I/O Command Type Servo Motor Inherits Strongest Servo Core

# MINAS A4P Series


## Achieves System Simplification and Cost Reduction

## 1.Built-in NC Functions

- NC functions allow positioning by I/O command only.
- A target can be positioned (by teaching) without complicated pulse calculations.
- In addition to travel distances, point tables combine 16 types of preset speeds, linear acceleration/deceleration or S-shaped acceleration/deceleration, and 4 types of acceleration and deceleration.
- Two types of continuous operations are available depending on required machine specifications; continuous positioning with a temporary stop at any point and a combined block operation without a temporary stop.
- Sequential operation can be set to execute a maximum of 60 positioning points automatically.
- 8 types of homing operation modes are available. If a bumping homing is selected, simplified return-to-origin can be executed without any origin sensor.

## 2.Neither a positioning unit nor a pulse generator is required

- A maximum of 60 positioning points can be stored. No complicated programming is required as before.
- Positioning points can be specified as absolute positions or relative positions.
- Positioning can be performed directly at an absolute position without requiring homing operation by using the MINAS A4P as an absolute encoder in combination with a motor equipped with a 17-bit absolute/incremental encoder.

# Details of Features

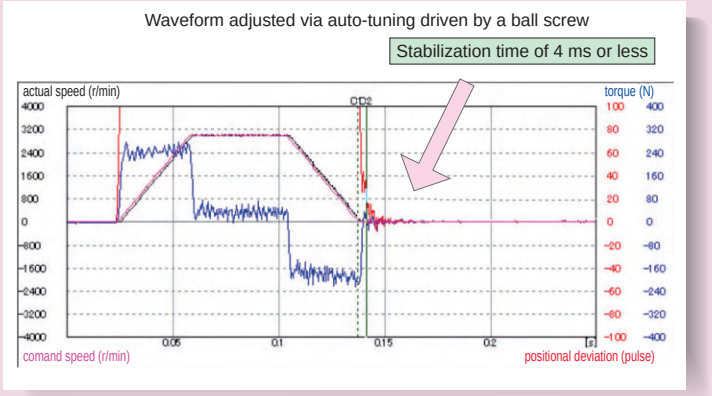
## Inherits high performance and advanced functioning

## 1. Further Adjustment-Free Operation

### High-functionality Real-Time Auto-Gain Tuning

- Corresponds to even variation of load inertia. Offers real automatic gain tuning to low and high stiffness machines with a combination of an adaptive filter.
- Supports the vertical axis application where the load torque is different in rotational direction.
- Prevents the machine from over-traveling during automatic gain tuning with software limit protective function.

Waveform adjusted via auto-tuning driven by a ball screw

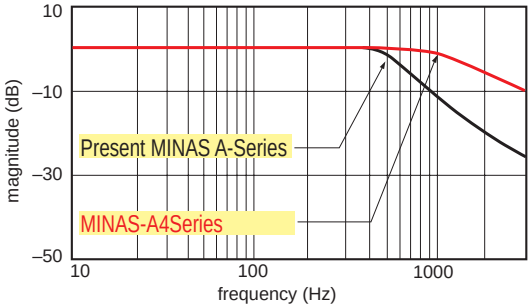



## 2. Further High-Speed and High-Response

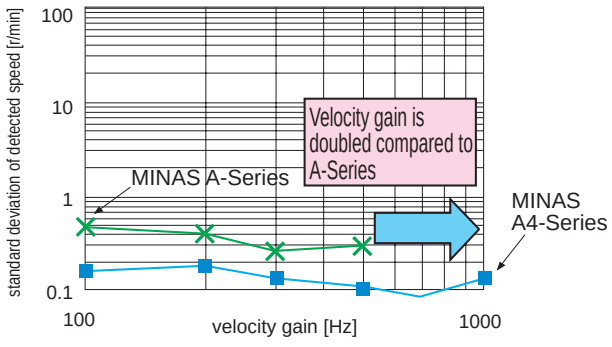
### Velocity response (bandwidth) of 1kHz

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

*) In case of high stiffness machine




Variation of detected speed at stopping



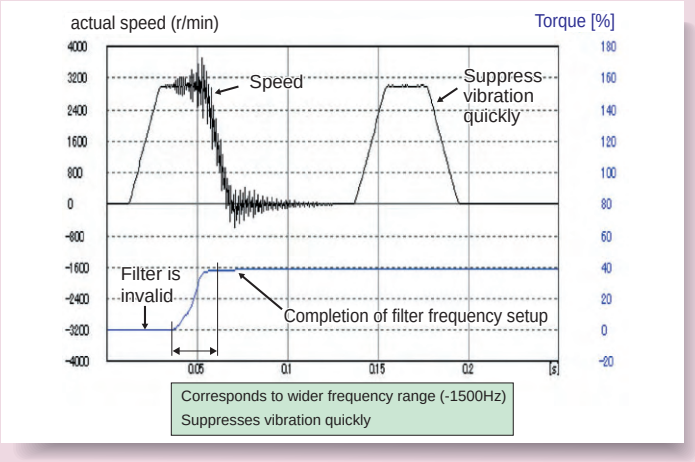

### High-functionality Real-Time Auto-Gain Tuning

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

# 3. Further Reduction of Vibration

## Adaptive filter

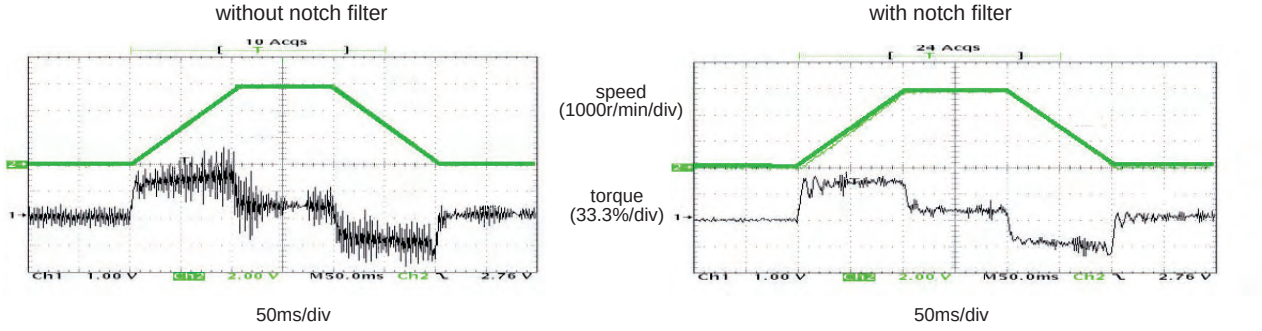
- Makes the notch filter frequency automatically follow the machine resonance frequency.
- Suppression of "Judder" noise of the machine can be expected which is caused by variation of the machines or resonance frequency due to aging.




## 2-channel notch filters

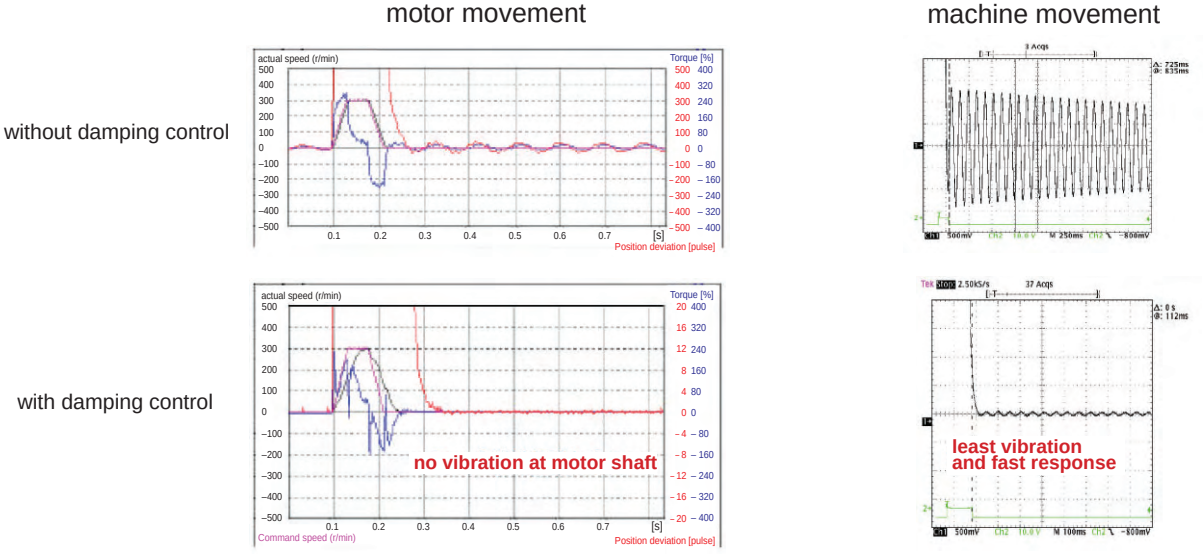
- 2-channel notch filters are equipped in the driver independent from adaptive filter.
- You can set up both frequency and width for each of 2 filters, and set up frequency in unit of 1Hz.
- Suppression of "Judder" noise of the machine which has multiple resonance points can be expected

Effect of notch filter




## Damping control

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



# 4. Further Flexibility and Multiplicity

## Dedicated Console (DV0P4420)

- Enables easy parameter setting/changing, control state monitoring, status/error log viewing, and parameter saving/loading.
- Makes it easy to move a target position, set a positioning point and perform teaching.
- Can select and display 16 types of operation data including motor rotational speed and torque in the monitor mode.

## Control Mode

- Makes it possible to select position control via the motor´s internal encoder or fully-closed control based on an feedback scale.

## Analog Monitor Terminal

- "Motor rotational speed", "Command speed", "torque command" and "positional deviation" can be observed by oscilloscope through the analog monitor pin at the front panel of the driver.

## Trial run (JOG)

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

## Full-closed control (High precision positioning)

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

Note) Applicable feedback scales are as follows,

- Made by Mitsutoyo

| | Resolution(μm) | Max. Speed*(m/s) |
|---|---|---|
| ABS AT573A Series | 0.05 | 2 |
| ABS ST771A Series | 0.5 | 5 |
| ABS ST773A Series | 0.1 | 4 |
| ABS ST771AL Series | 0.5 | 5 |
| ABS ST773AL Series | 0.1 | 4 |

(* The maximum speed depends on the driver performance. It is limited by the machine configuration and system configuration.)

- Best suits to high precision machines.

## Inrush current suppressing function

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

## Regeneration discharging function

- Discharges the regenerative energy with resister, which energy is generated while stopping the load with large moment of inertia, or use in up-down operation, and is returned to the driver from the motor.
- No regeneration discharge resistor is built-in to Frame A driver (MADDT1105P type.) and Frame B driver (MBDDT2210P type.), and we recommend you to connect optional regenerative resistor.
- Regenerative resistor is built-in to Frame C to F drivers, however, connection of the optional regenerative resistor bring you further regenerative capability.

## Built-in dynamic brake

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

## Setup support software

- With the setup support software, "PANATERM" via RS232 communication port, you can monitor the running status of the driver and set up parameters.

## Wave-form graphic function

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

＊ Note) Refer to page "F2" for setup support software.

## Selectable Torque Limit Value

- A torque limit can be set for each rotational direction.
- According to the specification of the machine, a maximum torque can be set for each rotational direction as necessary.

## Built in sequence of bumping homing

- You can select 8 kind of homing mode.
  - Home sensor (based on the front end)
  - Home sensor + Z phase (based on the front end)
  - Home sensor + Z phase (based on the rear end)
  - Limit sensor
  - Limit sensor + Z phase
  - Z phase homing
  - Bumping homing
  - Data set

## SEMI F47 voltage sag immunity

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

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

## Frequency analyzing function

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

*Note) Refer to page "F2" for setup support software.

## Applicable overseas safety standards

| Subject | Standard conformed | | |
|---|---|---|---|
| Motor | IEC60034-1 IEC60034-5 UL1004 CSA22.2 No.100 | | Conforms to Low-Voltage Directives |
| Motor and driver | EN50178 UL508C CSA22.2 No.14 | | |
| | EN55011 | Radio Disturbance Characteristics of Industrial, Scientific and Medical (ISM) Radio-Frequency Equipment | Conforms to references by EMC Directives |
| | EN61000-6-2 | Immunity for Industrial Environments | |
| | IEC61000-4-2 | Electrostatic Discharge Immunity Test | |
| | IEC61000-4-3 | Radio Frequency Electromagnetic Field Immunity Test | |
| | IEC61000-4-4 | Electric High-Speed Transition Phenomenon/ Burst Immunity Test | |
| | IEC61000-4-5 | Lightening Surge Immunity Test | |
| | IEC61000-4-6 | High Frequency Conduction Immunity Test | |
| | IEC61000-4-11 | Instantaneous Outage Immunity Test | |

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

Pursuant to at the directive 2004/108/EC,article 9(2)

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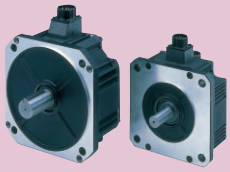
* When export this product, follow statutory provisions of the destination country.

# Motor Line-up

| | Motor series * | Rated output (kW) | Rated rotational speed (Max. speed) (r/min) | Rotary encoder | | Brake | Gear | CE/UL | Enclosure | Features | Applications |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 2500P/r incremental | 17bit absolute/ incremental | Holding | High precision | | | | |
| Ultra low inertia | **MAMA**  | **0.1-0.75**<br>4 models<br>0.1, 0.2, 0.4 and 0.75 | 5000 (6000) | ○ | ○ | ○ | — | ○ | IP65 (Except shaft through hole and connector) | ·Small capacity<br>·Suitable for the machines directly coupled with high speed ball screw and high stiffness and high repetitive application | ·SMT machines<br>·Inserters<br>·High repetitive positioning application |
| Low inertia | **MSMD**  | **0.05-0.75**<br>5 models<br>0.05, 0.1, 0.2, 0.4 and 0.75 | 3000 (5000)<br>*For 400W/100V and 750W 3000 (4500) | ○ | ○ | ○ | ○ | ○ | IP65 (Except shaft through hole and connector) | ·Small capacity<br>·Suitable for all applications | ·Inserters<br>·Belt driven machines<br>·Unloading robot |
| | **MQMA** (Cube type)  | **0.1-0.4**<br>3 models<br>0.1, 0.2, and 0.4 | 3000 (5000)<br>*For 400W/100V 3000 (4500) | ○ | ○ | ○ | — | ○ | IP65 (Except shaft through hole and connector) | ·Small capacity<br>·Suitable for flat type and low stiffness machines with belt driven | ·SMT machines<br>·Inserters<br>·Belt driven machines<br>·Unloading robot |
| | **MSMA**  | **1.0-5.0**<br>6 models<br>1.0,1.5,2.0, 3.0,4.0 and 5.0 | 3000 (5000)<br>*For 4kW and 5kW 3000 (4500) | ○ | ○ | ○ | — | ○ | IP65 (Except cannon plug/ connector pins) | ·Middle capacity<br>·Suitable for the machines directly coupled with ball screw and high stiffness and high repetitive application | ·SMT machines<br>·Inserter<br>·Food machines |
| Middle inertia | **MDMA**  | **1.0-5.0**<br>6 models<br>1.0,1.5,2.0, 3.0,4.0 and 5.0 | 2000 (3000) | ○ | ○ | ○ | — | ○ | IP65 (Except cannon plug/ connector pins) | ·Middle capacity<br>·Suitable for low stiffness machines with belt driven | ·Belt driven machines<br>·Conveyers<br>·Robots |
| | **MGMA** (Low speed/ High torque type)  | **0.9-4.5**<br>4 models<br>0.9,2.0,3.0 and 4.5 | 1000 (2000) | ○ | ○ | ○ | — | ○ | IP65 (Except cannon plug/ connector pins) | ·Middle capacity<br>·Suitable for machines requiring low speed with high torque | ·Belt driven machines<br>·Conveyers<br>·Robots |
| | **MFMA** (Flat type)  | **0.4-4.5**<br>4 models<br>0.4,1.5, 2.5 and 4.5 | 2000 (3000) | ○ | ○ | ○ | — | ○ | IP65 (Except cannon plug/ connector pins) | ·Middle capacity<br>·Flat type and suitable for machines with space limitation | ·Robots<br>·Food machines |
| High inertia | **MHMA**  | **0.5-5.0**<br>7 models<br>0.5,1.0,1.5, 2.0,3.0,4.0 and 5.0 | 2000 (3000) | ○ | ○ | ○ | — | ○ | IP65 (Except cannon plug/ connector pins) | ·Middle capacity<br>·Suitable for low stiffness machines with belt driven, and large load moment of inertia | ·Belt driven machines<br>·Conveyors<br>·Robots |

* Motor is sharing with A4/A4F series

# Model Designation

## • Servo Motor

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

Special specifications

Motor structure

Design order
1 : Standard

Rotary encoder specifications

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

Voltage specifications

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

Motor rated output

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

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

Motor structure

MSMD(standard stock), MQMA(build to order)

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

*Motor with oil seal is manufactured by order.

MSMA , MDMA , MGMA , MFMA , 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. See index (page F31).

MAMA

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

Products are standard stock items or build to order items. See index (page F31).

See page, A4-77 for motor specifications

## • Motor with reduction gear

M S M D 0 1 1 P 3 1 N

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

Motor rated output

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

Voltage specifications

| Symbol | Specifications |
|---|---|
| 1 | 100V |
| 2 | 200V |

Rotary encoder specifications

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

Gear reduction ration, gear type

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

Motor structure

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

See page, A4-133 for motor with gear reducer specifications

## • Servo Driver

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

Special specifications

Frame symbol

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

Power device Max. current rating

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

Supply voltage specifications

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

Current detector current rating

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

Interface

| Symbol | Specifications |
|---|---|
| P | I/O Operation |

See page, A4-67 for driver specifications

# Wiring example

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

**For details, refer to the Instruction Manual.**

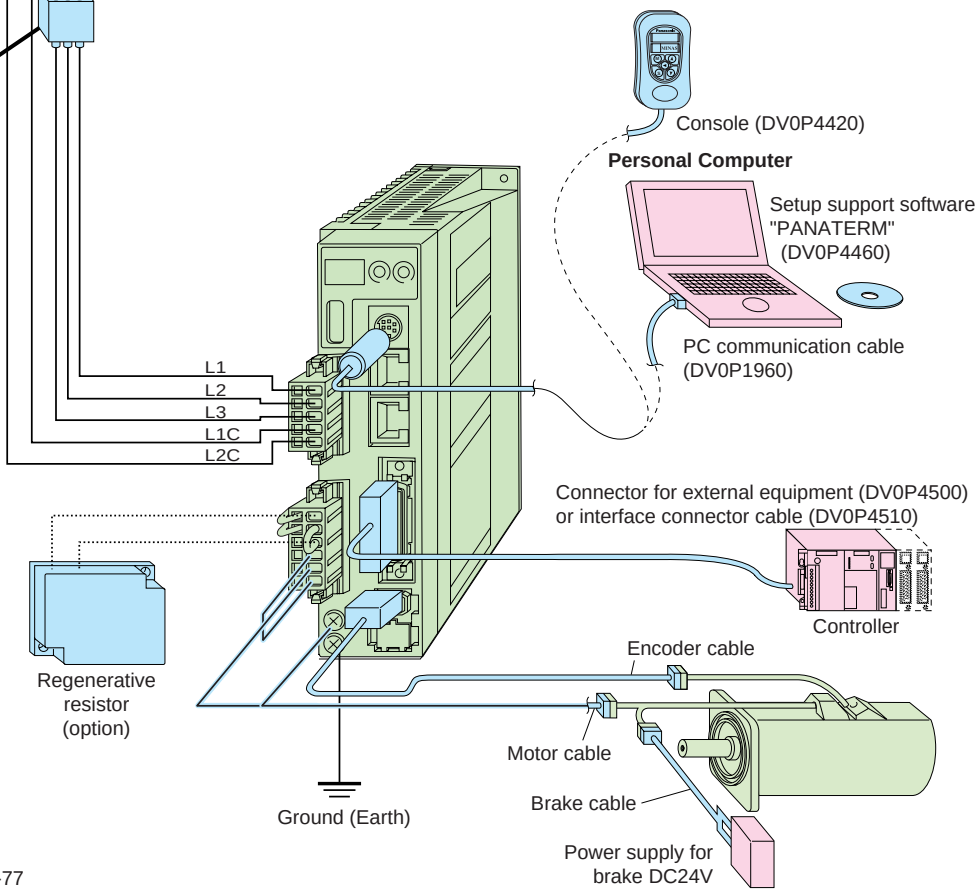
### • Wiring of main circuit

**Circuit Breaker (NFB)**
Protects the power lines.
Shuts off the circuit when overcurrent passes.

**Noise Filter (NF)**
Prevents external noise from the power lines.
And reduces an effect of the noise generated by the servo driver.

**Magnetic Contactor (MC)**
Turns on/off the main power of the servo driver.
Surge absorber to be used together with this.

**Reactor (L)**
Reduces harmonic current of the main power.




**Pin RB, RB2 and RB3 ...**

- RB2 and RB3 to be kept shorted for normal operation.
- When the internal regenerative resistor capacity has shortage, disconnect between RB2 and RB3, then connect an external regenerative resistor between RB1 and RB2. (Note: that no regenerative resistor is equipped in Frame A and B type.)

| | |
|---|---|
| Motor | to page A4-77 |
| Driver | to page A4-67 |
| Option | to page A4-141 |
| Recommended equipments | to page A4-64 |
| Parts customer to prepare | |

# Driver Frame Type Symbol (Frame E, F)

**For details, refer to the Instruction Manual.**

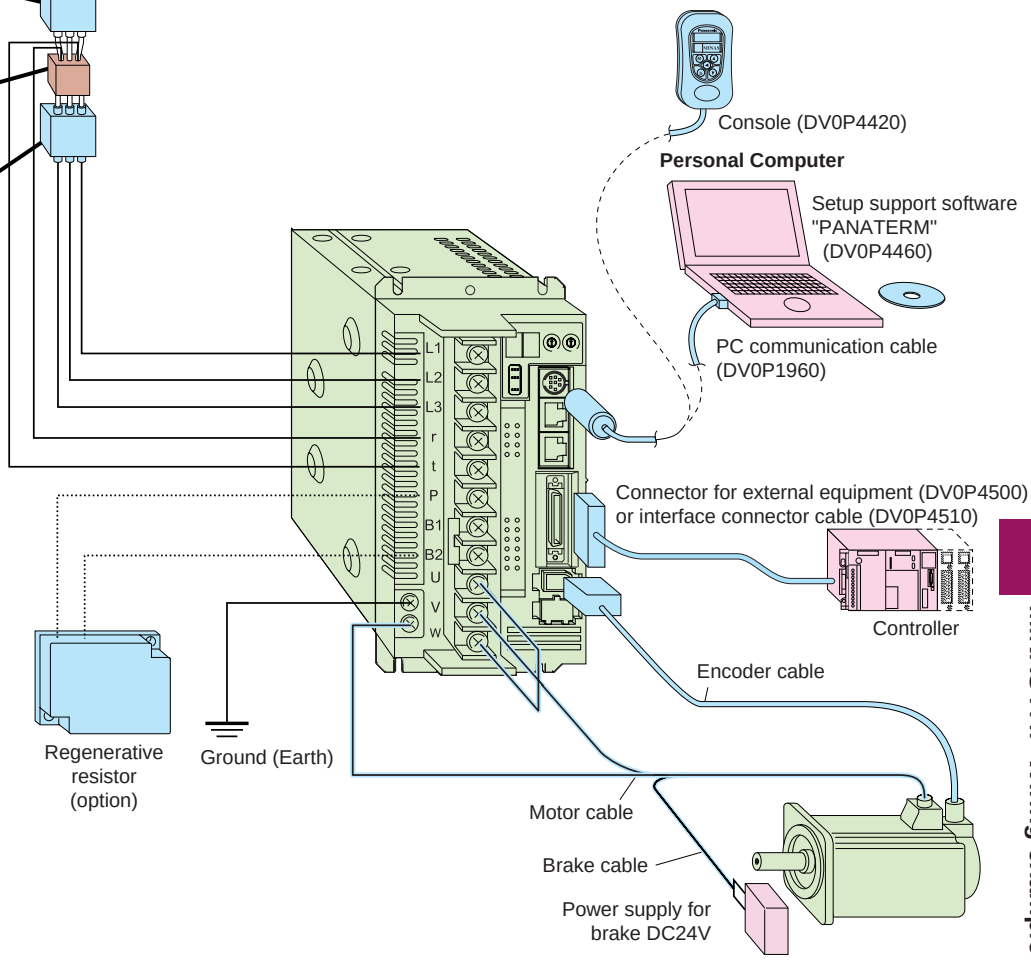
## • Wiring of main circuit

**Circuit Breaker (NFB)**
Protects the power lines.
Shuts off the circuit when overcurrent passes.

**Noise Filter (NF)**
Prevents external noise from the power lines.
And reduces an effect of the noise generated by the servo driver.

**Magnetic Contactor (MC)**
Turns on/off the main power of the servo driver.
Surge absorber to be used together with this.

**Reactor (L)**
Reduces harmonic current of the main power.



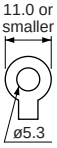

**Pin P, B1 and B2 ...**

- B1 and B2 to be kept shorted for normal operation.
- When the internal regenerative resistor capacity has shortage, disconnect between B1 and B2, then connect an external regenerative resistor between P and B2.


| | |
|---|---|
| Motor | to page A4-77 |
| Driver | to page A4-67 |
| Option | to page A4-141 |
| Recommended equipments | to page A4-64 |
| Parts customer to prepare | |

# Wiring example

## ● List of recommended peripheral equipments

| Power supply voltage | Applicable motor | | Power capacity (atrated load) | Circuit breaker (rated current) | Noise filter | Surge absorber | Noise filter (signal) | Magnetic contactor (Contact) | Cable diameter (Main circuit) | Cable diameter (controlcircuit) | Connector |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Series | Output | | | | | | | | | |
| Single phase, 100V | MSMD | 50W | Approx. 0.4kVA | BBW2102 (10A) | DVOP4170 | DVOP4190 | DVOP1460 | BMFT61041N (3P+1a) | 0.75mm$^2$ to 2.0mm$^2$ AWG14 to 18 | 0.75mm$^2$ AWG18 | Connection to exclusive connector |
| | MSMD MQMA | 100W | | | | | | | | | |
| | | 200W | Approx. 0.5kVA | | | | | | | | |
| | | 400W | Approx. 0.9kVA | | DVOP4180 | | | BMFT61541N (3P+1a) | | | |
| Single phase, 200V | MSMD | 50W | Approx. 0.5kVA | | DVOP4170 | | | BMFT61542N (3P+1a) | | | |
| | | 100W | | | | | | | | | |
| | MAMA MQMA | 100W | Approx. 0.3kVA | | | | | | | | |
| | MAMA MSMD MQMA | 200W | Approx. 0.5kVA | | | | | | | | |
| | MSMD MQMA | 400W | Approx. 0.9kVA | | | | | | | | |
| Single/ 3-phase, 200V | MAMA MFMA | 400W | Approx. 0.9kVA | BBW3152 (15A) | DVOP4180 | DVOP1450 | | | | | |
| | MHMA | 500W | Approx. 1.1kVA | | | | | | | | |
| | MSMD | 750W | Approx. 1.3kVA | | | | | | | | |
| | MAMA | | Approx. 1.6kVA | | DVOP4220 | | | BMFT61842N (3P+1a) | 2.0mm$^2$ AWG14 | | |
| | MDMA MHMA | 1.0kW | Approx. 1.8kVA | | | | | | | | |
| | MGMA | 900W | | BBW3202 (20A) | | | | | | | |
| | MSMA | 1.0kW | | | | | | | | | |
| | MSMA MDMA MFMA MHMA | 1.5kW | Approx. 2.3kVA | | | | | | | | |
| 3-phase, 200V | MSMA MDMA MHMA | 2.0kW | Approx. 3.3kVA | BBW3302 (30A) | DVOP4220 | | | BMF6352N (3P+2a2b) | 3.5mm$^2$ AWG12 | | Terminal block M5   |
| | MFMA | 2.5kW | Approx. 3.8kVA | | | | | | | | |
| | MGMA | 2.0kW | | BBW350S (50A) | DVOP3410 | | | | | | |
| | MSMA MDMA MHMA MGMA | 3.0kW | Approx. 4.5kVA | | | | | | | | |
| | MSMA MDMA MHMA | 4.0kW | Approx. 6.0kVA | | | | | BMF6652N (3P+2a2b) | 5.3mm$^2$ AWG10 | | |
| | MFMA | 4.5kW | Approx. 6.8kVA | | | | | | | | |
| | MGMA | | Approx. 7.5kVA | | | | | | | | |
| | MSMA | 5.0kW | | | | | | | | | |
| | MDMA | | | | | | | | | | |
| | MHMA | | | | | | | | | | |

- Select a single and 3-phase common specifications corresponding to the power supplies.
- Listed circuit breaker and magnetic contactor are manufactured by Panasonic Electric Works.
  **To conform to EC Directives, install a circuit breaker which conforms to IEC and UL Standards (Listed, UL marked) between noise filter and power supply without fail.**
- For details of noise filter, refer to Page A4-138.

**<Remarks>**

- Select a circuit breaker and noise filter which match to the capacity of power supply (including a load condition).
- Terminal block and earth terminals
  - Use a copper conductor cables with temperature rating of 60˚C or higher.
  - Earth terminals for Frame A to D are M4 and M5 for Frame E, F.
  - Larger tightening toque for screws than the max.value (M4 : 1.2 N·m, M5 : 2.0 N·m) may damage the terminal block.
  - Mounting screws on the cover of terminal block for frames E, F should be tightened with 0.2 N·m torque. Application of torque larger than 0.2 N·m may damage the thread on the driver.
- Use an earth cable with the same diameter as that of the main circuit cable.
  If the diameter of the main circuit cable is 1.6mm$^2$ or less, use an earth cable with a diameter of 1.6mm$^2$ (AWG14).
- Use the attached exclusive connector for A to D-frame, and maintain the peeled off length of 8 tot 9mm.
- Tighten the screws of the connector, CN X5 for the host controller with the torque of 0.3 to 0.35 N·m.
- Larger torque than 0.35N·m may damage the connector at the driver side.

**<Caution>**

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

# Table of Part Numbers and Options

| Motor series | Power supply | Rated rotational speed (r/min) | Output (W) | 2500P/r, Incremental | | | 17bit, Absolute/Incremental common | | | | 2500P/r and 17bit common | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Motor Note) 1 | Rating/ Spec. (page) | Encoder cable Note) 2 | Motor Note) 1 | Rating/ Spec. (page) | Encoder cable Note) 2 | Encoder cable Note) 2 | Driver | Frame symbol |
| MAMA [Ultra low inertia] | Single phase 200V | 5000 | 100 | MAMA012P1□ | A4-77 | MFECA 0**0EAM | MAMA012S1□ | A4-77 | MFECA 0**0EAE | MFECA 0**0EAD | MADDT1207P | A-frame |
| | | | 200 | MAMA022P1□ | | | MAMA022S1□ | | | | MBDDT2210P | B-frame |
| | | | 400 | MAMA042P1□ | | | MAMA042S1□ | | | | MCDDT3520P | C-frame |
| | | | 750 | MAMA082P1□ | | | MAMA082S1□ | | | | MDDDT5540P | D-frame |
| | 3-phase, 200V | 5000 | 400 | MAMA042P1□ | | | MAMA042S1□ | | | | MCDDT3520P | C-frame |
| | | | 750 | MAMA082P1□ | | | MAMA082S1□ | | | | MDDDT5540P | D-frame |
| MSMD [low inertia] | Single phase 100V | 3000 | 50 | MSMD5AZP1□ | A4-79 | MFECA 0**0EAM | MSMD5AZS1□ | A4-79 | MFECA 0**0EAE | MFECA 0**0EAD | MADDT1105P | A-frame |
| | | | 100 | MSMD011P1□ | | | MSMD011S1□ | | | | MADDT1107P | |
| | | | 200 | MSMD021P1□ | A4-81 | | MSMD021S1□ | A4-81 | | | MBDDT2110P | B-frame |
| | | | 400 | MSMD041P1□ | | | MSMD041S1□ | | | | MCDDT3120P | C-frame |
| | Single phase 200V | 3000 | 50 | MSMD5AZP1□ | A4-83 | | MSMD5AZS1□ | A4-83 | | | MADDT1205P | |
| | | | 100 | MSMD012P1□ | | | MSMD012S1□ | | | | MADDT1205P | A-frame |
| | | | 200 | MSMD022P1□ | | | MSMD022S1□ | | | | MADDT1207P | |
| | | | 400 | MSMD042P1□ | A4-85 | | MSMD042S1□ | A4-85 | | | MBDDT2210P | B-frame |
| | | | 750 | MSMD082P1□ | | | MSMD082S1□ | | | | MCDDT3520P | C-frame |
| | 3-phase, 200V | 3000 | 750 | MSMD082P1□ | | | MSMD082S1□ | | | | MCDDT3520P | |
| MQMA [Low inertia Cube type] | Single phase 100V | 3000 | 100 | MQMA011P1□ | | MFECA 0**0EAM | MQMA011S1□ | | MFECA 0**0EAE | MFECA 0**0EAD | MADDT1107P | A-frame |
| | | | 200 | MQMA021P1□ | A4-87 | | MQMA021S1□ | A4-87 | | | MBDDT2110P | B-frame |
| | | | 400 | MQMA041P1□ | | | MQMA041S1□ | | | | MCDDT3120P | C-frame |
| | Single phase 200V | 3000 | 100 | MQMA012P1□ | | | MQMA012S1□ | | | | MADDT1205P | A-frame |
| | | | 200 | MQMA022P1□ | A4-89 | | MQMA022S1□ | A4-89 | | | MADDT1207P | |
| | | | 400 | MQMA042P1□ | | | MQMA042S1□ | | | | MBDDT2210P | B-frame |
| MSMA [low inertia] | Single phase 200V | 3000 | 1000 | MSMA102P1□ | | MFECA 0**0ESD | MSMA102S1□ | | MFECA 0**0ESE | MFECA 0**0ESD | MDDDT5540P | D-frame |
| | | | 1500 | MSMA152P1□ | | | MSMA152S1□ | | | | MDDDT5540P | |
| | 3-phase, 200V | 3000 | 1000 | MSMA102P1□ | A4-91 | | MSMA102S1□ | A4-91 | | | MDDDT5540P | |
| | | | 1500 | MSMA152P1□ | | | MSMA152S1□ | | | | MDDDT5540P | |
| | | | 2000 | MSMA202P1□ | | | MSMA202S1□ | | | | MEDDT7364P | E-frame |
| | | | 3000 | MSMA302P1□ | | | MSMA302S1□ | | | | MFDDTA390P | |
| | | | 4000 | MSMA402P1□ | A4-93 | | MSMA402S1□ | A4-93 | | | MFDDTB3A2P | F-frame |
| | | | 5000 | MSMA502P1□ | | | MSMA502S1□ | | | | MFDDTB3A2P | |
| MDMA [Middle inertia] | Single phase 200V | 2000 | 1000 | MDMA102P1□ | | MFECA 0**0ESD | MDMA102S1□ | | MFECA 0**0ESE | MFECA 0**0ESD | MDDDT3530P | |
| | | | 1500 | MDMA152P1□ | A4-95 | | MDMA152S1□ | A4-95 | | | MDDDT5540P | D-frame |
| | 3-phase, 200V | 2000 Note)3 | 1000 | MDMA102P1□ | | | MDMA102S1□ | | | | MDDDT3530P | |
| | | | 1500 | MDMA152P1□ | | | MDMA152S1□ | | | | MDDDT5540P | |
| | | | 2000 | MDMA202P1□ | A4-97 | | MDMA202S1□ | A4-97 | | | MEDDT7364P | E-frame |
| | | | 3000 | MDMA302P1□ | | | MDMA302S1□ | | | | MFDDTA390P | |
| | | | 4000 | MDMA402P1□ | A4-99 | | MDMA402S1□ | A4-99 | | | MFDDTB3A2P | F-frame |
| | | | 5000 | MDMA502P1□ | | | MDMA502S1□ | | | | MFDDTB3A2P | |
| MGMA [Middle inertia Low speed/ High torque] | Single phase 200V | 1000 | 900 | MGMA092P1□ | | MFECA 0**0ESD | MGMA092S1□ | | MFECA 0**0ESE | MFECA 0**0ESD | MDDDT5540P | D-frame |
| | 3-phase, 200V | 1000 | 900 | MGMA092P1□ | A4-101 | | MGMA092S1□ | A4-101 | | | MDDDT5540P | |
| | | | 2000 | MGMA202P1□ | | | MGMA202S1□ | | | | MFDDTA390P | |
| | | | 3000 | MGMA302P1□ | A4-103 | | MGMA302S1□ | A4-103 | | | MFDDTB3A2 | F-frame |
| | | | 4500 | MGMA452P1□ | | | MGMA452S1□ | | | | MFDDTB3A2P | |
| MFMA [Middle inertia Flat type] | Single phase 200V | 2000 | 400 | MFMA042P1□ | | MFECA 0**0ESD | MFMA042S1□ | | MFECA 0**0ESE | MFECA 0**0ESD | MCDDT3520P | C-frame |
| | | | 1500 | MFMA152P1□ | A4-105 | | MFMA152S1□ | A4-105 | | | MDDDT5540P | D-frame |
| | 3-phase, 200V | 2000 Note)3 | 400 | MFMA042P1□ | | | MFMA042S1□ | | | | MCDDT3520P | C-frame |
| | | | 1500 | MFMA152P1□ | | | MFMA152S1□ | | | | MDDDT5540P | D-frame |
| | | | 2500 | MFMA252P1□ | A4-107 | | MFMA252S1□ | A4-107 | | | MEDDT7364P | E-frame |
| | | | 4500 | MFMA452P1□ | | | MFMA452S1□ | | | | MFDDTB3A2P | F-frame |
| MHMA [High inertia] | Single phase 200V | 2000 | 500 | MHMA052P1□ | | MFECA 0**0ESD | MHMA052S1□ | | MFECA 0**0ESE | MFECA 0**0ESD | MCDDT3520P | C-frame |
| | | | 1000 | MHMA102P1□ | | | MHMA102S1□ | | | | MDDDT3530P | D-frame |
| | | | 1500 | MHMA152P1□ | A4-109 | | MHMA152S1□ | A4-109 | | | MDDDT5540P | |
| | 3-phase, 200V | 2000 Note)3 | 500 | MHMA052P1□ | | | MHMA052S1□ | | | | MCDDT3520P | C-frame |
| | | | 1000 | MHMA102P1□ | | | MHMA102S1□ | | | | MDDDT3530P | D-frame |
| | | | 1500 | MHMA152P1□ | | | MHMA152S1□ | | | | MDDDT5540 | |
| | | | 2000 | MHMA202P1□ | | | MHMA202S1□ | | | | MEDDT7364P | E-frame |
| | | | 3000 | MHMA302P1□ | A4-111 | | MHMA302S1□ | A4-111 | | | MFDDTA390P | |
| | | | 4000 | MHMA402P1□ | | | MHMA402S1□ | | | | MFDDTB3A2P | F-frame |
| | | | 5000 | MHMA502P1□ | | | MHMA502S1□ | | | | MFDDTB3A2P | |

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

## ● Carrying page

| Options | | Part No. | Carrying page |
|---|---|---|---|
| Technical reference | Japanese | DV0P4480 | — |
| | English | DV0P4490 | — |
| Console | | DV0P4420 | A4-152 |
| Setup support software, PANATERM | Japanese | DV0P4460 | A4-151 |
| | English | | |
| RS232 communication cable (for connection with PC) | | DV0P1960 | A4-147 |
| Interface cable | | DV0P4510 | A4-147 |
| Connector kit for external equipment | | DV0P4500 | A4-146 |
| Connector kit for motor and encoder | | DV0P4290 | A4-148 |
| | | DV0P4380 | |
| | | DV0P4310 | A4-149 |
| | | DV0P4320 | |
| | | DV0P4330 | |
| | | DV0P4340 | |
| Battery for absolute encoder | | DV0P2990 | A4-154 |
| Mounting bracket | Frame A | DV0P4271 | A4-151 |
| | Frame B | DV0P4272 | |
| | Frame C | DV0P4273 | |
| | Frame D | DV0P4274 | |
| Encoder cable | MFECA0**0EAD | | A4-143 |
| | MFECA0**0EAE | | |
| | MFECA0**0EAM | | |
| | MFECA0**0ESD | | |
| | MFECA0**0ESE | | |
| Motor cable | MFMCA0**0EED | | A4-144 |
| | MFMCA0**2ECD | | |
| | MFMCA0**3ECT | | |
| | MFMCD0**2ECD | | |
| | MFMCD0**2ECT | | |
| | MFMCD0**3ECT | | |
| Motor cable (with brake) | MFMCA0**2FCD | | A4-145 |
| | MFMCA0**2FCT | | |
| | MFMCA0**3FCT | | |
| Brake cable | MFMCB0**0GET | | A4-145 |
| Regenerative resistor | 50 Ω , 25W | DV0P4280 | A4-153 |
| | 100 Ω , 25W | DV0P4281 | |
| | 25 Ω , 50W | DV0P4282 | |
| | 50 Ω , 50W | DV0P4283 | |
| | 30 Ω , 100W | DV0P4284 | |
| | 20 Ω , 130W | DV0P4285 | |
| Reactor | | DV0P220 to DV0P228 | A4-152 |
| Noise filter | | DV0P4170 | A4-138 |
| | | DV0P4180 | |
| | | DV0P4220 | |
| | | DV0P3410 | |
| Surge absorber | Single phase 100V, 200V | DV0P4190 | A4-139 |
| | 3-phase 200V | DV0P1450 | |
| Noise filter for signal wire | | DV0P1460 | A4-139 |

Note) 1. □represents the motor structure.
Note) 2. ** represents the cable length (specified value)
For details, refer to cable specifications (A4-141).