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Panasonic®

Instruction Manual

AC Servo Motor and Driver

MINAS A4 Series



- Thank you for buying and using Panasonic AC Servo Motor and Driver, MINAS A4 Series.
- Read through this Instruction Manual for proper use, especially read "Precautions for Safety" (P.8 to 11) without fail for safety purpose.
- Keep this Manual at an easily accessible place so as to be referred anytime as necessary.

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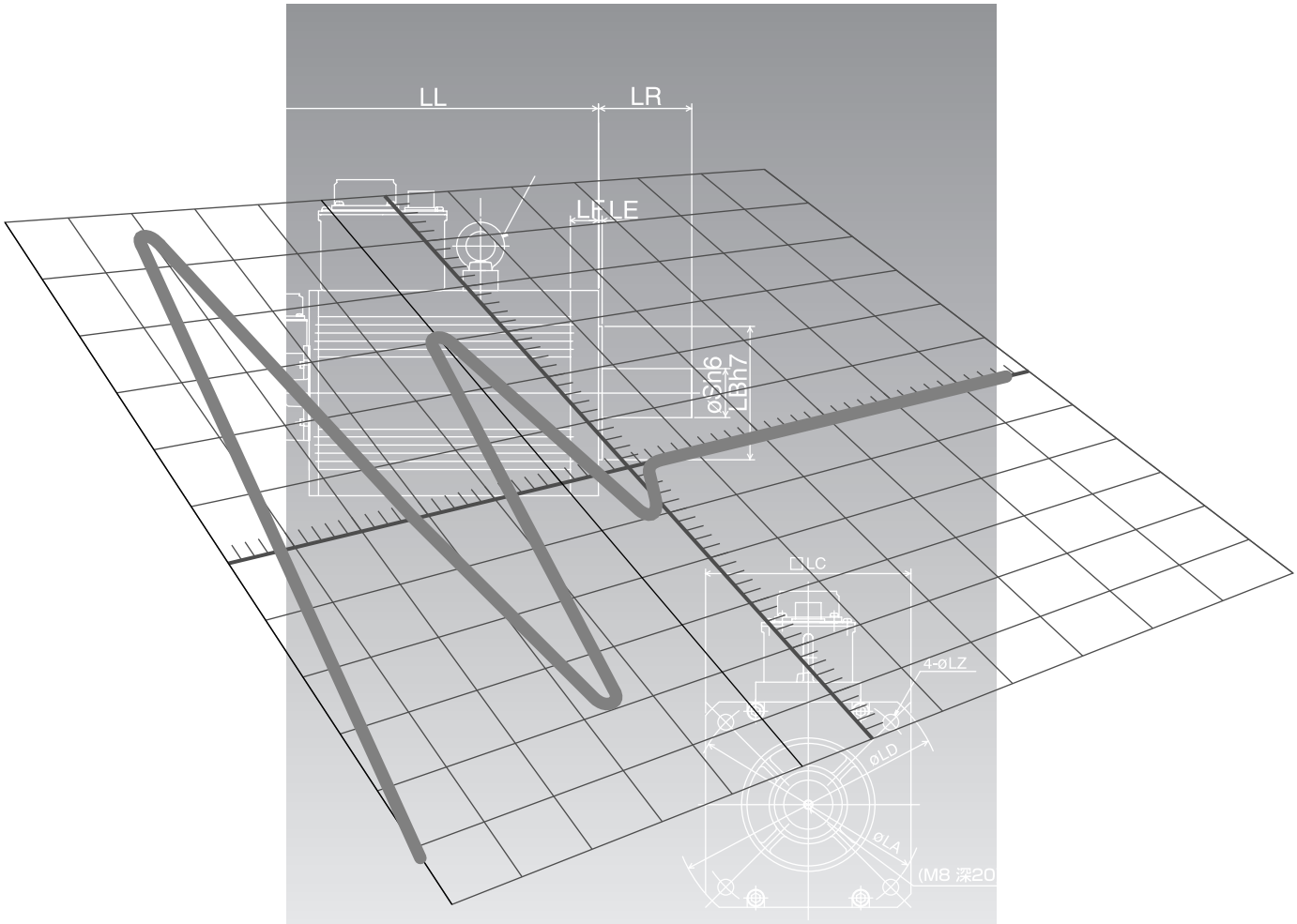
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Safety Precautions Observe the Following Instructions Without Fail

Observe the following precautions in order to avoid damages on the machinery and injuries to the operators and other personnel during the operation.

- **In this document, the following symbols are used to indicate the level of damages or injuries which might be incurred by the misoperation ignoring the precautions.**

DANGER	Indicates a potentially hazardous situation which, if not avoided, will result in death or serious injury.
CAUTION	Indicates a potentially hazardous situation which, if not avoided, will result in minor injury or property damage.

- **The following symbols represent "MUST NOT" or "MUST" operations which you have to observe. (Note that there are other symbols as well.)**

	Represents "MUST NOT" operation which is inhibited.
	Represents "MUST" operation which has to be executed.

DANGER

Do not subject the Product to water, corrosive or flammable gases, and combustibles.

Failure to observe this instruction could result in fire.

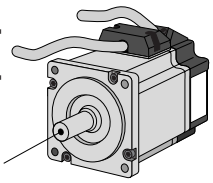
Do not subject the cables to excessive force, heavy object, or pinching force, nor damage the cables.

Failure to observe this instruction could result in electrical shocks, damages and breakdowns.

Do not put your hands in the servo driver.

Failure to observe this instruction could result in burn and electrical shocks.

Do not touch the rotating portion of the motor while it is running.



Failure to observe this instruction could result in injuries.

Do not drive the motor with external power.

Failure to observe this instruction could result in fire.

Do not touch the motor, servo driver and external regenerative resistor of the driver, since they become very hot.

Failure to observe this instruction could result in burns.

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⚠ DANGER

Do not place combustibles near by the motor, driver and regenerative resistor.



Failure to observe this instruction could result in fire.

Do not place the console close to a heating unit such as a heater or a large wire wound resistor.



Failure to observe this instruction could result in fire and breakdowns.

Ground the earth terminal of the motor and driver without fail.



Failure to observe this instruction could result in electrical shocks.

Install an over-current protection, earth leakage breaker, over-temperature protection and emergency stop apparatus without fail.



Failure to observe this instruction could result in electrical shocks, injuries and fire.

Install an emergency stop circuit externally so that you can stop the operation and shut off the power immediately.



Failure to observe this instruction could result in injuries, electrical shocks, fire, breakdowns and damages.

Turn off the power and wait for a longer time than the specified time, before transporting, wiring and inspecting the driver.



Failure to observe this instruction could result in electrical shocks.

Install and mount the Product and machinery securely to prevent any possible fire or accidents incurred by earthquake.



Failure to observe this instruction could result in electrical shocks, injuries and fire.

Turn off the power and make it sure that there is no risk of electrical shocks before transporting, wiring and inspecting the motor.



Failure to observe this instruction could result in electrical shocks.

Check and confirm the safety of the operation after the earthquake.



Failure to observe this instruction could result in electrical shocks, injuries and fire.

Wiring has to be carried out by the qualified and authorized specialist.



Failure to observe this instruction could result in electrical shocks.

Mount the motor, driver and regenerative resistor on incombustible material such as metal.



Failure to observe this instruction could result in fire.

Make the correct phase sequence of the motor and correct wiring of the encoder.



Failure to observe this instruction could result in injuries breakdowns and damages.

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Safety Precautions

Observe the Following Instructions Without Fail

⚠ CAUTION

Do not hold the motor cable or motor shaft during the transportation.

Failure to observe this instruction could result in injuries.

Do not block the heat dissipating holes or put the foreign particles into them.

Failure to observe this instruction could result in electrical shocks and fire.

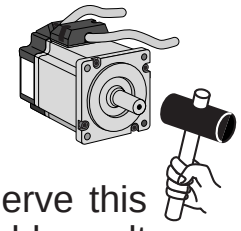
Never run or stop the motor with the electro-magnetic contactor installed in the main power side.

Failure to observe this instruction could result in breakdowns.

Do not step on the Product nor place the heavy object on them.

Failure to observe this instruction could result in electrical shocks, injuries, breakdowns and damages.

Do not give strong impact shock to the motor shaft.



Failure to observe this instruction could result in breakdowns.

Do not turn on and off the main power of the driver repeatedly.

Failure to observe this instruction could result in breakdowns.

Do not approach to the machine since it may suddenly restart after the power resumption.
Design the machine to secure the safety for the operator even at a sudden restart.

Failure to observe this instruction could result in injuries.

Do not make an extreme gain adjustment or change of the drive.
Do not keep the machine running/operating unstably.

Failure to observe this instruction could result in injuries.

Do not use the built-in brake as a "Braking" to stop the moving load.

Failure to observe this instruction could result in injuries and breakdowns.

Do not give strong impact shock to the Product.

Failure to observe this instruction could result in breakdowns.

Do not modify, disassemble nor repair the Product.

Failure to observe this instruction could result in fire, electrical shocks and injuries.

Do not pull the cables with excessive force.

Failure to observe this instruction could result in breakdowns.

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⚠ CAUTION

Use the motor and the driver in the specified combination.



Failure to observe this instruction could result in fire.

Make a wiring correctly and securely.



Failure to observe this instruction could result in fire and electrical shocks.

Use the eye bolt of the motor for transportation of the motor only, and never use this for transportation of the machine.



Failure to observe this instruction could result in injuries and breakdowns.

Observe the specified mounting method and direction.



Failure to observe this instruction could result in breakdowns.

Make an appropriate mounting of the Product matching to its weight and output rating.



Failure to observe this instruction could result in injuries and breakdowns.

Observe the specified voltage.



Failure to observe this instruction could result in electrical shocks, injuries and fire.

Keep the ambient temperature below the permissible temperature for the motor and driver.



Failure to observe this instruction could result in breakdowns.

Execute the trial run without connecting the motor to the machine system and fix the motor. After checking the operation, connect to the machine system again.



Failure to observe this instruction could result in injuries.

Connect the brake control relay to the relay which is to shut off at emergency stop in series.



Failure to observe this instruction could result in injuries and breakdowns.

When any error occurs, remove the cause and release the error after securing the safety, then restart.



Failure to observe this instruction could result in injuries.

When you dispose the batteries, observe any applicable regulations or laws after insulating them with tape.

This Product shall be treated as Industrial Waste when you dispose.

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Maintenance and Inspection

• Routine maintenance and inspection of the driver and motor are essential for the proper and safe operation.

Notes on Maintenance and Inspection

1) Turn on and turn off should be done by operators or inspectors themselves.
2) Internal circuit of the driver is kept charged with high voltage for a while even after power-off. Turn off the power and allow 15 minutes or longer after LED display of the front panel has gone off, before performing maintenance and inspection.
3) Disconnect all of the connection to the driver when performing megger test (Insulation resistance measurement) to the driver, otherwise it could result in breakdown of the driver.

Inspection Items and Cycles

General and normal running condition

Ambient conditions : 30˚C (annual average), load factor of 80% or lower, operating hours of 20 hours or less per day.

Perform the daily and periodical inspection as per the items below.

Type	Cycles	Items to be inspected
Daily inspection	Daily	• Ambient temperature, humidity, speck, dust or foreign object • Abnormal vibration and noise • Main circuit voltage • Odor • Lint or other particles at air holes • Cleanness at front portion of the driver and connecter • Damage of the cables • Loose connection or misalignment between the motor and machine or equipment • Pinching of foreign object at the load
Periodical inspection	Annual	• Loose tightening • Trace of overheat • Damage of the terminals

<Note> Inspection cycle may change when the running conditions of the above change.

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Guideline for Parts Replacement

Use the table below for a reference. Parts replacement cycle varies depending on the actual operating conditions. Defective parts should be replaced or repaired when any error have occurred.

Prohibited	**Disassembling for inspection and repair should be carried out only by authorized dealers or service company.**

Product	Component	Standard replacement cycles (hour)	Note
Driver	Smoothing capacitor	Approx. 5 years	These hours or cycles are reference. When you experience any error, replacement is required even before this standard replacement cycle.
	Cooling fan	2 to 3 years (10,000 to 30,000 hours)	
	Aluminum electrolytic capacitor (on PCB)	Approx. 5 years	
	Rush current preventive relay	Approx. 100,000 times (depending on working condition)	
	Rush current preventive resistor	Approx. 20,000 times (depending on working condition)	
Motor	Bearing	3 to 5 years (20,000 to 30,000 hours)	
	Oil seal	5000 hours	
	Encoder	3 to 5 years (20,000 to 30,000 hours)	
	Battery for absolute encoder	Life time varies depending on working conditions. Refer to the instruction manual attached to the battery for absolute encoder.	
Motor with gear reducer	Gear reducer	10,000 hours	

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Introduction

Outline

MINAS-A4 Series with wide output range from 50W to 5kW, are the high speed, high functionality AC servo drivers and motors. Thanks to the adoption of a new powerful CPU, A4 Series now realize velocity response frequency of 1kHz, and contribute to the development of a high-speed machine and drastic shortening of tact-time.
Standard line-up includes full-closed control and auto-gain tuning function and the motors with 2500P/r incremental encoder and 17-bit absolute/incremental encoder.
A4 Series have also improved the user-friendliness by offering a console (option) which enables you to monitor the rotational speed display, set up parameters, trial run (JOG running) and copy parameters.
A4 Series can support various applications and their requirement by featuring automated gain tuning function, damping control which achieves a stable "Stop Performance" even in low-stiffness machine and high speed motor.
This document is designed for the customer to exploit the versatile functions of A4 Series to full extent.

Cautions

1) Any part or whole of this document shall not be reproduced without written permission from us.
2) Contents of this document are subject to change without notice.

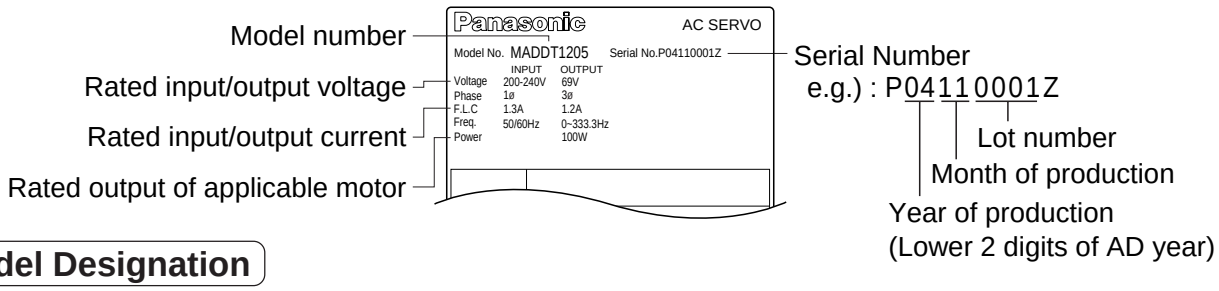
On Opening the Product Package

- Make sure that the model is what you have ordered.
- Check if the product is damaged or not during transportation.
- Check if the instruction manual is attached or not.
- Check if the power connector and motor connecters (CN X1 and CN X2 connectors) are attached or not (A to D-frame).

Contact to a dealer if you find any failures.

Check of the Driver Model

Contents of Name Plate



Model Designation

M A D D T 1 2 0 5 ∗ ∗ ∗

1 to 4 | 5 to 6 | 7 | 8 to 9 | 10 to 12

Special specifications (letters and numbers)

Current detector rating

Frame-size symbol

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

Max. current rating of power device

Symbol	Current rating
T1	10A
T2	15A
T3	30A
T5	50A
T7	70A
TA	100A
TB	150A

Power supply

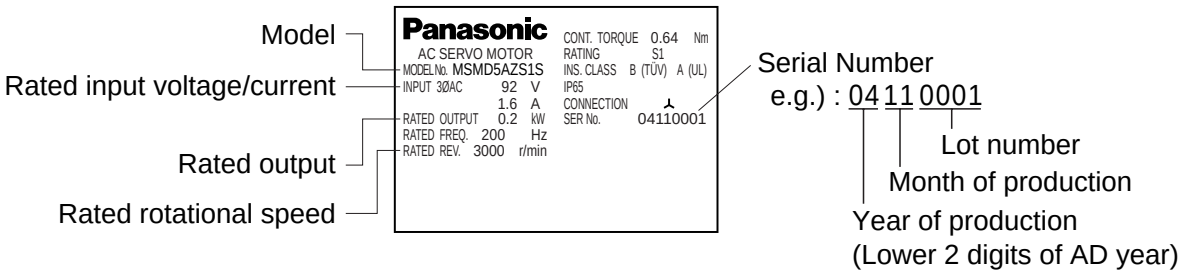
Symbol	Specifications
1	Single phase, 100V
2	Single phase, 200V
3	3-phase, 200V
5	Single/3-phase, 200V

Symbol	Current rating
05	5A
07	7.5A
10	10A
15	15A
20	20A
30	30A
40	40A
64	64A
90	90A
A2	120A

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Check of the Motor Model

Contents of Name Plate



Model Designation

M S M D 5 A Z S 1 S ∗∗

1 to 4 | 5 to 6 | 7 | 8 | 9 | 10 | 11 to 12

11 to 12: Special specifications (letters and numbers)

10: Motor structure

9: Design order
1: Standard

8: Voltage specifications

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

5 to 6: Motor rated output

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

1 to 4:

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

7: Rotary encoder specifications

Symbol	Specifications			
	Format	Pulse count	Resolution	Wire count
P	Incremental	2500P/r	10,000	5-wire
S	Absolute/Incremental common	17bit	131,072	7-wire

Motor structure

MSMD, MQMA

Symbol	Shaft		Holding brake		Oil seal	
	Round	Key way	Without	With	Without	With*1
A	●		●		●	
B	●			●	●	
S		●*2	●		●	
T		●*2		●	●	

*1 The product with oil seal is a special order product.
*2 Key way with center tap.

MAMA

Symbol	Shaft		Holding brake		Oil seal	
	Round	Key way	Without	With	Without	With
A	●		●		●	
B	●			●	●	
E		●	●		●	
F		●		●	●	

MSMA, MDMA, MFMA, MGMA, MHMA

Symbol	Shaft		Holding brake		Oil seal	
	Round	Key way	Without	With	Without	With
C	●		●			●
D	●			●		●
G		●	●			●
H		●		●		●

Products are standard stock items or build to order items. For details, inquire of the dealer.

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Introduction

Check of the Combination of the Driver and the Motor

This drive is designed to be used in a combination with the motor which are specified by us.
Check the series name of the motor, rated output torque, voltage specifications and encoder specifications.

Incremental Specifications, 2500P/r

<Remarks> Do not use in other combinations than those listed below.

Power supply	Applicable motor				Applicable driver	
	Motor series	Rated rotational speed	Model	Rated output	Model	Frame
Single phase, 200V	MAMA Ultra low inertia	5000r/min	MAMA012P1*	100W	MADDT1207	A-frame
			MAMA022P1*	200W	MBDDT2210	B-frame
3-phase, 200V			MAMA042P1*	400W	MCDDT3520	C-frame
			MAMA082P1*	750W	MDDDT5540	D-frame
Single phase, 100V	MAMA Low inertia	3000r/min	MQMA011P1*	100W	MADDT1107	A-frame
			MQMA021P1*	200W	MBDDT2110	B-frame
			MQMA041P1*	400W	MCDDT3120	C-frame
Single phase, 200V			MQMA012P1*	100W	MADDT1205	A-frame
			MQMA022P1*	200W	MADDT1207	A-frame
			MQMA042P1*	400W	MBDDT2210	B-frame
Single phase, 100V	MSMD Low inertia	3000r/min	MSMD5AZP1*	50W	MADDT1105	A-frame
			MSMD011P1*	100W	MADDT1107	
			MSMD021P1*	200W	MBDDT2110	B-frame
			MSMD041P1*	400W	MCDDT3120	C-frame
Single phase, 200V			MSMD5AZP1*	50W	MADDT1205	A-frame
			MSMD012P1*	100W		
			MSMD022P1*	200W	MADDT1207	
			MSMD042P1*	400W	MBDDT2210	B-frame
Single/3-phase, 200V			MSMD082P1*	750W	MCDDT3520	C-frame
	MSMA Low inertia	3000r/min	MSMA102P1*	1.0kW	MDDDT5540	D-frame
			MSMA152P1*	1.5kW		
3-phase, 200V			MSMA202P1*	2.0kW	MEDDT7364	E-frame
			MSMA302P1*	3.0kW	MFDDTA390	F-frame
			MSMA402P1*	4.0kW	MFDDTB3A2	
			MSMA502P1*	5.0kW		
Single/3-phase, 200V	MDMA Middle inertia	2000r/min	MDMA102P1*	1.0kW	MDDDT3530	D-frame
			MDMA152P1*	1.5kW	MDDDT5540	
3-phase, 200V			MDMA202P1*	2.0kW	MEDDT7364	E-frame
			MDMA302P1*	3.0kW	MFDDTA390	F-frame
			MDMA402P1*	4.0kW	MFDDTB3A2	
			MDMA502P1*	5.0kW		
Single/3-phase, 200V	MHMA High inertia	2000r/min	MHMA052P1*	500W	MCDDT3520	C-frame
			MHMA102P1*	1.0kW	MDDDT3530	D-frame
			MHMA152P1*	1.5kW	MDDDT5540	
3-phase, 200V			MHMA202P1*	2.0kW	MEDDT7364	E-frame
			MHMA302P1*	3.0kW	MFDDTA390	F-frame
			MHMA402P1*	4.0kW	MFDDTB3A2	
			MHMA502P1*	5.0kW		
Single/3-phase, 200V	MFMA Middle inertia	2000r/min	MFMA042P1*	400W	MCDDT3520	C-frame
			MFMA152P1*	1.5kW	MDDDT5540	D-frame
3-phase, 200V			MFMA252P1*	2.5kW	MEDDT7364	E-frame
			MFMA452P1*	4.5kW	MFDDTB3A2	F-frame
Single/3-phase, 200V	MGMA Middle inertia	1000r/min	MGMA092P1*	900W	MDDDT5540	D-frame
3-phase, 200V			MGMA202P1*	2.0kW	MFDDTA390	F-frame
			MGMA302P1*	3.0kW	MFDDTB3A2	
			MGMA452P1*	4.5kW		

<Note>

Suffix of " * " in the applicable motor model represents the motor structure.

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Absolute/Incremental Specifications, 17-bit

<Remarks> Do not use in other combinations than those listed below.

Power supply	Applicable motor				Applicable driver	
	Motor series	Rated rotational speed	Model	Rated output	Model	Frame
Single phase, 200V	MAMA Ultra low inertia	5000r/min	MAMA012S1*	100W	MADDT1207	A-frame
			MAMA022S1*	200W	MBDDT2210	B-frame
3-phase, 200V			MAMA042S1*	400W	MCDDT3520	C-frame
			MAMA082S1*	750W	MDDDT5540	D-frame
Single phase, 100V	MAMA Low inertia	3000r/min	MQMA011S1*	100W	MADDT1107	A-frame
			MQMA021S1*	200W	MBDDT2110	B-frame
			MQMA041S1*	400W	MCDDT3120	C-frame
Single phase, 200V			MQMA012S1*	100W	MADDT1205	A-frame
			MQMA022S1*	200W	MADDT1207	A-frame
			MQMA042S1*	400W	MBDDT2210	B-frame
Single phase, 100V	MSMD Low inertia	3000r/min	MSMD5AZS1*	50W	MADDT1105	A-frame
			MSMD011S1*	100W	MADDT1107	
			MSMD021S1*	200W	MBDDT2110	B-frame
			MSMD041S1*	400W	MCDDT3120	C-frame
Single phase, 200V			MSMD5AZS1*	50W	MADDT1205	A-frame
			MSMD012S1*	100W		
			MSMD022S1*	200W	MADDT1207	
			MSMD042S1*	400W	MBDDT2210	B-frame
Single/3-phase, 200V			MSMD082S1*	750W	MCDDT3520	C-frame
	MSMA Low inertia	3000r/min	MSMA102S1*	1.0kW	MDDDT5540	D-frame
			MSMA152S1*	1.5kW		
3-phase, 200V			MSMA202S1*	2.0kW	MEDDT7364	E-frame
			MSMA302S1*	3.0kW	MFDDTA390	F-frame
			MSMA402S1*	4.0kW	MFDDTB3A2	
			MSMA502S1*	5.0kW		
Single/3-phase, 200V	MDMA Middle inertia	2000r/min	MDMA102S1*	1.0kW	MDDDT3530	D-frame
			MDMA152S1*	1.5kW	MDDDT5540	
3-phase, 200V			MDMA202S1*	2.0kW	MEDDT7364	E-frame
			MDMA302S1*	3.0kW	MFDDTA390	F-frame
			MDMA402S1*	4.0kW	MFDDTB3A2	
			MDMA502S1*	5.0kW		
Single/3-phase, 200V	MHMA High inertia	2000r/min	MHMA052S1*	500W	MCDDT3520	C-frame
			MHMA102S1*	1.0kW	MDDDT3530	D-frame
			MHMA152S1*	1.5kW	MDDDT5540	
3-phase, 200V			MHMA202S1*	2.0kW	MEDDT7364	E-frame
			MHMA302S1*	3.0kW	MFDDTA390	F-frame
			MHMA402S1*	4.0kW	MFDDTB3A2	
			MHMA502S1*	5.0kW		
Single/3-phase, 200V	MFMA Middle inertia	2000r/min	MFMA042S1*	400W	MCDDT3520	C-frame
			MFMA152S1*	1.5kW	MDDDT5540	D-frame
3-phase, 200V			MFMA252S1*	2.5kW	MEDDT7364	E-frame
			MFMA452S1*	4.5kW	MFDDTB3A2	F-frame
Single/3-phase, 200V	MGMA Middle inertia	1000r/min	MGMA092S1*	900W	MDDDT5540	D-frame
3-phase, 200V			MGMA202S1*	2.0kW	MFDDTA390	F-frame
			MGMA302S1*	3.0kW	MFDDTB3A2	
			MGMA452S1*	4.5kW		

<Notes>

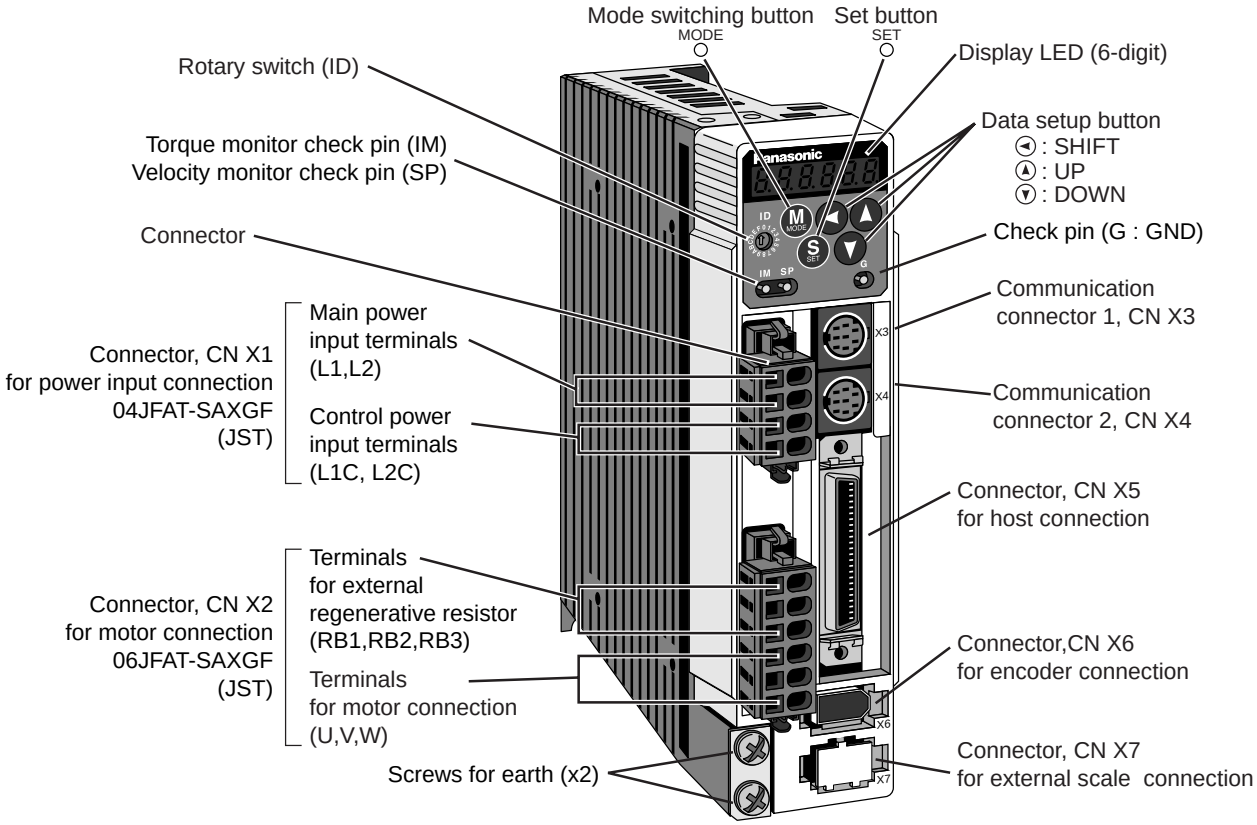
1) Suffix of " * " in the applicable motor model represents the motor structure.
2) Default of the driver is set for the incremental encoder specifications.
   When you use in absolute, make the following operations.
   a) Install a battery for absolute encoder. (refer to P.314, "Options" of Supplement.)
   b) Switch the parameter Pr0B (Absolute encoder setup) from "1 (default)" to "0".
3) No wiring for back up battery is required when you use the absolute 17-bit encoder in incremental.

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Parts Description

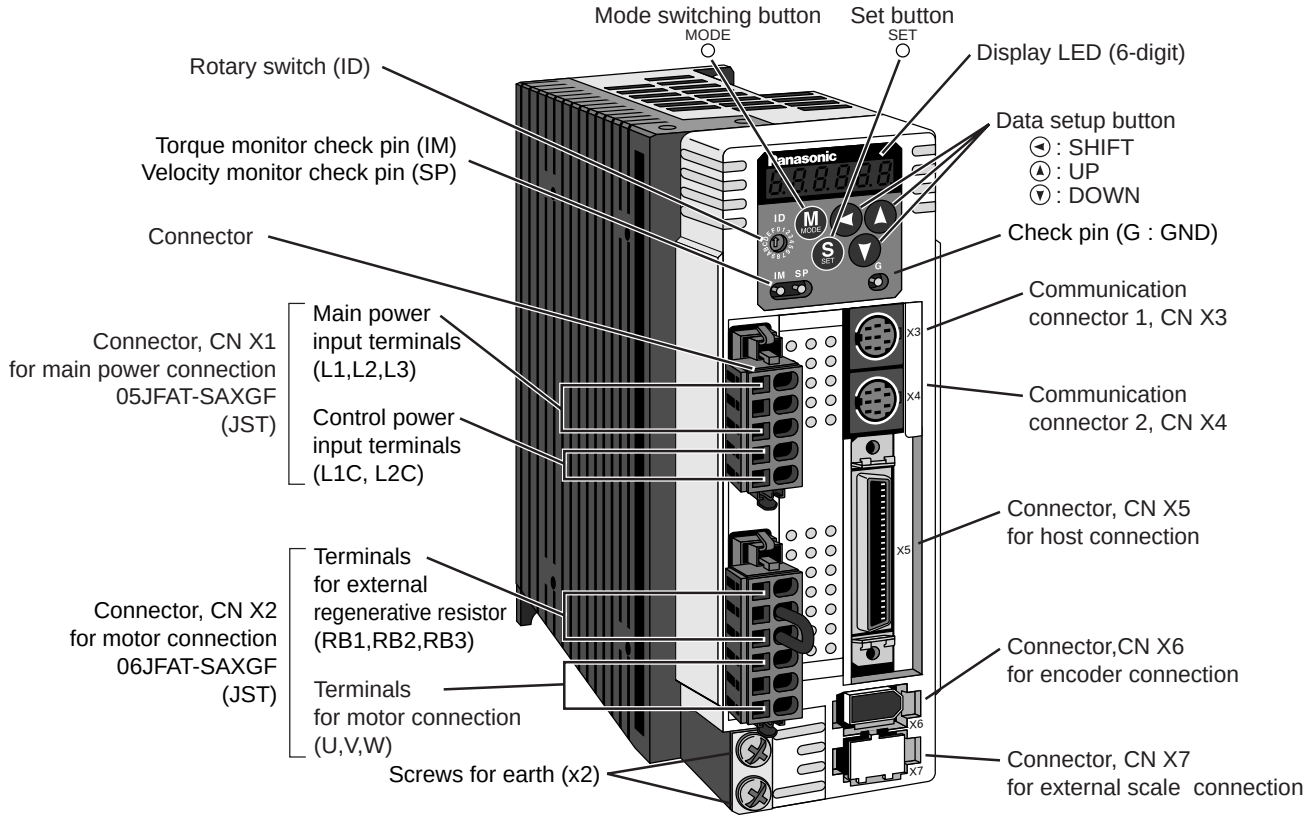
Driver

• A and B-frame



e.g.) : MADDT1207 (Single phase, 200V, 200W : A-frame)

• C and D-frame



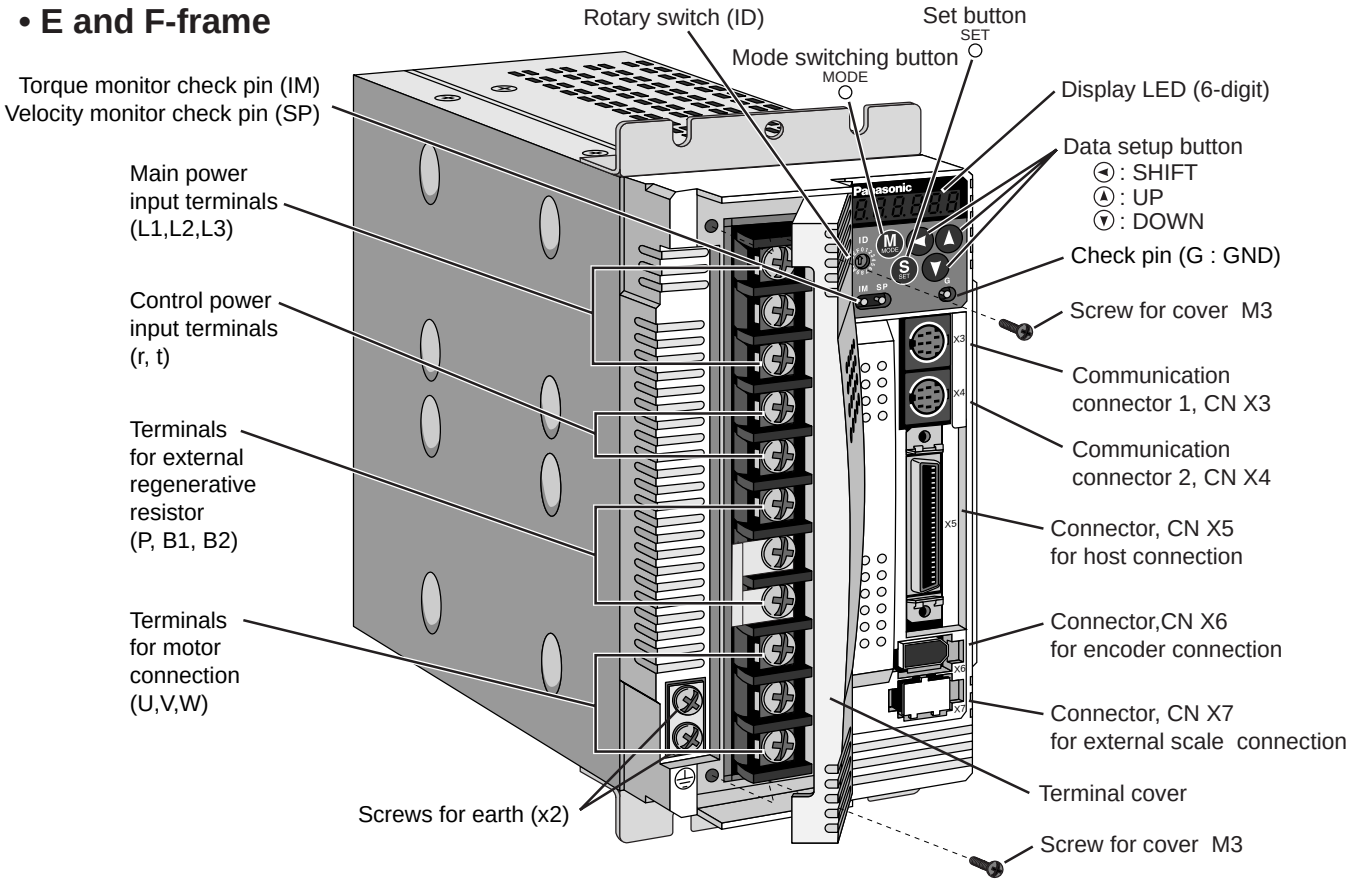
e.g.) : MCDDT1207 (Single/3-phase, 200V, 750W : C-frame)

<Note>

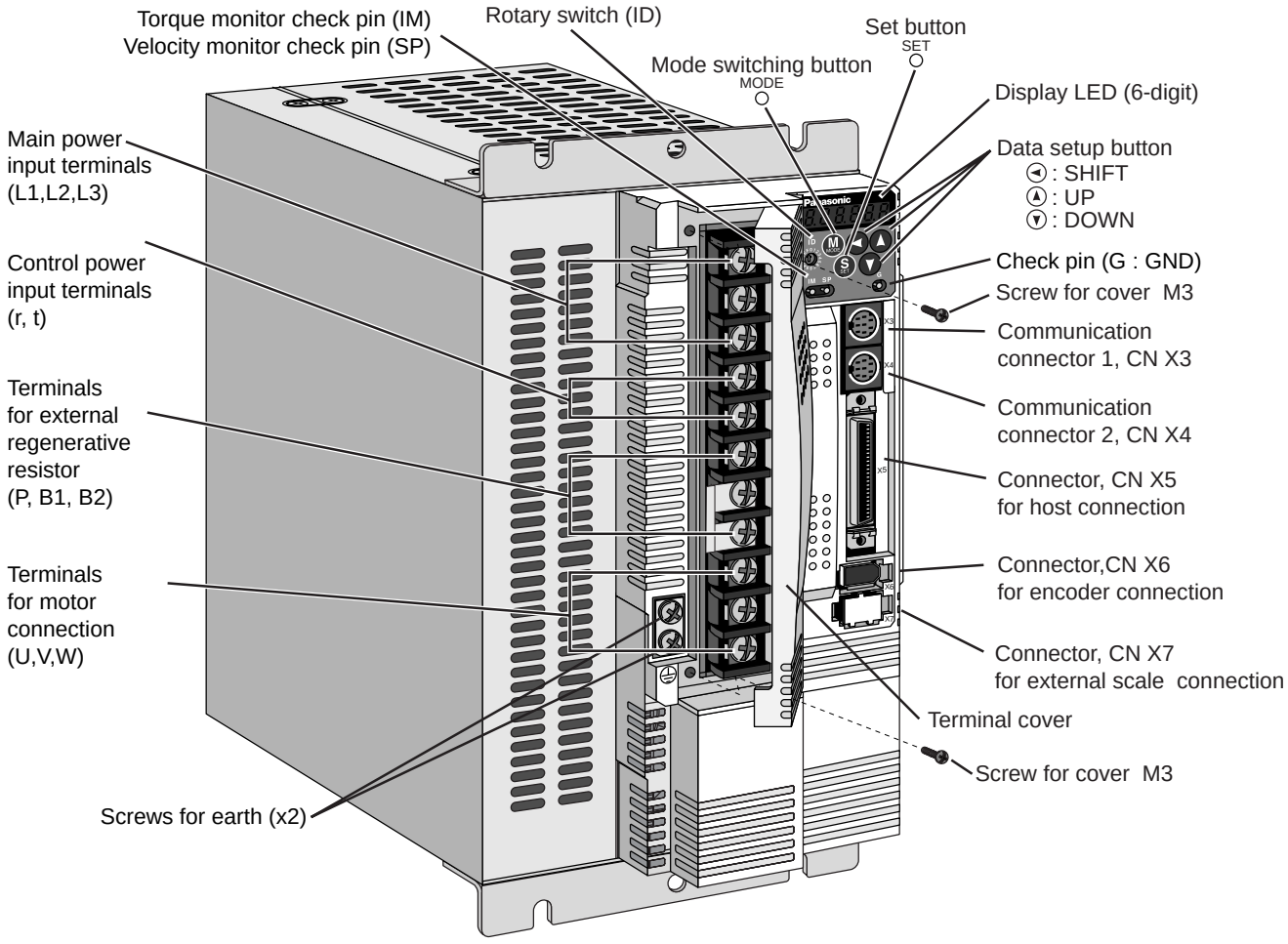
X1 and X2 are attached in A to D-frame driver.

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• E and F-frame



e.g.) : MEDDT7364 (3-phase, 200V, 2.0kW : E-frame)



e.g.) : MFDDTB3A2 (3-phase, 200V, 5.0kW : F-frame)

<Note>

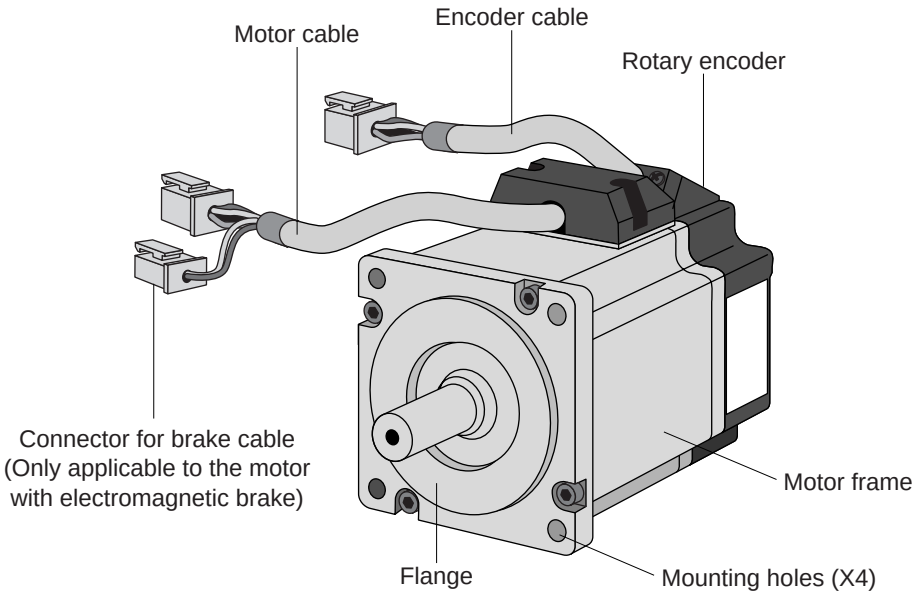
For details of each model, refer to "Dimensions " (P.324 to 326) of Supplement.

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Parts Description

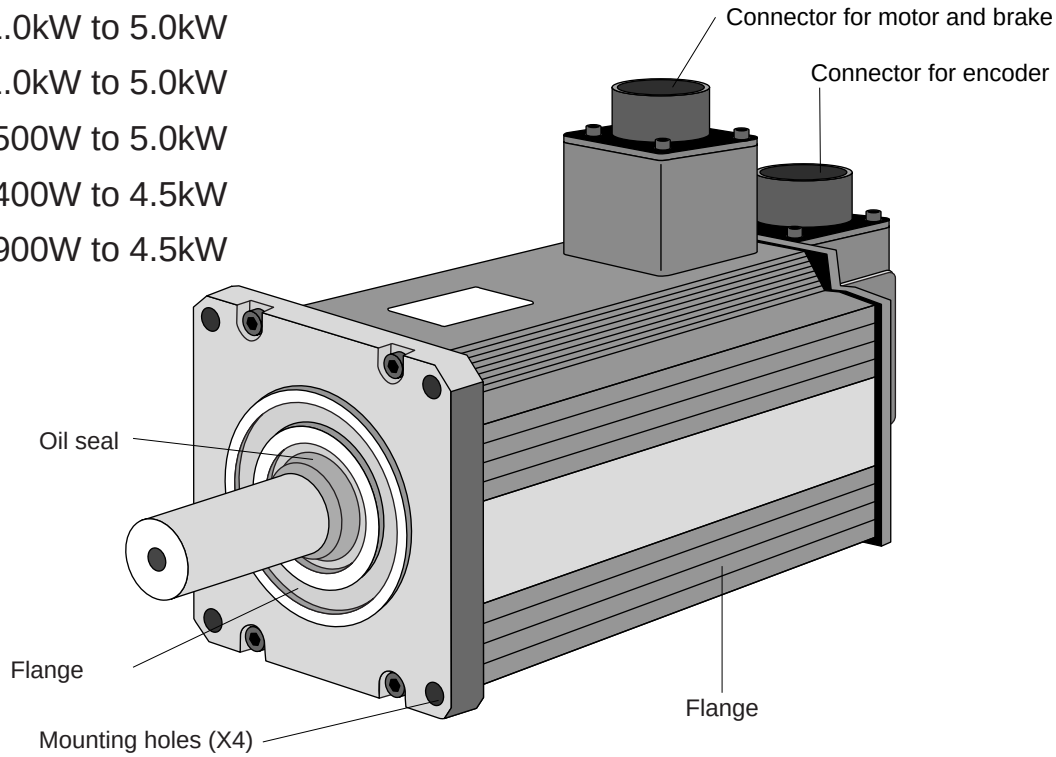
Motor

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



e.g.) : Low inertia type (MSMD series, 50W)

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



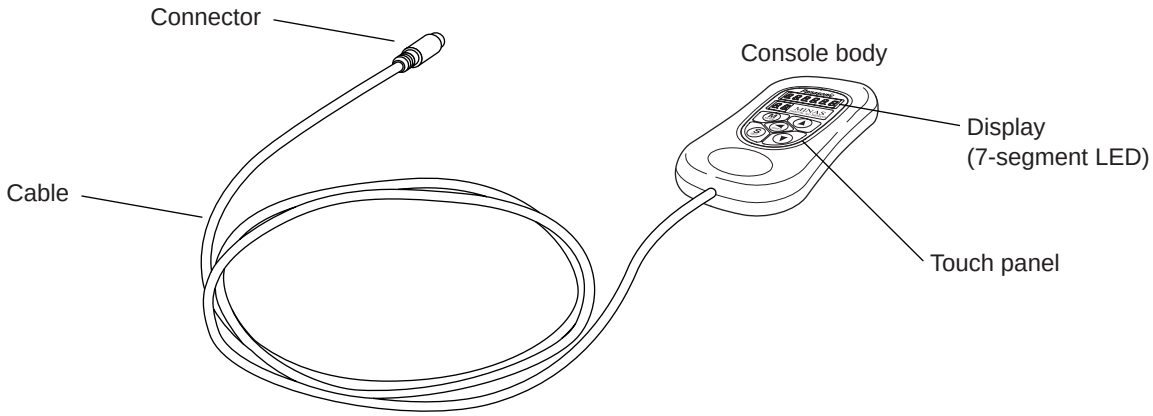
e.g.) : Middle inertia type (MDMA series, 1.0kW)

<Note>
For details of each model, refer to "Dimensions " (P.327 to P.341) of Supplement.

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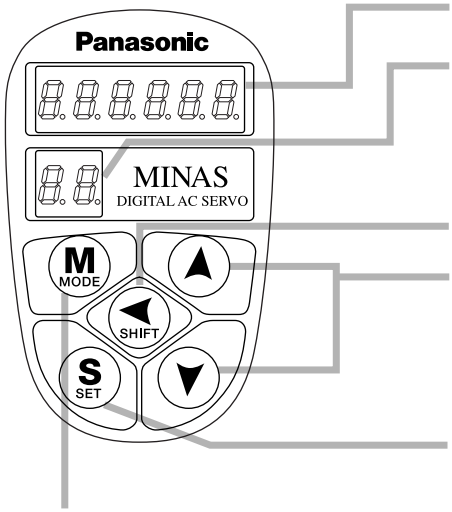
Console

Main Body



<Note>
Console is an option (Part No.: DV0P4420).

Display/Touch panel



Display LED (6 digits)

Displays **ID number of selected driver** (in 2 digits).
The value set in Pr00 (Address) is ID No.
Displays the parameter No. at parameter setup mode.

Press this to shift the digit for data change.

Press this to change the data and to execute the operation of the selected parameter.
Numerical value increases by pressing ▲,
and decreases by pressing ▼.

SET Button : Shifts to "EXECUTE" display of each mode selected by mode switching button.

Mode switching button : Switches the mode among the following 6 modes.

(1) Monitor mode
(2) Parameter setup mode
(3) EEPROM write mode
(4) Normal auto-gain tuning mode
(5) AUX function mode
- Trial run (JOG mode)
- Alarm clear

(6) Copy mode
- Parameter copy from the servo driver to the console
- Parameter copy from the console to the servo driver

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How to Install

Install the driver and the motor properly to avoid a breakdown or an accident.

Driver

Installation Place

1) Indoors, where the products are not subjected to rain or direct sun beams. The products are not water-proof.
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 low humidity and dust-free place.
4) Vibration-free place

Environmental Conditions

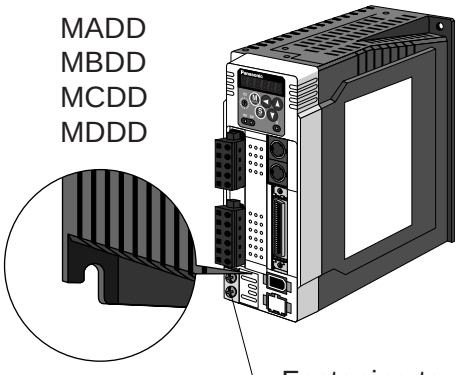
Item	Condition
Ambient temperature	0˚C to 55˚C (free from freezing)
Ambient humidity	Less than 90% RH (free from condensation)
Storage temperature	–20˚C to 80˚C (free from freezing)
Storage humidity	Less than 90% RH (free from condensation)
Vibration	Lower than 5.9m/S^2 (0.6G), 10 to 60Hz
Altitude	Lower than 1000m

How to Install

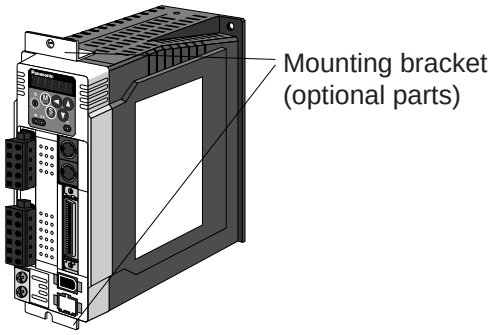
1) Rack-mount type. Install in vertical position, and reserve enough space around the servo driver for ventilation. Base mount type (rear mount) is standard (A to D-frame)
2) Use the optional mounting bracket when you want to change the mounting face.

A to D-frame

MADD
MBDD
MCDD
MDDD

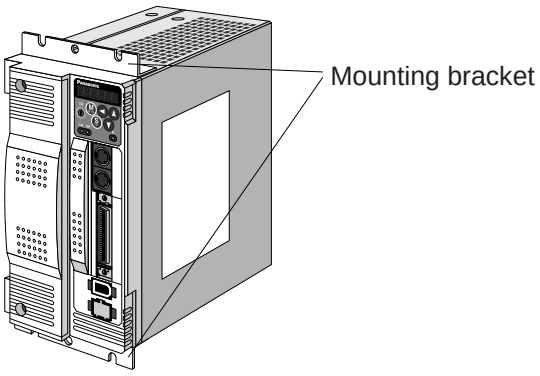


e.g.) In case of C-frame



Fastening torque of earth screws (M4) to be 0.39 to 0.59N·m.

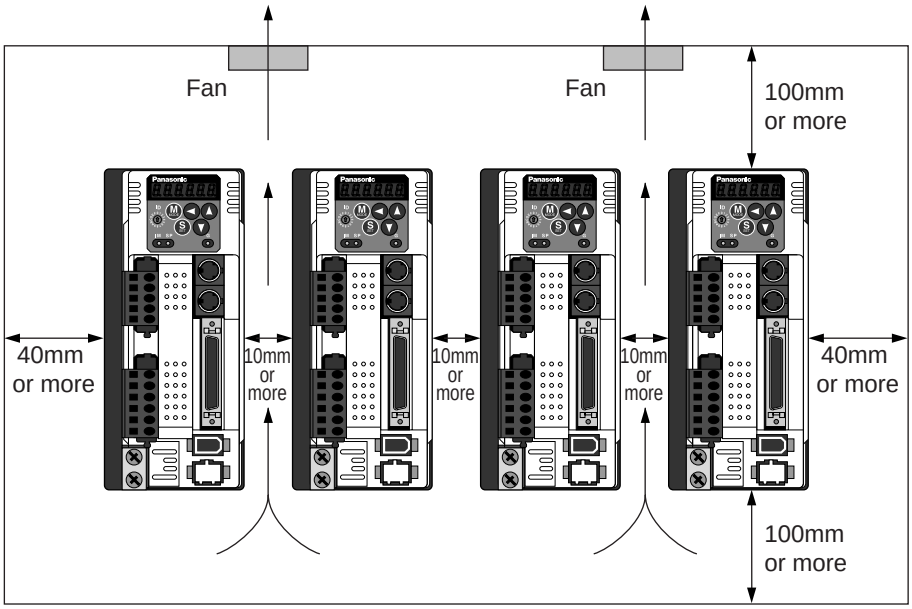
E and F-frame



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Mounting Direction and Spacing

- Reserve enough surrounding space for effective cooling.
- Install fans to provide uniform distribution of temperature in the control panel.
- Observe the environmental conditions of the control panel described in the next page.



<Note>

It is recommended to use the conductive paint when you make your own mounting bracket, or repaint after peeling off the paint on the machine for installing the products, in order to make noise countermeasure.

Caution on Installation

We have been making the best effort to ensure the highest quality, however, application of exceptionally large 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.

There might be a chance of smoke generation due to the failure of these products. Pay an extra attention when you apply these products in a clean room environment.

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How to Install

Motor

Installation Place

Since the conditions of location affect a lot to the motor life, select a place which meets the conditions below.

1) Indoors, where the products are not subjected to rain or direct sun beam. The products are not water-proof.
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) Where the motor is free from grinding oil, oil mist, iron powder or chips.
4) Well-ventilated and humid and dust-free place, far apart from the heat source such as a furnace.
5) Easy-to-access place for inspection and cleaning.
6) Vibration-free place.
7) Avoid enclosed place. Motor may gets hot in those enclosure and shorten the motor life.

Environmental Conditions

Item		Condition
Ambient temperature		0˚C to 40˚C (free from freezing) *1
Ambient humidity		Less than 85% RH (free from condensation)
Storage temperature		–20˚C to 80˚C (free from freezing) *2
Storage humidity		Less than 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	IP65 (except rotating portion of output shaft and lead wire end) • 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.

*1 Ambient temperature to be measured at 5cm away from the motor.
*2 Permissible temperature for short duration such as transportation.

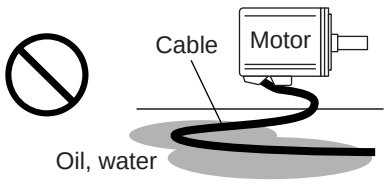
How to Install

You can mount the motor either horizontally or vertically as long as you observe the followings.

1) Horizontal mounting
   • Mount the motor with cable outlet facing downward for water/oil countermeasure.
2) Vertical mounting
   • Use the motor with oil seal (non-standard) when mounting the motor with gear reducer to prevent the reducer oil/grease from entering to the motor.
3) For mounting dimensions, refer to P.326 to 340 "Dimensions".

Oil/Water Protection

1) Don't submerge the motor cable to water or oil.
2) Install the motor with the cable outlet facing downward.
3) Avoid a place where the motor is subjected to oil or water.
4) Use the motor with an oil seal when used with the gear reducer, so that the oil may not enter to the motor through shaft.

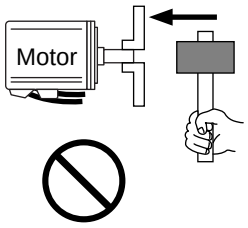


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Stress to Cables

1) Avoid a stress application to the cable outlet and connecting portion by bending or self-weight.
2) Especially in an application where the motor itself travels, fix the attached cable and contain the extension junction cable into the bearer so that the stress by bending can be minimized.
3) Take the cable bending radius as large as possible. (Minimum R20mm)

Permissible Load to Output Shaft



1) Design the mechanical system so that the applied radial load and/or thrust load to the motor shaft at installation and at normal operation can meet the permissible value specified to each model.
2) Pay an extra attention when you use a rigid coupling. (Excess bending load may damage the shaft or deteriorate the bearing life.
3) Use a flexible coupling with high stiffness designed exclusively for servo application in order to make a radial thrust caused by micro misalignment smaller than the permissible value.
4) For permissible load of each model, refer to P.342, "List of Permissible Load to Output Shaft" of Supplement.

Notes on Installation

1) Do not apply direct impact to the shaft by hammer while attaching/detaching a coupling to and from the motor shaft.
   (Or it may damage the encoder mounted on the other side of the shaft.)
2) Make a full alignment. (incomplete alignment may cause vibration and damage the bearing.)
3) If the motor shaft is not electrically grounded, it may cause electrolytic corrosion to the bearing depending on the condition of the machine and its mounting environment, and may result in the bearing noise. Check and verification by customer is required.

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How to Install

Console

Installation Place

1) Indoors, where the products are not subjected to rain or direct sun beam. The products are not water-proof.
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 low humidity and dust-free place.
4) Easy-to-access place for inspection and cleaning

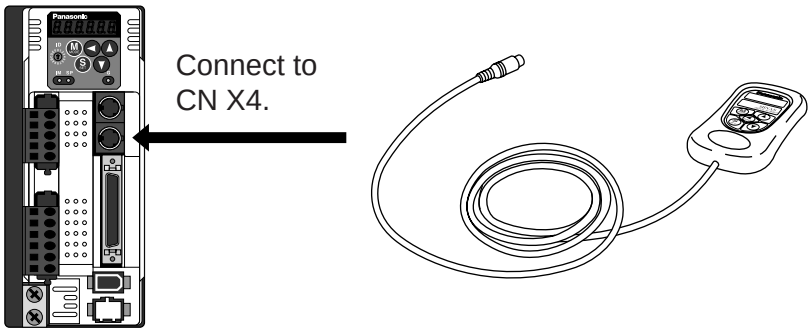
Environmental Conditions

Item	Condition
Ambient temperature	0˚C to 55˚C (free from freezing)
Ambient humidity	Less than 90% RH (free from condensation)
Storage temperature	–20˚C to 80˚C (free from freezing)
Storage humidity	Less than 90% RH (free from condensation)
Vibration	Lower than 5.9m/s^2 (0.6G), 10 to 60Hz
Impact	Conform to JISC0044 (Free fall test, 1m for 2 directions, 2 cycles)
Altitude	Lower than 1000m

<Cautions>

- Do not give strong impact to the products.
- Do not drop the products.
- Do not pull the cables with excess force.
- Avoid the place near to the heat source such as a heater or a large winding resistor.

How to Connect



<Remarks>

- Connect the console connector securely to CN X4 connector of the driver
- Never pull the cable to plug in or plug out.

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