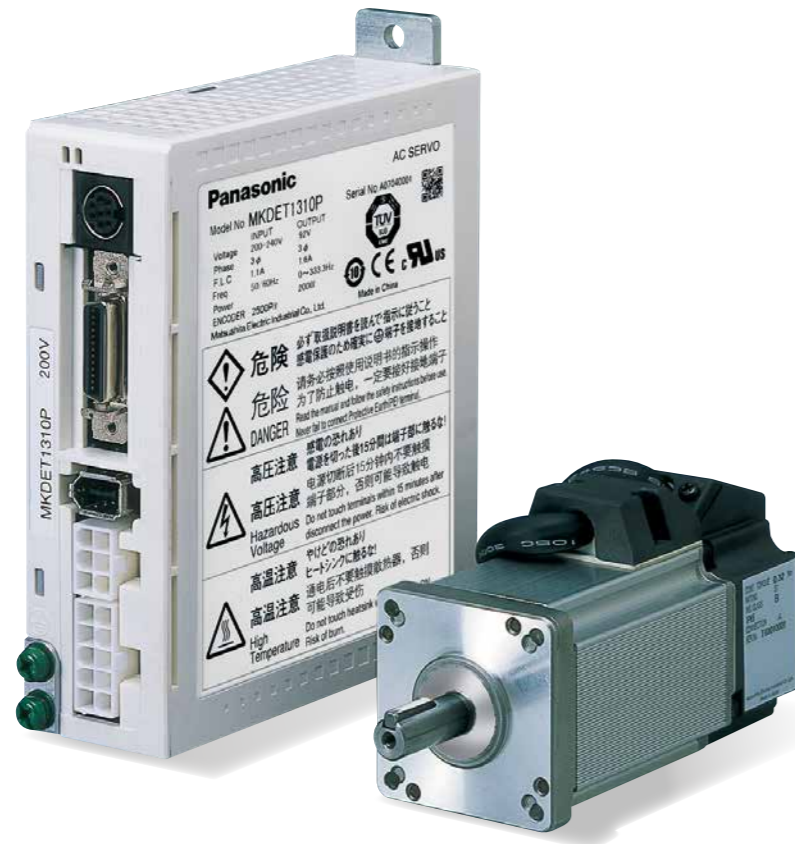


Compact Servo Only for Position Control.

Ultra compact position control type

MINAS E Series



1 Best Fit to Small Drives

- Further evolution in down-sizing, by 47% in size. ^(Note)
- Exclusively designed for position control.

(Note) Compared to MUDS043A1

2 Easy to Handle, Easy to Use

- DIN-rail mounting unit (option) improves handling/installation.
- User-friendly Console makes the setup easy.
- High functionality Real-Time Auto-Gain Tuning enables adjustment-free operation.



3 High-Speed Positioning with Resonance Suppression Filters

- Built-in notch filter suppresses resonance of the machine.
- Built-in adaptive filter detect resonance frequency and suppress vibration.

4 Smoother operation for Low Stiffness Machine

- Damping control function suppresses vibration during acceleration/deceleration

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A6 Series

A6N Series

A6B Series
Special Order Product

E Series

Information

1. Easy to Handle, Easy to Use

High-functionality Real-Time Auto-Gain Tuning (Note 1)

- Offers real automatic gain tuning for 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.

DIN-rail mounting unit (option)

- DIN-rail mounting unit allows parallel mounting with small control devices such as PLC.
- Easy to mount and easy to dismount.

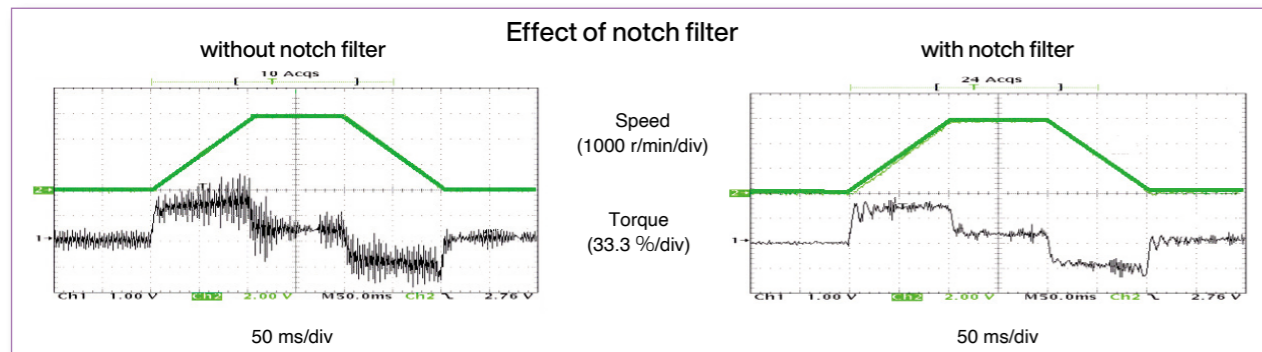
2. Further Reduction of Vibration

Adaptive filter (Note1)

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

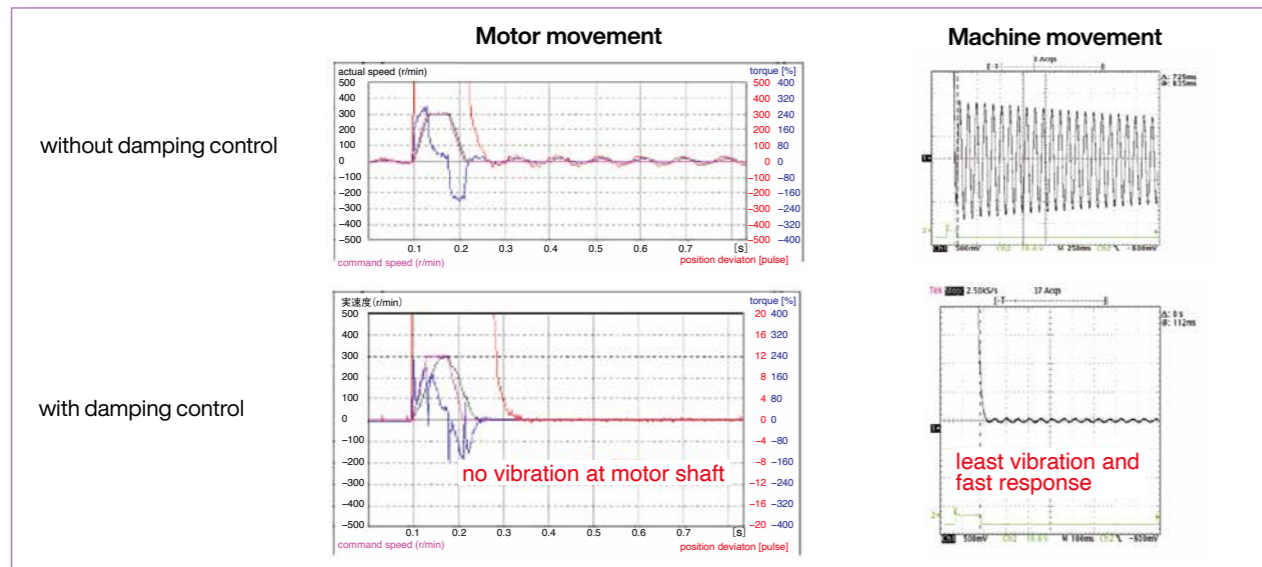
Notch filter (Note1)

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



Damping control (Note1)

- You can suppress vibration occurring at both starting and stopping in low stiffness machine, by manually setting up vibration frequency in 0.1 Hz unit. Note) Only applies to manual adjustment



(Note1) Select at positioning action mode.
 • At high speed positioning mode (Pr02=0) Select either one of notch filter, damping control or high-functionality real-time auto-gain tuning. Not possible to use them all at the same time. Adaptive filter cannot be used.
 • At high-functionality positioning mode (Pr02=1) All of notch filter, damping control, high-functionality real-time auto-gain tuning and adaptive filter can be used at the same time.

3. Further Flexibility and Multiplicity

Console (Option)

- You can set up parameters, copy and make a JOG run.
- Convenient for maintenance at site.
- Refer to P.403, Options.

Command control modes

- Offers 2 command modes, "Position control" and "Internal velocity control".
- You can make a 4-speed running at preset values with parameter at internal velocity control mode.

Inrush current suppressing function

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

Regeneration discharging function

- Discharges the regenerative energy with external resistor, where 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 regenerative resistor is installed in the driver.
- It is highly recommended to install an external regenerative resistor (option).

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 depending on the machine requirement.

Setup support software (Option)

- With the setup support software, "PANATERM" via RS232 / RS485 communication port, you can monitor the running status of the driver and set up parameters.
- Note) Refer to P.398 for setup support software.

Key-way shaft and tapped shaft end

- Easy pulley attachment and easy maintenance
- Attache screw to the tapped shaft to prevent key or pulley from being pulled out.

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 P.398 for setup support software.

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 P.398 for setup support software.

Torque limit switching function

- You can select 2 preset torque limit value from external input.
- Use this function for tension control or press-hold control.

Conformity to CE and UL Standards




| Subject | Standard conformed | |
|------------------|--------------------------------------|-------------------------------|
| Motor | IEC60034-1 IEC60034-5 CSA22.2 No.100 | Conforms to Low-Voltage |
| | UL508C CSA22.2 No.14 | |
| Motor and driver | EN55011 | Conforms to references by EMC |
| | EN61000-6-2 | |
| | EC61000-4-2 | |
| | IEC61000-4-3 | |
| | IEC61000-4-4 | |
| | IEC61000-4-5 | |
| | IEC61000-4-6 | |
| IEC61000-4-11 | Instantaneous Outage Immunity Test | |

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

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

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

| Motor series | Rated output (kW) | Rated rotational speed (Max. speed) (r/min) | Rotary encoder | | Brake | Gear | UL/ CSA | Enclosure | Features | Applications |
|--|--------------------|---|----------------------|----------------------------|---------|----------------|---------|--|-------------------------------------|--|
| | | | 2500 P/r incremental | 17bit absolute/incremental | Holding | High precision | | | | |
| MUMA  | 0.05 to 0.4 | 3000 (5000) | ○ | — | ○ | ○ | ○ | IP65 Except shaft throughhole and connector | Small capacity Ultra low inertia | SMT machines Inserters High repetitive positioning application |
| | 0.05 | | | | | | | | | |
| | 0.1 | | | | | | | | | |
| | 0.2 | | | | | | | | | |
| 0.4 | | | | | | | | | | |

■ Servo Motor

M U M A 5 A Z P 1 S * *

| Symbol | Series |
|--------|-----------------------------------|
| MUMA | Ultra low inertia (50 W to 400 W) |

Motor rated output

| Symbol | Rated output |
|--------|--------------|
| 5A | 50 W |
| 01 | 100 W |
| 02 | 200 W |
| 04 | 400 W |

Voltage specifications

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

Rotary encoder specifications

| Symbol | Format | Pulse counts | Resolution | Wires |
|--------|-------------|--------------|------------|-------|
| P | Incremental | 2500 P/r | 10000 | 5 |

Special specifications

Motor structure

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

* Motor with oil seal is manufactured by order.

Design order

| Symbol | Specifications |
|--------|----------------|
| 1 | Standard |

See P.389 for motor specifications

■ Motor with gear reducer

M U M A 0 1 1 P 3 1 N

| Symbol | Series |
|--------|------------------------------------|
| MUMA | Ultra low inertia (100 W to 400 W) |

Motor rated output

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

Voltage specifications

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

Rotary encoder specifications

| Symbol | Format | Pulse counts | Resolution | Wires |
|--------|-------------|--------------|------------|-------|
| P | Incremental | 2500 P/r | 10000 | 5 |

Gear reduction ratio, gear type

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

Motor structure

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

See P.394 for motor with gear reducer specifications

■ Servo Driver

M K D E T 1 3 1 0 P * *

Frame symbol

| Symbol | Frame |
|--------|-------------------|
| MKDE | E series, K-frame |
| MLDE | E series, L-frame |

Power device Max. current rating

| Symbol | Current rating |
|--------|----------------|
| T1 | 10 A |
| T2 | 15 A |

Supply voltage specifications

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

Special specifications

Control mode

| Symbol | Specifications |
|--------|----------------|
| P | Pulse train |

Current detector current rating

| Symbol | Current rating |
|--------|----------------|
| 05 | 5 A |
| 10 | 10 A |

See P.385 for driver specifications

- Wiring of main circuit

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

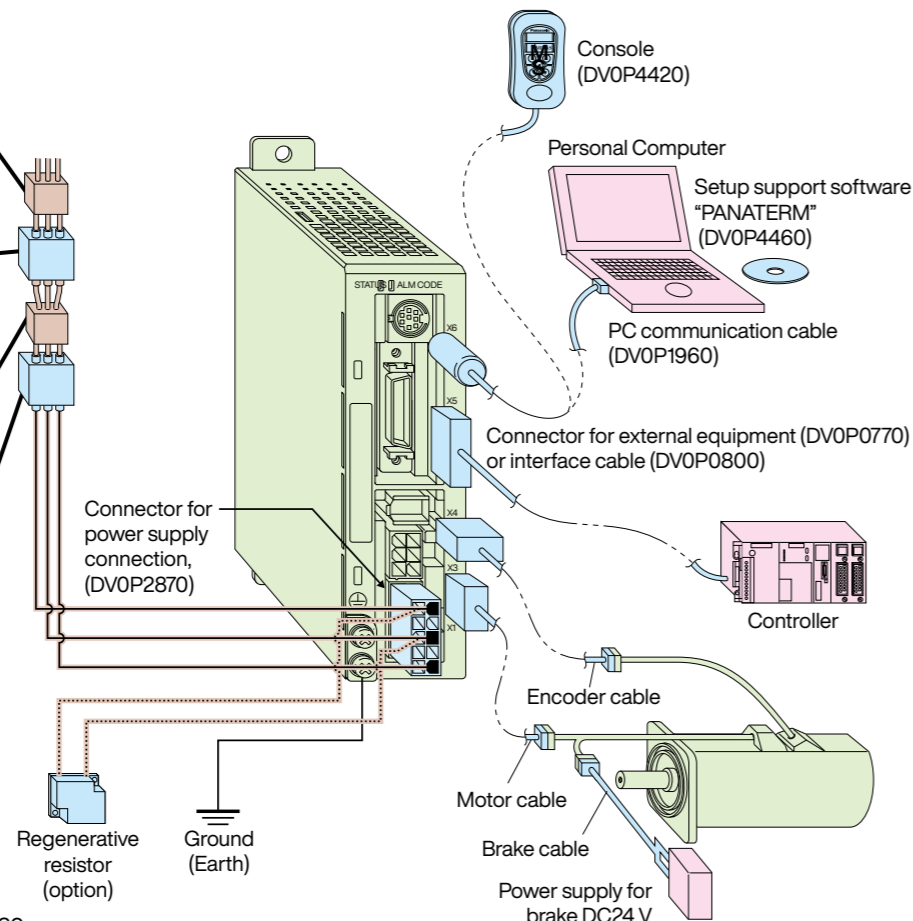
Noise Filter (NF)
Prevents external noise from the power lines. And reduces an effect of the noise generated by the servo driver.

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-5 and Pin-3 of CN POWER

Connect an external regenerative resistor (option) between P(pin-5) and B(pin-3) of connector, CN X1, when regenerative energy is large. (Refer to P.404 for regenerative resistor.)



| | |
|---------------------------|----------|
| Motor | to P.389 |
| Driver | to P.385 |
| Option | to P.398 |
| Recommended equipments | |
| Parts customer to prepare | |

Table of Part Numbers and Options

| Power supply | Output (W) | 2500P/r, Incremental | | | | Option | | | | | |
|--------------------|------------|-------------------------|---------------------|--------------------------|---------------------------|---------------------------------|-------------------------------|-------------------------------|--------------------------------|---------|--------------|
| | | Motor ^{Note 1} | Rating/Spec. (page) | Driver | Dimensions (Frame symbol) | Encoder Cable ^{Note 2} | Motor Cable ^{Note 2} | Brake Cable ^{Note 2} | External Regenerative Resistor | Reactor | Noise Filter |
| Single phase 100 V | 50 | MUMA5AZP1 □ | 389 | MKDET1105P | 388 (K) | MFECA0 * * 0EAM | MFMCA0 * * 0AEB | | DVOP2890 | DVOP227 | DVOP228 |
| | 100 | MUMA011P1 □ | 389 | MKDET1110P | 388 (K) | | | | | | |
| | 200 | MUMA021P1 □ | 389 | MLDET2110P | 388 (L) | | | | | | |
| Single phase 200 V | 50 | MUMA5AZP1 □ | 391 | MKDET1505P | 388 (K) | | | | | | |
| | 100 | MUMA012P1 □ | 391 | MKDET1505P | 388 (K) | | | | | | |
| | 200 | MUMA022P1 □ | 391 | MLDET2210P | 388 (L) | | | | | | |
| 3-phase 200 V | 400 | MUMA042P1 □ | 391 | MLDET2510P | 388 (L) | | | | | | |
| | 50 | MUMA5AZP1 □ | 391 | MKDET1505P | 388 (K) | | | | | | |
| | 100 | MUMA012P1 □ | 391 | MKDET1505P | 388 (K) | | | | | | |
| | 200 | MUMA022P1 □ | 391 | MKDET1310P | 388 (K) | | | | | | |
| | 400 | MUMA042P1 □ | 391 | MLDET2510P MLDET2310P | 388 (L) | | | | | | |

Note 1 Motor model number suffix: □
S: Key way with center tap, without brake
T: Key way with center tap, with brake
Note 2 * * represents cable length. For details, refer to P.399.

List of recommended peripheral devices

| Power supply | Motor | | Power capacity (at rated output) | Circuit Breaker (Rated current) | Noise Filter | Magnetic Contactor (Contact Composition) | Wire diameter (L1, L2, L3, U, V and W) |
|---------------------|--------|--------|----------------------------------|---------------------------------|--------------|--|--|
| | Series | Output | | | | | |
| Single phase, 100 V | MUMA | 50 W | 0.3 kVA | 5 A | DVOP4160 | 10 A (3P+1a) | 0.75 mm ² to 0.85 mm ² AWG18 |
| | | 100 W | 0.4 kVA | 10 A | | | |
| | | 200 W | 0.5 kVA | 10 A | | | |
| Single phase, 200 V | MUMA | 50 W | 0.3 kVA | 5 A | | | |
| | | 100 W | 0.3 kVA | 5 A | | | |
| | | 200 W | 0.5 kVA | 10 A | | | |
| 3-phase 200 V | MUMA | 400 W | 0.9 kVA | 10 A | | | |
| | | 50 W | 0.3 kVA | 5 A | | | |
| | | 100 W | 0.3 kVA | 5 A | | | |
| | | 200 W | 0.5 kVA | 10 A | | | |

- * Select the single and 3-phase common specifications corresponding to the power supplies.
- To conform to EC Directives, install a circuit breaker which conforms to IEC and UL Standards (Listed, marked) between noise filter and power supply.
- For details of the noise filters, refer to 416.

<Remarks>

- Use a copper conductor cables with temperature rating of 60 °C or higher for main power connector and ground terminal wiring. Use a cable for ground with diameter of 2.0 mm² (AWG14) or larger.

Fastening torque list

| Ground terminal screw | | Connector to host controller[X5] | |
|-----------------------|--|----------------------------------|--|
| Nominal size | Fastening torque (N·m) ^{Note 3} | Nominal size | Fastening torque (N·m) ^{Note 3} |
| M4 | 0.7~0.8 | M2.6 | 0.2±0.05 |

(Note 3) <Caution>

- Applying fastening torque larger than the maximum value may result in damage to the product.

<Remarks>

- To check for looseness, conduct periodic inspection of fastening torque once a year.

Carrying page

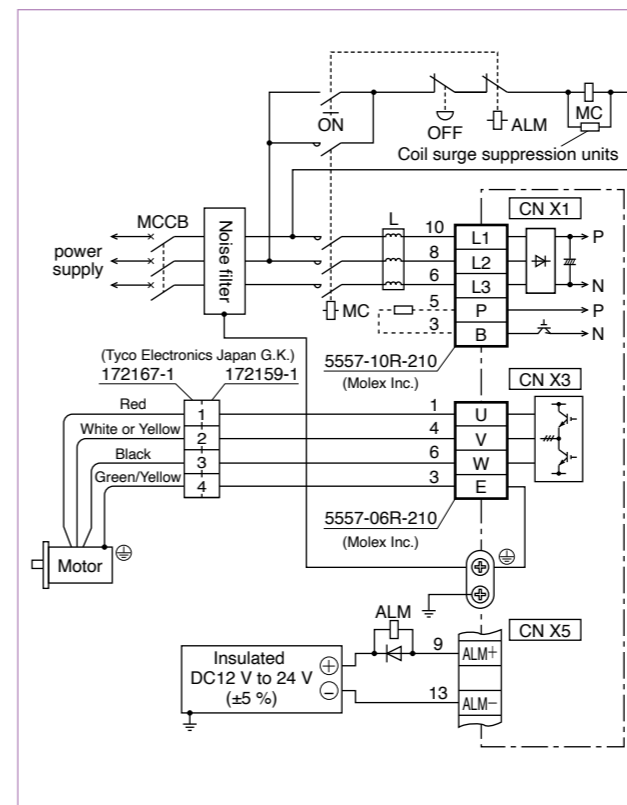
| Options | Part No. | Carrying page |
|--|---------------------------|---------------|
| Console | DVOP4420 | 403 |
| Setup Support Software, PANATERM | Japanese | 398 |
| | English | |
| RS232 Communication Cable (for Connection with PC) | DVOP1960 | 403 |
| Interface Cable | DVOP0800 | 403 |
| Connector Kit for Interface | DVOP0770 | 402 |
| Connector Kit for Motor and Encoder | DVOP3670 | 401 |
| Connector Kit for Driver Power Supply | DVOP2870 | 401 |
| Encoder Cable | MFECA0 * * 0EAM | 400 |
| Motor Cable | MFMCA0 * * 0AEB | 400 |
| Brake Cable | MFMCB0 * * 0GET | 400 |
| Cable Set (3 m) ^{Note 4} | DVOP37300 | 400 |
| Cable Set (5 m) ^{Note 4} | DVOP39200 | 400 |
| DIN Rail Mount Unit | DVOP3811 | 404 |
| External Regenerative Resistor | 100 V 50 Ω 10 W | DVOP2890 |
| | 200 V 100 Ω 10 W | DVOP2891 |
| Reactor | 100 V | DVOP227 |
| | | DVOP228 |
| | | DVOP220 |
| Noise Filter | DVOP4160 | 416 |
| Surge Absorber | Single phase 100 V, 200 V | DVOP4190 |
| | 3-phase 200 V | DVOP1450 |
| Ferrite core | DVOP1460 | 416 |

(Note 4) Cable set (3 m) contains,
1) Interface cable: DVOP0800
2) Encoder cable (3 m): MFECA0030EAM
3) Motor cable (3 m): MFMCA0030AEB
4) Connector kit for driver power supply connection: DVOP2870
Cable set (5 m) contains,
1) Interface cable: DVOP0800
2) Encoder cable (5 m): MFECA0050EAM
3) Motor cable (5 m): MFMCA0050AEB
4) Connector kit for driver power supply connection: DVOP2870

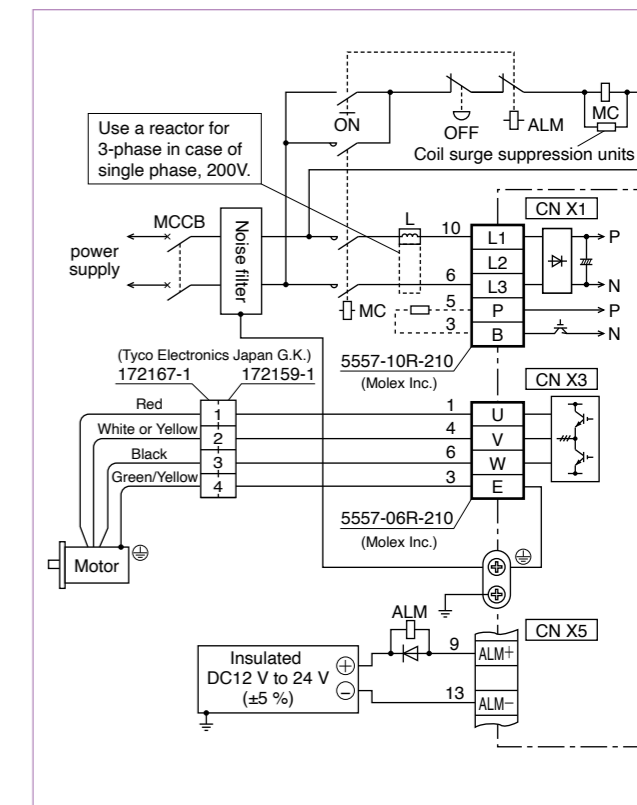
| | | | | | | |
|------------------------|---|--|--|----------------|-------------|--|
| Basic Specifications | Input power | Single phase, 100 V | Single phase, 100 V to 115 V | +10 % -15 % | 50 Hz/60 Hz | |
| | | Single phase, 200 V | Single phase, 200 V to 240 V | +10 % -15 % | 50 Hz/60 Hz | |
| | | 3-phase, 200 V | 3-phase, 200 V to 240 V | +10 % -15 % | 50 Hz/60 Hz | |
| | Environment | Temperature | Operating : 0 °C to 55 °C, Storage : -20 °C to 65 °C (Max.temperature guarantee 80 °C for 72 hours <Normal temperature>) | | | |
| | | Humidity | Both operating and storage : 90 %RH or less (free from condensation) | | | |
| | | Altitude | 1000 m or lower | | | |
| | | Vibration | 5.88 m/s ² or less, 10 Hz to 60 Hz (No continuous use at resonance frequency) | | | |
| | Withstand voltage | Should be 1500 VAC (Sensed current: 20 mA) for 1 minute between Primary and Ground. | | | | |
| | Control method | IGBT PWM Sinusoidal wave drive | | | | |
| | Encoder feedback | 2500 P/r (10000 resolution) incremental encoder | | | | |
| | Control signal | Input | 7 inputs (1) Servo-ON, (2) Alarm clear and other inputs vary depending on the control mode. | | | |
| | | Output | 4 outputs (1) Servo alarm, (2) Alarm, (3) Release signal of external brake and other outputs vary depending on the control mode. | | | |
| | Pulse signal | Input | 2 inputs Supports both line driver I/F and open collector I/F. | | | |
| | | Output | 4 outputs Feed out the encoder pulse (A, B and Z-phase) in line driver. Z-phase pulse is also feed out in open collector. | | | |
| | Communication function | RS232 | 1 : 1 communication to a host with RS232 interface is enabled. | | | |
| Display LED | (1) Status LED (STATUS), (2) Alarm code LED (ALM-CODE) | | | | | |
| Regeneration | No built-in regenerative resistor (external resistor only) | | | | | |
| Dynamic brake | Built-in | | | | | |
| Control mode | 3 modes of (1) High-speed position control, (2) Internal velocity control and (3) High-functionality positioning control are selectable with parameter. | | | | | |
| Position control | Control input | (1) CW over-travel inhibition, (2) CCW over-travel inhibition, (3) Deviation counter clear, (4) Gain switching, (5) Electronic gear switching | | | | |
| | Control output | (1) Positioning complete (In-position) | | | | |
| | Pulse input | Max. command pulse frequency | Line driver : 500 kpps, Open collector : 200 kpps | | | |
| | | Type of input pulse train | Differential input. Selectable with parameter, ((1) CW/CCW, (2) A and B-phase, (3) Command and Direction) | | | |
| | | Electronic gear (Division/Multiplication) of command pulse | Setup of electronic gear ratio Setup range of (1-10000) × 2 ⁽⁰⁻¹⁷⁾ /(1-10000) | | | |
| Smoothing filter | Primary delay filter or FIR type filter is selectable to the command input. | | | | | |
| Internal speed control | Control input | (1) CW over-travel inhibition, (2) CCW over-travel inhibition, (3) Selection 1 of internal command speed, (4) Selection 2 of internal command speed, (5) Speed zero clamp | | | | |
| | Control output | (1) Speed arrival (at-speed) | | | | |
| | Internal speed command | Internal 4-speed is selectable with control input. | | | | |
| | Soft-start/down function | Individual setup of acceleration and deceleration are enabled, with 0 s to 10 s/1000 r/min. Sigmoid acceleration/deceleration is also enabled. | | | | |
| Auto-gain tuning | Zero-speed clamp | 0-clamp of internal speed command with speed zero clamp input is enabled. | | | | |
| | Real-time | Estimates the load inertia in real-time in actual operation and sets up the gain automatically corresponding to the machine stiffness. Useable at (1) High-response position control, (2) Internal speed control and (3) High-functionality position control. | | | | |
| Common | Normal mode | Estimates the load inertia with an action command inside of the driver, and sets up the gain automatically corresponding to setup of the machine stiffness. Useable at (1) High-response position control, (2) Internal speed control and (3) High-functionality position control. | | | | |
| | Masking of unnecessary input | Masking of the following input signal is enabled. (1) Over-travel inhibition, (2) Speed zero clamp, (3) Torque limit switching | | | | |
| | | Division of encoder feedback pulse | 1 P/r to 2500 P/r (encoder pulses count is the max.). | | | |
| | Protective function | Hardware error | Over-voltage, under-voltage, over-speed over-load, over-heat, over-current and encoder error etc. | | | |
| | | Software error | Excess position deviation, command pulse division error, EEPROM error etc. | | | |
| | Traceability of alarm data | Traceable up to past 14 alarms including the present one. | | | | |
| | Damping control function | Manual setup with parameter | | | | |
| | Setup | Manual | Console | | | |
| | | Setup support software | PANATERM (Supporting OS : Windows98, Windows ME, Windows2000, and WindowsXP) | | | |

Standard Wiring Example of Main Circuit

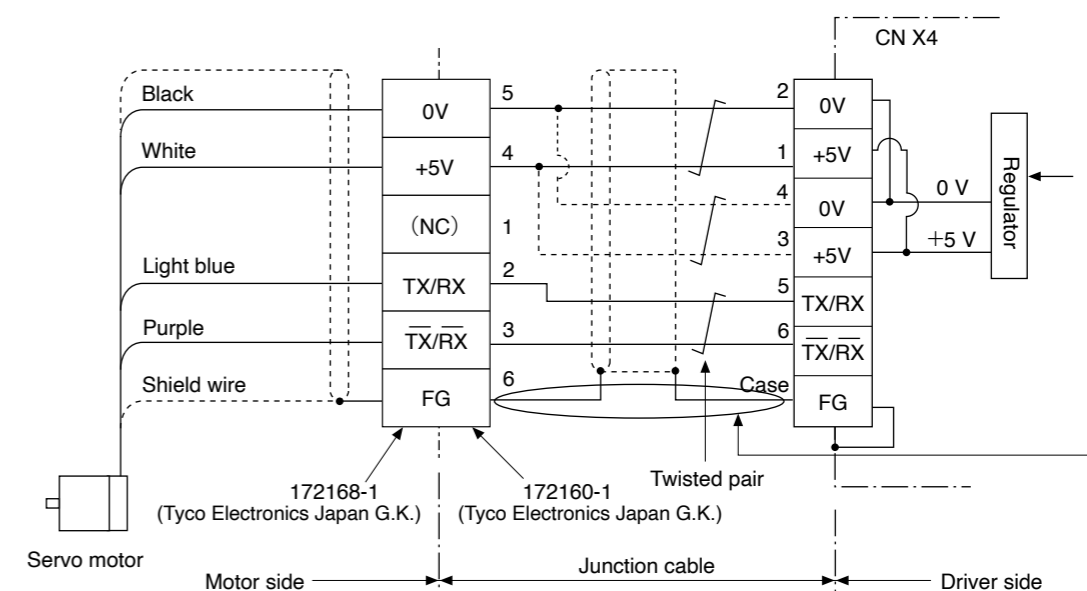
3-Phase, 200 V



Single Phase, 100 V / 200 V



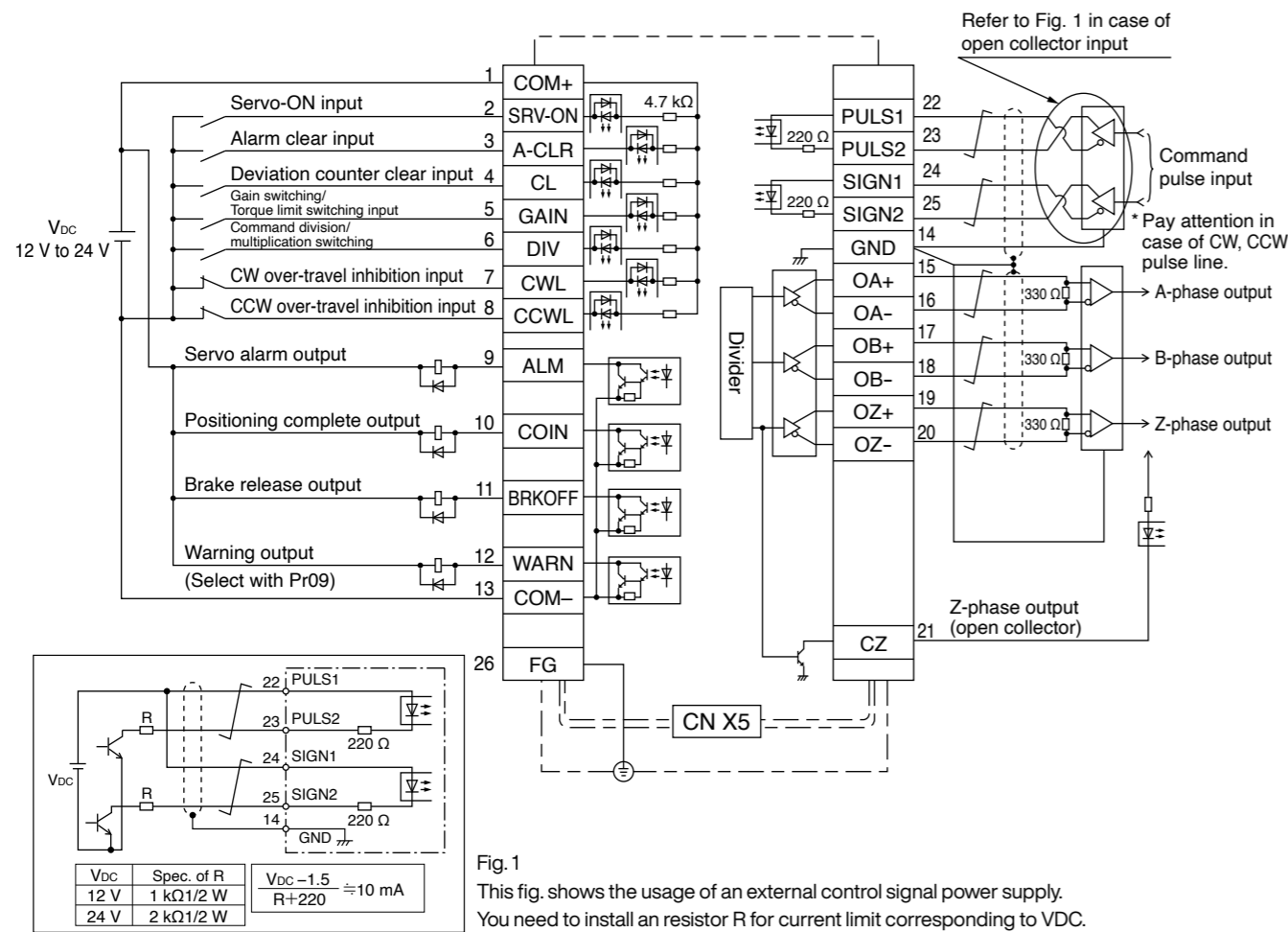
Encoder Wiring Diagram



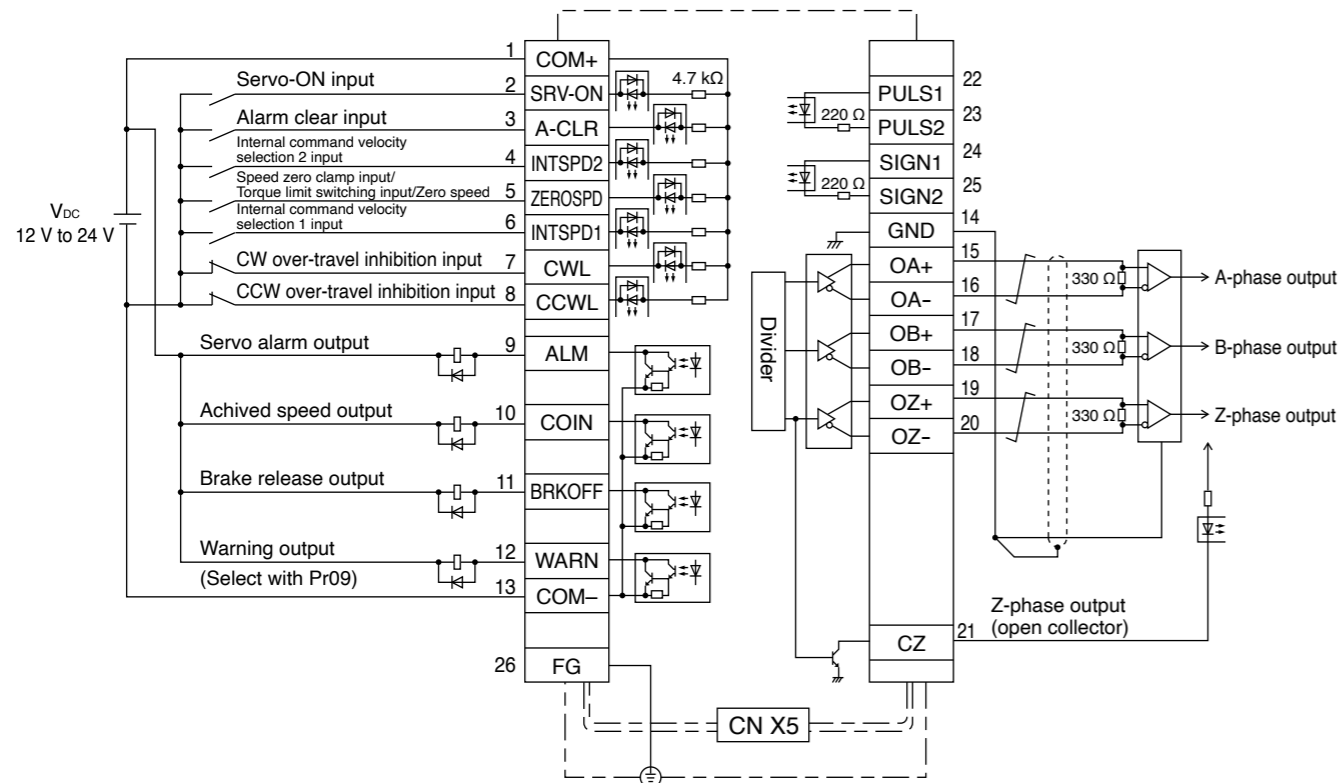
When you make your own junction cable for encoder (Refer to P.401, P.402 "Options" for connector.)

- 1) Refer the wiring diagram.
- 2) Use the twisted pair wire with shield, with core diameter of 0.18 mm² (AWG24) or larger, with higher bending resistance.
- 3) Use the twisted pair wire for the corresponding signal and power supply.
- 4) Shielding
Connect the shield of the driver to the case of CN X4.
Connect the shield of the motor to Pin-6.

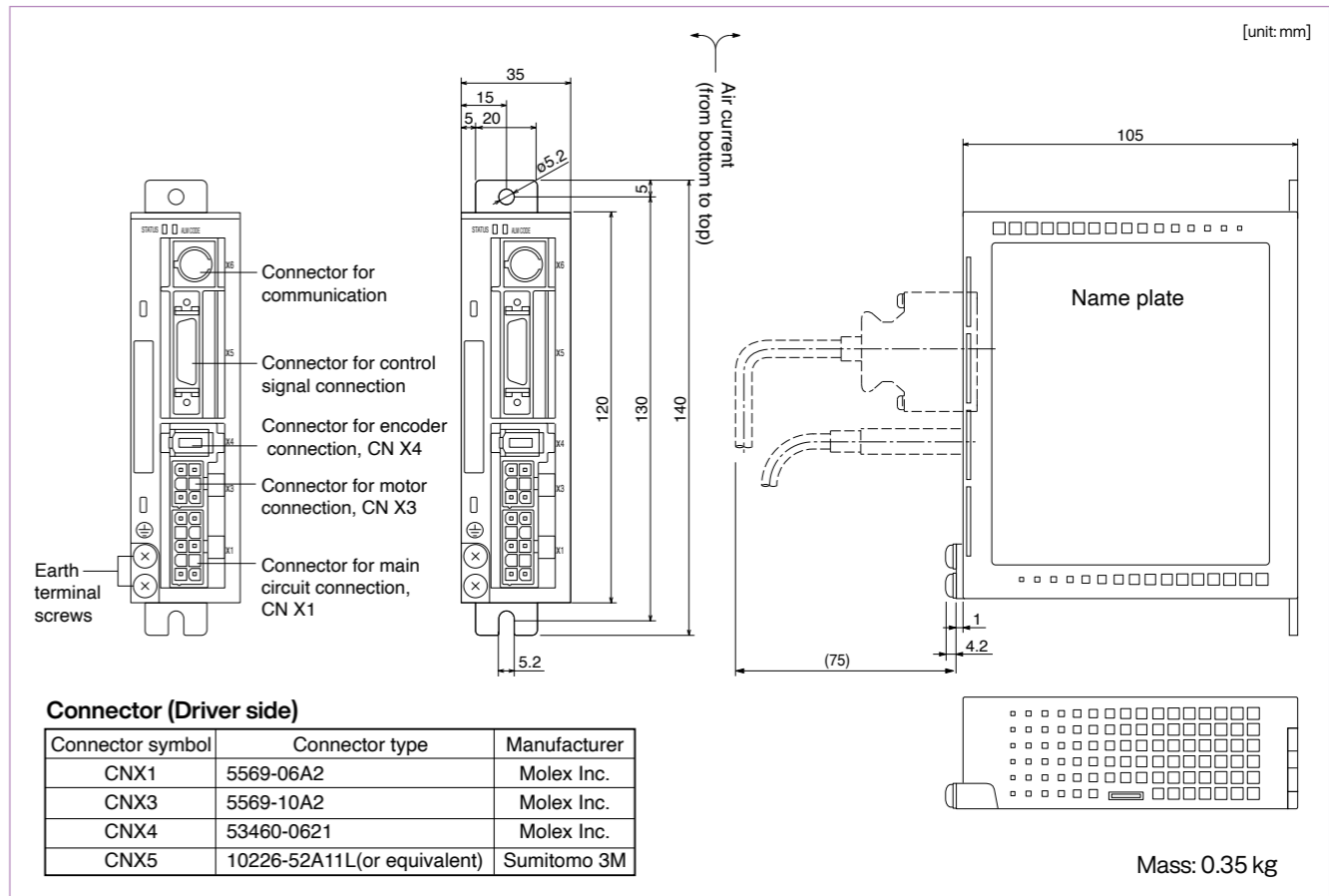
CN X 5 Wiring Example at Position Control Mode



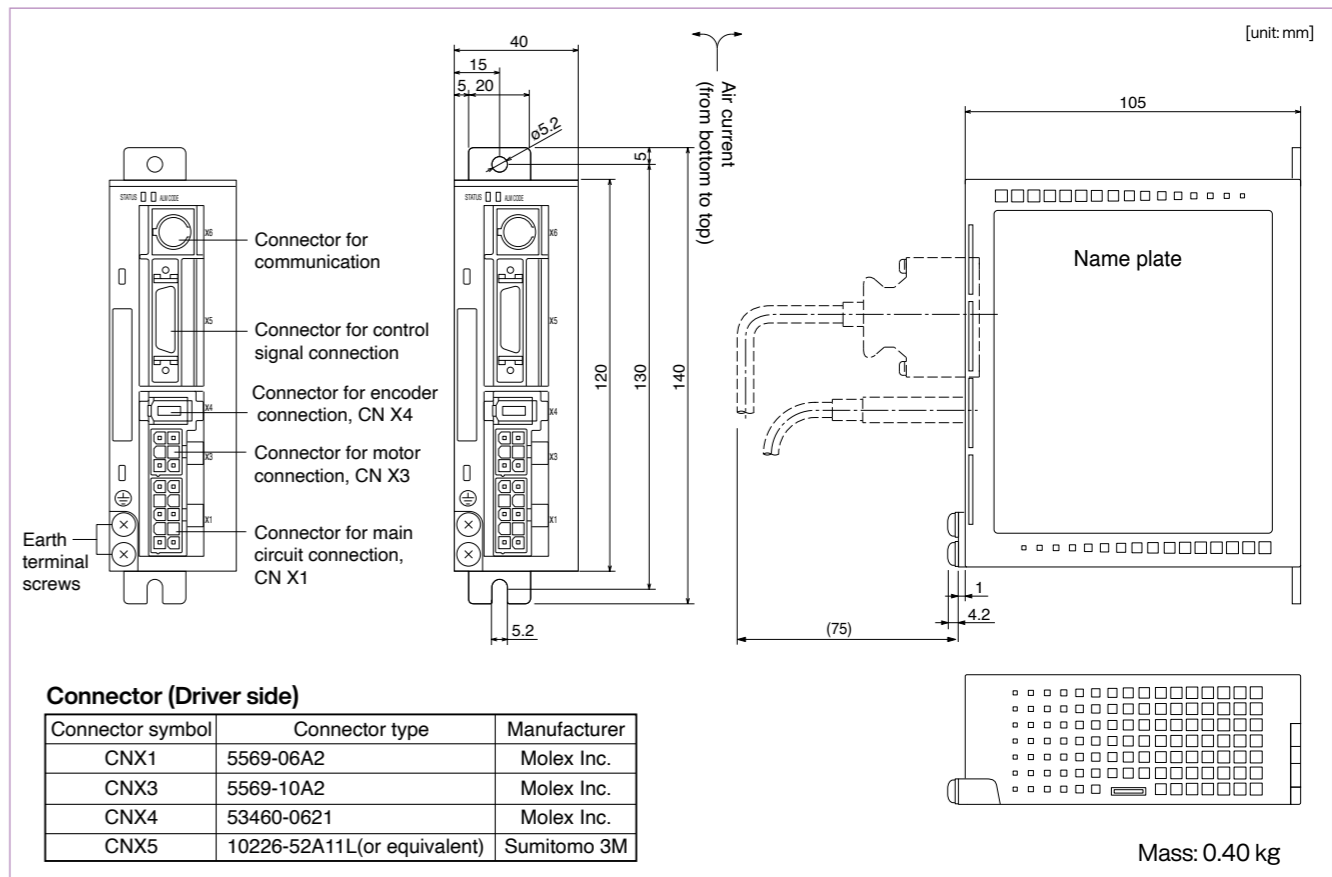
CN X 5 Wiring Example at Internal Velocity Control Mode



Frame K



Frame L



| | | AC100 V | | | |
|--|-----------------------|---|------------|-----------------|--------|
| Motor model | | MUMA | 5AZP1□ | 011P1□ | 021P1□ |
| Applicable driver | Model No. | MKDET1105P | MKDET1110P | MLDET2110P | |
| | Frame symbol | Frame K | | Frame L | |
| Power supply capacity (kVA) | | 0.3 | 0.4 | 0.5 | |
| Rated output (W) | | 50 | 100 | 200 | |
| Rated torque (N·m) | | 0.16 | 0.32 | 0.64 | |
| Momentary Max. peak torque (N·m) | | 0.48 | 0.95 | 1.91 | |
| Rated current (Arms) | | 1.0 | 1.6 | 2.5 | |
| Max. current (Ao-p) | | 4.3 | 6.9 | 11.7 | |
| Regenerative brake frequency (times/min) Note)1 | Without option | No limit Note)2 | | No limit Note)2 | |
| | DV0P2890 | No limit Note)2 | | No limit Note)2 | |
| Rated rotational speed (r/min) | | 3000 | | | |
| Max. rotational speed (r/min) | | 5000 | | | |
| Moment of inertia of rotor (×10 ⁻⁴ kg·m ²) | Without brake | 0.021 | 0.032 | 0.10 | |
| | With brake | 0.026 | 0.036 | 0.13 | |
| Recommended moment of inertia ratio of the load and the rotor Note)3 | | 30 times or less | | | |
| Rotary encoder specifications | | 2500 P/r | | | |
| | | Incremental | | | |
| Resolution per single turn | | 10000 | | | |
| Protective enclosure rating | | IP65 (except rotating portion of output shaft and lead wire end) | | | |
| Environment | Ambient temperature | 0 °C to 40 °C (free from freezing), Storage : -20 °C to 65 °C (Max.temperature guarantee 80 °C for 72 hours <nomal humidity>) | | | |
| | Ambient humidity | 85 %RH or lower (free from condensing) | | | |
| | Installation location | Indoors (no direct sunlight), free from corrosive gas, inflammable gas, oil mist and dust | | | |
| | Altitude | 1000 m or lower | | | |
| | Vibration resistance | 49 m/s ² or less | | | |
| Mass (kg), () represents holding brake type | | 0.4 (0.6) | 0.5 (0.7) | 0.96 (1.36) | |

| Brake specifications (This brake will be released when it is energized. Do not use this for braking the motor in motion.) | | |
|---|----------------|----------|
| Static friction torque (N·m) | 0.29 | 1.27 |
| Engaging time (ms) | 25 | 50 |
| Releasing time (ms) Note)4 | 20 (30) | 15 (100) |
| Exciting current (DC) (A) | 0.26 | 0.36 |
| Releasing voltage | DC 1 V or more | |
| Exciting voltage | DV 24 V ±10 % | |

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

For motor dimensions, refer to P.393, and for the driver, refer to P.388.

Model Designation

e.g.) **M U M A 5 A Z P 1 S**

| Symbol | Series |
|--------|-----------------------------------|
| MUMA | Ultra low inertia (50 W to 200 W) |

| Motor rated output | |
|--------------------|--------------|
| Symbol | Rated output |
| 5A | 50 W |
| 01 | 100 W |
| 02 | 200 W |

| Voltage specifications | |
|------------------------|-----------------------|
| Symbol | Specifications |
| 1 | 100 V |
| Z | 100/200 V (50 W only) |

Design order 1: Standard

Motor structure

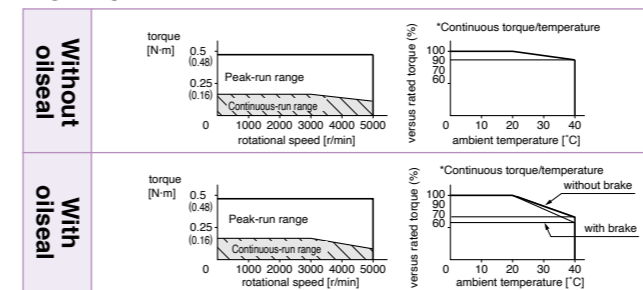
| Symbol | Shaft | Holding brake | | Oil seal | |
|--------|---------------------|---------------|------|----------|------|
| | Key-way, center tap | without | with | without | with |
| S | ● | ● | | ● | |
| T | ● | | ● | ● | |

Rotary encoder specifications

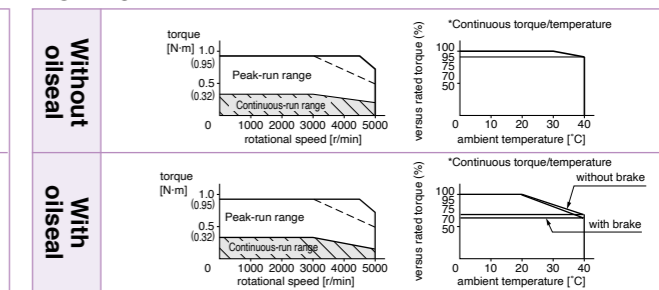
| Symbol | Format | Pulse counts | Resolution | Wires |
|--------|-------------|--------------|------------|-------|
| P | Incremental | 2500 P/r | 10000 | 5 |

Torque Characteristics [at AC100 V of power voltage (Dotted line represents the torque at 10 % less supply voltage.)]

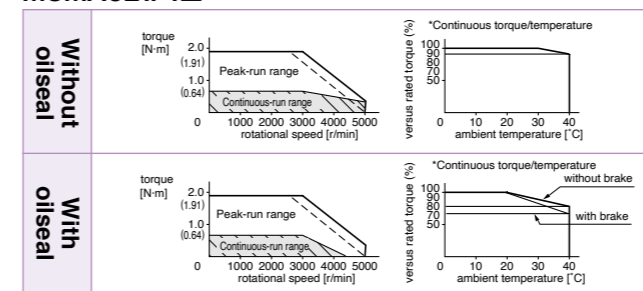
MUMA5AZP1□



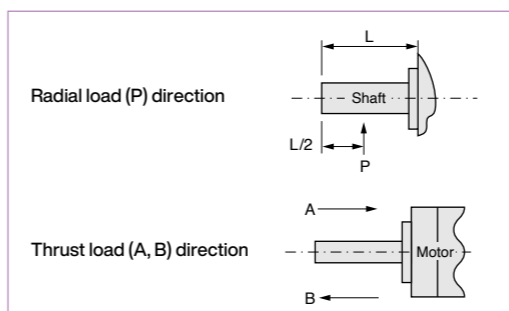
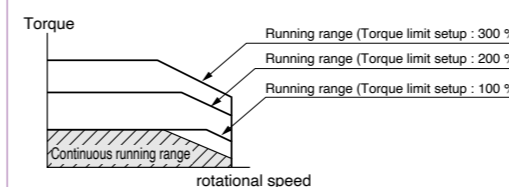
MUMA011P1□



MUMA021P1□



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



- Note) 1. Regenerative brake frequency represents the frequency of the motor's stops from the rated speed with deceleration without load.
- If the load is connected, frequency will be defined as $1/(m+1)$, where $m = (\text{load moment of inertia}) / (\text{rotor moment of inertia})$.
 - When the motor speed exceeds the rated speed, regenerative brake frequency is in inverse proportion to the square of (running speed/rated speed).
 - Power supply voltage is AC115 V (at 100 V of the main voltage). If the supply voltage fluctuates, frequency is in inverse proportion to the square of (Running supply voltage/115) relative to the value in the table.
 - When regeneration occurs continuously such cases as running speed frequently changes or vertical feeding, consult us or a dealer.
2. If the effective torque is within the rated torque, there is no limit in regenerative brake.
3. Consult us or a dealer if the load moment of inertia exceeds the specified value.
4. Specified releasing time is obtained with the use of surge absorber for brake (Z15D151 by SEMITEC Corporation or equivalent). () represents the actually measured value using a diode (200 V, 1 A or equivalent)

| | | AC200 V | | | |
|---|----------------------------|--|-----------|--------------------|------------|
| Motor model | MUMA | 5AZP1□ | 012P1□ | 022P1□ | 042P1□ |
| Applicable driver | Model No. | MKDET1505P | | MKDET1310P | MLDET2310P |
| | Frame symbol | Frame K | | Frame K Frame L | Frame L |
| Power supply capacity (kVA) | | 0.3 | 0.3 | 0.5 | 0.9 |
| Rated output (W) | | 50 | 100 | 200 | 400 |
| Rated torque (N · m) | | 0.16 | 0.32 | 0.64 | 1.3 |
| Momentary Max. peak torque (N · m) | | 0.48 | 0.95 | 1.91 | 3.8 |
| Rated current (Arms) | | 1.0 | 1.0 | 1.6 | 2.5 |
| Max. current (Ao-p) | | 4.3 | 4.3 | 7.5 | 11.7 |
| Regenerative brake frequency (times/min) | Without option | No limit Note)2 | | No limit Note)2 | |
| | Note)1 DV0P2891 | No limit Note)2 | | No limit Note)2 | |
| Rated rotational speed (r/min) | | 3000 | | | |
| Max. rotational speed (r/min) | | 5000 | | | |
| Moment of inertia of rotor (×10 ⁻⁴ kg·m ²) | Without brake | 0.021 | 0.032 | 0.10 | 0.17 |
| | With brake | 0.026 | 0.036 | 0.13 | 0.20 |
| Recommended moment of inertia ratio of the load and the rotor | Note)3 | 30 times or less | | | |
| Rotary encoder specifications | | 2500 P/r Incremental | | | |
| | Resolution per single turn | 10000 | | | |
| Protective enclosure rating | | IP65 (except rotating portion of output shaft and lead wire end) | | | |
| Environment | Ambient temperature | 0 °C to 40 °C (free from freezing), Storage : -20 °C to 65 °C (Max.temperature guarantee 80 °C for 72 hours <normal humidity>) | | | |
| | Ambient humidity | 85 %RH or lower (free from condensing) | | | |
| | Installation location | Indoors (no direct sunlight), free from corrosive gas, inflammable gas, oil mist and dust | | | |
| | Altitude | 1000 m or lower | | | |
| Vibration resistance | | 49 m/s ² or less | | | |
| Mass (kg), () represents holding brake type | | 0.4 (0.6) | 0.5 (0.7) | 0.96 (1.36) | 1.5 (1.9) |

| Brake specifications (This brake will be released when it is energized. Do not use this for braking the motor in motion.) | |
|---|-----------------------|
| Static friction torque (N · m) | 0.29 1.27 |
| Engaging time (ms) | 25 50 |
| Releasing time (ms) Note)4 | 20 (30) 15 (100) |
| Exciting current (DC) (A) | 0.26 0.36 |
| Releasing voltage | DC 1 V or more |
| Exciting voltage | DV 24 V ±10 % |

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

For motor dimensions, refer to P.393, and for the driver, refer to P.388.
 Note) Driver for 50 W and 100 W has a common power supply of single phase and 3-phase 200 V.
 Driver for 200 W, the upper row is the power supply of 3-phase 200 V, and lower is the power supply of single-phase 200 V.
 Driver for 400 W, the upper row is the power supply of 3-phase 200 V, and lower is the common power supply of single-phase and 3-phase 200 V.

Model Designation

e.g.) **M U M A 5 A Z P 1 S**

| Symbol | Series |
|--------|-----------------------------------|
| MUMA | Ultra low inertia (50 W to 400 W) |

| Symbol | Rated output |
|--------|--------------|
| 5A | 50 W |
| 01 | 100 W |
| 02 | 200 W |
| 04 | 400 W |

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

Design order
1: Standard

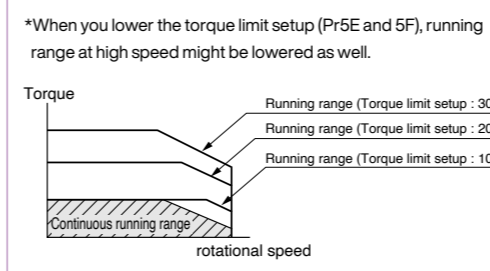
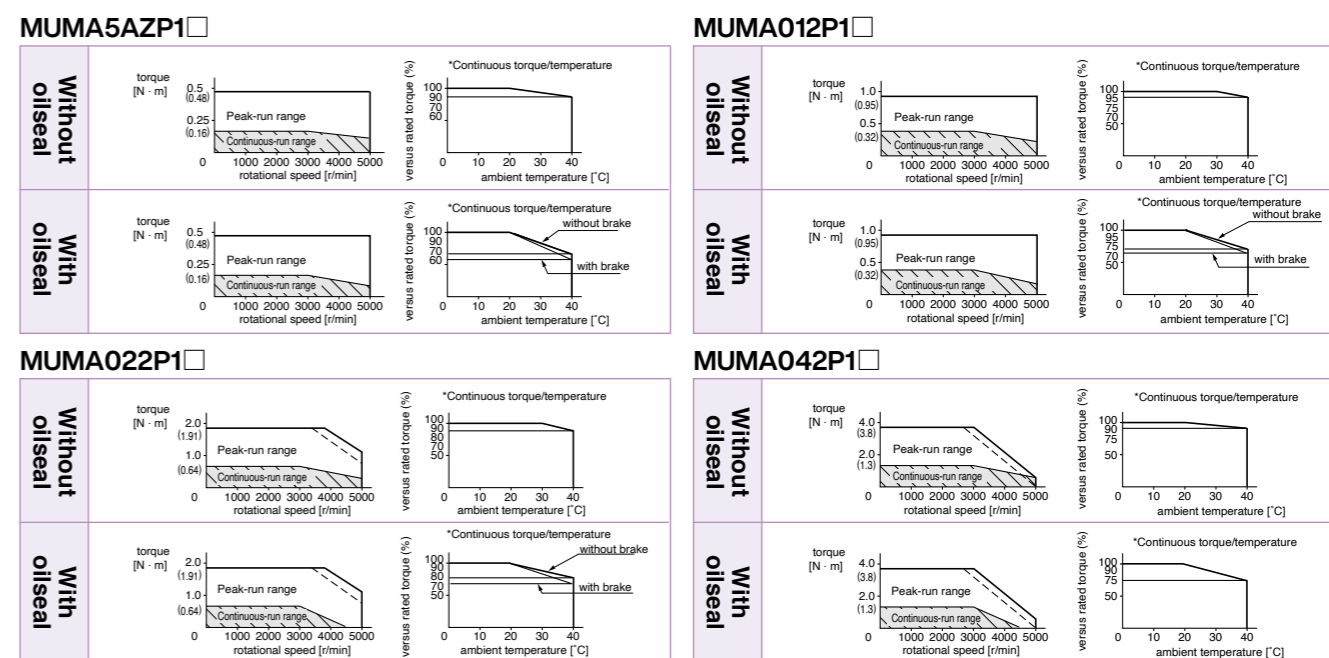
Motor structure

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

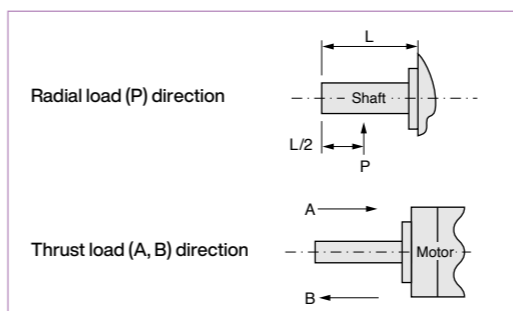
Rotary encoder specifications

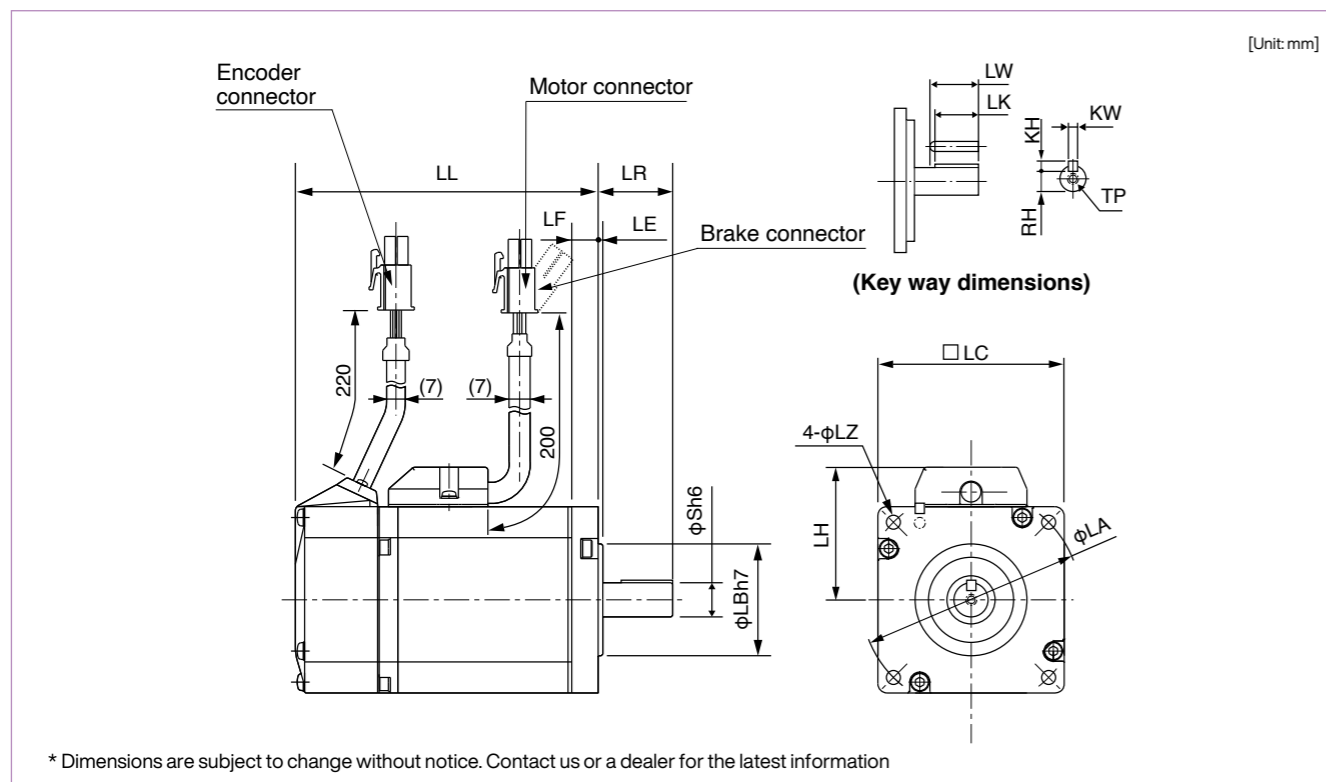
| Symbol | Format | Pulse counts | Resolution | Wires |
|--------|-------------|--------------|------------|-------|
| P | Incremental | 2500 P/r | 10000 | 5 |

Torque Characteristics [at AC200 V of power voltage (Dotted line represents the torque at 10 % less supply voltage.)]



- Note) 1. Regenerative brake frequency represents the frequency of the motor's stops from the rated speed with deceleration without load.
- If the load is connected, frequency will be defined as $1/(m+1)$, where $m = (\text{load moment of inertia}) / (\text{rotor moment of inertia})$.
 - When the motor speed exceeds the rated speed, regenerative brake frequency is in inverse proportion to the square of (running speed/rated speed).
 - Power supply voltage is AC240 V (at 200 V of the main voltage). If the supply voltage fluctuates, frequency is in inverse proportion to the square of (Running supply voltage/240) relative to the value in the table.
 - When regeneration occurs continuously such as running speed frequently changes or vertical feeding, consult us or a dealer.
- If the effective torque is within the rated torque, there is no limit in regenerative brake.
 - Consult us or a dealer if the load moment of inertia exceeds the specified value.
 - Specified releasing time is obtained with the use of surge absorber for brake (Z15D151 by SEMITEC Corporation or equivalent).
- () represents the actually measured value using a diode (200 V, 1 A or equivalent)





| | | MUMA series (Ultra low inertia) | | | |
|-------------------------------|---------------|---------------------------------|-------------------------|-------------------------|-------------------------|
| Motor output | | 50 W | 100 W | 200 W | 400 W |
| Motor model | MUMA | 5A□P1□ | 01□P1□ | 02□P1□ | 04□P1□ |
| Rotary encoder specifications | | 2500 P/r Incremental | 2500 P/r Incremental | 2500 P/r Incremental | 2500 P/r Incremental |
| LL | Without brake | 75.5 | 92.5 | 96 | 123.5 |
| | With brake | 107 | 124 | 129 | 156.5 |
| LR | | 24 | 24 | 30 | 30 |
| S | | 8 | 8 | 11 | 14 |
| LA | | 48 | 48 | 70 | 70 |
| LB | | 22 | 22 | 50 | 50 |
| LC | | 42 | 42 | 60 | 60 |
| LE | | 2 | 2 | 3 | 3 |
| LF | | 7 | 7 | 7 | 7 |
| LH | | 34 | 34 | 43 | 43 |
| LZ | | 3.4 | 3.4 | 4.5 | 4.5 |
| Key way | LW | 14 | 14 | 20 | 25 |
| | LK | 12.5 | 12.5 | 18 | 22.5 |
| | KW | 3h9 | 3h9 | 4h9 | 5h9 |
| | KH | 3 | 3 | 4 | 5 |
| | RH | 6.2 | 6.2 | 8.5 | 11 |
| | TP | M3 x 6 (depth) | M3 x 6 (depth) | M4 x 8 (depth) | M5 x 10 (depth) |
| Mass (kg) | Without brake | 0.40 | 0.50 | 0.96 | 1.5 |
| | With brake | 0.60 | 0.70 | 1.36 | 1.9 |
| Connector/Plug specifications | | refer to Options, P.401, P.402. | | | |

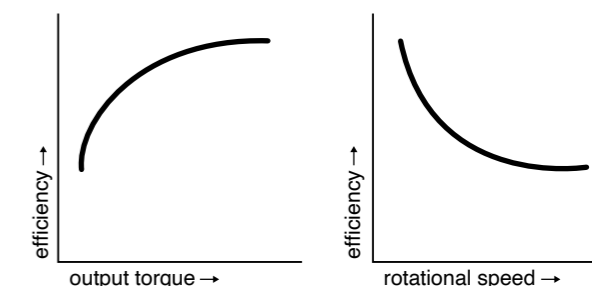
<Cautions>
 Reduce the moment of inertia ratio if high speed response operation is required.
 Read the Instruction Manual carefully and understand all precautions and remarks before using the products.

MINAS E Series Motors with Gear Reducer

Motor Types with Gear Reducer

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

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



Model No. Designation

e.g.) **M U M A 0 1 1 P 3 1 N**

| Symbol | Series |
|--------|----------------------------|
| MUMA | Low inertia (100 to 400 W) |

| Motor rated output | |
|--------------------|--------------|
| Symbol | Rated output |
| 01 | 100 W |
| 02 | 200 W |
| 04 | 400 W |

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

| Rotary encoder specifications | | | | |
|-------------------------------|-------------|--------------|--------------|------|
| Symbol | Format | Pulse counts | Pulse counts | Wire |
| P | Incremental | 2500 P/r | 10000 | 5 |

| Motor types with gear reducer | | | | | |
|-------------------------------|-----------------|--------------|-----|-----|--------------------|
| Symbol | Reduction ratio | Motor output | | | Type of reducer |
| | | 100 | 200 | 400 | |
| 1N | 1/5 | ● | ● | ● | For High precision |
| 2N | 1/9 | ● | ● | ● | |
| 4N | 1/25 | ● | ● | ● | |

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

Specifications of Motor with Gear Reducer

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

Table of Motor with Gear Reducer Specifications

| Model | Motor | | MUMA with gear reducer | | | | | | | | | | |
|-------------|------------|-----------------|------------------------|---------------------|--------------------|--------------------|------------------------|--|----------|-----------|----------|-----------------------------|-----------------------------|
| | Output (W) | Reduction ratio | Output (W) | Rated speed (r/min) | Max. speed (r/min) | Rated torque (N·m) | Peak max. torque (N·m) | Moment of inertia (motor + reducer/converted to motor shaft) J (× 10 ⁻⁴ kg·m ²) | | Mass (kg) | | Permissible radial load (N) | Permissible thrust load (N) |
| | | | | | | | | w/o brake | w/ brake | w/o brake | w/ brake | | |
| MUMA01□P□1N | 100 | 1/5 | 75 | 600 | 1000 | 1.18 | 3.72 | 0.072 | 0.076 | 1.05 | 1.25 | 490 | 245 |
| MUMA01□P□2N | | 1/9 | 80 | 333 | 555 | 2.25 | 6.86 | 0.0663 | 0.0703 | 1.05 | 1.25 | 588 | 294 |
| MUMA01□P□4N | | 1/25 | 80 | 120 | 200 | 6.27 | 19.0 | 0.0645 | 0.0685 | 2.20 | 2.40 | 1670 | 833 |
| MUMA02□P□1N | 200 | 1/5 | 170 | 600 | 1000 | 2.65 | 8.04 | 0.218 | 0.248 | 1.68 | 2.08 | 490 | 245 |
| MUMA02□P□2N | | 1/9 | 132 | 333 | 555 | 3.72 | 11.3 | 0.368 | 0.398 | 2.66 | 3.06 | 1180 | 588 |
| MUMA02□P□4N | | 1/25 | 140 | 120 | 200 | 11.1 | 33.3 | 0.388 | 0.418 | 2.66 | 3.06 | 1670 | 833 |
| MUMA042P□1N | 400 | 1/5 | 340 | 600 | 1000 | 5.39 | 16.2 | 0.533 | 0.563 | 3.2 | 3.6 | 980 | 490 |
| MUMA042P□2N | | 1/9 | 332 | 333 | 555 | 9.51 | 28.5 | 0.438 | 0.468 | 3.2 | 3.6 | 1180 | 588 |
| MUMA042P□4N | | 1/25 | 332 | 120 | 200 | 26.4 | 79.2 | 0.470 | 0.500 | 4.7 | 5.1 | 2060 | 1030 |

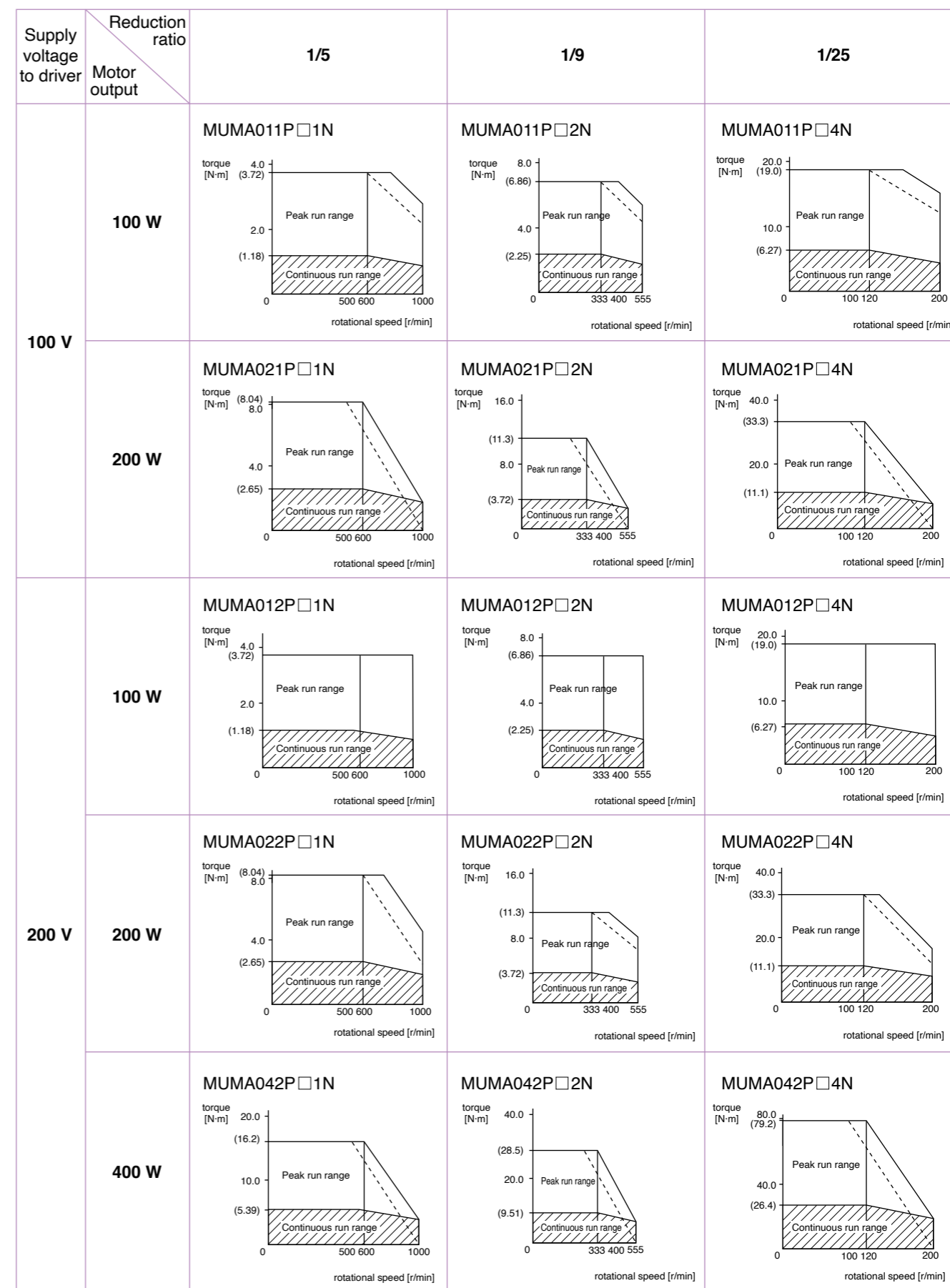
For dimensions, refer to P.397.

The Combination of the Driver and the Motor with Gear Reducer

| Combination with driver | | 100 V | | | 200 V | | |
|-------------------------|--------------|-------------------------------------|---------------------|-------------------------------------|--------------------------|---------------------|--|
| Encoder | Motor output | Part No. of motor with gear reducer | Single phase, 100 V | Part No. of motor with gear reducer | 3-phase, 200 V | Single phase, 200 V | |
| | | | Part No. of driver | | Part No. of driver | Part No. of driver | |
| 2500 P/r Incremental | 100 W | MUMA011P□□N | MKDET1110P | MUMA012P□□N | MKDET1505P | MKDET1505P | |
| | 200 W | MUMA021P□□N | MLDET2110P | MUMA022P□□N | MKDET1310P | MLDET2210P | |
| | 400 W | - | - | MUMA042P□□N | MLDET2510P MLDET2310P | MLDET2510P | |

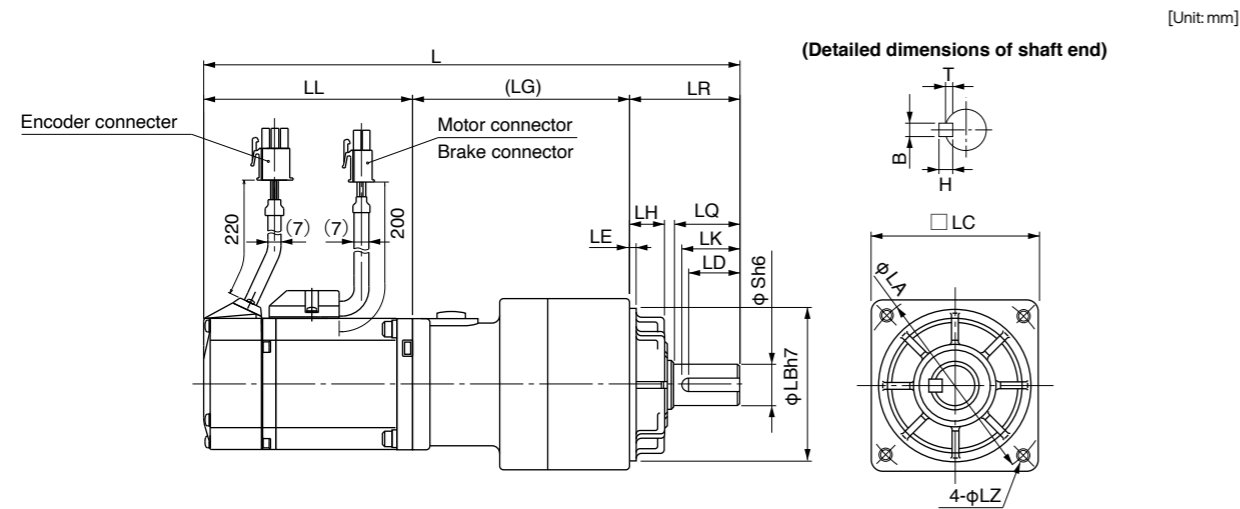
For dimensions of driver, refer to P.388.

For High Precision (MUMA Series 100 W to 400 W)



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

MUMA series with Gear Reducer



2500 P/r Encoder

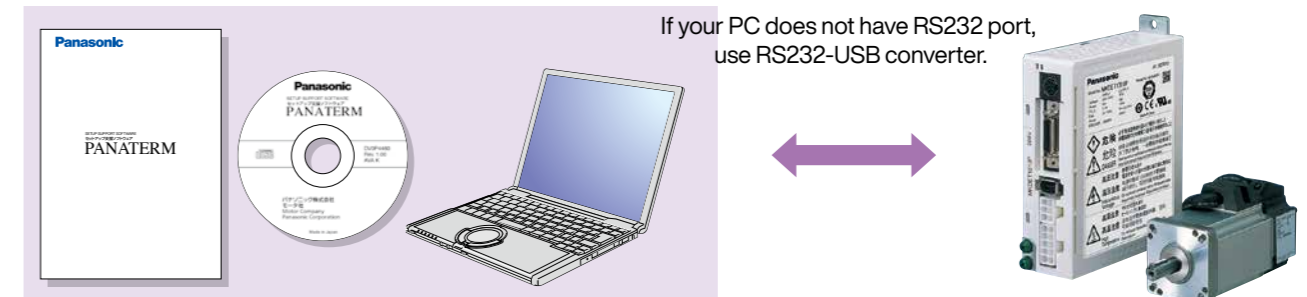
| Model | Motor output | Reduction ratio | L | LL | LR | LQ | LC | LB | LA | S | LH | LZ | LK | (LG) | LE | Key way B×H×LD | T |
|-------------|--------------|-----------------|-------|-------|----|----|----|----|-----|----|----|-------------------|----|------|----|----------------|-----|
| MUMA01□P□1N | 100 W | 1 / 5 | 192 | 92.5 | 32 | 20 | 52 | 50 | 60 | 12 | 10 | M5 (Depth: 12) | 18 | 67.5 | 3 | 4×4×16 | 2.5 |
| | | | 223.5 | 124 | | | | | | | | | | | | | |
| MUMA01□P□2N | 100 W | 1 / 9 | 192 | 92.5 | 50 | 30 | 78 | 70 | 90 | 19 | 17 | M6 (Depth: 20) | 26 | 92 | 3 | 6×6×22 | 3.5 |
| | | | 223.5 | 124 | | | | | | | | | | | | | |
| MUMA01□P□4N | 100 W | 1/25 | 234.5 | 92.5 | 50 | 30 | 78 | 70 | 90 | 19 | 17 | M6 (Depth: 20) | 26 | 92 | 3 | 6×6×22 | 3.5 |
| | | | 266 | 124 | | | | | | | | | | | | | |
| MUMA02□P□1N | 200 W | 1 / 5 | 200.5 | 96 | 32 | 20 | 52 | 50 | 60 | 12 | 10 | M5 (Depth: 12) | 18 | 72.5 | 3 | 4×4×16 | 2.5 |
| | | | 233.5 | 129 | | | | | | | | | | | | | |
| MUMA02□P□2N | 200 W | 1 / 9 | 235.5 | 96 | 50 | 30 | 78 | 70 | 90 | 19 | 17 | M6 (Depth: 20) | 26 | 89.5 | 3 | 6×6×22 | 3.5 |
| | | | 268.5 | 129 | | | | | | | | | | | | | |
| MUMA02□P□4N | 200 W | 1/25 | 246 | 96 | 50 | 30 | 78 | 70 | 90 | 19 | 17 | M6 (Depth: 20) | 26 | 100 | 3 | 6×6×22 | 3.5 |
| | | | 279 | 129 | | | | | | | | | | | | | |
| MUMA042P□1N | 400 W | 1 / 5 | 263 | 123.5 | 61 | 40 | 98 | 90 | 115 | 24 | 18 | M8 (Depth: 20) | 35 | 104 | 5 | 8×7×30 | 4 |
| | | | 296 | 156.5 | | | | | | | | | | | | | |
| MUMA042P□2N | 400 W | 1 / 9 | 263 | 123.5 | 61 | 40 | 98 | 90 | 115 | 24 | 18 | M8 (Depth: 20) | 35 | 104 | 5 | 8×7×30 | 4 |
| | | | 296 | 156.5 | | | | | | | | | | | | | |
| MUMA042P□4N | 400 W | 1/25 | 288.5 | 123.5 | 61 | 40 | 98 | 90 | 115 | 24 | 18 | M8 (Depth: 20) | 35 | 104 | 5 | 8×7×30 | 4 |
| | | | 321.5 | 156.5 | | | | | | | | | | | | | |

Upper column : without brake
Lower column : with brake

Setup Support Software "PANATERM" for MINAS series AC Servo Motor & Driver

Part No. DV0P4460 (Japanese/English version)

The PANATERM assists users in setting parameters, monitoring control conditions, setup support, and analyzing mechanical operation data on the PC screen, when installed in a commercially available personal computer, and connected to the MINAS A4 series, E series through the RS232 serial interface.



Basic Function

Parameter setup

- After a parameter is defined on the screen, it will be sent to the driver immediately.
- Once you register parameters you frequently use, they can be easily set up on the screen.

Monitoring Control Conditions

Monitor

- Control conditions: Control mode, velocity, torque, error and warning
- Driver input signal
- Load conditions: Total count of command/feedback pulses, Load ratio, Regenerative resistor load ratio

Alarm

- Displays the numbers and contents of the current alarm and up to 14 error events in the past.
- Clears the numbers and contents of the current alarm and up to 14 error events in the past.

Setup

Auto tuning

- Gain adjustment and inertia ratio measurement

Graphic waveform display

- The graphic display shows command velocity, actual velocity, torque, and error waveforms.

Absolute encoder setup

- Clears absolute encoder at the origin.
- Displays single revolution/multi-revolution data.
- Displays absolute encoder status.

Analysis of Mechanical Operation Data

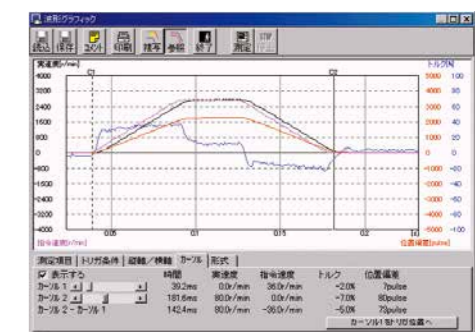
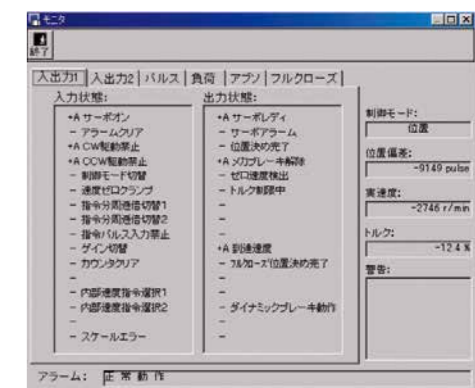
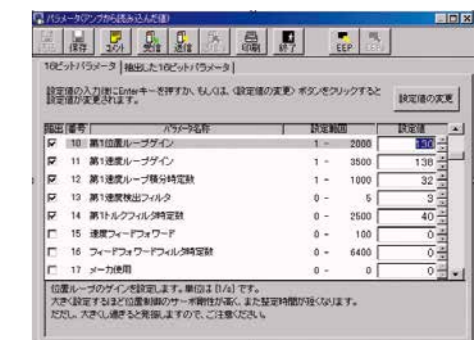
Frequency analysis

- Measures frequency characteristics of the machine, and displays Bode diagram.

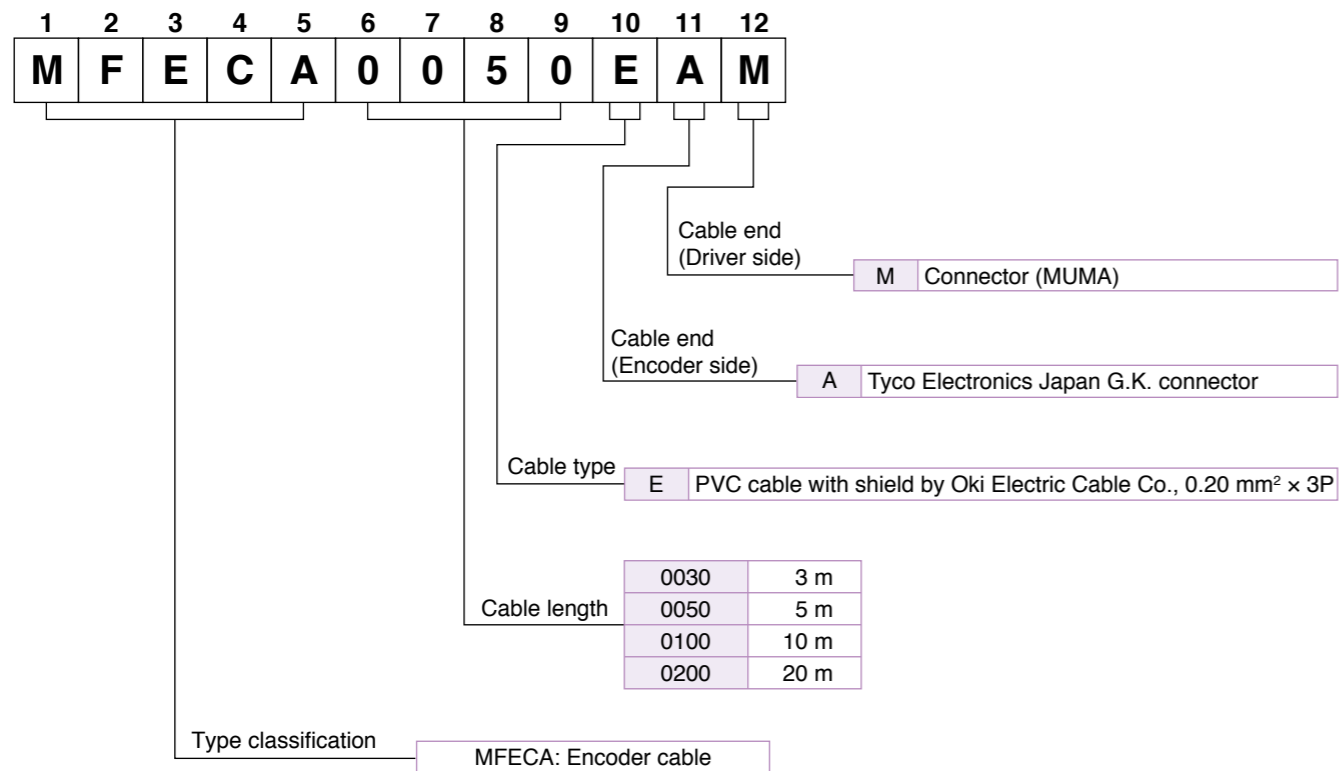
Can not use with A5, A6 Family.

Hardware configuration

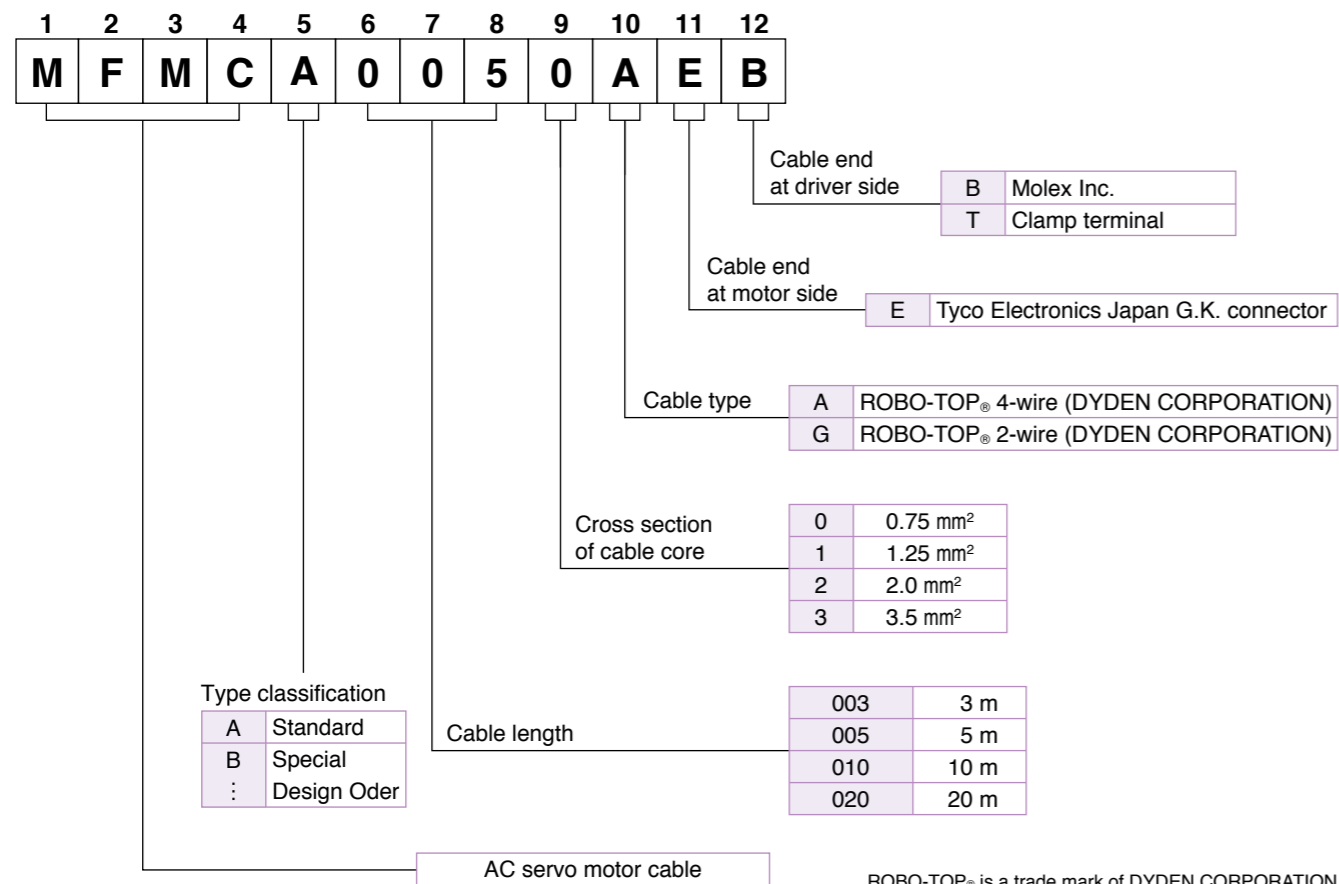
- Personal computer** : CPU : Pentium 100MHz or more • Memory : 16 MB or more (32 MB recommended)
- Hard disk capacity (vacancy of 25 MB or more recommended) • OS : Windows® 98, Windows® Me, Windows® 2000, Windows® XP (US version)
- Communication speed of serial communication port : 2400 bps or more (The software may not operate normally using USB-to-Serial adapter.) **Display** : Resolution : 640*480 (VGA) or more (desirably 1024*768) • Number of colors : 256 colors or more
- CD-ROM drive** : CD-ROM drive operable on the above-mentioned personal computer



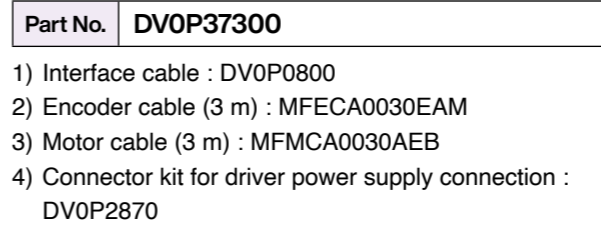
Encoder Cable For available optional items, please refer to P.400.



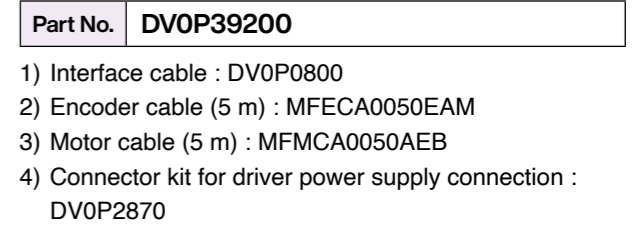
Motor Cable, Brake Cable For available optional items, please refer to P.400.



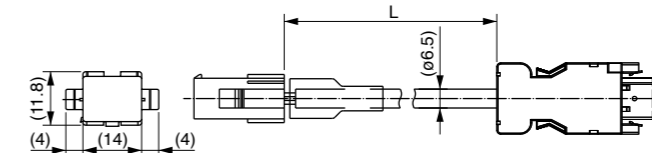
Cable Set (3 m)



Cable Set (5 m)



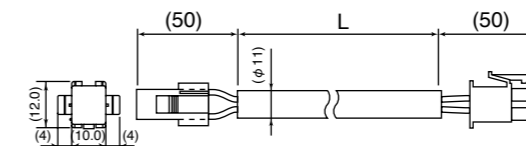
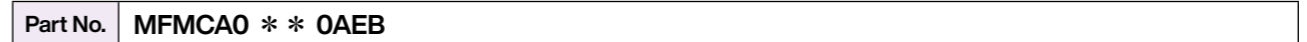
Encoder Cable



| Title | Part No. | Manufacturer | L (m) | Part No. |
|-------------------------|---------------------------|------------------------------|-------|--------------|
| Connector (Driver side) | 3E206-0100KV | Sumitomo 3M | 3 | MFECA0030EAM |
| Shell kit | 3E306-3200-008 | or equivalent | 5 | MFECA0050EAM |
| Connector | 172160-1 | Tyco Electronics | 10 | MFECA0100EAM |
| Connector Pin | 170365-1 | | 20 | MFECA0200EAM |
| Cable | 0.20 mm ² × 3P | Oki Electric Cable Co., Ltd. | | |

Motor Cable (ROBO-TOP® 105 °C 600 V . DP)

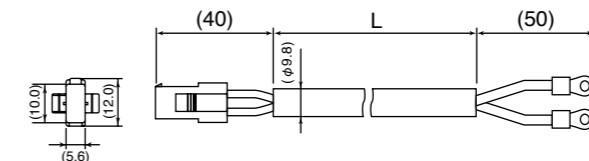
ROBO-TOP® is a trade mark of DYDEN CORPORATION



| Title | Part No. | Manufacturer | L (m) | Part No. |
|---------------|-------------------------------------|------------------|-------|--------------|
| Connector | 172159-1 | Tyco Electronics | 3 | MFMCA0030AEB |
| Connector Pin | 170362-1, 170366-1 | | 5 | MFMCA0050AEB |
| Connector | 5557-06R-210 | Molex Inc | 10 | MFMCA0100AEB |
| Connector Pin | 5556T | | 20 | MFMCA0200AEB |
| Cable | ROBO-TOP 600 V 0.75 mm ² | Daiden Co.,Ltd. | | |

Brake Cable (ROBO-TOP® 105 °C 600V . DP)

ROBO-TOP® is a trade mark of DYDEN CORPORATION



| Title | Part No. | Manufacturer | L (m) | Part No. |
|--------------------------------|-------------------------------------|----------------------|-------|--------------|
| Connector | 172157-1 | Tyco Electronics | 3 | MFMCB0030GET |
| Connector Pin | 170362-1, 170366-1 | | 5 | MFMCB0050GET |
| Nylon insulated round terminal | N1.25-M4 | J.S.T Mfg. Co., Ltd. | 10 | MFMCB0100GET |
| Cable | ROBO-TOP 600 V 0.75 mm ² | Daiden Co.,Ltd. | 20 | MFMCB0200GET |

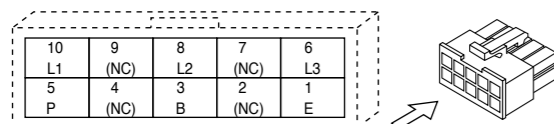
Connector Kit for Power Supply Connection

Part No. DV0P2870

● Parts composition

| Title | Part No. | Number | Manufacturer | Note |
|---------------------|--------------|--------|--------------|--------------------------------|
| Connector (10 pins) | 5557-10R-210 | 1 | Molex Inc. | For connector, CN X1 (10 pins) |
| Connector pin | 5556PBTL | 6 | | |

● Pin configuration of connector CN X1



● Recommended manual crimping tool (to be prepared by customer)

| Part No. | Cable material |
|------------|----------------|
| 57026-5000 | UL1007 |
| 57027-5000 | UL1015 |

<Cautions>

- The above pin disposition is shown when viewed from the terminal inserting direction. Make a correct wiring by checking the stamped pin numbers on the connector itself.
- Refer to P.386 for wiring and connection.
- Do not connect anything to pins marked "NC".

Connector Kit for Motor/Encoder Connection

Part No. DV0P3670 (Incremental 2500 pulse, 5-wire)

This option is required when you make your own encoder cable and motor cable. (Brake cable is required for brake.)

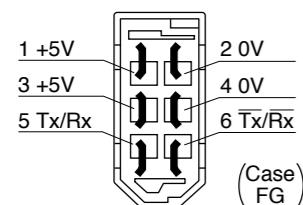
● Parts composition

| Title | Part No. | Number | Manufacturer | Note |
|-------------------------|----------------|--------|------------------|--|
| Connector (Driver side) | 3E206-0100 KV | 1 | Sumitomo 3M | For connector, CN X4 (6 pins) |
| Shell kit | 3E306-3200-008 | 1 | or equivalent | |
| Connector (6 pins) | 172160-1 | 1 | Tyco Electronics | For junction to encoder cable (6 pins) |
| Connector pin | 170365-1 | 6 | | |
| Connector (4 pins) | 172159-1 | 1 | Tyco Electronics | For junction to motor power cable (4 pins) |
| Connector pin | 170366-1 | 4 | | |
| Connector (6 pins) | 5557-06R-210 | 1 | Molex Inc. | For connector, CN X3 (6 pins) |
| Connector pin | 5556PBTL | 4 | | |

<Remarks>

We may use parts equivalent to the above for shell and connector cover.

● Pin configuration of connector CN X4 plug



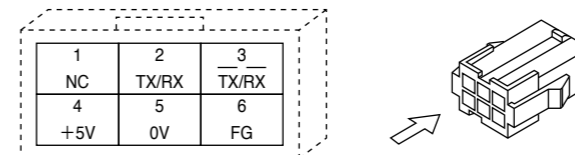
● Recommended manual crimping tool (to be prepared by customer)

| Title | Part No. | Manufacturer | Cable material |
|--------------------------------|------------|------------------|----------------|
| For encoder cable junction | 755330-1 | Tyco Electronics | — |
| For motor power cable junction | 755331-1 | | |
| For Connector CN X3 | 57026-5000 | Molex Inc. | UL1007 |
| | 57027-5000 | | UL1015 |

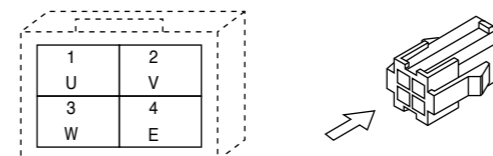
<Remarks>

- The above pin configuration is shown when viewed from the pin-soldering direction. Make a correct wiring by checking the stamped pin numbers on the connector itself.
- Connect the shield of the wire to the case (FG) without fail.
- For wiring and connection, refer to P.386.

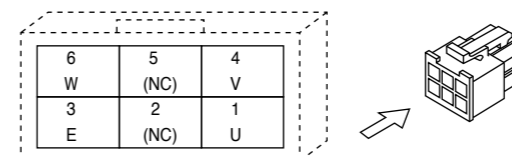
● Pin configuration of encoder cable junction



● Pin configuration of motor power cable junction



● Pin configuration of mating connector to CN X3 connector



<Cautions>

- The above pin configuration is shown when viewed from the terminal inserting direction. Make a correct wiring by checking the stamped pin numbers on the connector itself.
- Refer to P.386 for wiring and connection.

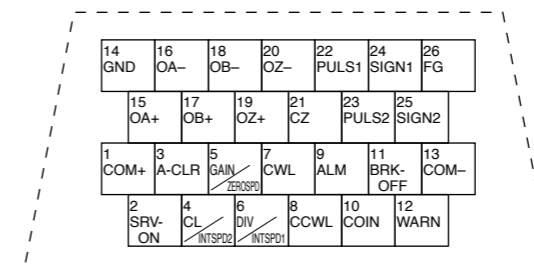
Connector Kit for Interface

Part No. DV0P0770

● Parts composition

| Title | Part No. | Number | Manufacturer | Note |
|-----------------|----------------|--------|---------------|--------------------------------|
| Connector | 10126-3000PE | 1 | Sumitomo 3M | For connector, CN X5 (26 pins) |
| Connector cover | 10326-52A0-008 | 1 | or equivalent | |

● Pin configuration of connector CN X5 (26 pins) (viewed from the soldering side)



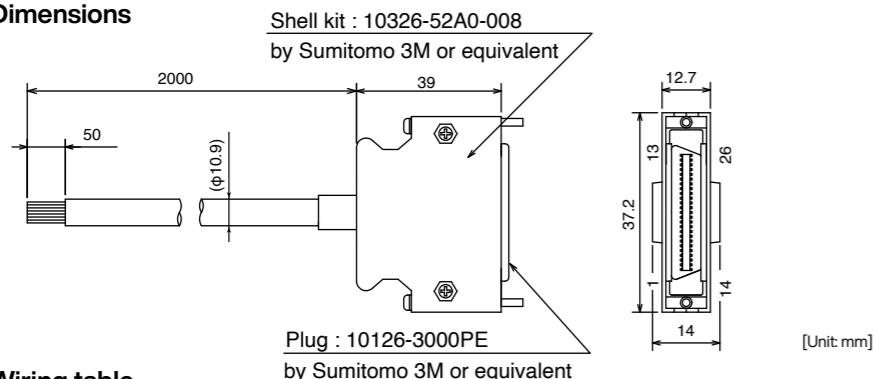
<Cautions>

- Make a correct wiring by checking the stamped pin numbers on the connector itself.
- Refer to P.387 for symbols and functions of the above signals.

Interface Cable

Part No. DV0P0800 Cable of 2 m is connected.

● Dimensions



● Wiring table

| Pin No. | Title of signal | Color or cable | Pin No. | Title of signal | Color or cable | Pin No. | Title of signal | Color or cable |
|---------|-----------------|------------------|---------|-----------------|------------------|---------|-----------------|------------------|
| 1 | COM+ | Orange (Red 1) | 10 | COIN | Pink (Black 1) | 19 | OZ+ | Pink (Red 2) |
| 2 | SRV-ON | Orange (Black 1) | 11 | BRK-OFF | Orange (Red 2) | 20 | OZ- | Pink (Black 2) |
| 3 | A-CLR | Gray (Red 1) | 12 | WARN | Orange (Black 2) | 21 | CZ | Orange (Red 3) |
| 4 | CL/INTSPD2 | Gray (Black 1) | 13 | COM- | Gray (Red 2) | 22 | PULS1 | Gray (Red 3) |
| 5 | GAIN/ZEROSPD | White (Red 1) | 14 | GND | Gray (Black 2) | 23 | PULS2 | Gray (Black 3) |
| 6 | DIV/INTSPD1 | White (Black 1) | 15 | OA+ | White (Red 2) | 24 | SIGN1 | White (Red 3) |
| 7 | CWL | Yellow (Red 1) | 16 | OA- | White (Black 2) | 25 | SIGN2 | White (Black 3) |
| 8 | CCWL | Yellow (Black 1) | 17 | OB+ | Yellow (Red 2) | 26 | FG | Orange (Black 3) |
| 9 | ALM | Pink (Red 1) | 18 | OB- | Yellow (Black 2) | | | |

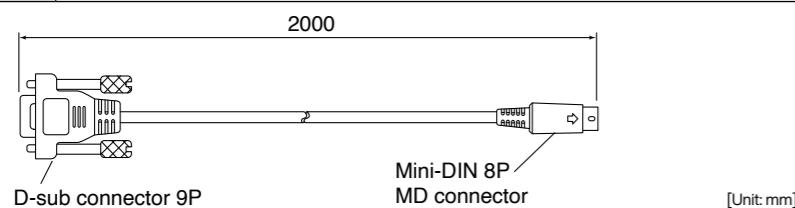
<Notes>
e.g. of Pin No. designation :
Pin No. 1... Wire color is orange, and one red dot.
Pin No. 12... Wire color is orange, and two black dot.

<Caution>

Cable pin No. 26 is not connected to the connector shell (housing) or shielded wire (net wire).
Pin No. 26 of the Driver is connected to the shell (housing) of the connector.
The shielded wire (net wire) of the cable is connected to the shell (housing) of the connector of the cable, and by connecting the connector of the optional cable to the Driver, pin No. 26 of the cable and the shielded wire (net wire) of the cable gets connected via the Driver.

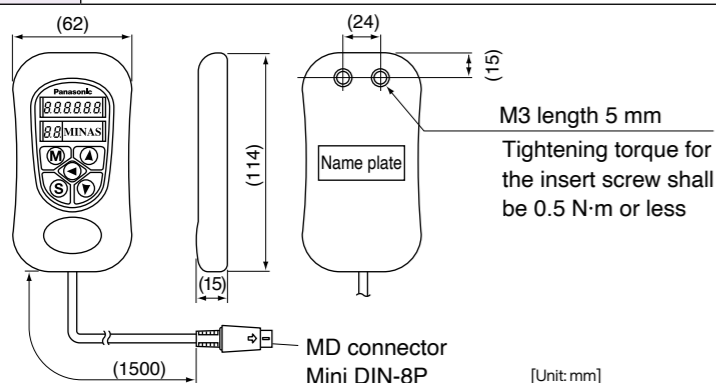
Communication Cable (For Connection with PC)

Part No. DV0P1960



Console

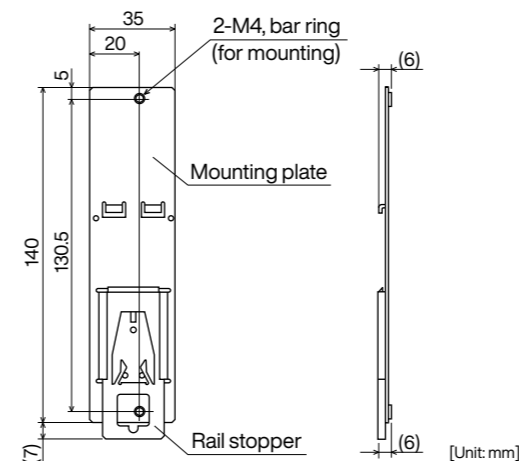
Part No. DV0P4420



DIN Rail Mounting Unit

Part No. DV0P3811

● Dimensions

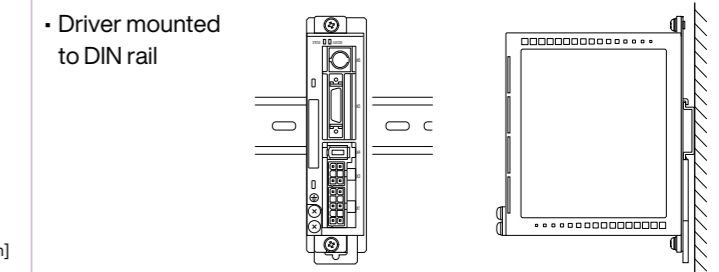


<Notes>

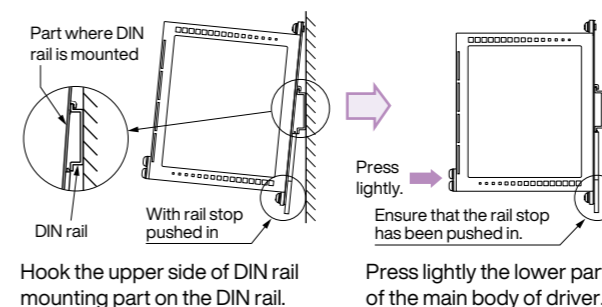
2 mounting screws (M4 X L8, Pan head) are attached.
Rail stopper can be extended to max. 10 mm.

<Cautions>

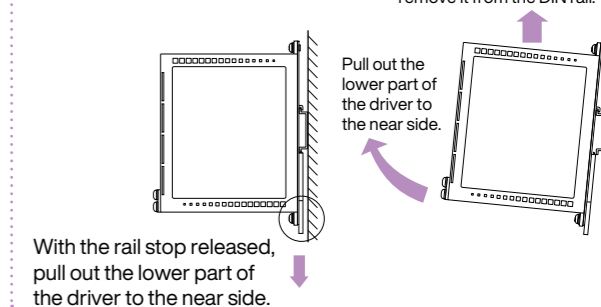
Please read carefully operation manual before using this product.
In addition, please do not apply excessive stress to the product.



• How to Install



• Removing from DIN Rail

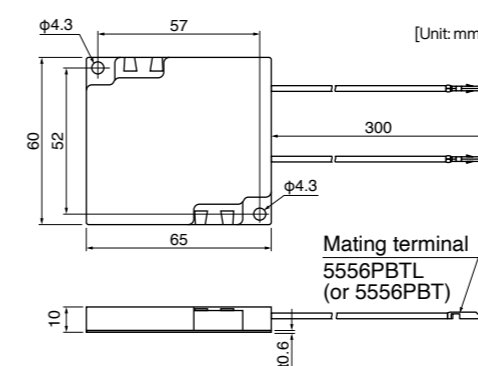


External Regenerative Resistor

| Part No. | Manufacturer's Part No. | Specifications | | | Note (Input Power of drive) |
|----------|-------------------------|-----------------|------------------|---|-----------------------------|
| | | Resistance Ω | Rated power W | Activation temperature of built-in fuse °C | |
| DV0P2890 | 45M03 | 50 | 10 | 137 ⁺³ / ₋₂ | Single phase, 100 V |
| DV0P2891 | 45M03 | 100 | 10 | 137 ⁺³ / ₋₂ | Single/3-phase, 200 V |

Manufactured by Iwaki Musen Kenkyusho Co., Ltd.

● Dimensions



<Caution of when using external regeneration resistor>

Since it becomes high temperature, external regeneration resistor must be installed according to the contents shown below.

- Attach to incombustibles, such as metal.
 - Install in the place which cannot touch directly by covering with incombustibles etc.
 - Do not install near the combustibles.
- Although the thermal cutoff is built in external regeneration resistor, the skin temperature of regeneration resistor may become high exceeding the operating temperature of thermal cutoff by the time the thermal cutoff operates in driver failure.
The thermal cutoff is for preventing ignition of the regeneration resistor in driver failure, and is not for controlling the skin temperature of resistor.

<Remarks>

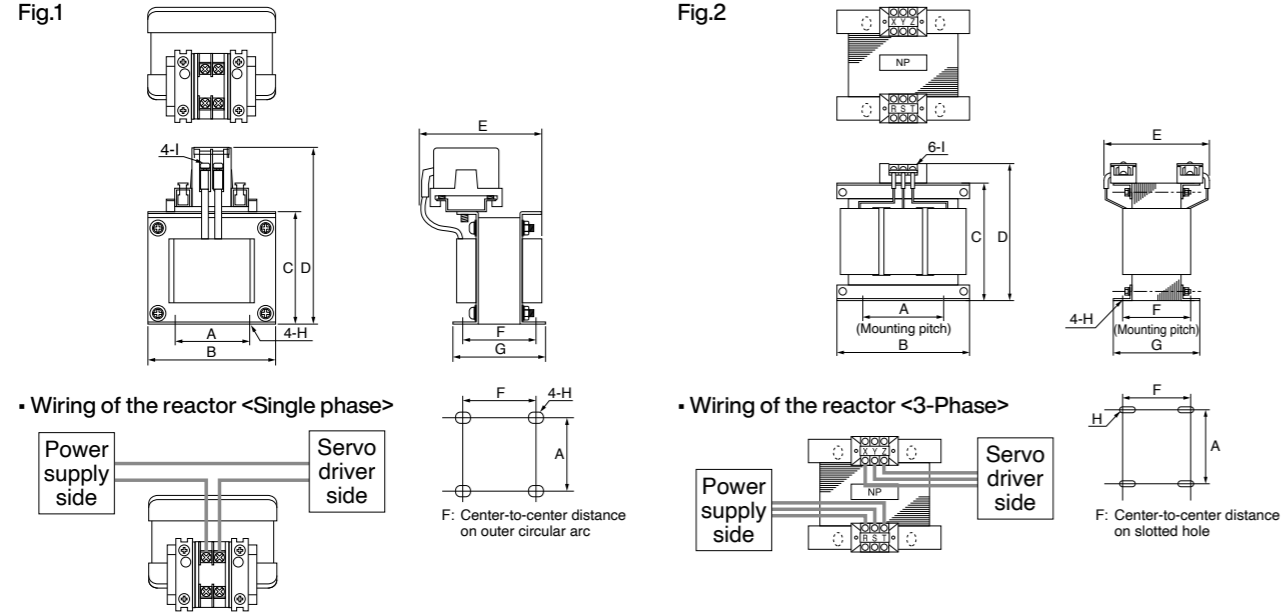
Thermal fuse is installed for safety.
The thermal fuse may blow due to heat dissipating condition, working temperature, supply voltage or load fluctuation.
Make it sure that the surface temperature of the resistor may not exceed 100 °C at the worst running conditions with the machine, which brings large regeneration (such case as high supply voltage, load inertia is large or deceleration time is short) Please carry out air cooling if needed.

Reactor

| Frame symbol of driver | Power supply specifications | Rated output | Part No. | Fig. |
|------------------------|-----------------------------|----------------|----------|------|
| MKDE | Single phase, 100 V | 50 W to 100 W | DV0P227 | 1 |
| | Single phase, 200 V | 50 W to 100 W | DV0P220 | 2 |
| | 3-phase, 200 V | 50 W to 200 W | | |
| MLDE | Single phase, 100 V | 200 W | DV0P228 | 1 |
| | Single phase, 200 V | 200 W to 400 W | DV0P220 | 2 |
| | 3-phase, 200 V | 400 W | | |

Fig.1

Fig.2



[Unit: mm]

| | Part No. | A | B | C | D | E(Max) | F | G | H | I | Inductance (mH) | Rated current (A) |
|-------|----------|--------|-------|--------|---------|--------|---------|------|---------|----|-----------------|-------------------|
| Fig.1 | DV0P227 | 55±0.7 | 80±1 | 66.5±1 | 110 Max | 90 | 41±2 | 55±2 | 4-5φ×10 | M4 | 4.02 | 5 |
| | DV0P228 | 55±0.7 | 80±1 | 66.5±1 | 110 Max | 95 | 46±2 | 60±2 | 4-5φ×10 | M4 | 2 | 8 |
| Fig.2 | DV0P220 | 65±1 | 125±1 | (93) | 136 Max | 155 | 70+3/-0 | 85±2 | 4-7φ×12 | M4 | 6.81 | 3 |

Harmonic restraint

Harmonic restraint measures are not common to all countries. Therefore, prepare the measures that meet the requirements of the destination country.

When installing a product for Japan, refer to the instruction manual available on our website.

[Panasonic Industry Co., Ltd. web site]

industrial.panasonic.com/ac/e/

<Remarks>

When using a reactor, be sure to install one reactor to one servo driver.

Recommended devices

Surge Absorber for Motor Brake

| Motor | Surge absorber for motor brake | |
|--------------------|--------------------------------|---------------------|
| | Part No. (Manufacturer's) | Manufacturer |
| MUMA 50 W to 400 W | Z15D151 | SEMITEC Corporation |

List of Peripheral Devices

| Manufacturer | Tel No. / Home Page | Peripheral devices |
|------------------------------------|--|---------------------------------|
| Panasonic Industry Co., Ltd. | http://panasonic.net/id/ | Surge absorber Switch, Relay |
| Iwaki Musen Kenkyusho Co., Ltd. | +81-44-833-4311 http://www.iwakimusen.co.jp/ | Regenerative resistor |
| SEMITEC Corporation | +81-3-3621-2703 http://www.semitec.co.jp/english2/ | Surge absorber for motor brake |
| TDK Corporation | +81-3-5201-7229 http://www.global.tdk.com/ | Ferrite core |
| Okaya Electric Industries Co. Ltd. | +81-3-4544-7040 http://www.okayaelec.co.jp/english/index.html | Surge absorber Noise filter |
| Sumitomo 3M | +81-3-5716-7290 http://solutions.3m.com/wps/portal/3M/ja_JP/WW2/Country/ | Connector |
| Tyco Electronics Japan G.K. | +81-44-844-8052 http://www.te.com/ja/home.html | |
| Japan Molex Inc. | +81-462-65-2313 http://www.molex.co.jp | Cable |
| DYDEN CORPORATION | +81-3-5805-5880 http://www.dyden.co.jp/english/index.htm | |

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

MEMO

A series of horizontal dashed lines for writing.