC) (A) | 1.4±10% |
| Releasing voltage (DC) (V) | 2 or more |
| Exciting voltage (DC) (V) | 24±2.4 |

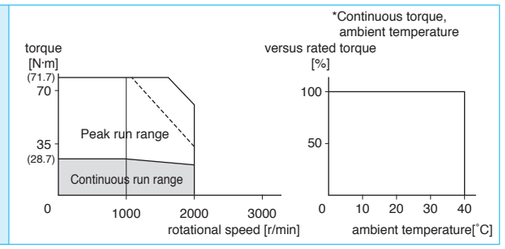
**• Permissible load** (For details, refer to P.104)

| | | |
|---|---|---|
| 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, B-direction (N) | 490 |

• For details of Note 1 to Note 5, refer to P.104.
• Dimensions of Driver, refer to P.34.
*1 Rotaly encoder specifications: □
*2 The product that the end of driver model designation has “E” is “positioning type”.
Detail of model designation, refer to P.11.

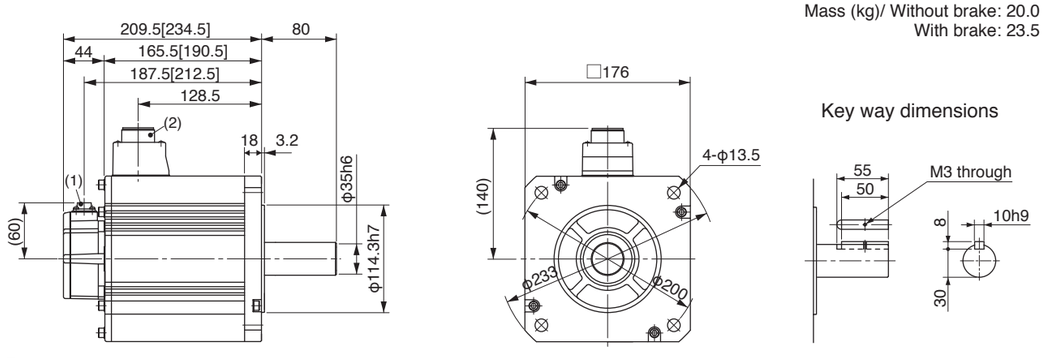
## Torque characteristics (at AC400V of power voltage <Dotted line represents the torque at 10% less supply voltage.>)

With oil seal




## Dimensions

Mass (kg)/ Without brake: 20.0
With brake: 23.5




Key way dimensions




(1) Encoder connector
(2) Motor/Brake connector

* Figures in [ ] represent the dimensions of with brake.

**<Cautions>** Reduce the moment of inertia ratio if high speed response operation is required.
Dimensions are subject to change without notice. Contact us or a dealer for the latest information.
Read the Instruction Manual carefully and understand all precautions and remarks before using the products.



MEMO

# Motor Specifications 400V MHME 0.9kW [High inertia, Middle capacity]

## Specifications

| | | | AC400V | |
|---|---|---|---|---|
| Motor model *1 | | MHME | 104G1□ | 104S1□ |
| Applicable driver *2 | Model No. | A5 series | MDDHT2412 | |
| | | A5E series | MDDHT2412E | |
| | Frame symbol | | D-frame | |
| Power supply capacity | | (kVA) | 1.8 | |
| Rated output | | (W) | 1.0 | |
| Rated torque | | (N·m) | 4.77 | |
| Momentary Max. peak torque | | (N·m) | 14.3 | |
| Rated current | | (A(rms)) | 2.9 | |
| Max. current | | (A(o-p)) | 12 | |
| Regenerative brake frequency (times/min) Note)1 | Without option | | 83 | |
| | DV0PM20048 | | No limit Note)2 | |
| Rated rotational speed | | (r/min) | 2000 | |
| Max. rotational speed | | (r/min) | 3000 | |
| Moment of inertia of rotor ($\times10^{-4}$kg·m$^2$) | Without brake | | 24.7 | |
| | With brake | | 26.0 | |
| Recommended moment of inertia ratio of the load and the rotor Note)3 | | | 0 times or less | |
| Rotary encoder specifications Note)5 | | | 20-bit Incremental | 17-bit Absolute |
| | Resolution per single turn | | 1,048,576 | 131,072 |

**• Brake specifications** (For details, refer to P.105)

(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 or more |
| Engaging time (ms) | 80 or less |
| Releasing time (ms) Note)4 | 70 or less |
| Exciting current (DC) (A) | 0.59±10% |
| Releasing voltage (DC) (V) | 2 or more |
| Exciting voltage (DC) (V) | 24±2.4 |

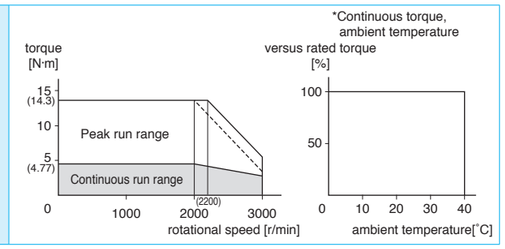
**• Permissible load** (For details, refer to P.104)

| | | |
|---|---|---|
| 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, B-direction (N) | 196 |

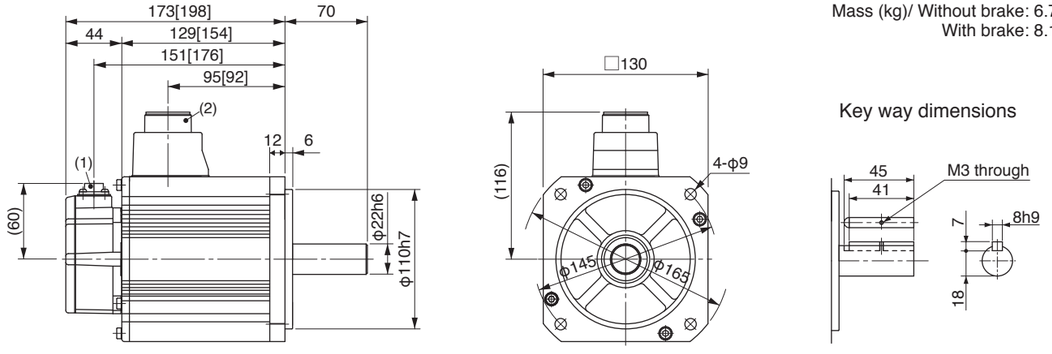
• For details of Note 1 to Note 5, refer to P.104.
• Dimensions of Driver, refer to P.32.
*1 Rotaly encoder specifications: □
*2 The product that the end of driver model designation has "E" is "positioning type".
Detail of model designation, refer to P.11.

## Torque characteristics (at AC400V of power voltage <Dotted line represents the torque at 10% less supply voltage.>)

With oil seal




## Dimensions




Mass (kg)/ Without brake: 6.7
With brake: 8.1

(1) Encoder connector
(2) Motor/Brake connector

* Figures in [ ] represent the dimensions of with brake.

**<Cautions>** Reduce the moment of inertia ratio if high speed response operation is required.
Dimensions are subject to change without notice. Contact us or a dealer for the latest information.
Read the Instruction Manual carefully and understand all precautions and remarks before using the products.



# Motor Specifications 400V MHME 1.5kW [High inertia, Middle capacity]

## Specifications

| | | | AC400V | |
|---|---|---|---|---|
| Motor model *1 | | MHME | 154G1□ | 154S1□ |
| Applicable driver *2 | Model No. | A5 series | MDDHT3420 | |
| | | A5E series | MDDHT3420E | |
| | Frame symbol | | D-frame | |
| Power supply capacity | | (kVA) | 2.3 | |
| Rated output | | (W) | 1.5 | |
| Rated torque | | (N·m) | 7.16 | |
| Momentary Max. peak torque | | (N·m) | 21.5 | |
| Rated current | | (A(rms)) | 4.7 | |
| Max. current | | (A(o-p)) | 20 | |
| Regenerative brake frequency (times/min) Note)1 | Without option | | 22 | |
| | DV0PM20048 | | 130 | |
| Rated rotational speed | | (r/min) | 2000 | |
| Max. rotational speed | | (r/min) | 3000 | |
| Moment of inertia of rotor ($\times10^{-4}$kg·m$^2$) | Without brake | | 37.1 | |
| | With brake | | 38.4 | |
| Recommended moment of inertia ratio of the load and the rotor Note)3 | | | 0 times or less | |
| Rotary encoder specifications Note)5 | | | 20-bit Incremental | 17-bit Absolute |
| | Resolution per single turn | | 1,048,576 | 131,072 |

**• Brake specifications** (For details, refer to P.105)

(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 or more |
| Engaging time (ms) | 100 or less |
| Releasing time (ms) Note)4 | 50 or less |
| Exciting current (DC) (A) | 0.79±10% |
| Releasing voltage (DC) (V) | 2 or more |
| Exciting voltage (DC) (V) | 24±2.4 |

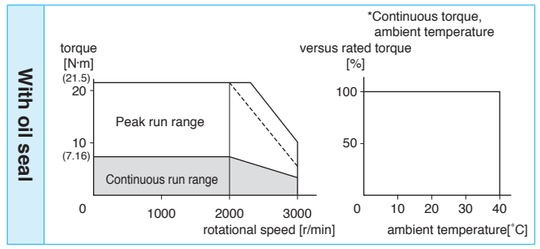
**• Permissible load** (For details, refer to P.104)

| | | |
|---|---|---|
| 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, B-direction (N) | 196 |

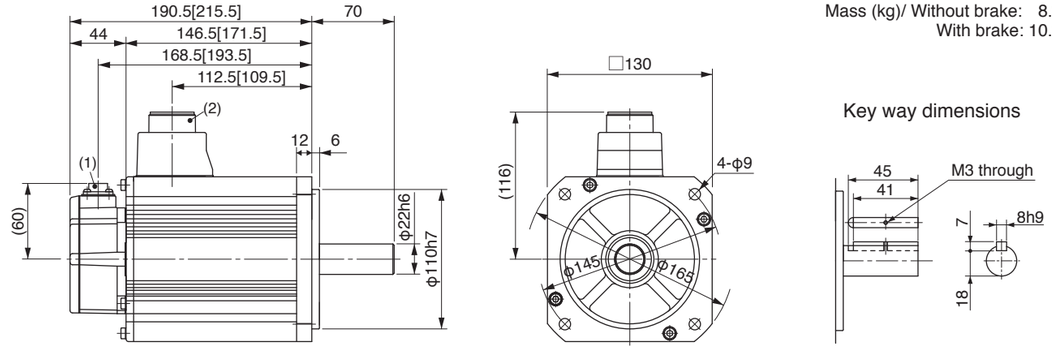
• For details of Note 1 to Note 5, refer to P.104.
• Dimensions of Driver, refer to P.32.
*1 Rotaly encoder specifications: □
*2 The product that the end of driver model designation has "E" is "positioning type".
Detail of model designation, refer to P.11.

## Torque characteristics (at AC400V of power voltage <Dotted line represents the torque at 10% less supply voltage.>)

With oil seal




## Dimensions




Mass (kg)/ Without brake: 8.6
With brake: 10.1

(1) Encoder connector
(2) Motor/Brake connector

* Figures in [ ] represent the dimensions of with brake.

**<Cautions>** Reduce the moment of inertia ratio if high speed response operation is required.
Dimensions are subject to change without notice. Contact us or a dealer for the latest information.
Read the Instruction Manual carefully and understand all precautions and remarks before using the products.

# Motor Specifications 400V MHME 2.0kW [High inertia, Middle capacity]

## Specifications

| | | | AC400V | |
|---|---|---|---|---|
| Motor model *1 | | MHME | 204G1□ | 204S1□ |
| Applicable driver *2 | Model No. | A5 series | MEDHT4430 | |
| | | A5E series | MEDHT4430E | |
| | Frame symbol | | E-frame | |
| Power supply capacity | | (kVA) | 3.3 | |
| Rated output | | (W) | 2.0 | |
| Rated torque | | (N·m) | 9.55 | |
| Momentary Max. peak torque | | (N·m) | 28.6 | |
| Rated current | | (A(rms)) | 5.5 | |
| Max. current | | (A(o-p)) | 24 | |
| Regenerative brake frequency (times/min) Note)1 | Without option | | 45 | |
| | DV0PM20048 | | 142 | |
| Rated rotational speed | | (r/min) | 2000 | |
| Max. rotational speed | | (r/min) | 3000 | |
| Moment of inertia of rotor ($\times10^{-4}$kg·m$^2$) | Without brake | | 57.8 | |
| | With brake | | 59.6 | |
| Recommended moment of inertia ratio of the load and the rotor Note)3 | | | 0 times or less | |
| Rotary encoder specifications Note)5 | | | 20-bit Incremental | 17-bit Absolute |
| | Resolution per single turn | | 1,048,576 | 131,072 |

**• Brake specifications** (For details, refer to P.105)

(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 or more |
| Engaging time (ms) | 80 or less |
| Releasing time (ms) Note)4 | 25 or less |
| Exciting current (DC) (A) | 1.3±10% |
| Releasing voltage (DC) (V) | 2 or more |
| Exciting voltage (DC) (V) | 24±2.4 |

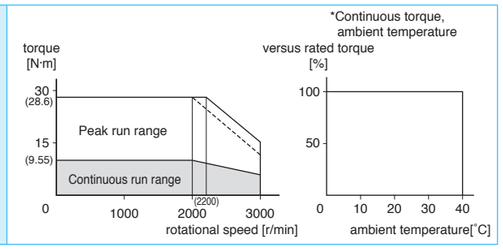
**• Permissible load** (For details, refer to P.104)

| | | |
|---|---|---|
| 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, B-direction (N) | 343 |

• For details of Note 1 to Note 5, refer to P.104.
• Dimensions of Driver, refer to P.33.
*1 Rotaly encoder specifications: □
*2 The product that the end of driver model designation has "E" is "positioning type".
Detail of model designation, refer to P.11.

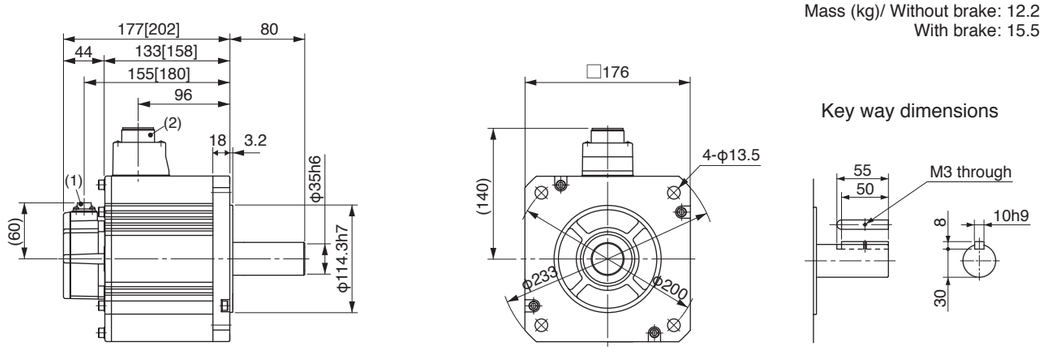
## Torque characteristics (at AC400V of power voltage <Dotted line represents the torque at 10% less supply voltage.>)

With oil seal




## Dimensions

Mass (kg)/ Without brake: 12.2
With brake: 15.5




(1) Encoder connector
(2) Motor/Brake connector

* Figures in [ ] represent the dimensions of with brake.

**<Cautions>** Reduce the moment of inertia ratio if high speed response operation is required.
Dimensions are subject to change without notice. Contact us or a dealer for the latest information.
Read the Instruction Manual carefully and understand all precautions and remarks before using the products.



# Motor Specifications 400V MHME 3.0kW [High inertia, Middle capacity]

## Specifications

| | | | AC400V | |
|---|---|---|---|---|
| Motor model *1 | | MHME | 304G1□ | 304S1□ |
| Applicable driver *2 | Model No. | A5 series | MFDHT5440 | |
| | | A5E series | MFDHT5440E | |
| | Frame symbol | | F-frame | |
| Power supply capacity | | (kVA) | 4.5 | |
| Rated output | | (W) | 3.0 | |
| Rated torque | | (N·m) | 14.3 | |
| Momentary Max. peak torque | | (N·m) | 43.0 | |
| Rated current | | (A(rms)) | 8.0 | |
| Max. current | | (A(o-p)) | 34 | |
| Regenerative brake frequency (times/min) Note)1 | Without option | | 19 | |
| | DV0PM20049×2 | | 142 | |
| Rated rotational speed | | (r/min) | 2000 | |
| Max. rotational speed | | (r/min) | 3000 | |
| Moment of inertia of rotor ($\times10^{-4}$kg·m$^2$) | Without brake | | 90.5 | |
| | With brake | | 92.1 | |
| Recommended moment of inertia ratio of the load and the rotor Note)3 | | | 0 times or less | |
| Rotary encoder specifications Note)5 | | | 20-bit Incremental | 17-bit Absolute |
| | Resolution per single turn | | 1,048,576 | 131,072 |

**• Brake specifications** (For details, refer to P.105)

(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 or more |
| Engaging time (ms) | 80 or less |
| Releasing time (ms) Note)4 | 25 or less |
| Exciting current (DC) (A) | 1.3±10% |
| Releasing voltage (DC) (V) | 2 or more |
| Exciting voltage (DC) (V) | 24±2.4 |

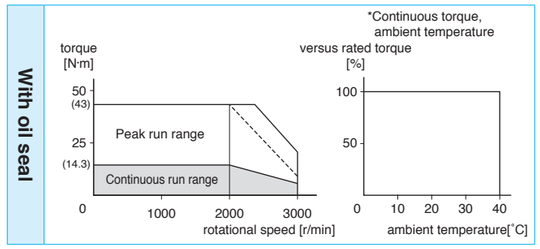
**• Permissible load** (For details, refer to P.104)

| | | |
|---|---|---|
| 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, B-direction (N) | 343 |

• For details of Note 1 to Note 5, refer to P.104.
• Dimensions of Driver, refer to P.34.
*1 Rotaly encoder specifications: □
*2 The product that the end of driver model designation has "E" is "positioning type".
Detail of model designation, refer to P.11.

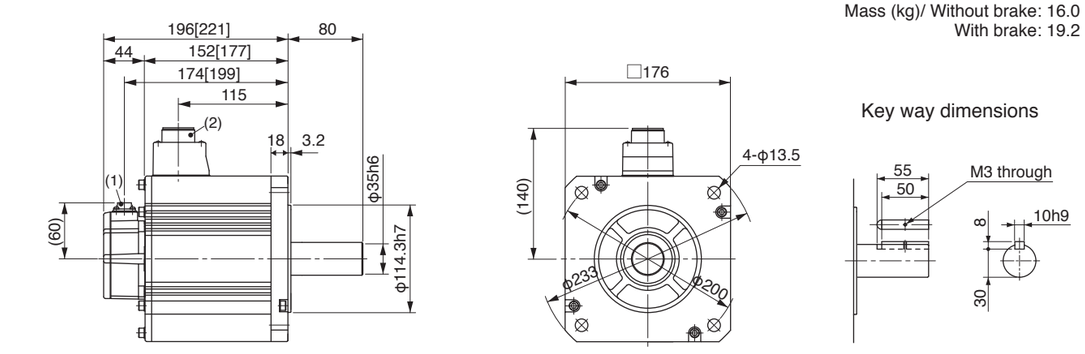
## Torque characteristics (at AC400V of power voltage <Dotted line represents the torque at 10% less supply voltage.>)

With oil seal




## Dimensions

Mass (kg)/ Without brake: 16.0
With brake: 19.2




(1) Encoder connector
(2) Motor/Brake connector

* Figures in [ ] represent the dimensions of with brake.

**<Cautions>** Reduce the moment of inertia ratio if high speed response operation is required.
Dimensions are subject to change without notice. Contact us or a dealer for the latest information.
Read the Instruction Manual carefully and understand all precautions and remarks before using the products.

## Specifications

| | | | AC400V | |
|---|---|---|---|---|
| Motor model *1 | | MHME | 404G1□ | 404S1□ |
| Applicable driver *2 | Model No. | A5 series | MFDHTA464 | |
| | | A5E series | MFDHTA464E | |
| | Frame symbol | | F-frame | |
| Power supply capacity | | (kVA) | 6.8 | |
| Rated output | | (W) | 4.0 | |
| Rated torque | | (N·m) | 19.1 | |
| Momentary Max. peak torque | | (N·m) | 57.3 | |
| Rated current | | (A(rms)) | 10.5 | |
| Max. current | | (A(o-p)) | 45 | |
| Regenerative brake frequency (times/min) Note)1 | Without option | | 17 | |
| | DV0PM20049×2 | | 125 | |
| Rated rotational speed | | (r/min) | 2000 | |
| Max. rotational speed | | (r/min) | 3000 | |
| Moment of inertia of rotor ($\times10^{-4}$kg·m$^2$) | Without brake | | 112 | |
| | With brake | | 114 | |
| Recommended moment of inertia ratio of the load and the rotor Note)3 | | | 0 times or less | |
| Rotary encoder specifications Note)5 | | | 20-bit Incremental | 17-bit Absolute |
| | Resolution per single turn | | 1,048,576 | 131,072 |

**• Brake specifications** (For details, refer to P.105)

(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 or more |
| Engaging time (ms) | 80 or less |
| Releasing time (ms) Note)4 | 25 or less |
| Exciting current (DC) (A) | 1.3±10% |
| Releasing voltage (DC) (V) | 2 or more |
| Exciting voltage (DC) (V) | 24±2.4 |

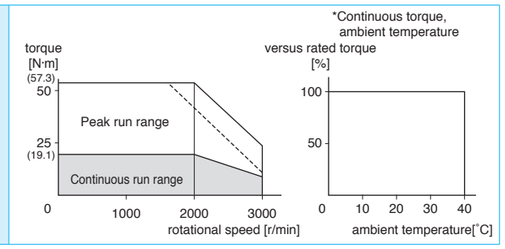
**• Permissible load** (For details, refer to P.104)

| | | |
|---|---|---|
| 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, B-direction (N) | 343 |

• For details of Note 1 to Note 5, refer to P.104.
• Dimensions of Driver, refer to P.34.
*1 Rotaly encoder specifications: □
*2 The product that the end of driver model designation has “E” is “positioning type”.
Detail of model designation, refer to P.11.

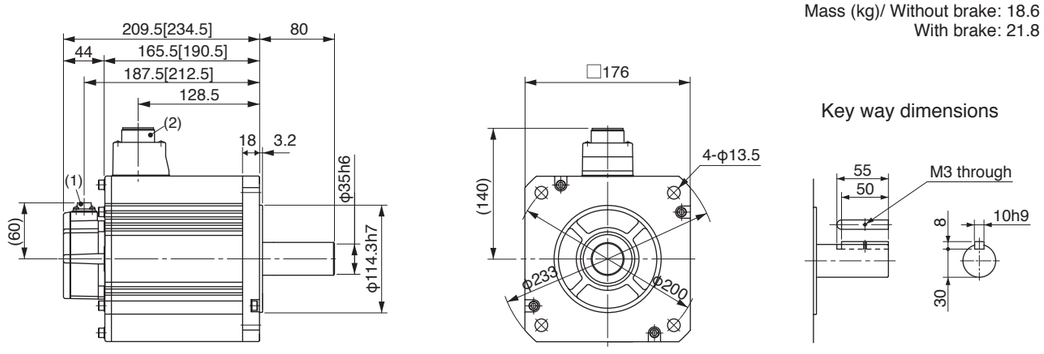
## Torque characteristics (at AC400V of power voltage <Dotted line represents the torque at 10% less supply voltage.>)

With oil seal




## Dimensions

Mass (kg)/ Without brake: 18.6
With brake: 21.8




(1) Encoder connector
(2) Motor/Brake connector

* Figures in [ ] represent the dimensions of with brake.

**<Cautions>** Reduce the moment of inertia ratio if high speed response operation is required.
Dimensions are subject to change without notice. Contact us or a dealer for the latest information.
Read the Instruction Manual carefully and understand all precautions and remarks before using the products.





## Specifications

| | | | AC400V | |
|---|---|---|---|---|
| Motor model *1 | | MHME | 504G1□ | 504S1□ |
| Applicable driver *2 | Model No. | A5 series | MFDHTA464 | |
| | | A5E series | MFDHTA464E | |
| | Frame symbol | | F-frame | |
| Power supply capacity | | (kVA) | 7.5 | |
| Rated output | | (W) | 5.0 | |
| Rated torque | | (N·m) | 23.9 | |
| Momentary Max. peak torque | | (N·m) | 71.6 | |
| Rated current | | (A(rms)) | 13.0 | |
| Max. current | | (A(o-p)) | 55 | |
| Regenerative brake frequency (times/min) Note)1 | Without option | | 10 | |
| | DV0PM20049×2 | | 76 | |
| Rated rotational speed | | (r/min) | 2000 | |
| Max. rotational speed | | (r/min) | 3000 | |
| Moment of inertia of rotor ($\times10^{-4}$kg·m$^2$) | Without brake | | 162 | |
| | With brake | | 164 | |
| Recommended moment of inertia ratio of the load and the rotor Note)3 | | | 0 times or less | |
| Rotary encoder specifications Note)5 | | | 20-bit Incremental | 17-bit Absolute |
| | Resolution per single turn | | 1,048,576 | 131,072 |

**• Brake specifications** (For details, refer to P.105)

(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 or more |
| Engaging time (ms) | 80 or less |
| Releasing time (ms) Note)4 | 25 or less |
| Exciting current (DC) (A) | 1.3±10% |
| Releasing voltage (DC) (V) | 2 or more |
| Exciting voltage (DC) (V) | 24±2.4 |

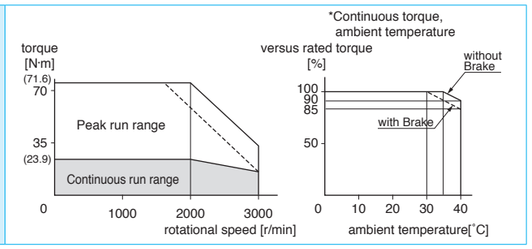
**• Permissible load** (For details, refer to P.104)

| | | |
|---|---|---|
| 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, B-direction (N) | 343 |

• For details of Note 1 to Note 5, refer to P.104.
• Dimensions of Driver, refer to P.34.
*1 Rotaly encoder specifications: □
*2 The product that the end of driver model designation has “E” is “positioning type”.
Detail of model designation, refer to P.11.

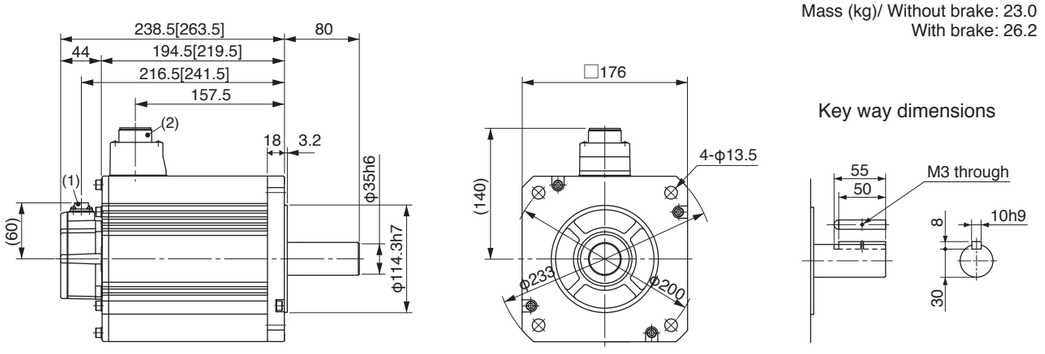
## Torque characteristics (at AC400V of power voltage <Dotted line represents the torque at 10% less supply voltage.>)

With oil seal




## Dimensions

Mass (kg)/ Without brake: 23.0
With brake: 26.2




(1) Encoder connector
(2) Motor/Brake connector

* Figures in [ ] represent the dimensions of with brake.

**<Cautions>** Reduce the moment of inertia ratio if high speed response operation is required.
Dimensions are subject to change without notice. Contact us or a dealer for the latest information.
Read the Instruction Manual carefully and understand all precautions and remarks before using the products.

## 「モータ仕様」ページの注釈について

Note) 1. **[At AC100V of power voltage]**
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 defines 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.

**[At AC200V of power voltage]**
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 defines 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.

**[At AC400V of power voltage]**
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 defines 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 AC460V (at 400V of the main voltage).
  If the supply voltage fluctuates, frequency is in inverse proportion to the square of (Running supply voltage/460) 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.

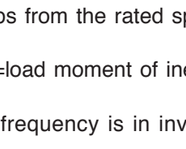
Note) 2. If the effective torque is within the rated torque, there is no limit in generative brake.
Note) 3. Consult us or a dealer if the load moment of inertia exceeds the specified value.
Note) 4. Releasing time values represent the ones with DC-cutoff using a varistor.
Note) 5. 17 ビット アブソリュートエンコーダは、17 ビット インクリメンタルエンコーダとしても使用可能です。

## Permissible Load at Output Shaft

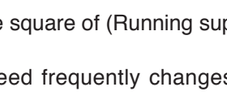
The radial load is defined as a load applied to the output shaft in the right-angle direction. This load is generated when the gear head is coupled to the machine using a chain, belt, etc., but not when the gear head is directly connected to the coupling. As shown in the right figure, the permissible value is determined based on the load applied to the L/2 position of the output shaft. The thrust load is defined as a load applied to the output shaft in the axial direction.

**Because the radial load and thrust load significantly affect the life of the bearing, take care not to allow the load during operation to exceed the permissible radial load and thrust load shown in the table below.**

Radial load (P) direction




Thrust load (A and B) direction






## Built-in Holding Brake

In the applications where the motor drives the vertical axis, this brake would be used to hold and prevent the work (moving load) from falling by gravity while the power to the servo is shut off.

**Use this built-in brake for "Holding" purpose only, that is to hold the stalling status. Never use this for "Brake" purpose to stop the load in motion.**

- **Output Timing of BRK-OFF Signal**
  - For the brake release timing at power-on, or braking timing at Servo-OFF/Servo-Alarm while the motor is in motion, refer to the Operating Instructions (Overall).
  - With the parameter, Pr4.38 (Setup of mechanical brake action while the motor is in motion), you can set up a time between when the motor enters to a free-run from energized status and when BRK-OFF signal turns off (brake will be engaged), when the Servo-OFF or alarm occurs while the motor is in motion. その詳細については、弊社ホームページから取扱説明書をダウンロードして参照してください。

**<Note>**
1. The lining sound of the brake (chattering and etc.) might be generated while running the motor with built-in brake, however this does not affect any functionality.
2. Magnetic flux might be generated through the motor shaft while the brake coil is energized (brake is open). Pay an extra attention when magnetic sensors are used nearby the motor.

- **Specifications of Built-in Holding Brake**

| Motor series | Motor output | Static friction torque N·m | Rotor inertia x $10^{-4}$ kg·m$^2$ | Engaging time ms | Releasing time ms | Exciting current DC A (at cool-off) | Releasing voltage | Permissible work (J) per one braking | Permissible total work x $10^3$J | Permissible angular acceleration rad/s$^2$ |
|---|---|---|---|---|---|---|---|---|---|---|
| MSMD | 50W, 100W | 0.29 or more | 0.002 | 35 or less | 20 or less | 0.3 | DC1V or more | 39.2 | 4.9 | 30000 |
| | 200W, 400W | 1.27 or more | 0.018 | 50 or less | 15 or less | 0.36 | | 137 | 44.1 | |
| | 750W | 2.45 or more | 0.075 | 70 or less | 20 or less | 0.42 | | 196 | 147 | |
| MSME | 50W, 100W | 0.29 or more | 0.002 | 35 or less | 20 or less | 0.3 | DC1V or more | 39.2 | 4.9 | 30000 |
| | 200W, 400W | 1.27 or more | 0.018 | 50 or less | 15 or less | 0.36 | | 137 | 44.1 | |
| | 750W | 2.45 or more | 0.075 | 70 or less | 20 or less | 0.42 | | 196 | 147 | |
| | 1.0kW, 1.5kW, 2.0kW | 7.8 or more | 0.33 | 50 or less | 15 or less (100) | 0.81 | DC2V or more | 392 | 490 | 10000 |
| | 3.0kW | 11.8 or more | | 80 or less | | | | | | |
| | 4.0kW, 5.0kW | 16.1 or more | 1.35 | 110 or less | 50 or less (130) | 0.9 | | 1470 | 2200 | |
| MDME | 1.0kW | 4.9 or more | 1.35 | 80 or less | 70 or less (200) | 0.59 | DC2V or more | 588 | 780 | 10000 |
| | 1.5kW, 2.0kW | 13.7 or more | | 100 or less | 50 or less (130) | 0.79 | | 1176 | 1500 | |
| | 3.0kW | 16.2 or more | | 110 or less | | 0.9 | | 1470 | 2200 | |
| | 4.0kW, 5.0kW | 24.5 or more | 4.7 | 80 or less | 25 or less (200) | 1.3 | | 1372 | 2900 | 5440 |
| MGME | 900W | 13.7 or more | 1.35 | 100 or less | 50 or less (130) | 0.79 | DC2V or more | 1176 | 1500 | 10000 |
| | 2.0kW | 24.5 or more | 4.7 | 80 or less | 25 or less (200) | 1.3 | | 1372 | 2900 | 5440 |
| | 3.0kW | 58.8 or more | | 150 or less | 50 or less (130) | 1.4 | | | | |
| MHMD | 200W, 400W | 1.27 or more | 0.018 | 50 or less | 15 or less | 0.36 | DC1V or more | 137 | 44.1 | 30000 |
| | 750W | 2.45 or more | 0.075 | 70 or less | 20 or less | 0.42 | | 196 | 147 | |
| MHME | 1.0kW | 4.9 or more | 1.35 | 80 or less | 70 or less (200) | 0.59 | DC2V or more | 588 | 780 | 10000 |
| | 1.5kW | 13.7 or more | | 100 or less | 50 or less (130) | 0.79 | | 1176 | 1500 | |
| | 2.0kW to 5.0kW | 24.5 or more | 4.7 | or less以下 | 25 or less (200) | 1.3 | | 1372 | 2900 | 5440 |

- Excitation voltage is DC24V±10% (Large type motor) and DC24V±5% (Small type motor).
- Releasing time values represent the ones with DC-cutoff using a varistor.
  Values in ( ) represent those measured by using a diode (V03C by Hitachi, Ltd.)
- Above values (except static friction torque, releasing voltage and excitation current) represent typical values.
- Backlash of the built-in holding brake is kept ±1˚or smaller at ex-factory point.
- Service life of the number of acceleration/deceleration with the above permissible angular acceleration is more than 10 million times. (Life end is defined as when the brake backlash drastically changes.)

# EC Directives/Conformity to UL Standards

## 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.
However, our AC servos meet the relevant EC Directives for Low Voltage Equipment so that the machine or equipment comprising our AC servos can meet EC Directives.

## EMC Directives

MINAS Servo System conforms to relevant standard 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.

## Conformity to UL Standards

Observe the following conditions of (1) and (2) to make the system conform to UL508C (E164620).

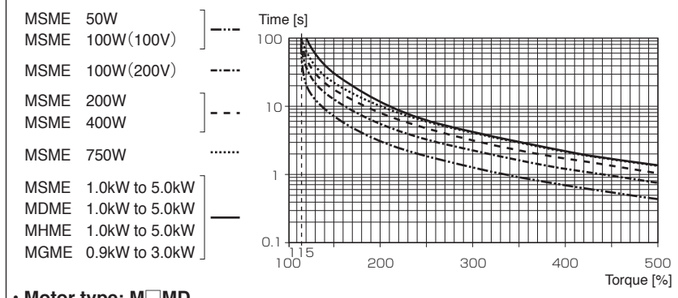
(1) Use the driver in an environment of Pollution Degree 2 or 1 prescribed in IEC60664-1.
(e.g. Install in the control box with IP54 enclosure.)

(2) Make sure to install a circuit breaker or fuse which are UL recognized (Listed Ⓤ marked) between the power supply and the noise filter.
For rated current of circuit breaker and fuse, refer to P.14 “Driver and List of Applicable Peripheral Equipments”.
Use a copper cable with temperature rating of 75˚C or higher.

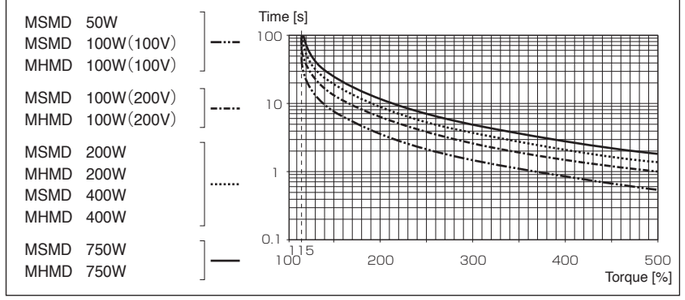
(3) Over-load protection level
Over-load protective function will be activated when the effective current exceeds 115% or more than the rated current based on the time characteristics (see the next page). Confirm that the effective current of the driver does not exceed the rated current.
Set up the peak permissible current with Pr0.13 (Setup of 1st torque limit) and Pr5.22 (Setup 2nd torque limit).

**Overload protection time characteristics**

**• Motor type: M□ME**




**• Motor type: M□MD**




## Conformed Standards

For details, refer to P.9.



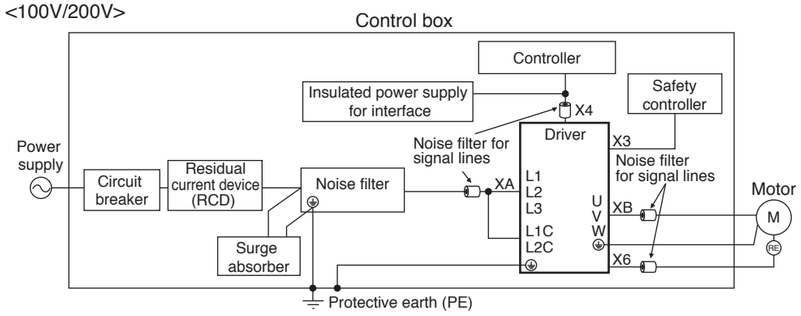


# Composition of Peripheral Equipments

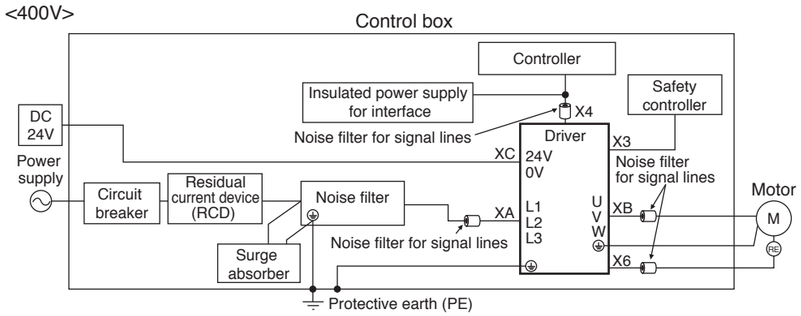
## Installation Environment

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

<100V/200V>




<400V>




**<Caution>**

Use options correctly after reading Operating Instructions of the options to better understand the precautions.
Take care not to apply excessive stress to each optional part.

## Power Supply

| | | | | | | |
|---|---|---|---|---|---|---|
| 100V type : (A to C-frame) | Single phase, 100V | + 10% − 15% | to | 120V | + 10% − 15% | 50/60Hz |
| 200V type : (A to D-frame) | Single/3-phase, 200V | + 10% − 15% | to | 240V | + 10% − 15% | 50/60Hz |
| 200V type : (E, F-frame) | 3-phase, 200V | + 10% − 15% | to | 230V | + 10% − 15% | 50/60Hz |
| 400 V type (Main power supply): (D to F-frame) | 3-phase, 380V | + 10% − 15% | to | 480V | + 10% − 15% | 50/60Hz |

400 V type (Control power supply): DC 24V ±15%
(D to F-frame)

(1) This product is designed to be used in over-voltage category (installation category) III of EN 61800-5-1:2007.
(2) Use an insulated power supply of DC12 to 24V which has CE marking or complies with EN60950.

## Circuit Breaker

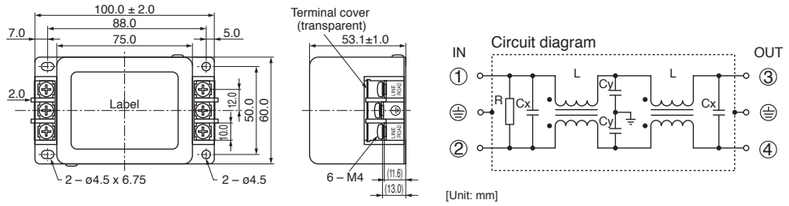
Install a circuit breaker which complies with IEC Standards and UL recognized (Listed and marked) between power supply and noise filter.
The short-circuit protection circuit on the product is not for protection of branch circuit.
The branch circuit should be protected in accordance with NEC and the applicable local regulations in your area.

## Noise Filter

When you install one noise filter at the power supply for multi-axes application, contact to a manufacture of the noise filter. If noise margin is required, connect 2 filters in series to emphasize effectiveness.

### • Options

| Option part No. | Voltage specifications for driver | Manufacturer's part No. | Applicable driver (frame) | Manufacturer |
|---|---|---|---|---|
| DV0P4170 | Single phase 100V, 200V | SUP-EK5-ER-6 | A and B-frame | Okaya Electric Ind. |

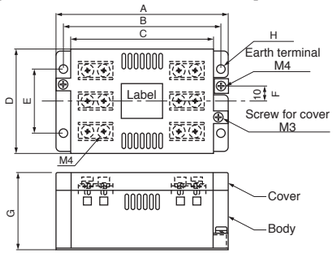




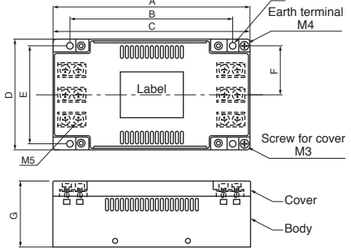


| Option part No. | Voltage specifications for driver | Manufacturer's part No. | Applicable driver (frame) | Manufacturer |
|---|---|---|---|---|
| DV0PM20042 | 3-phase 200V | 3SUP-HU10-ER-6 | A and B-frame | Okaya Electric Ind. |
| | Single phase 100V, 200V<br>3-phase 200V | | C-frame | |
| DV0P4220 | Single/3-phase 200V | 3SUP-HU30-ER-6 | D-frame | |
| DV0PM20043 | 3-phase 200V | 3SUP-HU50-ER-6 | E-frame | |

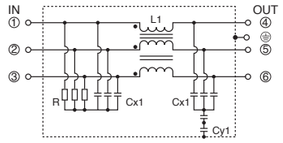
[DV0PM20042, DV0P4220]




[DV0PM20043]



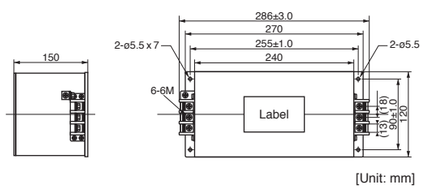

Circuit diagram



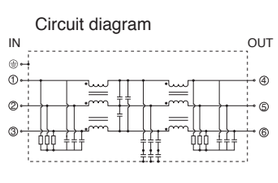

[Size] [Unit: mm]

| | A | B | C | D | E | F | G | H |
|---|---|---|---|---|---|---|---|---|
| DV0PM20042 | 115 | 105 | 95 | 70 | 43 | 10 | 52 | 5.5 |
| DV0P4220 | 145 | 135 | 125 | 70 | 50 | 10 | 52 | 5.5 |
| DV0PM20043 | 165 | 136 | 165 | 90 | 80 | 40 | 54 | 5.5 |

| Option part No. | Voltage specifications for driver | Manufacturer's part No. | Applicable driver (frame) | Manufacturer |
|---|---|---|---|---|
| DV0P3410 | 3-phase 200V | 3SUP-HL50-ER-6B | F-frame | Okaya Electric Ind. |




Circuit diagram




### • Recommended components

| part No. | Voltage specifications for driver | Current rating (A) | Manufacturer |
|---|---|---|---|
| RTHN-5010 | Single phase 100V, 200V<br>3-phase 200V | 10 | TDK-Lambda Corp. |
| RTHN-5020 | | 30 | |
| RTHN-5030 | | 50 | |
| FN258L-16-07 | 3-phase 400V | 16 | SCHAFFNER |
| FN258L-30-07 | | 30 | |

**<Remarks>**
- Select a noise filter of capacity that exceeds the capacity of the power source (also check for load condition).
- For detailed specification of the filter, contact the manufacturer.

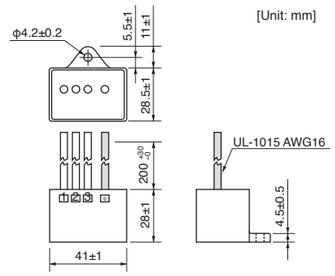




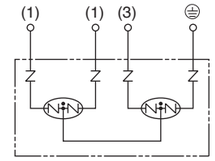
## Surge Absorber

Provide a surge absorber for the primary side of noise filter.

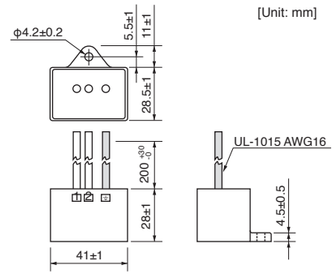
| Option part No. | Voltage specifications for driver | Manufacturer's part No. | Manufacturer |
|---|---|---|---|
| DV0P1450 | 3-phase 200V | RAV-781BXZ-4 | Okaya Electric Ind. |
| DV0PM20050 | 3-phase 400V | RAV-801BXZ-4 | |



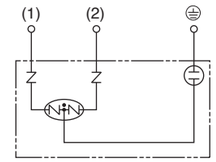

Circuit diagram




| Option part No. | Voltage specifications for driver | Manufacturer's part No. | Manufacturer |
|---|---|---|---|
| DV0P4190 | Single phase 100V, 200V | RAV-781BWZ-4 | Okaya Electric Ind. |




Circuit diagram

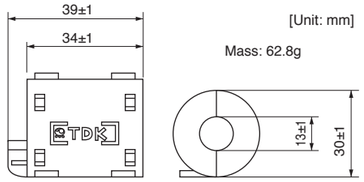



## Noise Filter for Signal Lines

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

| Option part No. | Manufacturer's part No. | Number | Manufacturer |
|---|---|---|---|
| DV0P1460 | ZCAT3035-1330 | 4 | TDK Corp. |

**<Caution>**
Fix the signal line noise filter in place to eliminate excessive stress to the cables.




## Residual current device

Install a type B Residual current device (RCD) at primary side of the power supply.

## Grounding

(1) Connect the protective earth terminal (⏚) of the driver and the protective earth terminal (PE) of the control box without fail to prevent electrical shocks.
(2) Do not make a joint connection to the protective earth terminals (⏚). 2 terminals are provided for protective earth.

**<Note>**
For driver and applicable peripheral equipments, refer to P.14 "Driver and List of Applicable Peripheral Equipments".

# Cable part No. designation

## Encoder cable

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| M | F | E | C | A | 0 | 0 | 5 | 0 | M | J | D |

Type classification

| | |
|---|---|
| MFECA: Encoder cable | |

Cable end (Driver side)

| | |
|---|---|
| D | Molex Inc. connector (Incremental) |
| E | Molex Inc. connector (Absolute) |
| M | Molex Inc. connector (MSMD, MHMD) |

Cable end (Encoder side)

| | |
|---|---|
| J | Japan Aviation Electronics Industry, Ltd. connector |
| T | Japan Aviation Electronics Industry, Ltd. plug connector |
| A | Tyco Electronics, AMP connector |

Cable type

| | |
|---|---|
| E | PVC cable with shield by Oki Electric Cable Co., 0.20mm² × 8P, 3P |
| M | Hitachi Cable, Ltd. |

Cable length

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

## Motor cable, Brake cable

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| M | F | M | C | A | 0 | 0 | 5 | 2 | N | J | D |

AC servo motor cable

Type classification

| | |
|---|---|
| A | Standard |
| B | Special |
| ⋮ | Design order |

Cable length

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

Cable end at driver side

| | |
|---|---|
| D | Phoenix contact Clamp terminal |
| T | Clamp terminal |

Cable end at motor side

| | |
|---|---|
| C | S type cannon plug |
| J | Japan Aviation Electronics Industry, Ltd. connector |
| E | Tyco Electronics, AMP connector |

Cable type

| | |
|---|---|
| E | ROBOTOP 4-wire by Daiden Co., Ltd. |
| F | ROBOTOP 6-wire by Daiden Co., Ltd. |
| N | 4-wire by Hitachi Cable, Ltd. |
| P | 2-wire by Hitachi Cable, Ltd. |

Cross section of cable core

| | |
|---|---|
| 0 | 0.75mm² |
| 1 | 1.25mm² |
| 2 | 2.0mm² |
| 3 | 3.5mm² |



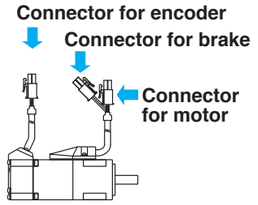


# Specifications of Motor connector

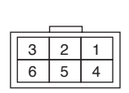


- **When the motors of <MSMD, MHMD> are used, they are connected as shown below.**

Connector: Made by Japan Aviation Electronics Industry, Ltd. (The figures below show connectors for the motor.)



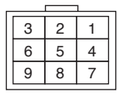

<Connector for encoder>



172168-1

20-bit Incremental

| PIN No. | Application |
|---|---|
| 1 | NC |
| 2 | PS |
| 3 | PS |
| 4 | E5V |
| 5 | E0V |
| 6 | FG(SHIELD) |



172169-1

17-bit Absolute

| PIN No. | Application |
|---|---|
| 1 | BAT+ |
| 2 | BAT– |
| 3 | FG(SHIELD) |
| 4 | PS |
| 5 | PS |
| 6 | NC |
| 7 | E5V |
| 8 | E0V |
| 9 | NC |

<Connector for motor>

172167-1

| PIN No. | Application |
|---|---|
| 1 | U-phase |
| 2 | V-phase |
| 3 | W-phase |
| 4 | Ground |

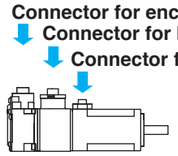
<Connector for brake>

172165-1

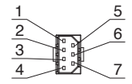
| PIN No. | Application |
|---|---|
| 1 | Brake |
| 2 | Brake |

- **When the motors of <MSME (50 W to 750 W)> are used, they are connected as shown below.**

Connector: Made by Japan Aviation Electronics Industry, Ltd. (The figures below show connectors for the motor.)




<Connector for encoder>



JN6CR07PM2

20-bit Incremental

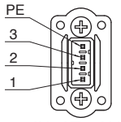
| PIN No. | Application |
|---|---|
| 1 | FG(SHIELD) |
| 2 | — |
| 3 | E0V |
| 4 | PS |
| 5 | — |
| 6 | E5V |
| 7 | PS |

17-bit Absolute

| PIN No. | Application |
|---|---|
| 1 | FG(SHIELD) |
| 2 | BAT– |
| 3 | E0V |
| 4 | PS |
| 5 | BAT+ |
| 6 | E5V |
| 7 | PS |

Tightening torque of the screw (M2) 0.19 to 0.21 N·m

<Connector for motor>

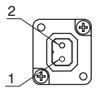


JN8AT04NJ1

| PIN No. | Application |
|---|---|
| 1 | U-phase |
| 2 | V-phase |
| 3 | W-phase |
| PE | Ground |

Tightening torque of the screw (M2)
0.085 to 0.095 N·m
(screwed to plastic)

<Connector for brake>



JN4AT02PJM-R

| PIN No. | Application |
|---|---|
| 1 | Brake |
| 2 | Brake |

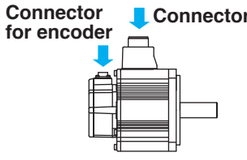
* Electromagnetic brake is a nonpolar device.

Tightening torque of the screw (M2)
0.19 to 0.21 N·m

* Be sure to use only the screw supplied with the connector, to avoid damage.

- **When the motors of <MSME (1.0 kW to 5.0 kW), MDME, MGME, MHME> are used, they are connected as shown below.**

Connector: Made by Japan Aviation Electronics Industry, Ltd. (The figures below show connectors for the motor.)




<Connector for encoder>

JN2AS10ML3-R

20-bit Incremental

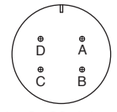
| PIN No. | Application |
|---|---|
| 1 | E0V |
| 2 | NC |
| 3 | PS |
| 4 | E5V |
| 5 | NC |
| 6 | NC |
| 7 | PS |
| 8 | NC |
| 9 | FG(SHIELD) |
| 10 | NC |

17-bit Absolute

| PIN No. | Application |
|---|---|
| 1 | E0V |
| 2 | NC |
| 3 | PS |
| 4 | E5V |
| 5 | BAT– |
| 6 | BAT+ |
| 7 | PS |
| 8 | NC |
| 9 | FG(SHIELD) |
| 10 | NC |

<Connector for motor>

<with Brake>



JL04V-2E20-4PE-B-R

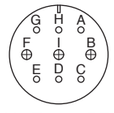
MSME 1.0kW to 2.0kW
MDME 1.0kW to 2.0kW
MGME 0.9kW
MHME 1.0kW to 1.5kW

JL04HV-2E22-22PE-B-R

MSME 3.0kW to 5.0kW
MDME 3.0kW to 5.0kW
MGME 2.0kW to 3.0kW
MHME 2.0kW to 5.0kW

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

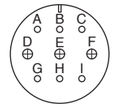
<without Brake>



JL04V-2E20-18PE-B-R

MSME 1.0kW to 2.0kW
MDME 1.0kW to 2.0kW
MGME 0.9kW
MHME 1.0kW to 1.5kW

| PIN No. | Application |
|---|---|
| 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-R

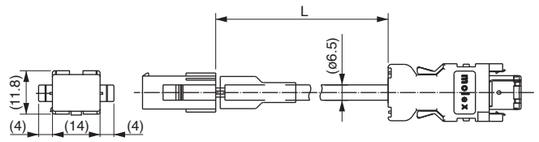
200V:
MSME 3.0kW to 5.0kW
MDME 3.0kW to 5.0kW
MGME 2.0kW to 3.0kW
MHME 2.0kW to 5.0kW
400V:
MSME 1.0kW to 5.0kW
MDME 1.0kW to 5.0kW
MGME 0.9kW to 3.0kW
MHME 1.0kW to 5.0kW

| PIN No. | Application |
|---|---|
| A | Brake |
| B | Brake |
| C | NC |
| D | U-phase |
| E | V-phase |
| F | W-phase |
| G | Ground |
| H | Ground |
| I | NC |

**<Remarks>** Do not connect anything to NC.

# Junction Cable for Encoder

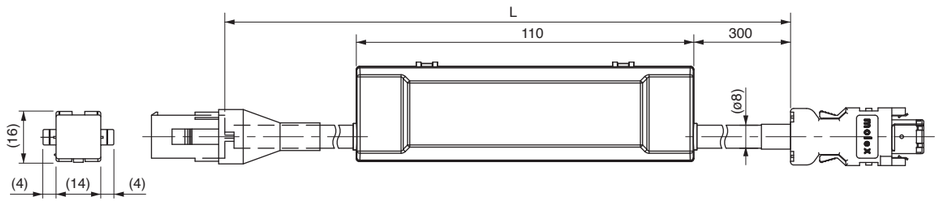
| Part No. | MFECA0＊＊0EAM | Compatible motor output | MSMD 50W to 750W, MHMD 200W to 750W |
|---|---|---|---|
| Specifications | For 20-bit incremental encoder (Without battery box) | | |




| Title | Part No. | Manufacturer |
|---|---|---|
| Connector | 55100-0670 | Molex Inc |
| Connector | 172160-1 | Tyco Electronics AMP |
| Connector pin | 170365-1 | |
| Cable | 0.20mm²×3P | Oki Electric Cable Co., Ltd. |

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

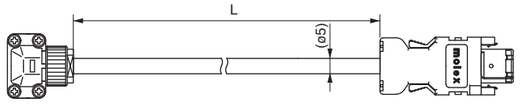
| Part No. | MFECA0＊＊0EAE | Compatible motor output | MSMD 50W to 750W, MHMD 200W to 750W |
|---|---|---|---|
| Specifications | For 17-bit absolute encoder (With battery box) | | |




| Title | Part No. | Manufacturer |
|---|---|---|
| Connector | 55100-0670 | Molex Inc |
| Connector | 172161-1 | Tyco Electronics AMP |
| Connector pin | 170365-1 | |
| Cable | 0.20mm²×4P | Oki Electric Cable Co., Ltd. |

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

| Part No. | MFECA0＊＊0MJD | Compatible motor output | MSME 50W to 750W |
|---|---|---|---|
| Specifications | For 20-bit incremental encoder (Without battery box) | | |

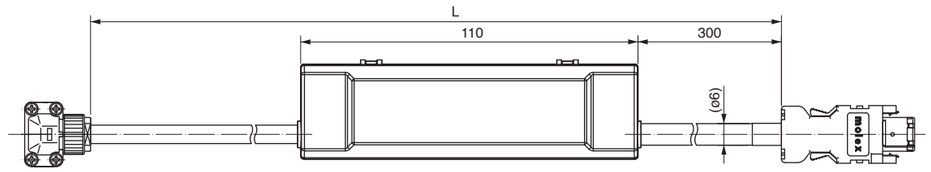



| Title | Part No. | Manufacturer |
|---|---|---|
| Connector | 55100-0670 | Molex Inc |
| Connector | JN6FR07SM1 | Japan Aviation Electronics Ind. |
| Connector pin | LY10-C1-A1-10000 | |
| Cable | AWG24×4P, AWG22×2P | Hitachi Cable, Ltd. |

| L (m) | Part No. |
|---|---|
| 3 | MFECA0030MJD |
| 5 | MFECA0050MJD |
| 10 | MFECA0100MJD |
| 20 | MFECA0200MJD |



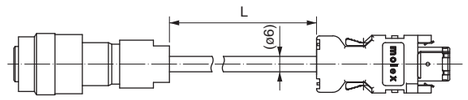
| Part No. | MFECA0＊＊0MJE | Compatible motor output | MSME 50W to 750W |
|---|---|---|---|
| Specifications | For 17-bit absolute encoder (With battery box) | | |




| Title | Part No. | Manufacturer |
|---|---|---|
| Connector | 55100-0670 | Molex Inc |
| Connector | SMM-003T-P0.5 | J.S.T Mfg. Co., Ltd. |
| Connector pin | ZMR-02 | |
| Connector | JN6FR07SM1 | Japan Aviation Electronics Ind. |
| Connector pin | LY10-C1-A1-10000 | |
| Cable | AWG24 ×4P, AWG22×2P | Hitachi Cable, Ltd. |

| L (m) | Part No. |
|---|---|
| 3 | MFECA0030MJE |
| 5 | MFECA0050MJE |
| 10 | MFECA0100MJE |
| 20 | MFECA0200MJE |

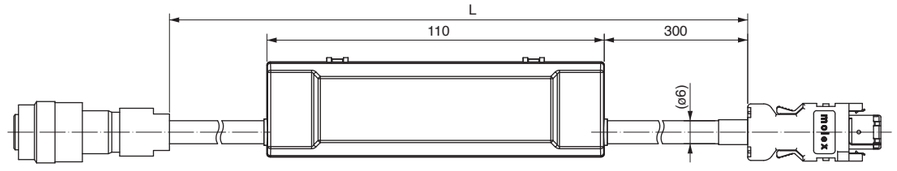
| Part No. | MFECA0＊＊0ETD | Compatible motor output | 0.9kW to 5.0kW |
|---|---|---|---|
| Specifications | For 20-bit incremental encoder (Without battery box) | | |




| Title | Part No. | Manufacturer |
|---|---|---|
| Connector | 55100-0670 | Molex Inc |
| Connector | JN2DS10SL1-R | Japan Aviation Electronics Ind. |
| Connector pin | JN1-22-22S-PKG100 | |
| Cable | 0.2mm²×3P | Oki Electric Cable Co., Ltd. |

| L (m) | Part No. |
|---|---|
| 3 | MFECA0030ETD |
| 5 | MFECA0050ETD |
| 10 | MFECA0100ETD |
| 20 | MFECA0200ETD |

| Part No. | MFECA0＊＊0ETE | Compatible motor output | 0.9kW to 5.0kW |
|---|---|---|---|
| Specifications | For 17-bit absolute encoder (With battery box) | | |

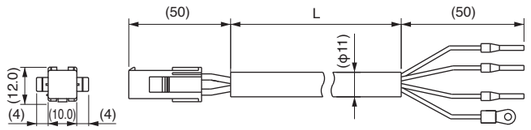



| Title | Part No. | Manufacturer |
|---|---|---|
| Connector | 55100-0670 | Molex Inc |
| Connector | ZMR-02 | J.S.T Mfg. Co., Ltd. |
| Connector pin | SMM-003T-P0.5 | |
| Connector | JN2DS10SL1-R | Japan Aviation Electronics Ind. |
| Connector pin | JN1-22-22S-PKG100 | |
| Cable | 0.2mm² ×3P | Oki Electric Cable Co., Ltd. |

| L (m) | Part No. |
|---|---|
| 3 | MFECA0030ETE |
| 5 | MFECA0050ETE |
| 10 | MFECA0100ETE |
| 20 | MFECA0200ETE |

# Junction Cable for Motor (Without brake)

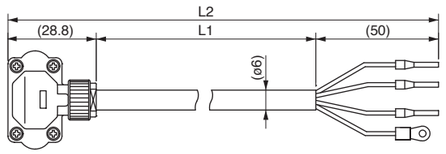
| Part No. | MFMCA0 * * 0EED | Applicable model | MSMD 50W to 750W, MHMD 200W to 750W |
|---|---|---|---|




| Title | Part No. | Manufacturer |
|---|---|---|
| Connector | 172159-1 | Tyco Electronics AMP |
| Connector pin | 170366-1 | |
| Rod terminal | AI0.75-8GY | Phoenix Contact |
| Nylon insulated round terminal | N1.25-M4 | J.S.T Mfg. Co., Ltd. |
| Cable | ROBO-TOP 600V 0.75mm$^2$ | Daiden Co.,Ltd. |

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

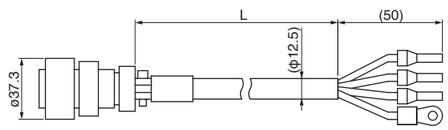
| Part No. | MFMCA0 * * 0NJD | Applicable model | MSME 50W to 750W |
|---|---|---|---|




| Title | Part No. | Manufacturer |
|---|---|---|
| Connector | JN8FT04SJ1 | Japan Aviation Electronics Ind. |
| Connector pin | ST-TMH-S-C1B-3500 | |
| Rod terminal | AI0.75-8GY | Phoenix Contact |
| Nylon insulated round terminal | N1.25-M4 | J.S.T Mfg. Co., Ltd. |
| Cable | AWG18×4P | Hitachi Cable, Ltd. |

| L (m) | Part No. |
|---|---|
| 3 | MFMCA0030NJD |
| 5 | MFMCA0050NJD |
| 10 | MFMCA0100NJD |
| 20 | MFMCA0200NJD |

| Part No. | MFMCD0 * * 2ECD | Applicable model | MSME 1.0kW to 2.0kW, MDME 1.0kW to 2.0kW<br>MHME 1.0kW to 1.5kW, MGME 0.9kW<br>(All model 200V and 400V commonness) |
|---|---|---|---|

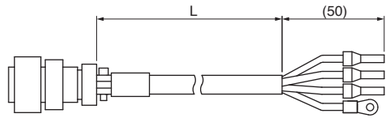



| Title | Part No. | Manufacturer |
|---|---|---|
| Connector | JL04V-6A20-4SE-EB-R | Japan Aviation Electronics Ind. |
| Cable clamp | JL04-2022CK(14)-R | |
| Rod terminal | AI2.5-8BU | Phoenix Contact |
| Nylon insulated round terminal | N2-M4 | J.S.T Mfg. Co., Ltd. |
| Cable | ROBO-TOP 600V 2.0mm$^2$ | Daiden Co.,Ltd. |

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



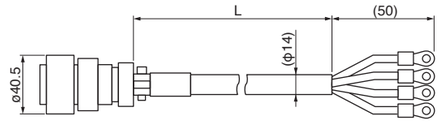
| Part No. | MFMCE0 * * 2ECD | Applicable model | MHME 2.0kW (200V and 400V commonness) |
|---|---|---|---|




| Title | Part No. | Manufacturer |
|---|---|---|
| Straight plug | JL04V-6A22-22SE-EB-R | Japan Aviation Electronics Ind. |
| Cable clamp | JL04-2022CK(14)-R | |
| Rod terminal | AI2.5-8BU | Phoenix Contact |
| Nylon insulated round terminal | N2-M4 | J.S.T Mfg. Co., Ltd. |
| Cable | ROBO-TOP 600V 2.0mm$^2$ | Daiden Co.,Ltd. |

| L (m) | Part No. |
|---|---|
| 3 | MFMCE0032ECD |
| 5 | MFMCE0052ECD |
| 10 | MFMCE0102ECD |
| 20 | MFMCE0202ECD |

| Part No. | MFMCA0 * * 3ECT | Applicable model | MSME 3.0kW to 5.0kW, MDME 3.0kW to 5.0kW<br>MHME 3.0kW to 5.0kW, MGME 2.0kW to 3.0kW<br>(All model 200V and 400V commonness) |
|---|---|---|---|

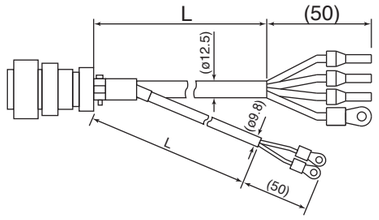



| Title | Part No. | Manufacturer |
|---|---|---|
| Straight plug | JL04V-6A22-22SE-EB-R | Japan Aviation Electronics Ind. |
| Cable clamp | JL04-2022CK(14)-R | |
| Nylon insulated round terminal | N5.5-5 | J.S.T Mfg. Co., Ltd. |
| Cable | ROBO-TOP 600V 3.5mm$^2$ | Daiden Co.,Ltd. |

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

# Junction Cable for Motor (With brake)

| Part No. | MFMCA0 * * 2FCD | Applicable model | MSME 1.0kW to 2.0kW (200V), MDME 1.0kW to 2.0kW (200V)<br>MHME 1.0kW to 1.5kW (200V), MGME 0.9kW (200V) |
|---|---|---|---|

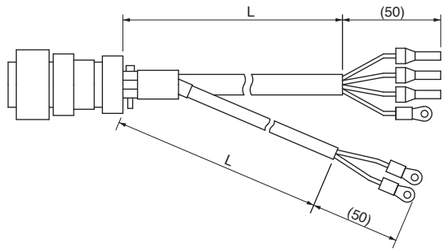



* This cable does not conform to IP67.

| Title | | Part No. | Manufacturer |
|---|---|---|---|
| Straight plug | | JL04V-6A20-18SE-EB-R | Japan Aviation Electronics Ind. |
| Cable clamp | | JL04-2022CK(14)-R | |
| Rod terminal | | AI2.5-8BU | Phoenix Contact |
| Nylon insulated round terminal | Earth | N2-M4 | J.S.T Mfg. Co., Ltd. |
| | Brake | N1.25-M4 | |
| Cable | | ROBO-TOP 600V 0.75mm$^2$ and ROBO-TOP 600V 2.0mm$^2$ | Daiden Co.,Ltd. |

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

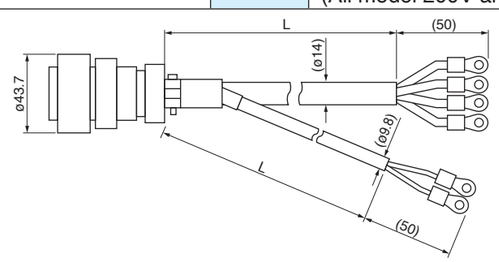
| Part No. | MFMCE0 * * 2FCD | Applicable model | MHME 2.0kW (200V),<br>MSME 1.0kW to 2.0kW (400V), MDME 1.0kW to 2.0kW (400V)<br>MHME 1.0kW to 2.0kW (400V), MGME 0.9kW (400V) |
|---|---|---|---|




| Title | | Part No. | Manufacturer |
|---|---|---|---|
| Straight plug | | JL04V-6A24-11SE-EB-R | Japan Aviation Electronics Ind. |
| Cable clamp | | JL04-2428CK(17)-R | |
| Rod terminal | | AI2.5-8BU | Phoenix Contact |
| Nylon insulated round terminal | Earth | N2-M4 | J.S.T Mfg. Co., Ltd. |
| | Brake | N1.25-M4 | |
| Cable | | ROBO-TOP 600V 0.75mm$^2$ and ROBO-TOP 600V 2.0mm$^2$ | Daiden Co.,Ltd. |

| L (m) | Part No. |
|---|---|
| 3 | MFMCE0032FCD |
| 5 | MFMCE0052FCD |
| 10 | MFMCE0102FCD |
| 20 | MFMCE0202FCD |

| Part No. | MFMCA0 * * 3FCT | Applicable model | MSME 3.0kW to 5.0kW, MDME 3.0kW to 5.0kW<br>MHME 3.0kW to 5.0kW, MGME 2.0kW to 3.0kW<br>(All model 200V and 400V commonness) |
|---|---|---|---|




* This cable does not conform to IP67.

| Title | | Part No. | Manufacturer |
|---|---|---|---|
| Straight plug | | JL04V-6A24-11SE-EB-R | Japan Aviation Electronics Ind. |
| Cable clamp | | JL04-2428CK(17)-R | |
| Nylon insulated round terminal | Earth | N5.5-5 | J.S.T Mfg. Co., Ltd. |
| | Brake | N1.25-M4 | |
| Cable | | ROBO-TOP 600V 0.75mm$^2$ and ROBO-TOP 600V 3.5mm$^2$ | Daiden Co.,Ltd. |

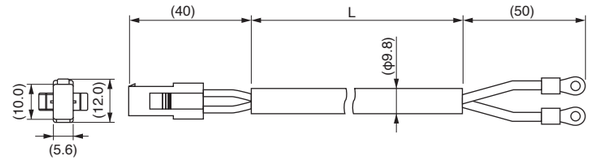
| L (m) | Part No. |
|---|---|
| 3 | MFMCA0033FCT |
| 5 | MFMCA0053FCT |
| 10 | MFMCA0103FCT |
| 20 | MFMCA0203FCT |





# Junction Cable for Brake

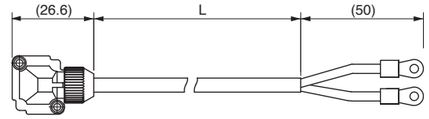
| Part No. | MFMCB0 * * 0GET | Applicable model | MSMD 50W to 750W, MHMD 200W to 750W |
|---|---|---|---|




| Title | Part No. | Manufacturer |
|---|---|---|
| Connector | 172157-1 | Tyco Electronics AMP |
| Connector pin | 170366-1, 170362-1 | |
| Nylon insulated round terminal | N1.25-M4 | J.S.T Mfg. Co., Ltd. |
| Cable | ROBO-TOP 600V 0.75mm$^2$ | Daiden Co.,Ltd. |

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

| Part No. | MFMCB0 * * 0PJT | Applicable model | MSME 50W to 750W |
|---|---|---|---|




| Title | Part No. | Manufacturer |
|---|---|---|
| Connector | JN4FT02SJMR | Japan Aviation Electronics Ind. |
| Connector pin | ST-TMH-S-C1B-3500 | |
| Nylon insulated round terminal | N1.25-M4 | J.S.T Mfg. Co., Ltd. |
| Cable | AWG22 | Hitachi Cable, Ltd. |

| L (m) | Part No. |
|---|---|
| 3 | MFMCB0030PJT |
| 5 | MFMCB0050PJT |
| 10 | MFMCB0100PJT |
| 20 | MFMCB0200PJT |

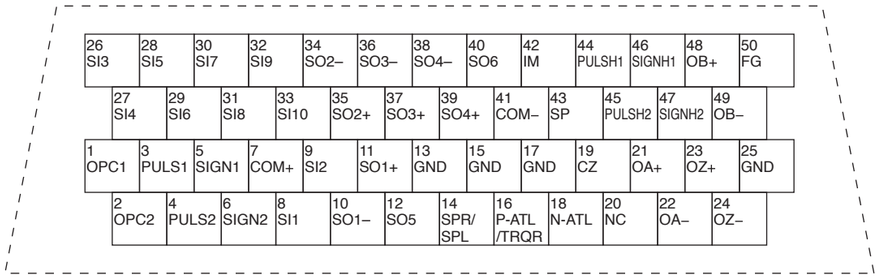
## Connector Kit for Interface

| Part No. | DV0P4350 |
|---|---|

• **Components**

| Title | Part No. | Number | Manufacturer | Note |
|---|---|---|---|---|
| Connector | 54306-5011 | 1 | Molex Inc | For Connector X4 (50-pins) |
| Connector cover | 54331-0501 | 1 | | |

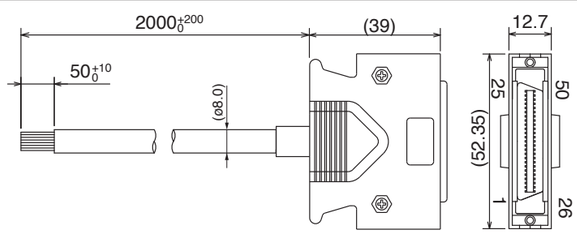
• Pin disposition (50 pins) (viewed from the soldering side)




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 the connector X4.
3) Do not connect anything to NC pins in the above table.

## Interface Cable

| Part No. | DV0P4360 |
|---|---|




This 2 m connector cable contains AWG28 conductors.

• 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 | Pink (Red3) | 39 | Pink (Black4) | 49 | Pink (Black5) |
| 10 | Orange (Red2) | 20 | —— | 30 | Pink (Black3) | 40 | Gray (Black4) | 50 | Gray (Black5) |

**<Remarks>**
Color designation of the cable
e.g.) Pin-1 Cable color : Orange (Red1) : One red dot on the cable



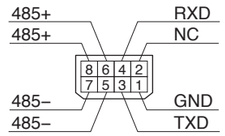
## Connector Kit for Communication Cable (for RS485, RS232) (Excluding A5E Series)

| Part No. | DV0PM20024 |
|---|---|

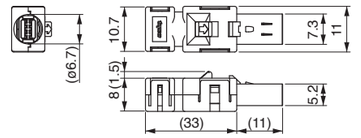
• **Components**

| Title | Part No. | Manufacturer | Note |
|---|---|---|---|
| Connector | 2040008-1 | Tyco Electronics AMP | For Connector X2 (8-pins) |

• Pin disposition of connector, connector X2




• Dimensions



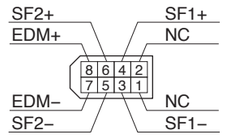

## Connector Kit for Safety (Excluding A5E Series)

| Part No. | DV0PM20025 |
|---|---|

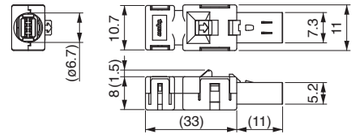
• **Components**

| Title | Part No. | Manufacturer | Note |
|---|---|---|---|
| Connector | 2013595-1 | Tyco Electronics AMP | For Connector X3 (8-pins) |

• Pin disposition of connector, connector X3




• Dimensions



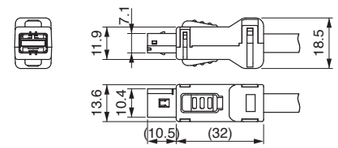

## Connector Kit for External Scale (Excluding A5E Series)

| Part No. | DV0PM20026 |
|---|---|

• **Components**

| Title | Part No. | Manufacturer | Note |
|---|---|---|---|
| Connector | MUF-PK10K-X | J.S.T Mfg. Co., Ltd. | For Connector X5 |

• Dimensions




## Connector Kit for Encoder

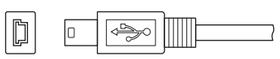
| Part No. | DV0PM20010 |
|---|---|

• **Components**

| Title | Part No. | Manufacturer | Note |
|---|---|---|---|
| Connector | 55100-0670 | Molex Inc | For Connector X6 |

**<Remarks>**
Connector X1: use with commercially available cable.

• Configuration of connector X1: USB mini-B



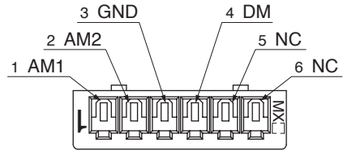
## Connector Kit for Analog Monitor Signal

**Part No.** **DV0PM20031**

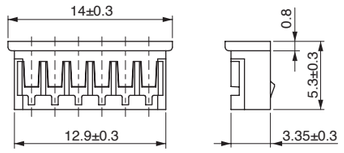
• **Components**

| Title | Part No. | Number | Manufacturer | Note |
|---|---|---|---|---|
| Connector | 510040600 | 1 | Molex Inc | For Connector X7 (6-pins) |
| Connector pin | 500118100 | 6 | | |

• Pin disposition of connector, connector X7




• Dimensions




## Connector Kit for Power Supply Input

**Part No.** **DV0PM20032** (For A to D-frame: Single row type)

• **Components**

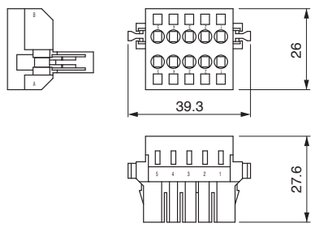
| Title | Part No. | Number | Manufacturer | Note |
|---|---|---|---|---|
| Connector | 05JFAT-SAXGF | 1 | J.S.T Mfg. Co., Ltd. | For Connector XA |
| Handle lever | J-FAT-OT | 2 | | |

**Part No.** **DV0PM20033** (For A to D-frame: Double row type)

• **Components**

| Title | Part No. | Number | Manufacturer | Note |
|---|---|---|---|---|
| Connector | 05JFAT-SAXGSA-C | 1 | J.S.T Mfg. Co., Ltd. | For Connector XA |
| Handle lever | J-FAT-OT | 2 | | |

• Dimensions




**Part No.** **DV0PM20044** (For E-frame)

• **Components**

| Title | Part No. | Number | Manufacturer | Note |
|---|---|---|---|---|
| Connector | 05JFAT-SAXGSA-L | 1 | J.S.T Mfg. Co., Ltd. | For Connector XA (E-frame) |
| Handle lever | J-FAT-OT-L | 2 | | |



**Part No.** **DV0PM20051** (For D-frame 400V)

• **Components**

| Title | Part No. | Number | Manufacturer | Note |
|---|---|---|---|---|
| Connector | 03JFAT-SAYGSA-M | 1 | J.S.T Mfg. Co., Ltd. | For Connector XA (D-frame) |
| Handle lever | J-FAT-OT-L | 2 | | |

**Part No.** **DV0PM20052** (For E-frame 400V)

• **Components**

| Title | Part No. | Number | Manufacturer | Note |
|---|---|---|---|---|
| Connector | 03JFAT-SAYGSA-L | 1 | J.S.T Mfg. Co., Ltd. | For Connector XA (E-frame) |
| Handle lever | J-FAT-OT-L | 2 | | |

## Connector Kit for Control Power Supply Input

**Part No.** **DV0PM20053** (For D, E-frame 400V)

• **Components**

| Title | Part No. | Number | Manufacturer | Note |
|---|---|---|---|---|
| Connector | 02MJFAT-SAGF | 1 | J.S.T Mfg. Co., Ltd. | For Connector XC (D, E-frame) |
| Handle lever | MJFAT-0T | 2 | | |

## Connector Kit for Regenerative Resistor Connection (E-frame)

**Part No.** **DV0PM20045** (For E-frame 200V/400V)

• **Components**

| Title | Part No. | Number | Manufacturer | Note |
|---|---|---|---|---|
| Connector | 04JFAT-SAXGSA-L | 1 | J.S.T Mfg. Co., Ltd. | 200V: For Connector XC<br>400V: For Connector XD<br>※ジャンパー線も付属しています。 |
| Handle lever | J-FAT-OT-L | 2 | | |

**Part No.** **DV0PM20055** (For D-frame 400V)

• **Components**

| Title | Part No. | Number | Manufacturer | Note |
|---|---|---|---|---|
| Connector | 04JFAT-SAXGSA-M | 1 | J.S.T Mfg. Co., Ltd. | For Connector XD |
| Handle lever | J-FAT-OT-L | 2 | | |

## Connector Kit for Motor Connection (Driver side)

**Part No.** **DV0PM20034** (For A to D-frame 100V/200V)

• **Components**

| Title | Part No. | Number | Manufacturer | Note |
|---|---|---|---|---|
| Connector | 06JFAT-SAXGF | 1 | J.S.T Mfg. Co., Ltd. | For Connector XB<br>※ジャンパー線も付属しています。 |
| Connector pin | J-FAT-OT | 2 | | |

| Part No. | DV0PM20046 (For E-frame 200V/400V) |
|---|---|

• **Components**

| Title | Part No. | Number | Manufacturer | Note |
|---|---|---|---|---|
| Connector | 03JFAT-SAXGSA-L | 1 | J.S.T Mfg. Co., Ltd. | For Connector XB (E-frame) |
| Handle lever | J-FAT-OT-L | 2 | | |

| Part No. | DV0PM20054 (For D-frame 400V) |
|---|---|

• **Components**

| Title | Part No. | Number | Manufacturer | Note |
|---|---|---|---|---|
| Connector | 03JFAT-SAXGSA-M | 1 | J.S.T Mfg. Co., Ltd. | For Connector XB (D-frame) |
| Handle lever | J-FAT-OT-L | 2 | | |

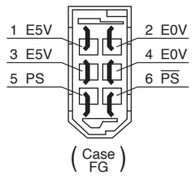
## Connector Kit for Motor/Encoder Connection

| Part No. | DV0P4290 | Applicable model | MSMD 50W to 750W, MHMD 200W to 750W (absolute encoder type) |
|---|---|---|---|

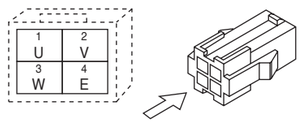
• **Components**

| Title | Part No. | Number | Manufacturer | Note |
|---|---|---|---|---|
| Connector | 55100-0670 | 1 | Molex Inc | For Connector 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 power (4-pins) |
| Connector pin | 170366-1 | 4 | | |

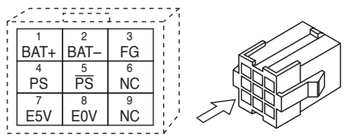
• Pin disposition of connector, connector X6




• Pin disposition of junction cable for motor power




• Pin disposition of junction cable for encoder



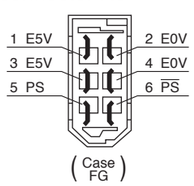

* When you connect the battery for absolute encoder, refer to P.125, "When you make your own cable for 17-bit absolute encoder"

| Part No. | DV0P4380 | Applicable model | MSMD 50W to 750W, MHMD 200W to 750W (incremental encoder type) |
|---|---|---|---|

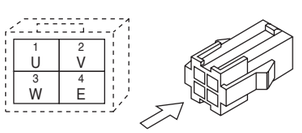
• **Components**

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

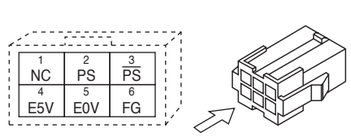
• Pin disposition of connector, connector X6




• Pin disposition of junction cable for motor power




• Pin disposition of junction cable for encoder





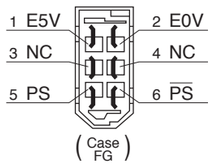



| Part No. | DV0PM20035 | Applicable model | MSME 50W to 750W |
|---|---|---|---|

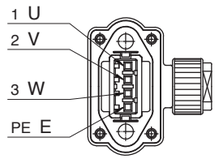
• **Components**

| Title | Part No. | Number | Manufacturer | Note |
|---|---|---|---|---|
| Connector | 55100-0670 | 1 | Molex Inc | For Connector X6 (6-pins) |
| Encoder plug connector | JN6FR07SM1 | 1 | Japan Aviation Electronics Ind. | For junction cable to encoder (7-pins) |
| Socket contact | LY10-C1-A1-10000 | 7 | | |
| Motor plug connector | JN8FT04SJ1 | 1 | Japan Aviation Electronics Ind. | For junction cable to motor power (4-pins) |
| Socket contact | ST-TMH-S-C1B-3500 | 4 | | |

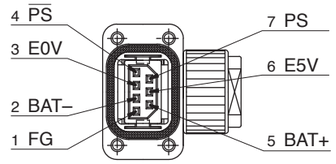
• Pin disposition of connector, connector X3




• Pin disposition of junction cable for motor power




• Pin disposition of junction cable for encoder




※インクリメンタルエンコーダの場合は
２ピンと５ピンは使用しません。

| Part No. | DV0PM20036 | Applicable model | MSME 1.0kW to 2.0kW, MDME 1.0kW to 2.0kW<br>MHME 1.0kW to 1.5kW, MGME 0.9kW<br>(All model 200V and 400V commonness) | Without brake |
|---|---|---|---|---|

• **Components**

| Title | Part No. | Number | Manufacturer | Note |
|---|---|---|---|---|
| Connector | 55100-0670 | 1 | Molex Inc | For Connector X6 (6-pins) |
| Encoder connector | JN2DS10SL1-R | 1 | Japan Aviation Electronics Ind. | For junction cable to encoder |
| Connector pin | JN1-22-22S-PKG100 | 5 | | |
| Motor connector | JL04V-6A-20-4SE-EB-R | 1 | Japan Aviation Electronics Ind. | For junction cable to motor power |
| Cable clamp | JL04-2022CK(14)-R | 1 | | |

| Part No. | DV0PM20037 | Applicable model | MSME 3.0kW to 5.0kW, MDME 3.0kW to 5.0kW<br>MHME 2.0kW to 5.0kW, MGME 2.0kW to 3.0kW<br>(All model 200V and 400V commonness) | Without brake |
|---|---|---|---|---|

• **Components**

| Title | Part No. | Number | Manufacturer | Note |
|---|---|---|---|---|
| Connector | 55100-0670 | 1 | Molex Inc | For Connector X6 (6-pins) |
| Encoder connector | JN2DS10SL1-R | 1 | Japan Aviation Electronics Ind. | For junction cable to encoder |
| Connector pin | JN1-22-22S-PKG100 | 5 | | |
| Motor connector | JL04V-6A22-22SE-EB-R | 1 | Japan Aviation Electronics Ind. | For junction cable to motor power |
| Cable clamp | JL04-2022CK(14)-R | 1 | | |

| Part No. | DV0PM20038 | Applicable model | MSME 1.0kW to 2.0kW, MDME 1.0kW to 2.0kW<br>MHME 1.0kW to 1.5kW, MGME 0.9kW<br>(All model 200V) | With brake |
|---|---|---|---|---|

• **Components**

| Title | Part No. | Number | Manufacturer | Note |
|---|---|---|---|---|
| Connector | 55100-0670 | 1 | Molex Inc | For Connector X6 (6-pins) |
| Encoder connector | JN2DS10SL1-R | 1 | Japan Aviation Electronics Ind. | For junction cable to encoder |
| Connector pin | JN1-22-22S-PKG100 | 5 | | |
| Motor connector | JL04V-6A20-18SE-EB-R | 1 | Japan Aviation Electronics Ind. | For junction cable to motor power |
| Cable clamp | JL04-2022CK(14)-R | 1 | | |

| Part No. | DV0PM20039 | Applicable model | (200V)<br>MSME 3.0kW to 5.0kW, MDME 3.0kW to 5.0kW<br>MHME 2.0kW to 5.0kW, MGME 2.0kW to 3.0kW<br>(400V)<br>MSME 1.0kW to 5.0kW, MDME 1.0kW to 5.0kW<br>MHME 1.0kW to 5.0kW, MGME 0.9kW to 3.0kW | With brake |
|---|---|---|---|---|

• **Components**

| Title | Part No. | Number | Manufacturer | Note |
|---|---|---|---|---|
| Connector | 55100-0670 | 1 | Molex Inc | For Connector X6 (6-pins) |
| Encoder connector | JN2DS10SL1-R | 1 | Japan Aviation Electronics Ind. | For junction cable to encoder |
| Connector pin | JN1-22-22S-PKG100 | 5 | | |
| Motor connector | JL04V-6A24-11SE-EB-R | 1 | Japan Aviation Electronics Ind. | For junction cable to motor power |
| Cable clamp | JL04-2428CK(17)-R | 1 | | |

## Connector Kit for Motor/Brake Connection

| Part No. | DV0PM20040 |
|---|---|

• **Components**

| Title | Part No. | Number | Manufacturer | Note |
|---|---|---|---|---|
| Connector | JN4FT02SJM-R | 1 | Japan Aviation Electronics Ind. | |
| Handle lever | ST-TMH-S-C1B-3500 | 2 | | |

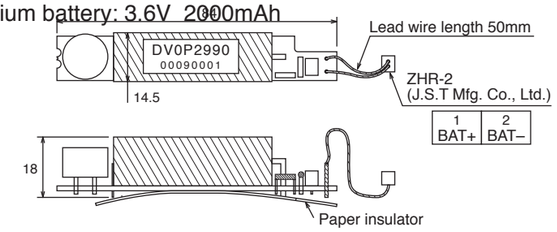




## Battery For Absolute Encoder

| Part No. | DV0P2990 |
|---|---|

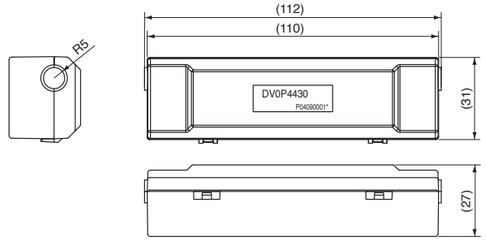
• Lithium battery: 3.6V 2000mAh




**<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).

## Battery Box For Absolute Encoder

| Part No. | DV0P4430 |
|---|---|




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

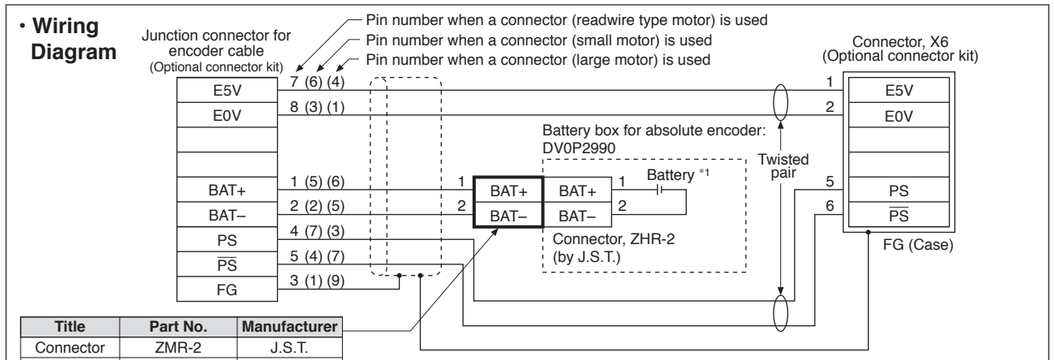
When you make your own cable for 17-bit absolute encoder, connect the optional battery for absolute encoder, DV0P2060 or DV0P2990 as per the wiring diagram below. Connector of the battery for absolute encoder shall be provided by customer as well.

**<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 the battery.

• **Installation Place**

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, sulfuric gas, acid, alkaline and salt and so on, and are 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**




| Title | Part No. | Manufacturer |
|---|---|---|
| Connector | ZMR-2 | J.S.T. |
| Connector pin | SMM-003T-P0.5 | J.S.T. |
| Clamping Jig | YRS-800 | J.S.T. |

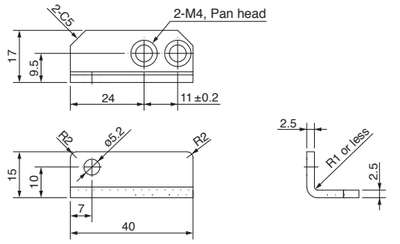
*1 Battery for absolute encoder (Option): DV0P2990

# Mounting Bracket

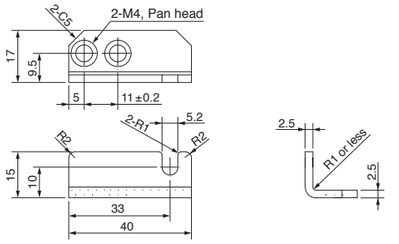
| Part No. | DV0PM20027 | Frame symbol of applicable driver | A-frame | Mounting screw | M4 × L6 Pan head 4pcs |
|---|---|---|---|---|---|

Dimensions

Upper side



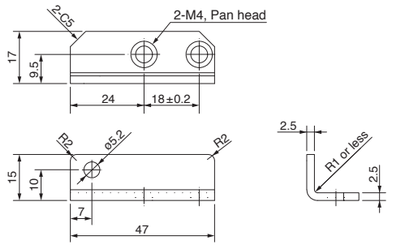

Bottom side



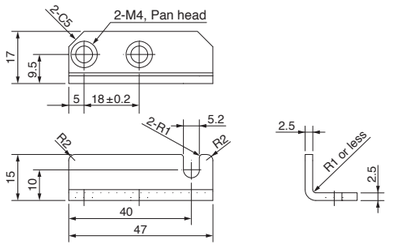

| Part No. | DV0PM20028 | Frame symbol of applicable driver | B-frame | Mounting screw | M4 × L6 Pan head 4pcs |
|---|---|---|---|---|---|

Dimensions

Upper side



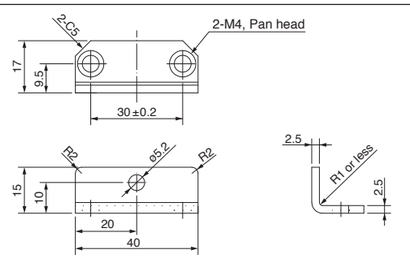

Bottom side



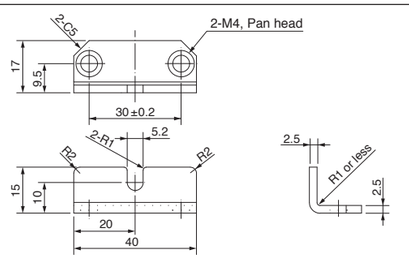

| Part No. | DV0PM20029 | Frame symbol of applicable driver | C-frame | Mounting screw | M4 × L6 Pan head 4pcs |
|---|---|---|---|---|---|

Dimensions

Upper side



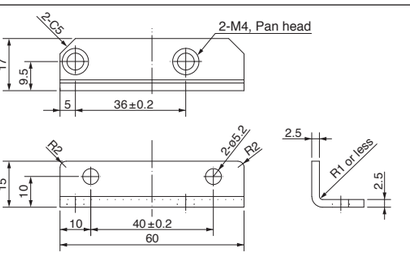

Bottom side



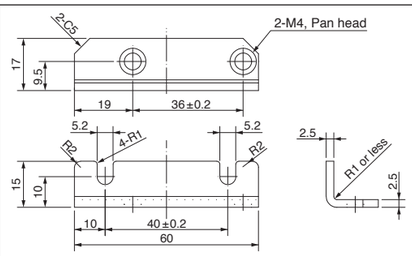

| Part No. | DV0PM20030 | Frame symbol of applicable driver | D-frame | Mounting screw | M4 × L6 Pan head 4pcs |
|---|---|---|---|---|---|

Dimensions

Upper side




Bottom side




**<Caution>**

For E and F-frame, you con make a front end and back end mounting by changing the mounting direction of L-shape bracket (attachment).





# Reactor

Fig.1

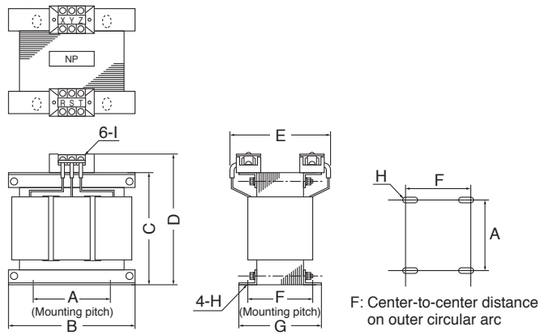
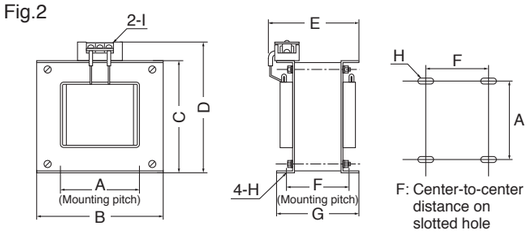



Fig.2




| | Part No. | A | B | C | D | E (Max) | F | G | H | I | Inductance (mH) | Rated current (A) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Fig.1 | **DV0P220** | 65±1 | 125±1 | (93) | 136Max | 155 | 70+3/–0 | 85±2 | 4-7ϕ×12 | M4 | 6.81 | 3 |
| | **DV0P221** | 60±1 | 150±1 | (113) | 155Max | 130 | 60+3/–0 | 75±2 | 4-7ϕ×12 | M4 | 4.02 | 5 |
| | **DV0P222** | 60±1 | 150±1 | (113) | 155Max | 140 | 70+3/–0 | 85±2 | 4-7ϕ×12 | M4 | 2 | 8 |
| | **DV0P223** | 60±1 | 150±1 | (113) | 155Max | 150 | 79+3/–0 | 95±2 | 4-7ϕ×12 | M4 | 1.39 | 11 |
| | **DV0P224** | 60±1 | 150±1 | (113) | 160Max | 155 | 84+3/–0 | 100±2 | 4-7ϕ×12 | M5 | 0.848 | 16 |
| | **DV0P225** | 60±1 | 150±1 | (113) | 160Max | 170 | 100+3/–0 | 115±2 | 4-7ϕ×12 | M5 | 0.557 | 25 |
| Fig.2 | **DV0P227** | 55±0.7 | 80±1 | 66.5±1 | 110Max | 90 | 41±2 | 55±2 | 4-5ϕ×10 | M4 | 4.02 | 5 |
| | **DV0P228** | 55±0.7 | 80±1 | 66.5±1 | 110Max | 95 | 46±2 | 60±2 | 4-5ϕ×10 | M4 | 2 | 8 |

* For application, refer to P.16, 17 “Table of Part Numbers and Options”.

## Harmonic restraint

On September, 1994, “Guidelines for harmonic restraint on heavy consumers who receive power through high voltage system or extra high voltage system” and “Guidelines for harmonic restraint on household electrical appliances and general-purpose articles” established by the Agency for Natural Resources and Energy of the Ministry of Economy, Trade and Industry (the ex-Ministry of International Trade and Industry). According to those guidelines, the Japan Electrical Manufacturers’ Association (JEMA) have prepared technical documents (procedure to execute harmonic restraint: JEM-TR 198, JEM-TR 199 and JEM-TR 201) and have been requesting the users to understand the restraint and to cooperate with us.
On January, 2004, it has been decided to exclude the general-purpose inverter and servo driver from the “Guidelines for harmonic restraint on household electrical appliances and general-purpose articles”. After that, the “Guidelines for harmonic restraint on household electrical appliances and general-purpose articles” was abolished on September 6, 2004.
We are pleased to inform you that the procedure to execute the harmonic restraint on general-purpose inverter and servo driver was modified as follows.

1. All types of the general-purpose inverters and servo drivers used by specific users are under the control of the “Guidelines for harmonic restraint on heavy consumers who receive power through high voltage system or extra high voltage system”. The users who are required to apply the guidelines must calculate the equivalent capacity and harmonic current according to the guidelines and must take appropriate countermeasures if the harmonic current exceeds a limit value specified in a contract demand. (Refer to JEM-TR 210 and JEM-TR 225.)
2. The “Guidelines for harmonic restraint on household electrical appliances and general-purpose articles” was abolished on September 6, 2004. However, based on conventional guidelines, JEMA applies the technical documents JEM-TR 226 and JEM-TR 227 to any users who do not fit into the “Guidelines for harmonic restraint on heavy consumers who receive power through high voltage system or extra high voltage system” from a perspective on enlightenment on general harmonic restraint. The purpose of these guidelines is the execution of harmonic restraint at every device by a user as usual to the utmost extent.

**<Remarks>** When using a reactor, be sure to install one reactor to one servo driver.

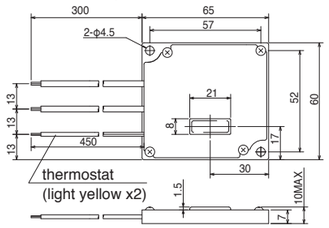
# External Regenerative Resistor

| Part No. | Manufacturer's part No. | Specifications | | | | | Activation temperature of built-in thermostat |
|---|---|---|---|---|---|---|---|
| | | Resistance | Rated power (reference) * | | | | |
| | | | Free air [W] | with fan [W] | | | |
| | | Ω | | 1m/s | 2m/s | 3m/s | |
| **DV0P4280** | RF70M | 50 | 10 | 25 | 35 | 45 | 140±5°C<br>B-contact<br>Open/Close capacity<br>(resistance load)<br>4A 125VAC 10000 times<br>2.5A 250VAC 10000 times |
| **DV0P4281** | RF70M | 100 | 10 | 25 | 35 | 45 | |
| **DV0P4282** | RF180B | 25 | 17 | 50 | 60 | 75 | |
| **DV0P4283** | RF180B | 50 | 17 | 50 | 60 | 75 | |
| **DV0P4284** | RF240 | 30 | 40 | 100 | 120 | 150 | |
| **DV0P4285** | RH450F | 20 | 52 | 130 | 160 | 200 | |
| **DV0PM20048** | RF240TF | 120 | 35 | 80 | 70 | 75 | |
| **DV0PM20049** | RH450FTF | 80 | 65 | 190 | 100 | 110 | |

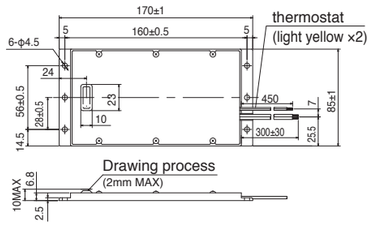
Manufacturer : Iwaki Musen Kenkyusho

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

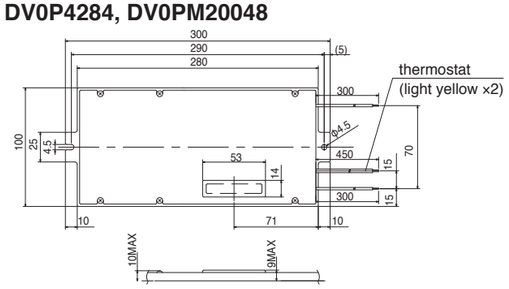
**DV0P4280, DV0P4281**



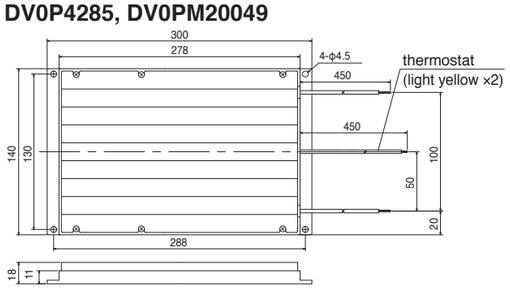

**DV0P4282, DV0P4283**




**DV0P4284, DV0PM20048**




**DV0P4285, DV0PM20049**




| Frame | Power supply | | |
|---|---|---|---|
| | Single phase, 100V | Single phase, 200V 3-phase, 200V | 3-phase, 400V |
| A | DV0P4280 | DV0P4281 | — |
| B | DV0P4283 | DV0P4283 | |
| C | DV0P4282 | | |
| D | — | DV0P4284 | DV0PM20048 |
| E | | DV0P4285 | DV0PM20049 |
| F | | DV0P4285 × 2 in parallel | DV0PM20049 × 2 in parallel |

**<Remarks>**

**Thermal fuse is 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.**





# Surge absorber for motor brake

| Motor | Part No. | Manufacturer |
|---|---|---|
| MSME 50W to 750W | Z15D271 | Ishizuka Electronics Co. |
| MHME 2.0kW to 5.0kW | Z15D151 | Ishizuka Electronics Co. |
| MGME 0.9kW to 2.0kW | | |
| MSME 1.0kW to 5.0kW | | |
| MDME 4.0kW to 5.0kW | | |
| MGME 3.0kW | | |
| MDME 1.0kW to 3.0kW | TND09V-820KB00AAA0 | Nippon Chemi_Con Co. |
| MHME 1.0kW to 1.5kW | | |

# List of Peripheral Equipments

| Manufacturer | Tel No. / Home Page | Peripheral components |
|---|---|---|
| Automation Controls Company<br>Panasonic Electric Works, Co.,Ltd | 81-6-6908-1131<br>http://panasonic-denko.co.jp/ac | Circuit breaker<br>Surge absorber |
| Iwaki Musen Kenkyusho Co., Ltd. | 81-44-833-4311<br>http://www.iwakimusen.co.jp/ | Regenerative resistor |
| Nippon Chemi-Con Co. | 81-3-5436-7711<br>http://www.chemi_con.co.jp/ | Surge absorber<br>for holding brake |
| Ishizuka Electronics Corp. | 81-3-3621-2703<br>http://www.semitec.co.jp/ | |
| TDK Corp. | 81-3-5201-7229<br>http://www.tdk.co.jp/ | Noise filter for signal lines |
| Okaya Electric Industries Co. Ltd. | 81-3-4544-7040<br>http://www.okayatec.co.jp/ | Surge absorber<br>Noise filter |
| Japan Aviation Electronics Industry, Ltd. | 81-3-3780-2717<br>http://www.jae.co.jp | Connector |
| Sumitomo 3M | 81-3-5716-7290<br>http://www.mmmco.jp | |
| Tyco Electronics AMP k.k, | 81-44-844-8111<br>http://www.tycoelectronics.com/<br>japan/amp | |
| Japan Molex Inc. | 81-462-65-2313<br>http://www.molex.co.jp | |
| J.S.T. Mfg. Co., Ltd. | 81-45-543-1271<br>http://www.jst-mfg.com/index_i.html | |
| Daiden Co., Ltd. | 81-3-5805-5880<br>http://www.dyden.co.jp/ | Cable |
| Mitutoyo Corp. | 81-44-813-8236<br>http://www.mitutoyo.co.jp | External scale |
| Sony Manufacturing Systems Corp. | 81-3-3490-3920<br>http://www.sonysms.co.jp/ | |

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

## Contents

# Setup support software “PANATERM”

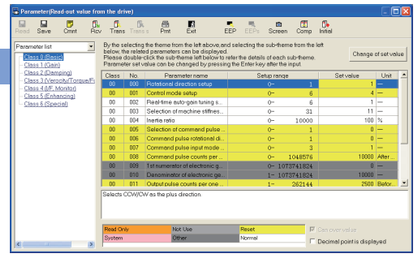
## 先進機能満載の次世代サポートツール

新しくなったセットアップ支援ソフトウェア「PANATERM」のご紹介

### ■パソコン上で監視･設定･解析

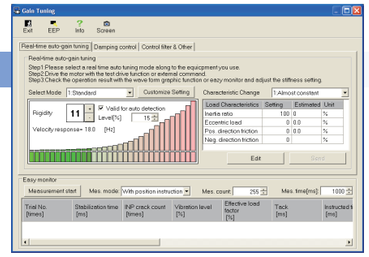
・USB通信により、アンプ・パソコン間のアクセスが高速に。
・4言語対応（日・英・中・韓）。
・Windows Vista、Windows XP（SP3）対応（現行32ビット版のみ）。

**設定**



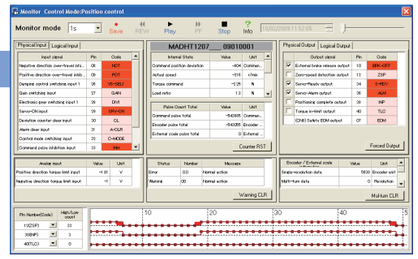
入力し易い階層別パラメータ表示

**調整**



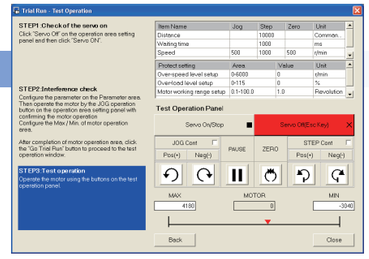
発振時剛性自動低減付きゲイン調整専用画面追加

**モニタ**



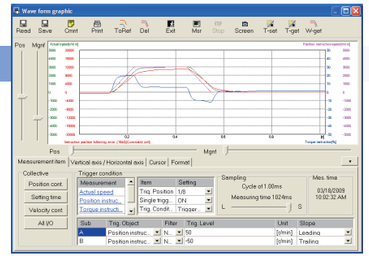
録再機能装備のユニバーサルモニタ

**試運転**



動作範囲制限で安心な試運転機能搭載

**解析**



測定対象が大幅増加高機能波形グラフィック

**その他**

・周波数特性測定
・トラブルシュート
・アナログ入力調整
・Z相サーチ機能
・アラームモニタ
・外部ツール使用による機能拡張

**Hardware configuration**

| | | |
|---|---|---|
| **Personal computer** | CPU | Pentium 100MHz or more |
| | Memory | 256MB or more (512MB recommended) |
| | Hard disk capacity | Vacancy of 512MB or more recommended |
| | OS | Windows® XP SP3, Windows® Vista SP1 (Japanese/US/Chinese version)<br>※64bit版Windows(x64)には非対応 |
| | serial communication port | USB port |
| **Display** | Resolution | 1024 × 768pix or more (desirably 1024 × 768) |
| | Number of colors | 24bit colors (TrueColor) or more |

**Please download from our web site and use after install to the PC.** **http://panasonic.co.jp/motor/**





# AC servo motor capacity selection software
# Option selection software for AC servo motor



## AC servo motor capacity selection software

We have prepared PC software “M-SELECT” for AC servo motor capacity selection.
Consult our sales representative or authorized distributor.

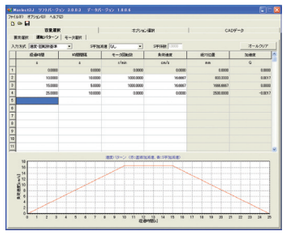
### ・Three-step selection

**1. Select components and specified values**

Select appropriate mechanical parameter items and fill them with parameter values derived from the real machine. To simulate the target machine as practical as possible, use maximum number of parameters available.

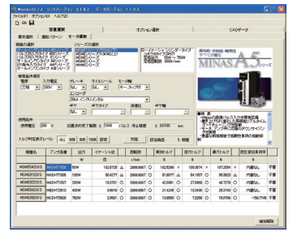
**2. Enter operation pattern**

Input the planned operation pattern that will contain [speed and rotation standard] or [absolute position standard] with optional settings such as S-acceleration/deceleration.



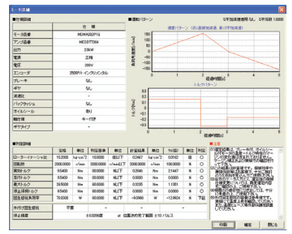
**3. Select the motor**

When the data required in step 1 and 2 above have been input, the software lists the motors, which will be appropriate to use with your machine. Select the motor that is best suitable for your machine application.



**Details of motor**

Once the motor is selected, specifications of the motor and amplifier, and details of reason for determination are displayed and may be printed out.



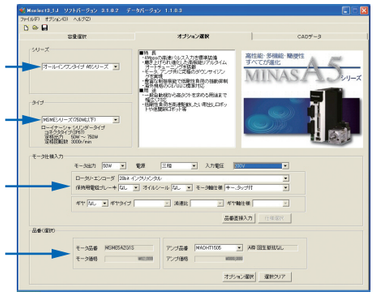
## Option selection software for AC servo motor

We have prepared PC software to enable fast, easy, and correct option selection, a complicated job without the software.

### ・Two procedures for option selection

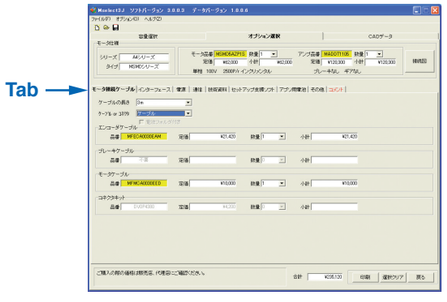
**1. Selection according to driver series and motor type**

Suitable option can be selected by selecting driver series, motor type and motor specification through pulldown menu.




**2. Entry of model number**

If you know the model number based on the servo motor and driver currently used, enter the model number.



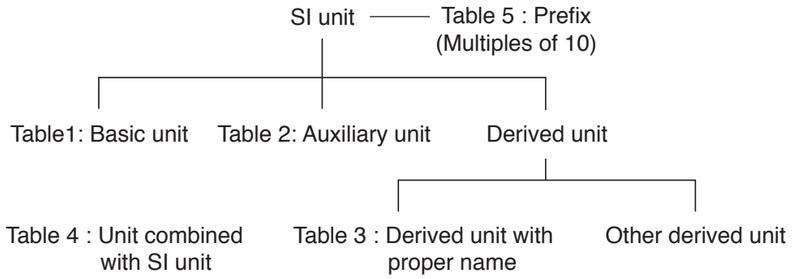

**Result of selection**

Tab sheet specific to each of option model numbers is used for easier identification of the desired option.

* When you are using the motor capacity selection software, simply press [Option Selection] tab and the screen as shown right will appear.

**Please download from our web site and use after install to the PC.** **http://panasonic.co.jp/motor/**

# Organization of the system of units




## Table1: Basic unit

| Quantity | Name of unit | Symbol of unit |
|---|---|---|
| Length | meter | m |
| Weight | kilogram | kg |
| Time | second | s |
| Current | ampere | A |
| Thermodynamic temperature | kelvin | K |
| Amount of substance | mol | mol |
| Luminous intensity | candela | cd |

## Table 2: Auxiliary unit

| Quantity | Name of unit | Symbol of unit |
|---|---|---|
| Plane angle | radian | rad |
| Solid angle | steradian | sr |

## Table 3: Major derived unit with proper name

| Quantity | Name | Symbol of unit | Derivation from basic unit, auxiliary unit or other derived unit |
|---|---|---|---|
| Frequency | hertz | Hz | $1Hz=1s^{-1}$ |
| Force | newton | N | $1N=1kg{\cdot}m/s^2$ |
| Pressure, Stress | pascal | Pa | $1Pa=1N/m^2$ |
| Energy, Work, Amount of heat | joule | J | $1J=1N{\cdot}m$ |
| Amount of work, Work efficiency, Power, Electric power | watt | W | 1W=1J/s |
| Electric charge, Amount of electricity | coulomb | C | $1C=1A{\cdot}s$ |
| Electric potential, Potential difference, Voltage, Electromotive force | volt | V | 1V=1J/C |
| Electrostatic capacity, Capacitance | farad | F | 1F=1C/V |
| Electric resistance | ohm | Ω | $1\Omega=1V/A$ |
| Electric conductance | siemens | S | $1S=1\Omega^{-1}$ |
| Magnetic flux | weber | Wb | $1Wb=1V{\cdot}s$ |
| Magnetic flux density, Magnetic induction | tesla | T | $1T=1Wb/m^2$ |
| Inductance | henry | H | 1H=1Wb/A |
| Degree centigrade (Celsius) | degree centigrade (Celsius) / degree | ˚C | $t˚C=(t+273.15)K$ |
| Luminous flux | lumen | lm | $1lm=1cd{\cdot}sr$ |
| Illuminance | lux | lx | $1lx=1lm/m^2$ |

## Table 4: Unit combined with SI unit

| Quantity | Name | Symbol of unit |
|---|---|---|
| Time | minute | min |
| | hour | h |
| | day | d |
| Plane angle | degree | ° |
| | minute | ' |
| | second | " |
| Volume | liter | l, L |
| Weight | ton | t |

## Table 5: Prefix

| Multiples powered to unit | Prefix | |
|---|---|---|
| | Name | Symbol |
| $10^{18}$ | exa | E |
| $10^{15}$ | peta | P |
| $10^{12}$ | tera | T |
| $10^{9}$ | giga | G |
| $10^{6}$ | mega | M |
| $10^{3}$ | kilo | k |
| $10^{2}$ | hecto | h |
| 10 | deca | da |
| $10^{-1}$ | deci | d |
| $10^{-2}$ | centi | c |
| $10^{-3}$ | milli | m |
| $10^{-6}$ | micro | μ |
| $10^{-9}$ | nano | n |
| $10^{-12}$ | pico | p |
| $10^{-15}$ | femto | f |
| $10^{-18}$ | atto | a |





# Major compatible unit

| Quantity | Symbol of conventional unit | Symbol of SI unit and compatible unit | Conversion value |
|---|---|---|---|
| Length | μ (micron) | μ m | $1\mu=1\mu m$ (micrometer) |
| Acceleration | Gal | $m/s^2$ | $1Gal=10^{-2}m/s^2$ |
| | G | $m/s^2$ | $1G=9.806\ 65m/s^2$ |
| Frequency | c/s, c | Hz | 1c/s=Hz |
| Revolving speed, Number of revolutions | rpm | $s^{-1}$ or $min^{-1}$, r/min | $1rpm=1min^{-1}$ |
| Weight | kgf | – | Same value |
| Mass | – | kg | |
| Weight flow rate | kgf/s | – | Same value |
| Mass flow rate | – | kg/s | |
| Specific weight | $kgf/m^3$ | – | Same value |
| Density | – | $kg/m^3$ | |
| Specific volume | $m^3/kgf$ | $m^3/kg$ | Same value |
| Load | kgf | N | $1kgf=9.806\ 65N$ |
| Force | kgf | N | $1kgf=9.806\ 65N$ |
| | dyn | N | $1dyn=10^{-5}N$ |
| Moment of force | kgf-m | N-m | $1kgf\text{-}m=9.806\ N{\cdot}m$ |
| Pressure | $kgf/cm^2$ | Pa, bar (2) or $kgf/cm^2$ | $1kgf/cm^2=9.806\ 65\times10^4Pa=0.980$ |
| | at (Engineering atmospheric pressure) | Pa | 665bar |
| | atm (Atmospheric pressure) | Pa | $1at=9.806\ 65\times10^4Pa$ |
| | $mH_2o$, mAq | Pa | $1atm=1.013\ 25\times10^3Pa$ |
| | mmHg | Pa or mmHg (2) | $1mH_2O=9.806\ 65\times10^3Pa$ |
| | Torr | Pa | 1mmHg=133.322Pa |
| Stress | $kgf/mm^2$ | Pa or $N/m^2$ | $1kgf/mm^2=9.806\ 65\times10^4Pa$ |
| | | | $=9.806\ 65\times10^6N/m^2$ |
| | $kgf/cm^2$ | Pa or $N/m^2$ | $1kgf/cm^2=9.806\ 65\times10^4Pa$ |
| | | | $=9.806\ 65\times10^4N/m^2$ |
| Elastic modulus | $kgf/m^2$ | Pa or $N/m^2$ | $1kgf/m^2=9.806\ 65Pa=9.806\ 65N/m^2$ |
| | | | $1kgf/cm^2=9.806\ 65\times10^4N/m^2$ |
| Energy, Work | kgf-m | J (joule) | $1kgf{\cdot}m=9.806\ 65J$ |
| | erg | J | $1erg=10^7J$ |
| Work efficiency, Power | kgf-m/s | W (watt) | $1kgf\text{-}m/s=9.806\ 65W$ |
| | PS | W | $1PS=0.735\ 5kW$ |
| Viscosity | PP | Ps-s | 1P=0.1Pa-s |
| Kinetic viscosity | St | $mm^2/s$ | $10^{-2}St=1mm^2/s$ |
| Thermodynamic temperature | K | K (kelvin) | 1K=1K |
| Temperature interval | deg | K (3) | 1deg=1K |
| Amount of heat | cal | J | $1cal=4.186\ 05J$ |
| Heat capacity | cal/˚C | J/K (3) | $1cal/˚C=4.186\ 05J/K$ |
| Specific heat, Specific heat capacity | cal/ (kgf·˚C) | cal/ (kgf·K)(3) | $1cal/\ (kgf{\cdot}˚C)=4.186\ 05J/\ (kg{\cdot}K)$ |
| Entropy | cal/K | J/K | $1cal/K=4.186\ 05J/K$ |
| Specific entropy | cal/ (kgf·K) | J/(kg·K) | $1cal/\ (kgf{\cdot}K)=4.186\ 05J/\ (kg{\cdot}K)$ |
| Internal energy (Enthalpy) | cal | J | $1cal=4.186\ 05J$ |
| Specific internal energy (Specific enthalpy) | cal/kgf | J/kg | $1cal/kgf=4.186\ 05J/kg$ |
| Heat flux | cal/h | W | $1kcal/h=1.162\ 79W$ |
| Heat flux density | cal/ (h·$m^2$) | $W/m^2$ | $1kcal\ (h{\cdot}m^2)=1.162\ 79W/m^2$ |
| Thermal conductivity | cal/ (h·m·˚C) | W/ (m·K) (3) | $1kcal\ (h{\cdot}m{\cdot}˚C)=1.162\ 79W/\ (m{\cdot}K)$ |
| Coefficient of thermal conductivity | cal/ (h·$m^2$·˚C) | W/ ($m^2$·K) (3) | $1kcal\ (h{\cdot}m{\cdot}˚C)=1.162\ 79W/\ (m^2{\cdot}K)$ |
| Intensity of magnetic field | Oe | A/m | $1Oe=10^2/\ (4\pi)A/m$ |
| Magnetic flux | Mx | Wb (weber) | $1Mx=10^{-8}Wb$ |
| Magnetic flux density | Gs,G | T (tesla) | $1Gs=10^{-4}T$ |

**Note**
(1) Applicable to liquid pressure. Also applicable to atmospheric pressure of meteorological data, when “bar” is used in international standard.
(2) Applicable to scale or indication of blood pressure manometers.
(3) “˚C” can be substituted for “K”.

# Flow of motor selection

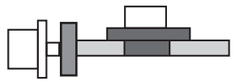
## Flow of motor selection

**1. Definition of mechanism to be driven by motor.**

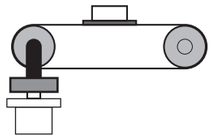
Define details of individual mechanical components (ball screw length, lead and pulley diameters, etc.)

**<Typical mechanism>**

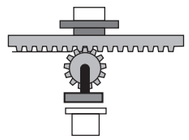
Ball screw mechanism



Belt mechanism

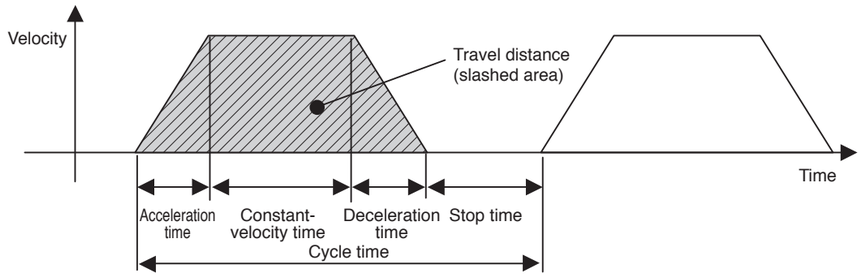


Rack & pinion, etc.



**2. Definition of operating pattern.**

Acceleration/deceleration time, Constant-velocity time, Stop time, Cycle time, Travel distance




Note) Selection of motor capacity significantly varies depending on the operating pattern.
The motor capacity can be reduced if the acceleration/deceleration time and stop time are set as long as possible.

**3. Calculation of load inertia and inertia ratio.**

Calculate load inertia for each mechanical component. (Refer to "General inertia calculation method" described later.)
Divide the calculated load inertia by the inertia of the selected motor to check the inertia ratio.
For calculation of the inertia ratio, note that the catalog value of the motor inertia is expressed as "× $10^{-4}$kg·$m^2$".

**4. Calculation of motor velocity**

Calculate the motor velocity from the moving distance, acceleration / deceleration time and constant-velocity time.

**5. Calculation of torque**

Calculate the required motor torque from the load inertia, acceleration/deceleration time and constant-velocity time.

**6. Calculation of motor**

Select a motor that meets the above 3 to 5 requirements.





# Description on the items related to motor selection

## Description on the items related to motor selection

**1. Torque**

**(1) Peak torque**

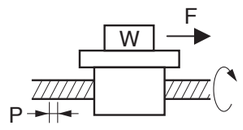
Indicate the maximum torque that the motor requires during operation (mainly in acceleration and deceleration steps). The reference value is 80% or less of the maximum motor torque. If the torque is a negative value, a regenerative discharge resistor may be required.

**(2) Traveling torque, Stop holding torque**

Indicates the torque that the motor requires for a long time. The reference value is 80% or less of the rated motor torque. If the torque is a negative value, a regenerative discharge resistor may be required.

**Traveling torque calculation formula for each mechanism**

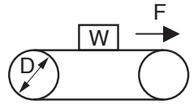
**Ball screw mechanism**




Traveling torque $T_f = \frac{P}{2\pi\eta}(\mu g W + F)$

W : Weight [kg]
P : Lead [m]
F : External force [N]
$\eta$ : Mechanical efficiency
$\mu$ : Coefficient of friction
g : Acceleration of gravity 9.8[$m/s^2$]

**Belt mechanism**




Traveling torque $T_f = \frac{D}{2\pi\eta}(\mu g W + F)$

W : Weight [kg]
P : Pulley diameter [m]
F : External force [N]
$\eta$ : Mechanical efficiency
$\mu$ : Coefficient of friction
g : Acceleration of gravity 9.8[$m/s^2$]

**(3) Effective torque**

Indicates a root-mean-square value of the total torque required for running and stopping the motor per unit time. The reference value is approx. 80% or less of the rated motor torque.

$$Trms = \sqrt{\frac{Ta^2 \times ta + Tf^2 \times tb + Td^2 \times td}{tc}}$$

$T_a$ : Acceleration torque [N·m]
$T_f$ : Traveling torque [N·m]
$T_d$ : Deceleration torque [N·m]
$t_a$ : Acceleration time [s]
$t_b$ : Constant-velocity time [s]
$t_d$ : Deceleration time [s]
$t_c$ : Cycle time [s] (Run time + Stop time)

**2. Motor velocity**

**Maximum velocity**

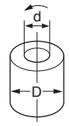
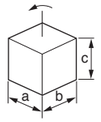
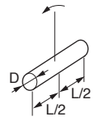
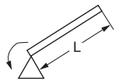
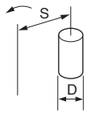
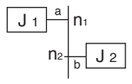
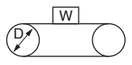
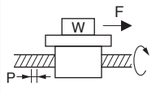
Maximum velocity of motor in operation: The reference value is the rated velocity or lower value.
When the motor runs at the maximum velocity, you must pay attention to the motor torque and temperature rise. For actual calculation of motor velocity, see "Example of motor selection" described later.

# Description on the items related to motor selection

**3. Inertia and inertia ratio**

Inertia is like the force to retain the current moving condition.
Inertia ratio is calculated by dividing load inertia by rotor inertia.
Generally, for motors with 750 W or lower capacity, the inertia ratio should be “20” or less. For motors with 1000 W or higher capacity, the inertia ratio should be “10” or less.
If you need quicker response, a lower inertia ratio is required.
(For example, when the motor takes several seconds in acceleration step, the inertia ratio can be further increased.)

## General inertia calculation method

| Shape | J calculation formula | Shape | J calculation formula |
|---|---|---|---|
| **Disk**  | $J=\frac{1}{8}WD^2$ [kg·m²]<br>W : Weight [kg]<br>D : Outer diameter [m] | **Hollow cylinder**  | $J=\frac{1}{8}W(D^2+d^2)$ [kg·m²]<br>W : Weight [kg]<br>D : Outer diameter [m]<br>d : Inner diameter [m] |
| **Prism**  | $J=\frac{1}{12}W(a^2+b^2)$ [kg·m²]<br>W : Weight [kg]<br>a, b, c : Side length [m] | **Uniform rod**  | $J=\frac{1}{48}W(3D^2+4L^2)$ [kg·m²]<br>W : Weight [kg]<br>D : Outer diameter [m]<br>L : Length [m] |
| **Straight rod**  | $J=\frac{1}{3}WL^2$ [kg·m²]<br>W : Weight [kg]<br>L : Length [m] | **Separated rod**  | $J=\frac{1}{8}WD^2+WS^2$ [kg·m²]<br>W : Weight [kg]<br>D : Outer diameter [m]<br>S : Distance [m] |
| **Reduction gear**  | Inertia on shaft "a"<br>$J=J_1+(\frac{n_2}{n_1})^2 J_2$[kg·m²]<br>$n_1$ : A rotational speed of a shaft [r/min]<br>$n_2$ : A rotational speed of b shaft [r/min] | | |
| **Conveyor**  | $J=\frac{1}{4}WD^2$ [kg·m²]<br>W : Workpiece weight on conveyor [kg]<br>D : Drum diameter [m]<br>* Excluding drum J | **Ball screw**  | $J=J_B+\frac{W\cdot P^2}{4\pi^2}$ [kg·m²]<br>W : Weight [kg]<br>P : Lead<br>$J_B$ : J of ball screw |

If weight (W [kg]) is unknown, calculate it with the following formula:

Weight W[kg]=Density $\rho$ [kg/m³] x Volume V[m³]

Density of each material

Iron $\rho$ =7.9 x 10³ [kg/m³] Aluminum $\rho$ =2.8 x 10³ [kg/m³]

Brass $\rho$ =8.5 x 10³ [kg/m³]

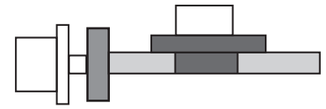




# To drive ball screw mechanism

## To drive ball screw mechanism

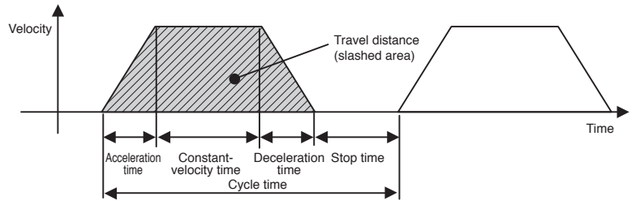
**1. Example of motor selection for driving ball screw mechanism**



Workpiece weight $W_A$ = 10 [kg]
Ball screw length $B_L$ = 0.5 [m]
Ball screw diameter $B_D$ = 0.02 [m]
Ball screw pitch $B_P$ = 0.02 [m]
Ball screw efficiency $B\eta$ = 0.9
Travel distance 0.3[m]
Coupling inertia $J_C = 10 \times 10^{-6}$ [kg·m²] (Use manufacturer-specified catalog value, or calculation value.)

**2. Running pattern :**

Acceleration time ta = 0.1 [s]
Constant-velocity time tb = 0.8 [s]
Deceleration time td = 0.1 [s]
Cycle time tc = 2 [s]
Travel distance 0.3[m]




**3. Ball screw weight**

$$B_W = \rho \times \pi \times \left(\frac{B_D}{2}\right)^2 \times B_L = 7.9 \times 10^3 \times \pi \times \left(\frac{0.02}{2}\right)^2 \times 0.5$$
$$= 1.24 \text{ [kg]}$$

**4. Load inertia**

$$J_L = J_C + J_B = J_C + \frac{1}{8}B_W \times B_D^2 + \frac{W_A \cdot B_P^2}{4\pi^2}$$
$$= 0.00001 + (1.24 \times 0.02^2) / 8 + 10 \times 0.02^2 / 4\pi^2$$
$$= 1.73 \times 10^{-4} \text{ [kg·m²]}$$

**5. Provisional motor selection**

**In case of 200 W motor :** $J_M = 0.17 \times 10^{-4}$ [kg·m²]

**6. Calculation of inertia ratio**

$J_L / J_M = 1.73 \times 10^{-4} / 0.17 \times 10^{-4}$ Therefore, the inertia ratio is "10.2" (less than "20")
(In case of 100 W motor: $J_M = 0.064 \times 10^{-4}$ Therefore, the inertia ratio is "27.0".)

**7. Calculation of maximum velocity (Vmax)**

$$\frac{1}{2}\times\text{Acceleration time}\times V_{max}+\text{Constant-velocity time}\times V_{max}+\frac{1}{2}\times\text{Deceleration time}\times V_{max} = \text{Travel distance}$$
$$\frac{1}{2} \times 0.1 \times V_{max} + 0.8 \times V_{max} + \frac{1}{2} \times 0.1 \times V_{max} = 0.3$$
$$0.9 \times V_{max} = 0.3$$
$$= 0.3 / 0.9 = 0.334 \text{ [m/s]}$$

**8. Calculation of motor velocity (N [r/min]) Ball screw lead per resolution: $B_P$ = 0.02 [m]**

N = 0.334 / 0.02 = 16.7 [r/s]
= 16.7 × 60 = 1002 [min⁻¹] < 3000 [min⁻¹] (Rated velocity of 200W motor)

**9. Calculation of torque**

Traveling torque $T_f = \frac{B_P}{2\pi B\eta}(\mu g W_A + F) = \frac{0.02}{2\pi \times 0.9}$ (0.1×9.8×10+0)
$= 0.035$ [N·m]

Acceleration torque $T_a = \frac{(J_L + J_M) \times 2\pi N[r/s]}{\text{Acceleration time [s]}}$ + Traveling torque
$= \frac{(1.73 \times 10^{-4} + 0.17 \times 10^{-4}) \times 2\pi \times 16.7}{0.1} + 0.035$
$= 0.199 + 0.035 = 0.234$ [N·m]

Deceleration torque $T_d = \dfrac{(J_L + J_M) \times 2\pi N[r/s]}{\text{Deceleration time}[s]}$ – Traveling torque

$= \dfrac{(1.73 \times 10^{-4} + 0.17 \times 10^{-4}) \times 2\pi \times 16.7}{0.1} - 0.035$

$= 0.199 - 0.035 = 0.164\ [N \cdot m]$

**10. Verification of maximum torque**

Acceleration torque = $T_a = 0.234\ [N \cdot m] < 1.91\ [N \cdot m]$ (Maximum torque of 200 W motor)

**11. Verification of effective torque**

$$T_{rms} = \sqrt{\frac{T_a^2 \times t_a + T_f^2 \times t_b + T_d^2 \times t_d}{t_c}}$$

$$= \sqrt{\frac{0.234^2 \times 0.1 + 0.035^2 \times 0.8 + 0.164^2 \times 0.1}{2}}$$

$= 0.065\ [N \cdot m] < 0.64\ [N \cdot m]$ (Rated torque of 200 W motor)

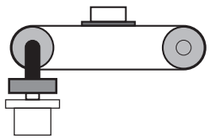
**12. Judging from the inertia ratio calculated above, selection of 200 W motor is preferable, although the torque margin is significantly large.**

## Example of motor selection

**Example of motor selection for timing belt mechanism**

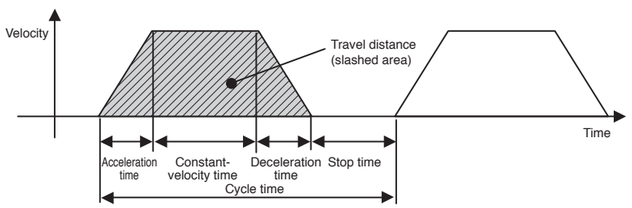
**1.Mechanism**

| | |
|---|---|
| Workpiece weight | $W_A$ =3[kg] (including belt) |
| Pulley diameter | $P_D$ =0.05[m] |
| Pulley weight | $W_P$ =0.5[kg] (Use manufacturer-specified catalog value, or calculation value.) |
| Mechanical efficiency | $B\eta$ = 0.8 |
| Coupling inertia | Jc = 0 (Direct connection to motor shaft) |
| Belt mechanism inertia | $J_B$ |
| Pulley inertia | $J_P$ |



**2. Running pattern**

| | |
|---|---|
| Acceleration time | ta = 0.1[s] |
| Constant-velocity time | tb = 0.8[s] |
| Deceleration time | td = 0.1[s] |
| Cycle time | tc = 2[s] |
| Travel distance | 1[m] |




**3. Load inertia** $J_L = J_C + J_B + J_P$

$= J_C + \dfrac{1}{4} W_A \times P_D^2 + \dfrac{1}{8} W_P \times P_D^2 \times 2$

$= 0 + \dfrac{1}{4} \times 3 \times 0.05^2 + \dfrac{1}{8} \times 0.5 \times 0.05^2 \times 2$

$= 0.00219 = 21.9 \times 10^{-4}\ [kg \cdot m^2]$

**4. Provisional motor selection**

**In case of 750 W motor :** $J_M = 1.31 \times 10^{-4}\ [kg \cdot m^2]$

**5. Calculation of inertia ratio**

$J_L / J_M = 21.9 \times 10^{-4} / 1.31 \times 10^{-4}$ Therefore, the inertia ratio is "16.7" (less than "20")





**6. Calculation of maximum velocity (Vmax)**

$\frac{1}{2}$ × Acceleration time × Vmax + Constant-velocity time × Vmax + $\frac{1}{2}$ × Deceleration time × Vmax = Travel distance

$\dfrac{1}{2} \times 0.1 \times Vmax + 0.8 \times Vmax + \dfrac{1}{2} \times 0.1 \times Vmax = 1$

$0.9 \times Vmax = 1$

$Vmax = 1 / 0.9 = 1.111[m/s]$

**7. Calculation of motor velocity (N [r/min])**

A single rotation of pulley : $\pi \times P_D = 0.157[m]$

$N = 1.11 / 0.157 = 7.08[r/s]$

$= 7.08 \times 60 = 424.8[min^{-1}] < 3000[min^{-1}]$ (Rated velocity of 750 W motor)

**8. Calculation of torque**

Traveling torque $T_f = \dfrac{P_D}{2\eta}(\mu g W_A + F) = \dfrac{0.05}{2 \times 0.8}(0.1 \times 9.8 \times 3 + 0)$

$= 0.092[N \cdot m]$

Acceleration torque $T_a = \dfrac{(J_L + J_M) \times 2\pi N[r/s]}{\text{Acceleration time}[s]}$ + Traveling torque

$= \dfrac{(21.9 \times 10^{-4} + 1.31 \times 10^{-4}) \times 2\pi \times 7.08}{0.1} + 0.092$

$= 1.032 + 0.092 = 1.124[N \cdot m]$

Deceleration torque $T_d = \dfrac{(J_L + J_M) \times 2\pi N[r/s]}{\text{Deceleration time}[s]}$ – Traveling torque

$= \dfrac{(21.9 \times 10^{-4} + 1.31 \times 10^{-4}) \times 2\pi \times 7.08}{0.1} - 0.092$

$= 1.032 - 0.092 = 0.94[N \cdot m]$

**9. Verification of maximum torque**

Acceleration torque $T_a = 1.124[N \cdot m] < 7.1[N \cdot m]$ (Maximum torque of 750 W motor)

**10. Verification of effective torque**

$$T_{rms} = \sqrt{\frac{T_a^2 \times t_a + T_f^2 \times t_b + T_d^2 \times t_d}{t_c}}$$

$$= \sqrt{\frac{1.124^2 \times 0.1 + 0.092^2 \times 0.8 + 0.94^2 \times 0.1}{2}}$$

$= 0.333\ [N \cdot m] < 2.4\ [N \cdot m]$ (Rated torque of 750 W motor)

**11. Judging from the above calculation result, selection of 750W motor is acceptable.**

# Request Sheet for Motor Selection

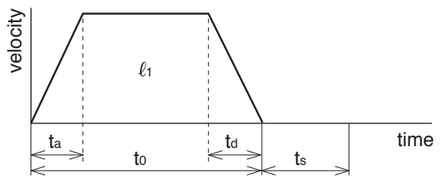
Customer Service Technical Support Center,
Motor Company, Panasonic Corporation

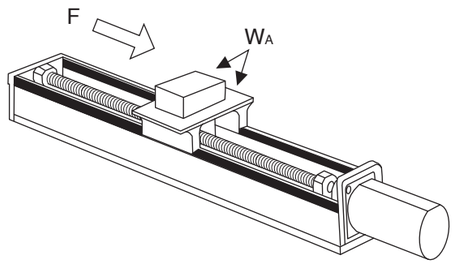
## Request for Motor Selection Ⅰ : Ball screw drive

### 1. Driven mechanism and running data

| | | |
|---|---|---|
| 1) Travel distance of the work load per one cycle | $\ell_1$: | mm |
| 2) Cycle time | $t_0$: | s |
| (Fill in items 3) and 4) if required.) | | |
| 3) Acceleration time | $t_a$: | s |
| 4) Deceleration time | $t_d$: | s |
| 5) Stopping time | $t_s$: | s |
| 6) Max. velocity | V: | mm/s |
| 7) External force | F: | kg |
| 8) Positioning accuracy of the work load | ± | mm |
| 9) Total weight of the work load and the table | $W_A$: | kg |
| 10) Power supply voltage | | V |
| 11) Diameter of the ball screw | | mm |
| 12) Total length of the ball | | mm |
| 13) Lead of the ball screw | | mm |
| 14) Traveling direction (horizontal, vertical etc.) | | |

Running pattern




### 2. Other data

(Fill the details on specific mechanism and its configurations in the following blank.)

Company name :
Department/Section :
Name :
Address :
Tel :
Fax :
E-mail address:



# Request Sheet for Motor Selection

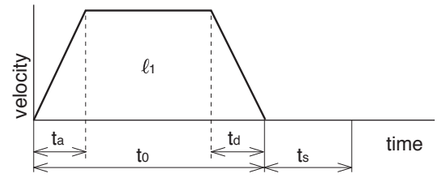
Customer Service Technical Support Center,
Motor Company, Panasonic Corporation

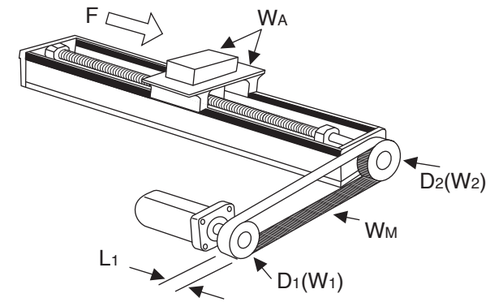
## Request for Motor Selection Ⅱ : Timing pulley + Ball screw drive

### 1. Driven mechanism and running data

| | | | Motor side | Motor side |
|---|---|---|---|---|
| 1) Travel distance of the work load per one cycle | $\ell_1$: | mm | 15) Diameter of the pulley | $D_1$: mm | $D_2$: mm |
| 2) Cycle time | $t_0$: | s | 16) Weight of the pulley | $W_1$: kg | $W_2$: kg |
| (Fill in items 3) and 4) if required.) | | | (or item 17) and 18)) | | |
| 3) Acceleration time | $t_a$: | s | 17) Width of the pulley | $L_1$: mm | |
| 4) Deceleration time | $t_d$: | s | 18) Material of the pulley | | |
| 5) Stopping time | $t_s$: | s | 19) Weight of the belt | $W_M$: kg | |
| 6) Max. velocity | V: | mm/s | | | |
| 7) External force | F: | kg | | | |
| 8) Positioning accuracy of the work load | ± | mm | | | |
| 9) Total weight of the work load and the table | $W_A$: | kg | | | |
| 10) Power supply voltage | | V | | | |
| 11) Diameter of the ball screw | | mm | | | |
| 12) Total length o the ball screw | | mm | | | |
| 13) Lead of the ball screw | | mm | | | |
| 14) Traveling | | | | | |

Running pattern




### 2. Other data

(Fill the details on specific mechanism and its configurations in the following blank.)

Company name :
Department/Section :
Name :
Address :
Tel :
Fax :
E-mail address:

# Request Sheet for Motor Selection

Customer Service Technical Support Center,
Motor Company, Panasonic Corporation

## Request for Motor Selection Ⅲ : Belt drive

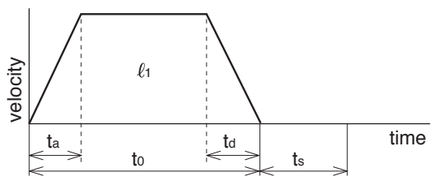
### 1. Driven mechanism and running data

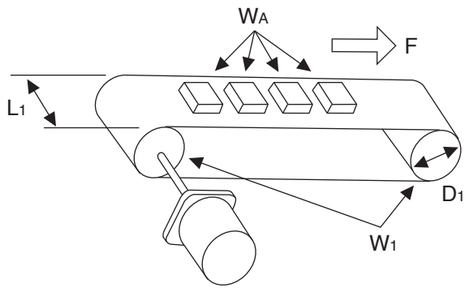
| | | |
|---|---|---|
| 1) Travel distance of the work load per one cycle | $\ell_1$: | mm |
| 2) Cycle time | $t_0$: | s |

(Fill in items 3) and 4) if required.)

| | | |
|---|---|---|
| 3) Acceleration time | $t_a$: | s |
| 4) Deceleration time | $t_d$: | s |
| 5) Stopping time | $t_s$: | s |
| 6) Max. velocity | V: | mm/s |
| 7) External force | F: | kg |
| 8) Positioning accuracy of the work load | ± | mm |
| 9) Total weight of the work load | $W_A$: | kg |
| 10) Power supply voltage | | V |
| 11) Weight of the belt | $W_M$: | kg |
| 12) Diameter of the driving pulley | $D_1$: | mm |
| 13) Total weight of the pulley | $W_1$: | kg |

Running pattern




(or item 14) and 15))

| | | |
|---|---|---|
| 14)Width of the pulley | $L_1$: | mm |
| 15) Material of the pulley | | |
| 16) Traveling direction (horizontal, vertical etc.) | | |

### 2. Other data

(Fill the details on specific mechanism and its configurations in the following blank.)

| |
|---|
| Company name : |
| Department/Section : |
| Name : |
| Address : |
| Tel : |
| Fax : |
| E-mail address: |



# Request Sheet for Motor Selection

Customer Service Technical Support Center,
Motor Company, Panasonic Corporation

## Request for Motor Selection Ⅳ : Timing pulley + Belt drive

### 1. Driven mechanism and running data

| | | |
|---|---|---|
| 1) Travel distance of the work load per one cycle | $\ell_1$: | mm |
| 2) Cycle time | $t_0$: | s |

(Fill in items 3) and 4) if required.)

| | | |
|---|---|---|
| 3) Acceleration time | $t_a$: | s |
| 4) Deceleration time | $t_d$: | s |
| 5) Stopping time | $t_s$: | s |
| 6) Max. velocity | V: | mm/s |
| 7) External force | F: | kg |
| 8) Positioning accuracy of the work load | ± | mm |
| 9) Total weight of the work load and the table | $W_A$: | kg |
| 10) Power supply voltage | | V |
| 11) Weight of motor site belt | $W_M$: | kg |

| | Motor side | | Belt side | |
|---|---|---|---|---|
| 12) Diameter of the pully | $D_1$: | mm | $D_2$: | mm |
| 13) Weight of the pulley | $W_1$: | kg | $W_2$: | kg |

(or item 14) and 15))

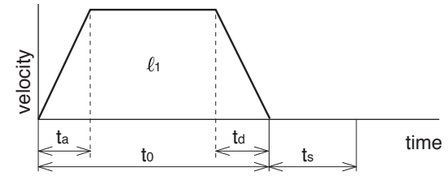
| | | |
|---|---|---|
| 14) Weight of the belt | $L_1$: | mm |
| 15) Material of the pulley | | |

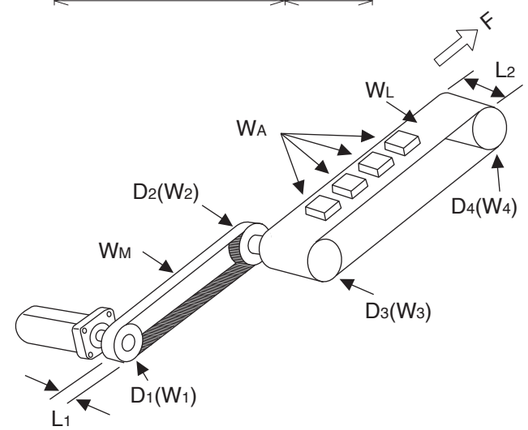
| | Motor side | | Belt side | |
|---|---|---|---|---|
| 16) Diameter of the pulley | $D_3$: | mm | $D_4$: | mm |
| 17) Weight of the pulley | $W_3$: | kg | $W_4$: | kg |

(or item 18) and 19))

| | | |
|---|---|---|
| 18) Width of the pulley | $L_2$: | mm |
| 19) Material of the pulley | | |
| 20) Weight of the belt | $W_L$: | kg |
| 21) Traveling direction (horizontal, vertical etc.) | | |

Running pattern




### 2. Other data

(Fill the details on specific mechanism and its configurations in the following blank.)

| |
|---|
| Company name : |
| Department/Section : |
| Name : |
| Address : |
| Tel : |
| Fax : |
| E-mail address: |

# Request Sheet for Motor Selection

Customer Service Technical Support Center,
Motor Company, Panasonic Corporation

## Request for Motor Selection Ⅴ : Turntable drive

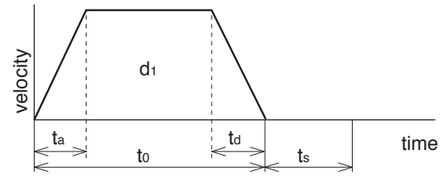
### 1. Driven mechanism and running data

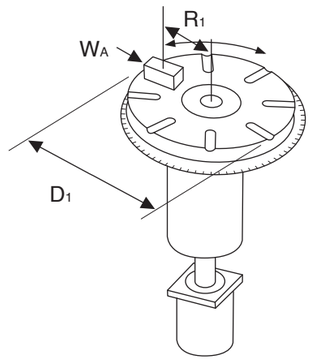
| | | |
|---|---|---|
| 1) Travel distance of the work load per one cycle | $d_1$: | deg |
| 2) Cycle time | $t_0$: | s |
| (Fill in items 3) and 4) if required.) | | |
| 3) Acceleration time | $t_a$: | s |
| 4) Deceleration time | $t_d$: | s |
| 5) Stopping time | $t_s$: | s |
| 6) Max. rotational speed of the table | v: | deg/s |
| (or) | V: | r/s |
| 7) Positioning accuracy of the work load | ± | deg |
| 8) Weight of one work load | $W_A$: | kg |
| 9) Driving radius of the center of gravity of the | $R_1$: | mm |
| 10) Diameter of the table | $D_1$: | mm |
| 11) Mass of the table | $W_1$: | kg |
| 12) Diameter of the table support | $T_1$: | mm |
| 13) Power supply voltage | | V |

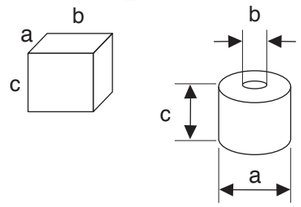
| 14) Dimensions of the work load | Prism | Cylinder |
|---|---|---|
| | a: mm | a: mm |
| | b: mm | b: mm |
| | c: mm | c: mm |

| | |
|---|---|
| 15) Number of work loads | pcs |

Running pattern




### 2. Other data

(Fill the details on specific mechanism and its configurations in the following blank.)

| | |
|---|---|
| | Company name : |
| | Department/Section : |
| | Name : |
| | Address : |
| | Tel : |
| | Fax : |
| | E-mail address: |



# Request Sheet for Motor Selection

Customer Service Technical Support Center,
Motor Company, Panasonic Corporation

## Request for Motor Selection Ⅵ : Timing pulley + Turntable drive

### 1. Driven mechanism and running data

| | | |
|---|---|---|
| 1) Travel distance of the work load per one cycle | $d_1$: | deg |
| 2) Cycle time | $t_0$: | s |
| (Fill in items 3) and 4) if required.) | | |
| 3) Acceleration time | $t_a$: | s |
| 4) Deceleration time | $t_d$: | s |
| 5) Stopping time | $t_s$: | s |
| 6) Max. rotating speed of the table | v: | deg/s |
| (or) | V: | r/s |
| 7) Positioning accuracy of the work load | ± | deg |
| 8) Weight of one work load | $W_A$: | kg |
| 9) Driving radius of the center of gravity of the | $R_1$: | mm |
| 10) Diameter of the table | $D_1$: | mm |
| 11) Mass of the table | $W_1$: | kg |
| 12) Diameter of the table support | $T_1$: | mm |
| 13) Power supply voltage | | V |

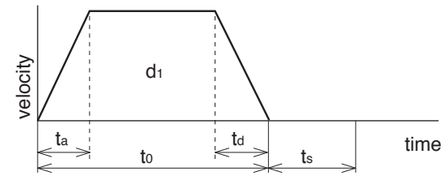
| 14) Dimension of the work load | (Prism) | (Cylinder) |
|---|---|---|
| | a: mm | a: mm |
| | b: mm | b: mm |
| | c: mm | c: mm |

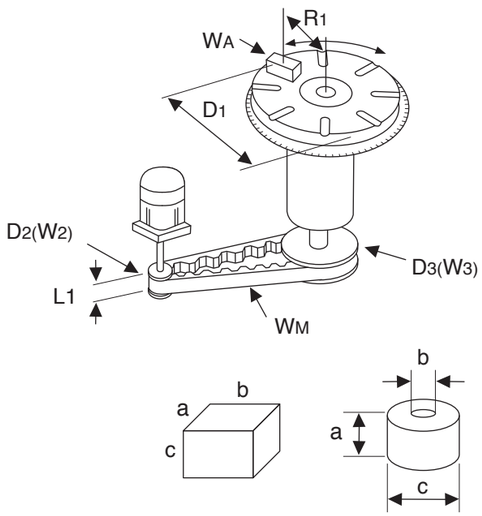
| | |
|---|---|
| 15) Number of work loads | pcs |

| | Motor side | Turntable side |
|---|---|---|
| 16) Diameter of the pulley | $D_2$: mm | $D_3$: mm |
| 17) Weight of the pulley | $W_2$: kg | $W_3$: kg |
| (or item 18) and 19)) | | |

| | |
|---|---|
| 18) Width of the pulley | $L_1$: mm |
| 19) Material of the pulley | |
| 20) Weight of the belt | $W_M$: kg |

Running pattern




### 2. Other data

(Fill the details on specific mechanism and its configurations in the following blank.)

| | |
|---|---|
| | Company name : |
| | Department/Section : |
| | Name : |
| | Address : |
| | Tel : |
| | Fax : |
| | E-mail address: |

# Request Sheet for Motor Selection

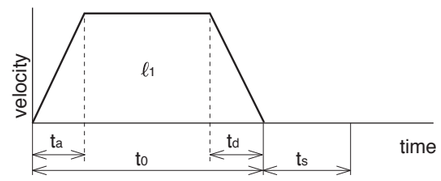
Customer Service Technical Support Center,
Motor Company, Panasonic Corporation

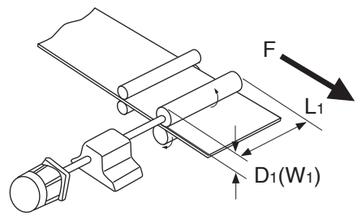
## Request for Motor Selection Ⅶ : Roller feed drive

### 1. Driven mechanism and running data

| | | |
|---|---|---|
| 1) Travel distance of the work load per one cycle | $\ell_1$: | mm |
| 2) Cycle time | $t_0$: | s |
| (Fill in items 3) and 4) if required.) | | |
| 3) Acceleration time | $t_a$: | s |
| 4) Deceleration time | $t_d$: | s |
| 5) Stopping time | $t_s$: | s |
| 6) Max. velocity | v: | mm/s |
| 7) External pulling force | F: | kg |
| 8) Positioning accuracy of the work load | ± | mm |
| 9) Total weight of the work load | | pcs |
| 10) Power supply voltage | | V |
| 11) Diameter of the roller | $D_1$: | mm |
| 12) Mass of the roller | $W_1$: | kg |

Running pattern




(or item 13) and 14))

| | | |
|---|---|---|
| 13) Width of the roller | $L_1$: | mm |
| 14) Material of the roller | | |

### 2. Other data

(Fill the details on specific mechanism and its configurations in the following blank.)

| |
|---|
| Company name : |
| Department/Section : |
| Name : |
| Address : |
| Tel : |
| Fax : |
| E-mail address: |



# Request Sheet for Motor Selection

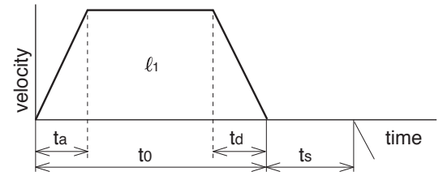
Customer Service Technical Support Center,
Motor Company, Panasonic Corporation

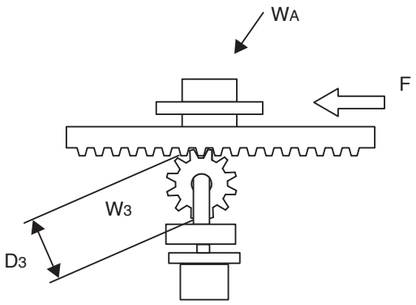
## Request for Motor Selection Ⅷ : Driving with Rack & Pinion

### 1. Driven mechanism and running data

| | | |
|---|---|---|
| 1) Travel distance of the work load per one cycle | $\ell_1$: | mm |
| 2) Cycle time | $t_0$: | s |
| (Fill in items 3) and 4) if required.) | | |
| 3) Acceleration time | $t_a$: | s |
| 4) Deceleration time | $t_d$: | s |
| 5) Stopping time | $t_s$: | s |
| 6) Max. velocity | V: | mm/s |
| 7) External force | F: | kg |
| 8) Positioning accuracy of the work load | ± | mm |
| 9) Total weight of the work load | $W_A$: | kg |
| 10) Power supply voltage | | V |
| 11) Diameter of the pinion | $D_3$: | mm |
| 12) Mass of the pinion | $W_3$: | kg |
| 13) Traveling direction (horizontal, vertical, etc) | | |

Running pattern



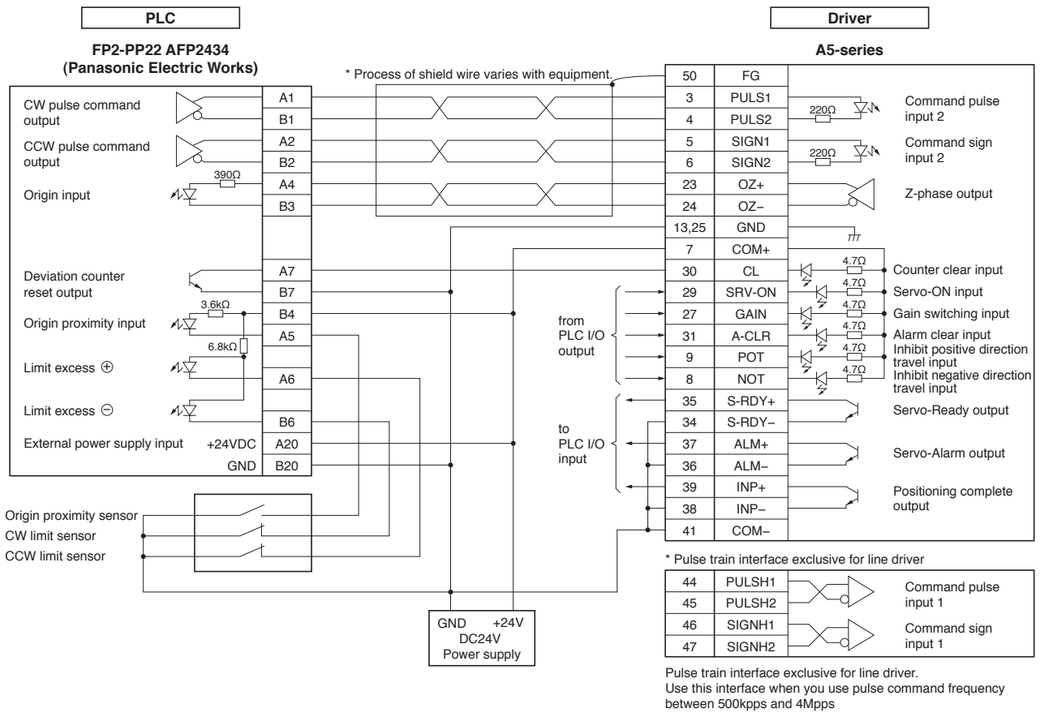

### 2. Other data

(Fill the details on specific mechanism and its configurations in the following blank.)

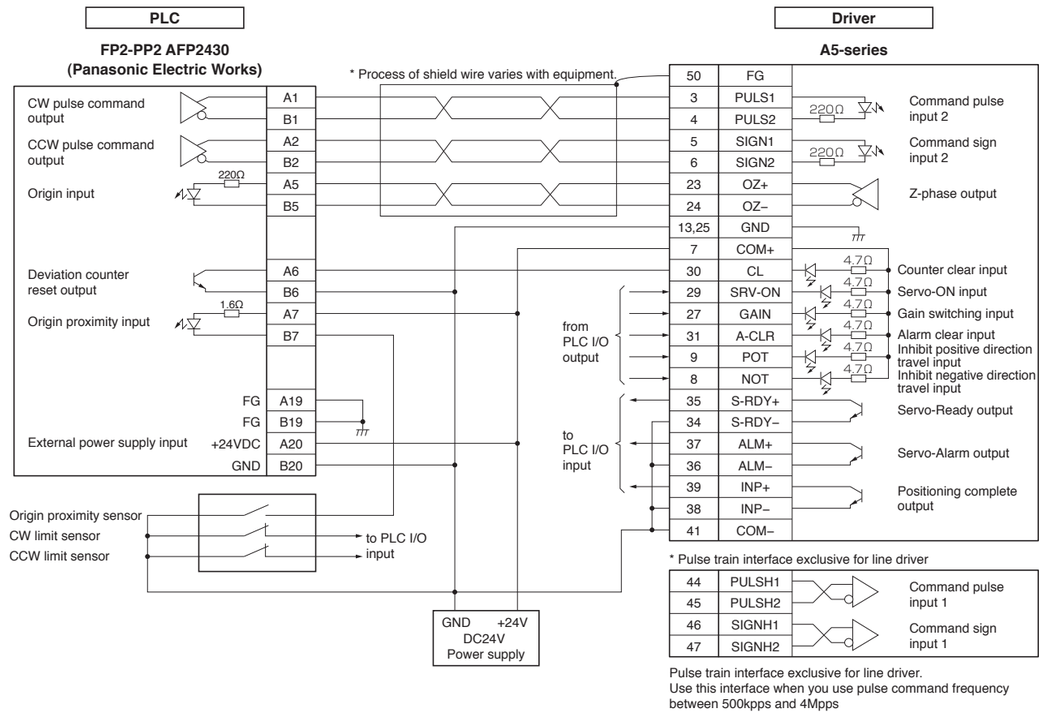
| |
|---|
| Company name : |
| Department/Section : |
| Name : |
| Address : |
| Tel : |
| Fax : |
| E-mail address: |

# Connection between Driver and Controller

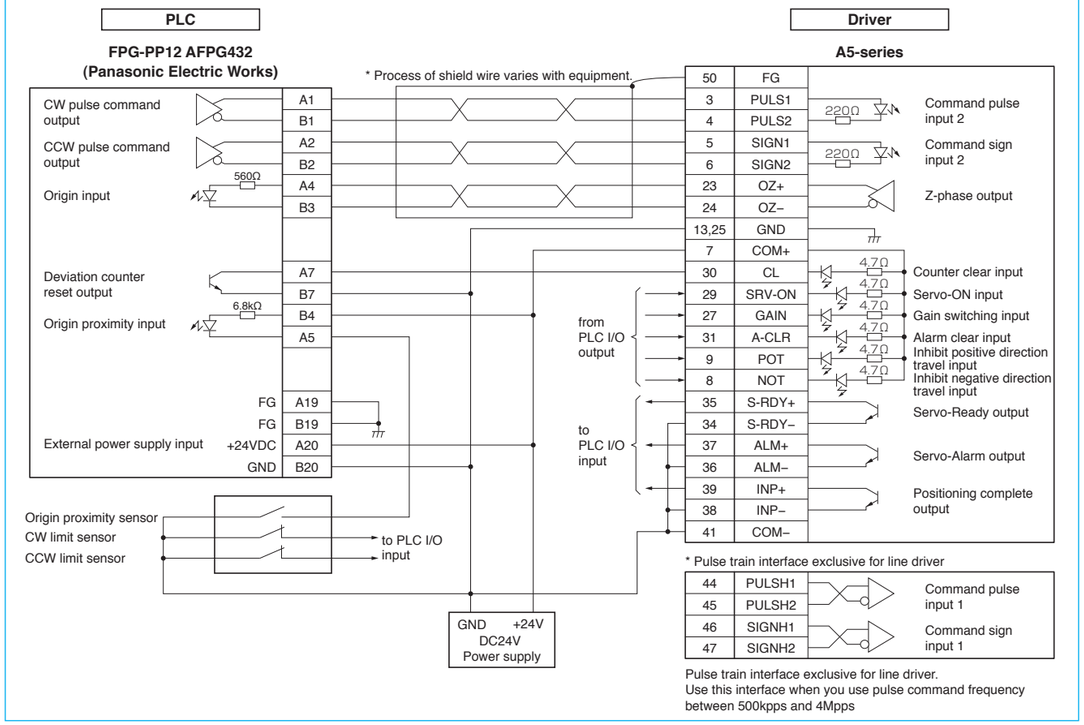
## Connection between MINAS A5 and FP2-PP22 AFP2434 (Panasonic Electric Works)



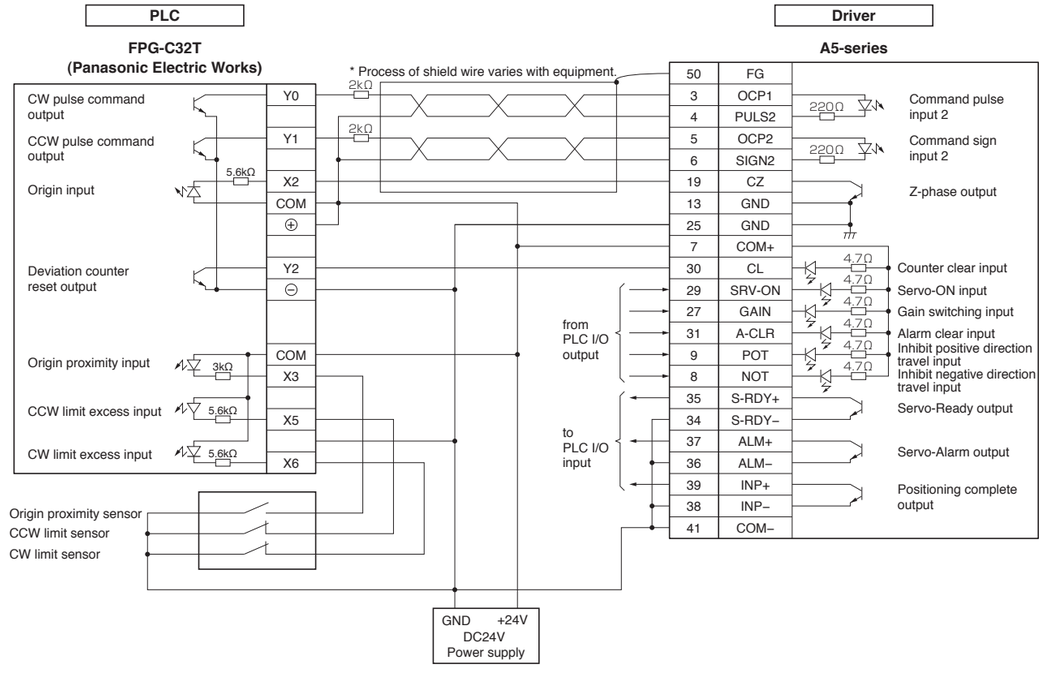

## Connection between MINAS A5 and FP2-PP22 AFP2434 (Panasonic Electric Works)



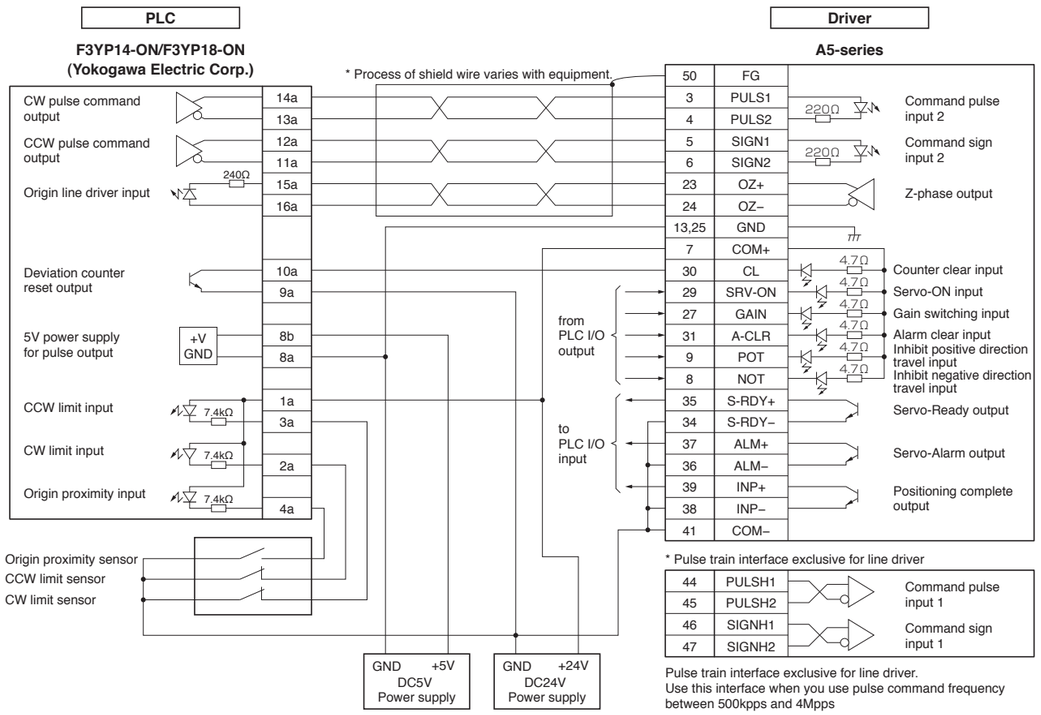

## Connection between MINAS A5 and FPG-PP12 AFPG432 (Panasonic Electric Works)



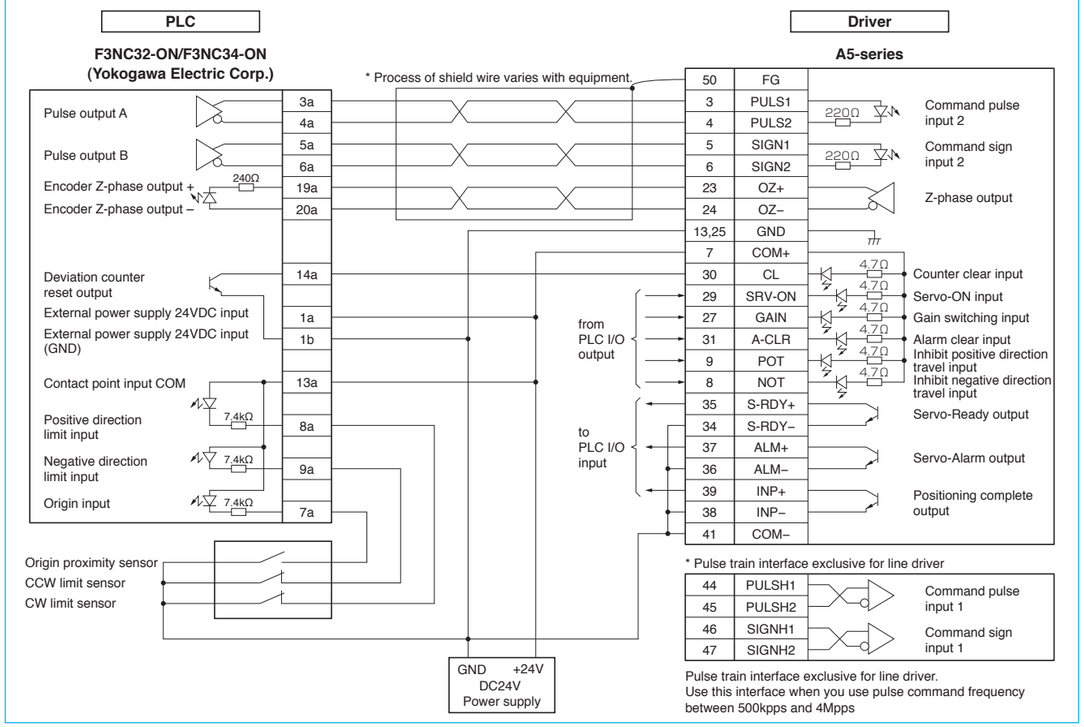

## Connection between MINAS A5 and FPG-C32T (Panasonic Electric Works)



## Connection between MINAS A5 and F3YP14-ON/F3YP18-ON (Yokogawa Electric Corp.)

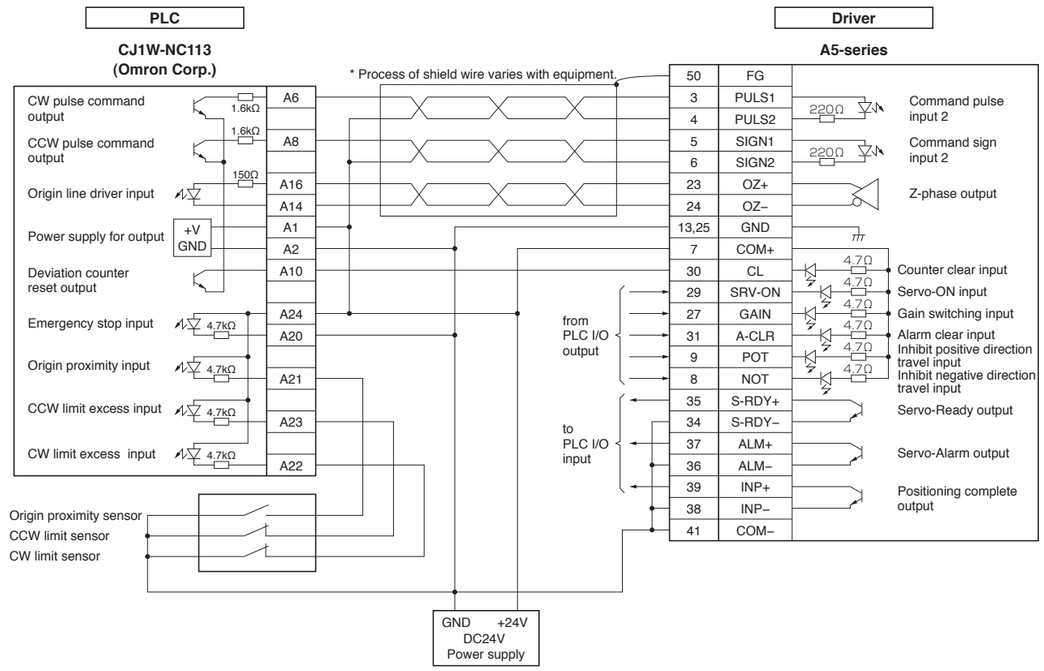



## Connection between MINAS A5 and F3NC32-ON/F3NC34-ON (Yokogawa Electric Corp.)

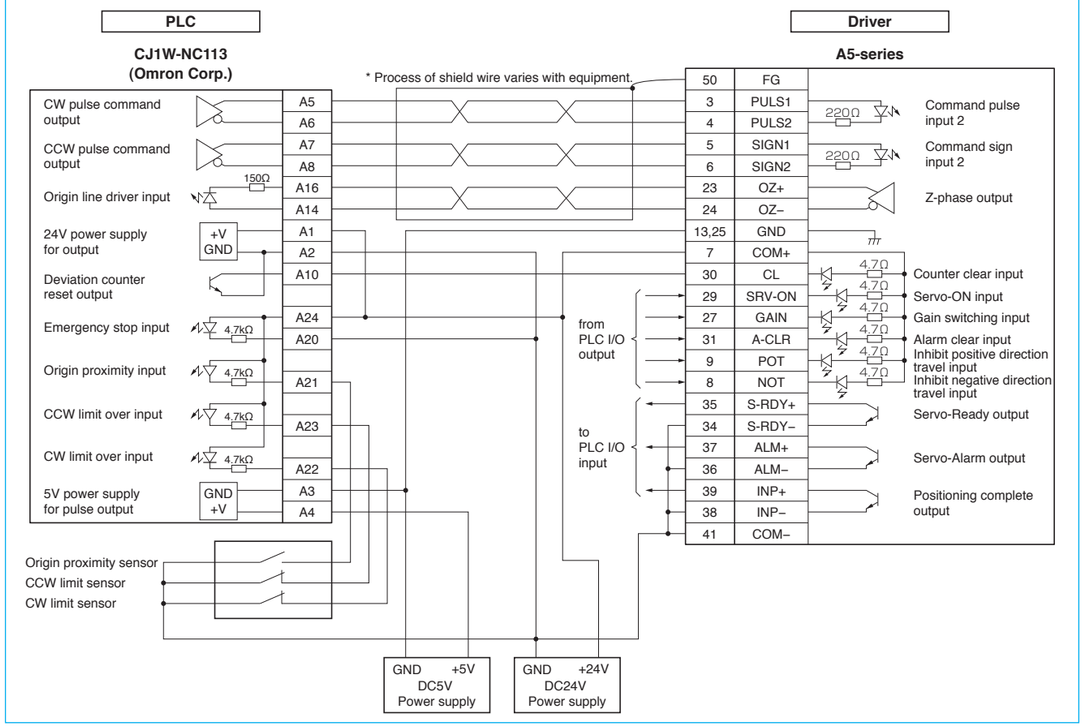





## Connection between MINAS A5 and CJ1W-NC113 (Omron Corp.)

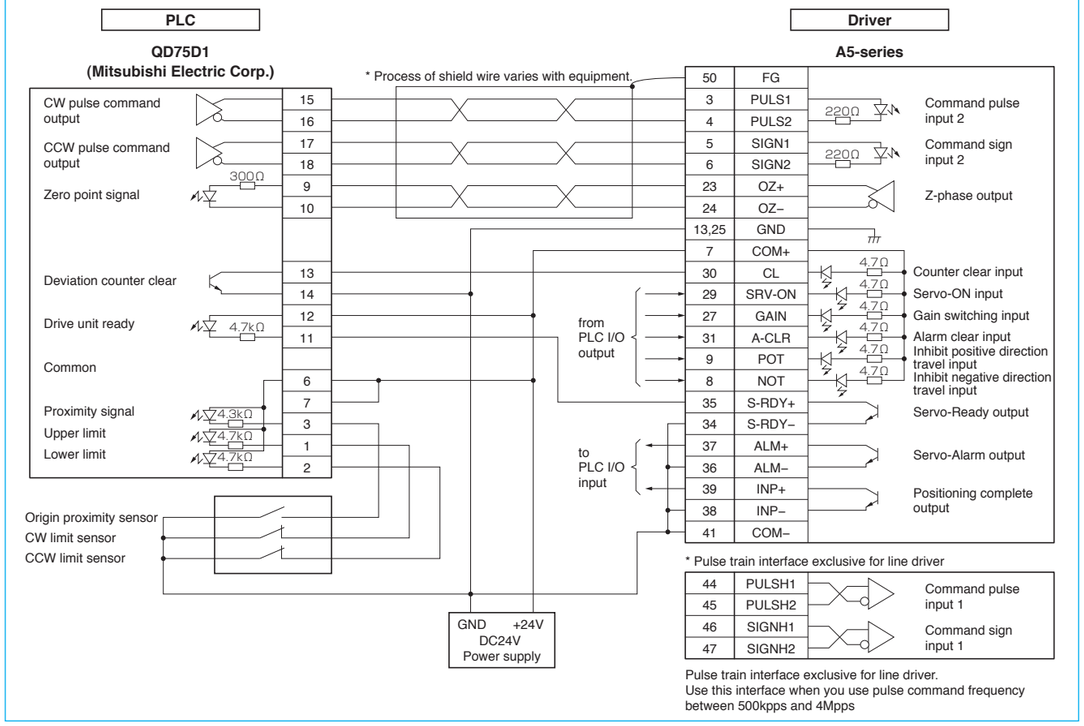



## Connection between MINAS A5 and CJ1W-NC133 (Omron Corp.)

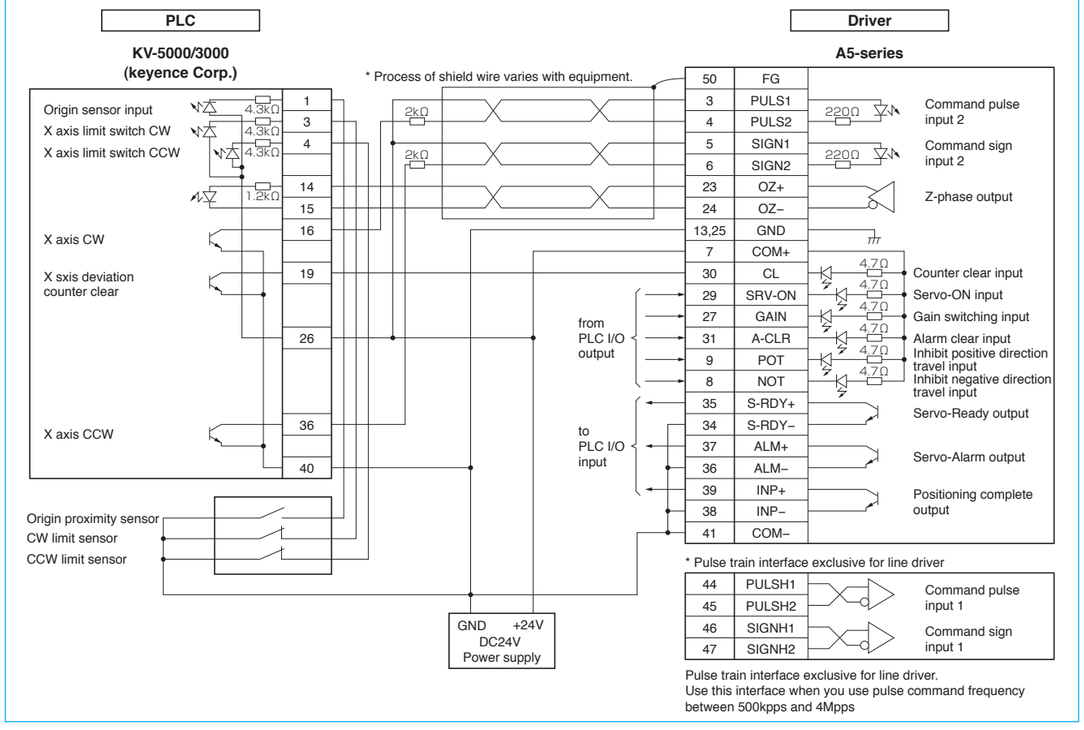


# Connection between Driver and Controller

## Connection between MINAS A5 and QD75D1 (Mitsubishi Electric Corp.)




## Connection between MINAS A5 and KV-5000/3000 (keyence Corp.)






# Index (Alphabetical order)

# Index (Alphabetical order)

# Index (Alphabetical order)

# Index (Alphabetical order)

# Sales Office

## [Panasonic Sales Office of Motors]

(Sep. 1. 2009)

| Country | Company Name | City | Address | TEL / FAX |
|---|---|---|---|---|
| U.S.A. | Panasonic Industrial Company(PIC) | New Jersey | Two Panasonic Way Secaucus, New Jersey 07094 U.S.A. | TEL 1-201-348-5356<br>FAX 1-201-392-4315 |
| | | California | 2033 Gateway Place, Suite 200 San Jose, CA 95110, U.S.A. | TEL 1-408-487-9536<br>FAX 1-408-436-8037 |
| Spain | Panasonic Electric Works Espana S.A. | Madrid | Barajas Park, San Severo 20, 28042 Madrid,Spain | TEL 34-91-329-3875<br>FAX 34-91-329-2976 |
| Germany | Panasonic Electric Works Europe AG | Munich | Rudolf-Diesel-Ring 2, 83607 Holzkirchen, Germany | TEL 49-8024-648-0<br>FAX 49-8024-648-555 |
| Italy | Panasonic Electric Works Italia srl | Verona | Via del Commercio 3-5 (Z.I. Ferlina), 37012 Bussolengo (VR), Italy | TEL 39-045-6752711<br>FAX 39-045-6700444 |
| United Kingdom | Panasonic Electric Works UK Ltd. | Milton Keynes | Sunrise Parkway,Linford Wood, Milton Keynes, MK14 6 LF, the United Kingdom | TEL 44-1908-231-555<br>FAX 44-1908-231-599 |
| Taiwan | Panasonic Industrial Sales (Taiwan) Co., Ltd.(PIST) | Taipei | 12F, No.9, SongGao Rd., Taipei 110, Taiwan, R.O.C. | TEL 886-2-2757-1878<br>FAX 886-2-2757-1907 |
| Singapore | Panasonic Industrial Singapore(PICS) | Singapore | 300 Beach Road #16-01 The Concourse Singapore 199555 | TEL 65-6390-3727<br>FAX 65-6390-3834 |
| China | Panasonic Industrial (China) Co.,Ltd.(PICN) | Shanghai | Floor 7, China Insurance Building, 166 East Road LuJiaZui PuDong New District, Shanghai, China | TEL 86-21-3855-2442<br>FAX 86-21-3855-2375 |
| | Panasonic Shun Hing Industrial Sales (Hong kong) Co., Ltd. | Hong kong | Level 33, Office Tower, Langham Place, 8 Argyle Street, Mongkok, Kin.,Hong Kong | TEL 852-2529-7322<br>FAX 852-2598-9743 |
| | Panasonic Shun Hing Industrial Sales (Shenzhen) Co., Ltd. | Shenzhen | 6th Floor, Excellence Times Square, #4068 Yitian Road, Futian District, Shenzhen, China | TEL 86-755-8255-8551<br>FAX 86-755-8255-8668 |
| India | Panasonic Industrial Asia Pte Ltd. (PIAI) | New Delhi | 510, E-Block, International Trade Tower, Nehru Place, New Delhi | TEL 91-11-26292870<br>FAX 91-11-26292878 |

## [Distributor]

| Country | Company Name | City | Address | TEL / FAX |
|---|---|---|---|---|
| Korea | YOUNG IL Electric Co.,Ltd. | Seoul | 3Fr-, Young-il, 982-4, Shi-heung 3 Dong, Keum-cheon Ku, Seoul, Korea | TEL 82-2-805-2471<br>FAX 82-2-805-2475 |
| | Soonhan Engineering Co.,Ltd. | Sungnam | 333-11, Sangdaewon-Dong, Jungwon-Ku, Sungnam City, Kyungki-Do, 462-806, Korea | TEL 82-31-737-1660<br>FAX 82-31-732-9188 |
| | Zeus Co.,Ltd. | Osan | 163-1, Busan-Dong, Osan-City, Kyunggi-Do, 447-050, Korea | TEL 82-31-377-9500<br>FAX 82-31-378-8660 |

## Cautions for Proper Use

- This product is intended to be used with a general industrial product, but not designed or manufactured to be used in a machine or system that may cause personal death when it is failed.
- Installation, wiring, operation, maintenance, etc., of the equipment should be done by qualified and experienced personnel.
- Apply adequate tightening torque to the product mounting screw by taking into consideration strength of the screw and the characteristics of material to which the product is installed. Overtightening can damage the screw and/or material; undertightening can result in loosening.
  Example) Steel screw (M5) into steel section: 2.7 to 3.3 N·m.
- Install a safety equipments or apparatus in your application, when a serious accident or loss of property is expected due to the failure of this product.
- Consult us if the application of this product is under such special conditions and environments as nuclear energy control, aerospace, transportation, medical equipment, various safety equipments or equipments which require a lesser air contamination.
- We have been making the best effort to ensure the highest quality of the products, however, application of exceptionally larger external noise disturbance and static electricity, or failure in input power, wiring and components may result in unexpected action. It is highly recommended that you make a fail-safe design and secure the safety in the operative range.
- If the motor shaft is not electrically grounded, it may cause an electrolytic corrosion to the bearing, depending on the condition of the machine and its mounting environment, and may result in the bearing noise. Checking and verification by customer is required.
- Failure of this product depending on its content, may generate smoke of about one cigarette. Take this into consideration when the application of the machine is clean room related.
- Please be careful when using in an environment with high concentrations of sulfur or sulfric gases, as sulfuration can lead to disconnection from the chip resistor or a poor contact connection.
- Take care to avoid inputting a supply voltage which significantly exceeds the rated range to the power supply of this product. Failure to heed this caution may result in damage to the internal parts, causing smoking and/or a fire and other trouble.
- The user is responsible for matching between machine and components in terms of configuration, dimensions, life expectancy, characteristics, when installing the machine or changing specification of the machine. The user is also responsible for complying with applicable laws and regulations.
- Read and observe the instruction manual without fail for proper usage of the products.

| | |
|---|---|
| **Repair** | Consult to the dealer from whom you have purchased this product for details of repair work.<br>When the product is incorporated to the machine you have purchased, consult to the machine manufacturer or its dealer. |
| **URL** | Electric data of this product (Instruction Manual, CAD data) can be download from the following web site;<br><http://industrial.panasonic.com/ww/i_e/25000/motor_fa_e/motor_fa_e.html |

Contact to :

Motor Company,
Panasonic Corporation
1-1 Morofuku 7-chome, Daito, Osaka 574-0044, Japan
Tel : +81-72-871-1212
Fax: +81-72-870-3151

ISO14001 Certificate division
CERTIFICATE OF APPROVAL ISO14001

ISO9001 Certificate division
CERTIFICATE OF APPROVAL ISO9001

**The contents of this catalog apply to the products as of Sep. 1, 2009.**

- Printed colors may be slightly different from the actual products.
- Specifications and design of the products are subject to change without notice for the product improvement.

<09.09 Ⓜ>