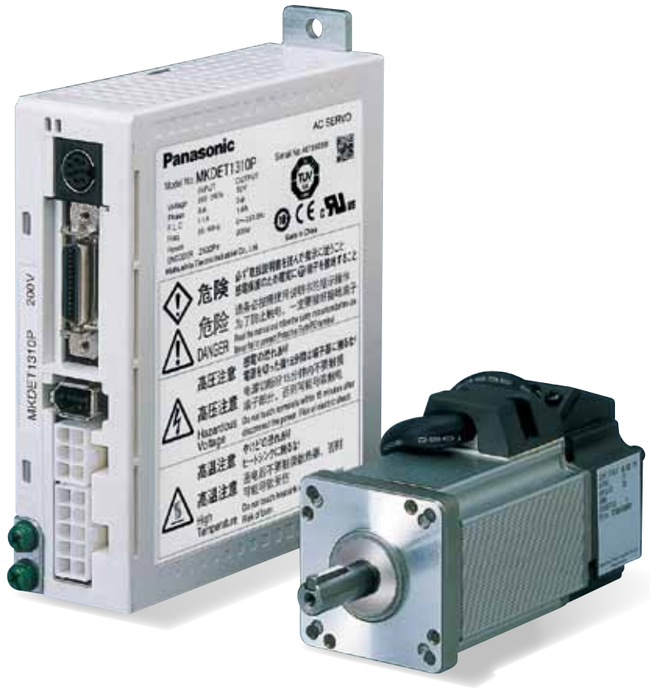
Compact Servo Only for Position Control.

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.



Console
Option

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

Contents

Features **215**
Motor Line-up **219**
Model Designation **220**
Overall Wiring **221**
Driver and List of Applicable Peripheral Equipments **221**
Driver **223**
Driver Specifications 223
Standard Wiring Example of Main Circuit 224
Encorder Wiring Diagram 224
Control Circuit Standard Wiring Example 225
Dimensions of Driver 226
Motor **227**
Specifications/Model designation/Torque Characteristics 227
Dimensions of Moter 231
Motors with Gear Reducer 232
Options **236**
Setup Support Software 236
Cable part No. Designation 237
Cable Set 238
Encoder Cable 238
Motor Cable 238
Brake Cable 238
Connector Kit 239
Interface Cable 241
Communication Cable 241
Console 241
DIN Rail Mounting Unit 242
External Regenerative Resistor 242
Reactor 243
Surge Absorber for Motor Brake 243
List of Peripheral Components 244

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

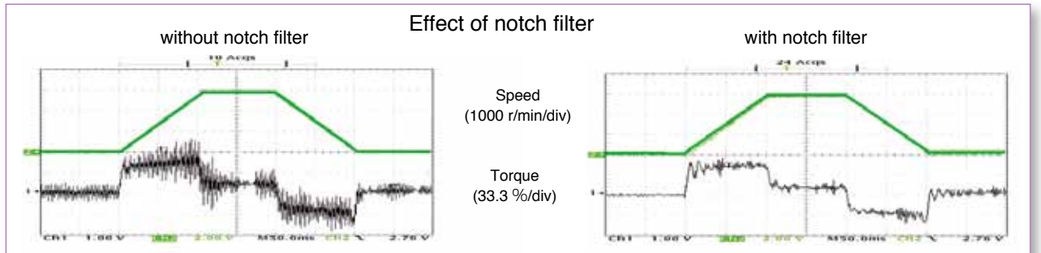
Adaptive filter (Note1)

- 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)

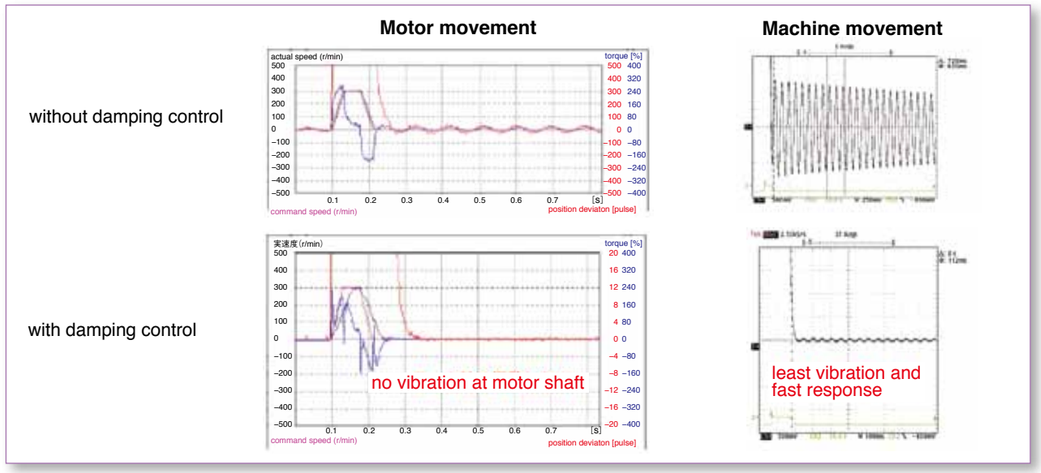
- 1-channel notch filter is equipped in the driver independent from adaptive filter.
- Each of 2 filters can set up frequency and notch width, and frequency in 1Hz unit. Suppression of "Judder" noise of the machine which has multiple resonance points can be expected.

Effect of notch filter



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.241, 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.236 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.236 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.236 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 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 EquipmentI	Conforms to references by EMC Directives
	EN61000-6-2	Immunity for Industrial Environments	
	EC61000-4-2	Electrostatic Discharge Immunity Test	
	IEC61000-4-3	Radio Frequency Electromagnetic Field Immunity Test	
	IEC61000-4-4	Electric High-Speed Transition Phenomenon/Burst Immunity Test	
	IEC61000-4-5	Lightening Surge Immunity Test	
	IEC61000-4-6	High Frequency Conduction Immunity Test	
	IEC61000-4-11	Instantaneous Outage Immunity Test	

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

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

Panasonic Testing Centre
Panasonic Service Europe,
a division of Panasonic Marketing Europe GmbH
Winsbergring 15,22525 Hamburg,F.R.Germany

* When exporting 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: 2500 P/r incremental	Rotary encoder: 17bit absolute/ incremental	Brake: Holding	Gear: High precision	UL/ CSA	Enclosure	Features	Applications
Ultra low inertia	MUMA 	0.05 to 0.4 0.05 0.1 0.2 0.4	3000 (5000)	○	–	○	○	○	IP65 Except shaft throughhole and connector	Small capacity Ultra low inertia	SMT machines Inserters High repetitive positioning application

Model Designation

Servo Motor

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

Special specifications

Symbol	Type
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	10,000	5

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.227 for motor specifications

Motor with gear reducer

M U M A 0 1 1 P 3 1 N

Symbol	Type
MUMA	Ultra low inertia (100 W to 400 W)

Motor rated output

Symbol	Specifications
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	10,000	5

Gear reduction ration, gear type

Symbol	Gear reduction ratio	Motor output (W) 100	200	400	Gear type
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.232 for motor with gear reducer specifications

Servo Driver

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

Special specifications

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

Control mode

Symbol	Specifications
P	Pulse train

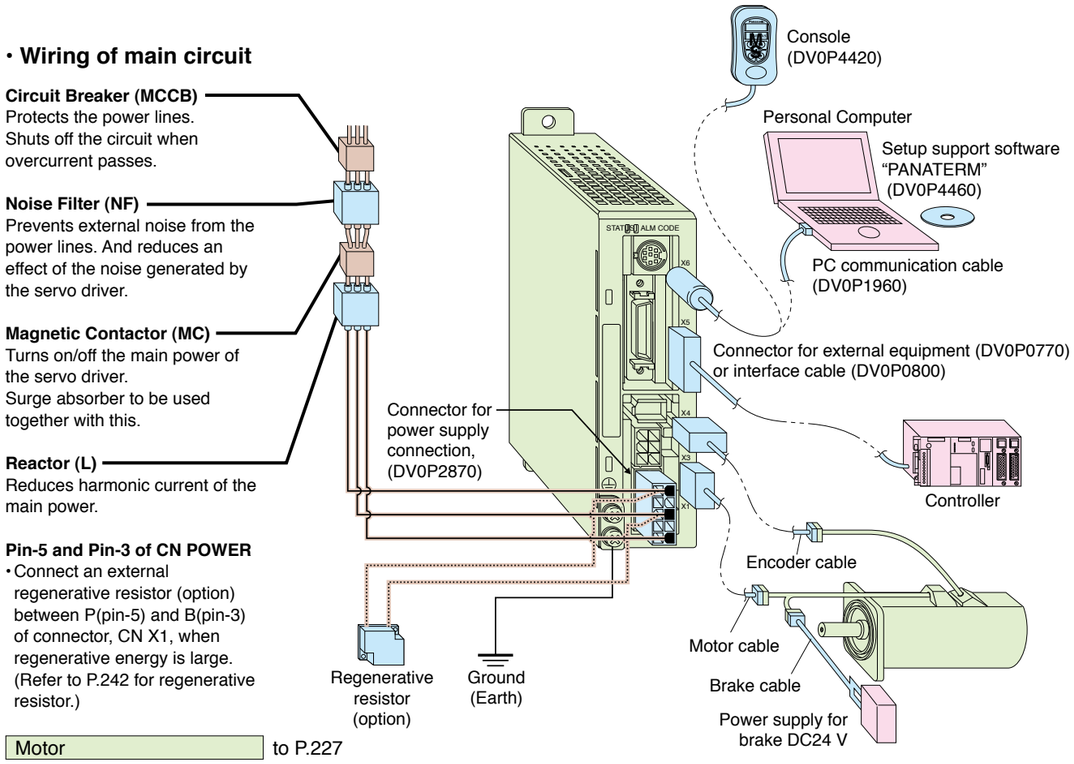
Current detector current rating

Symbol	Current rating
05	5 A
10	10 A

See P.223 for driver specifications

Overall Wiring/ Driver and List of Applicable Peripheral Equipments

• 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.242 for regenerative resistor.)

Motor to P.227
Driver to P.223
Option to P.236
Recommended equipments
Parts customer to prepare

List of recommneded prripheral equipments

Power supply	Motor Series	Motor Output	Power capacity (at rated output)	Circuit Breaker (Rated current)	Noise Filter	Magnetic Contactor Contact Composition	Wire diameter (L1, L2, L3, U, V and W)
Single phase, 100 V	MUMA	50 W	0.3 kVA	(5 A)	DV0P4160	10 A (3P+1a)	0.75 mm² to 0.85 mm² AWG18
		100 W	0.4 kVA				
		200 W	0.5 kVA	(10 A)			
Single phase, 200 V		50 W	0.3 kVA	(5 A)		15 A (3P+1a)	
		100 W					
		200 W	0.5 kVA				
		400 W	0.9 kVA	(10 A)			
3-phase 200 V		50 W	0.3 kVA	(5 A)		10 A (3P+1a)	
		100 W					
		200 W	0.5 kVA				
		400 W	0.9 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 P.256.

<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.

Carrying page

Options		Part No.	Carrying page
Technical Reference	Japanese	DV0P3680	—
	English	DV0P3700	—
Console		DV0P4420	241
Setup Support Software, PANATERM	Japanese	DV0P4460	236
	English		
RS232 Communication Cable (for Connection with PC)		DV0P1960	241
Interface Cable		DV0P0800	241
Connector Kit for External Equipment		DV0P0770	240
Connector Kit for Motor and Encoder		DV0P3670	239
Connector Kit for Driver Power Supply		DV0P2870	239
Encoder Cable	MFECA0 ∗ ∗ 0EAM		238
Motor Cable	MFMCA0 ∗ ∗ 0AEB		238
Brake Cable	MFMCB0 ∗ ∗ 0GET		238
Cable Set (3 m) (Note 3)	DV0P37300		238
Cable Set (5 m) (Note 3)	DV0P39200		238
DIN Rail Mount Unit	DV0P3811		242
External Regenerative Resistor	100 V	50 Ω 10 W	DV0P2890	242
	200 V	100 Ω 10 W	DV0P2891	
Reactor	100 V		DV0P227	243
			DV0P228	
	200 V		DV0P220	
Noise Filter			DV0P4160	256
Surge Absorber	Single phase 100 V, 200 V		DV0P4190	256
	3-phase 200 V		DV0P1450	
Noise Filter for Signal Wire			DV0P1460	256

(Note 3) Cable set (3 m) contains,
1) Interface cable: DV0P0800
2) Encoder cable (3 m) : MFECA0030EAM
3) Motor cable (3 m) : MFMCA0030AEB
4) Connector kit for driver power supply connection : DV0P2870
Cable set (5 m) contains,
1) Interface cable: DV0P0800
2) Encoder cable (5 m) : MFECA0050EAM
3) Motor cable (5 m) : MFMCA0050AEB
4) Connector kit for driver power supply connection : DV0P2870

Table of Part Numbers and Options

Power supply	Output (W)	2500P/r, Incremental Motor (Note) 1	Rating/Spec. (page)	Driver	Dimensions (Frame symbol)	Option Encoder Cable (Note) 2	Motor Cable (Note) 2		Brake Cable (Note) 2	External Regenerative Resistor	Reactor	Noise Filter
Single phase 100 V	50	MUMA5AZP1 □	227	MKDET1105P	226（K）	MFECA0∗∗0EAM	MFMCA0∗∗0AEB		MFMCB0∗∗0GET	DV0P2890	DV0P227	DV0P4160
	100	MUMA011P1 □	227	MKDET1110P	226（K）							
	200	MUMA021P1 □	227	MLDET2110P	226（L）						DV0P228	
Single phase 200 V	50	MUMA5AZP1 □	229	MKDET1505P	226（K）					DV0P2891	DV0P220	
	100	MUMA012P1 □	229	MKDET1505P	226（K）							
	200	MUMA022P1 □	229	MLDET2210P	226（L）							
	400	MUMA042P1 □	229	MLDET2510P	226（L）							
3-phase 200 V	50	MUMA5AZP1 □	229	MKDET1505P	226（K）							
	100	MUMA012P1 □	229	MKDET1505P	226（K）							
	200	MUMA022P1 □	229	MKDET1310P	226（K）							
	400	MUMA042P1 □	229	MLDET2510P	226（L）							
				MLDET2310P								

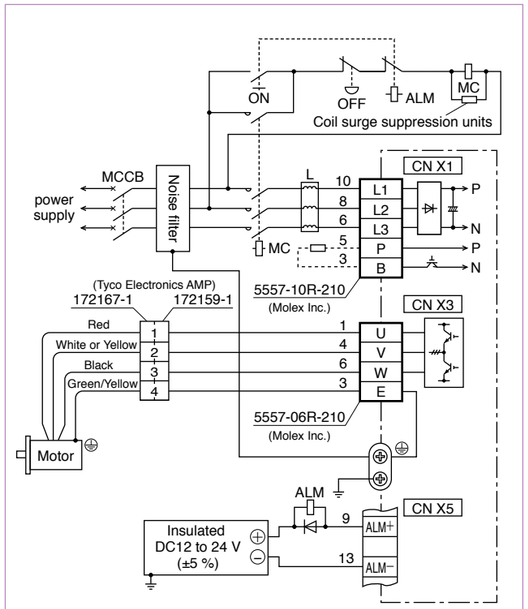
Note) 1 Motor model number suffix: □
S : Key way with center tap, without brake
T : Kew way with center tap, with brake
Note) 2 ∗ ∗ represents cable length. For details, refer to P.237.

Basic Specifications	Input power	Single phase, 100 V	Single phase, 100 V to 115 V +10 % –15 %	50/60 Hz
		Single phase, 200 V	Single phase, 200 V to 240 V +10 % –15 %	50/60 Hz
		3-phase, 200 V	3-phase, 200 V to 240 V +10 % –15 %	50/60 Hz
	Environment	Temperature	Operating : 0 to 55 ˚C, Storage : –20 ˚C to 65 ˚C (Max.temperature guarantee 80 ˚C for 72 hours <Nomal temperature>)	
		Humidity	Both operating and storage : 90 %RH or less (free from condensation)	
		Altitude	1000 m or lower	
		Vibration	5.88 m/s² or less, 10 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.	
Functions	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	
		Pulse input — Type of input pulse train	Differential input. Selectable with parameter, ((1) CW/CCW, (2) A and B-phase, (3) Command and Direction)	
		Pulse input — Electronic gear (Division/Multiplication of command pulse)	Setup of electronic gear ratio Setup range of (1-10000) × $2^{(0\text{-}17)}$/(1-10000)	
		Pulse input — 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 to 10 s/1000 r/min. Sigmoid acceleration/deceleration is also enabled.	
		Zero-speed clamp	0-clamp of internal speed command with speed zero clamp input is enabled.	
	Common	Auto-gain tuning — 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.	
		Auto-gain tuning — 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.	
		Protective function — 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 — Setup support software	PANATERM (Supporting OS : Windows98, Windows ME, Windows2000, and WindowsXP)	

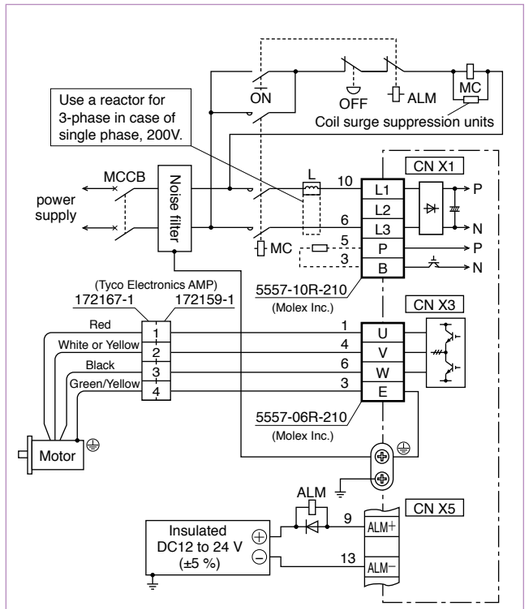
Standard Wiring Example of Main Circuit/ Encorder Wiring Diagram

Standard Wiring Example of Main Circuit

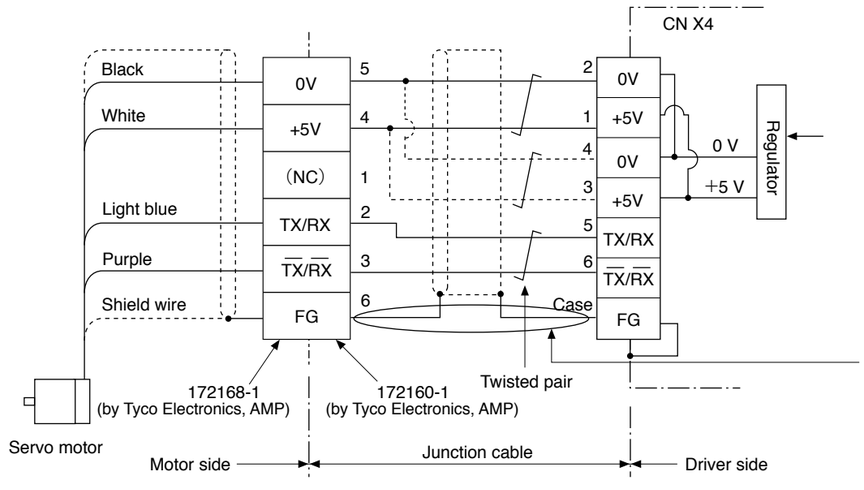
3-Phase, 200 V



Single Phase, 100 V / 200 V



Encorder Wiring Diagram



When you make your own junction cable for encoder (Refer to P.239, P.240 "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.

Control Circuit Standard Wiring Example

CN X 5 Wiring Example at Position Control Mode

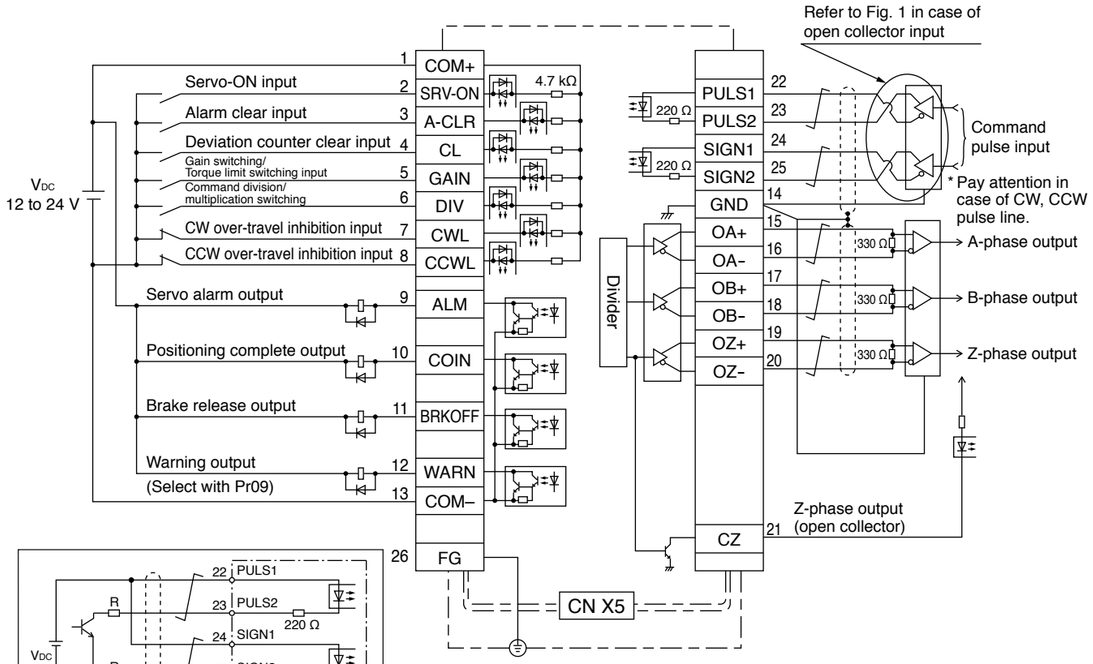
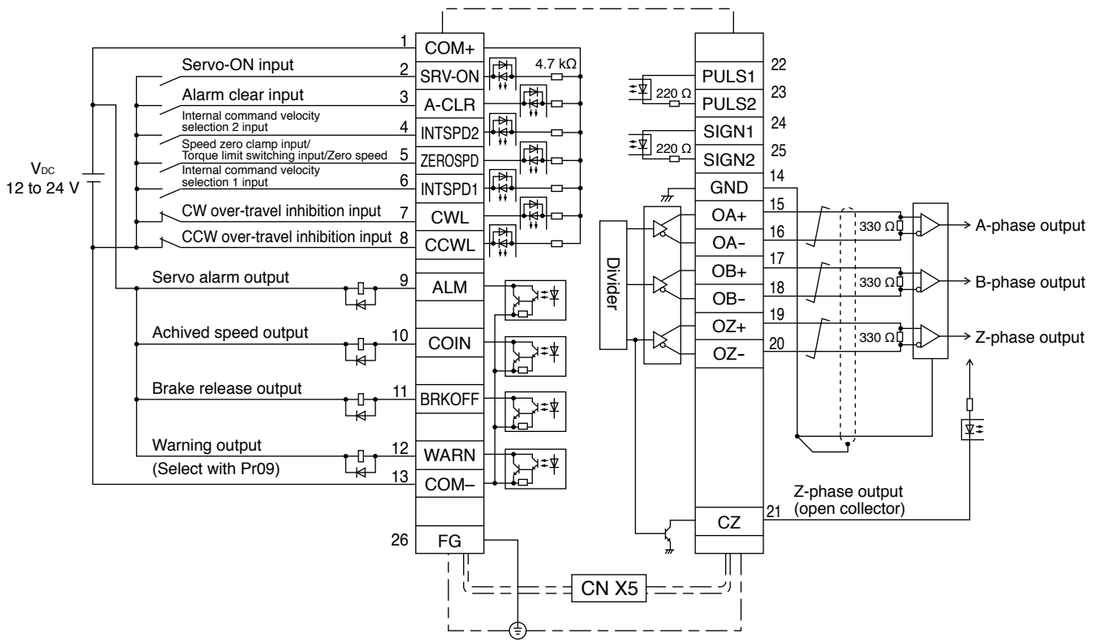
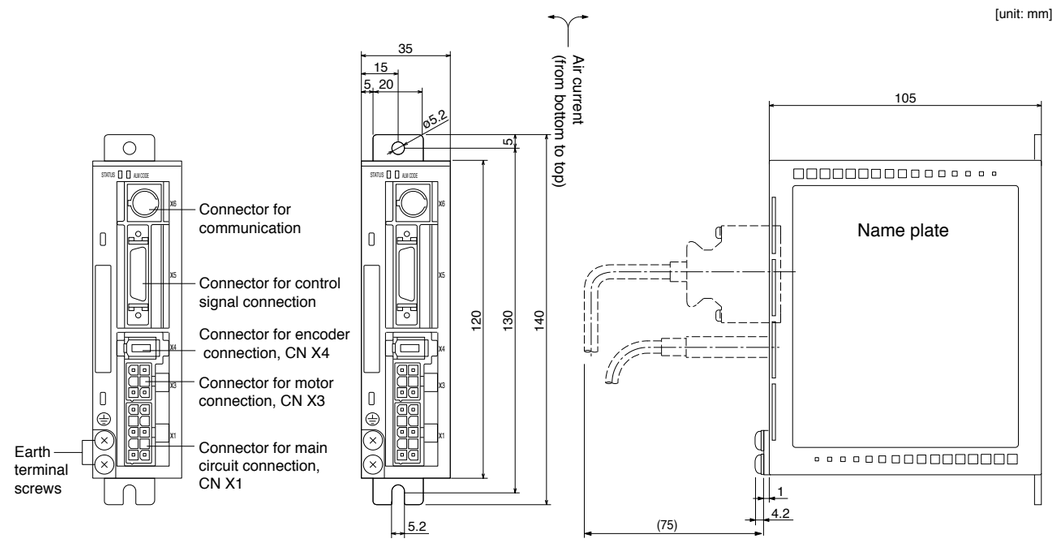


Fig. 1
This fig. shows the usage of an external control signal power supply.
You need to install an resistor R for current limit corresponding to VDC.

CN X 5 Wiring Example at Internal Velocity Control Mode



Frame K

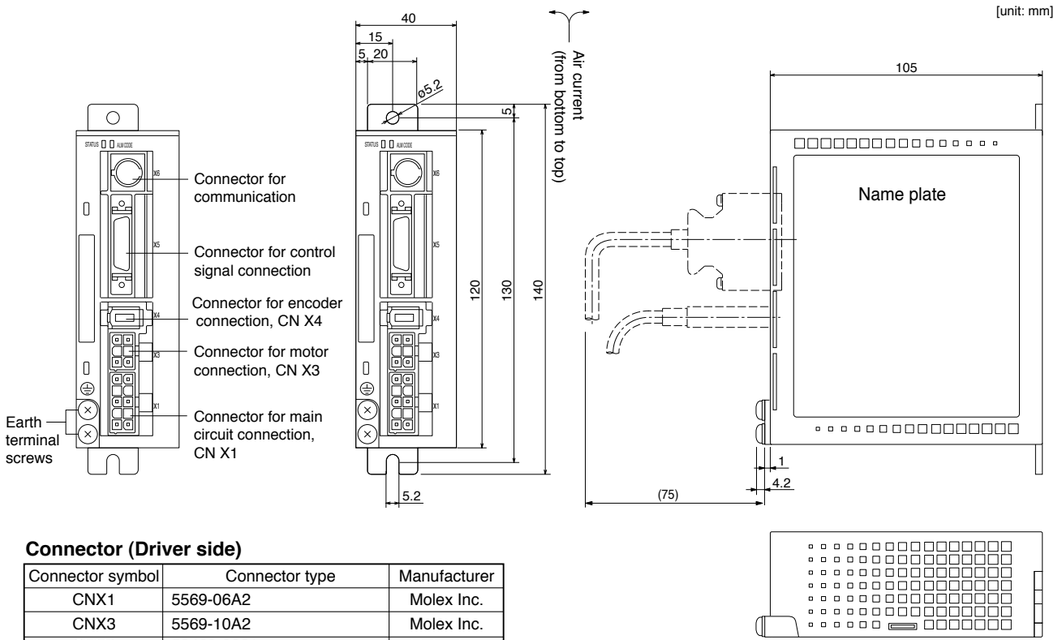


Connector (Driver side)

Connector symbol	Connector type	Manufacturer
CNX1	5569-06A2	Molex Inc.
CNX3	5569-10A2	Molex Inc.
CNX4	53460-0621	Molex Inc.
CNX5	10226-52A11L(or equivalent)	Sumitomo 3M

Mass: 0.35 kg

Frame L



Connector (Driver side)

Connector symbol	Connector type	Manufacturer
CNX1	5569-06A2	Molex Inc.
CNX3	5569-10A2	Molex Inc.
CNX4	53460-0621	Molex Inc.
CNX5	10226-52A11L(or equivalent)	Sumitomo 3M

Mass: 0.40 kg

100 V MUMA 50 W to 200 W [Low inertia Small drives]

		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		
	DV0P2890	No limit Note)2		
Rated rotational speed (r/min)		3000		
Max. rotational speed (r/min)		5000		
Moment of inertia of rotor ($\times 10^{-4}$ kg·m^2)	Without brake	0.021	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		DC 24 V 10 %	

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

For motor dimensions, refer to P.231, and for the diver, refer to P.226.

Model Designation

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

Symbol	Type
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

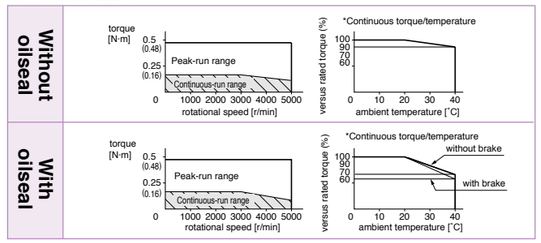
Symbol	Shaft	Holding brake		Oil seal	
	Key-way, center tap	without	with	without	with
S	●	●		●	
T	●		●	●	

Rotary encoder specifications

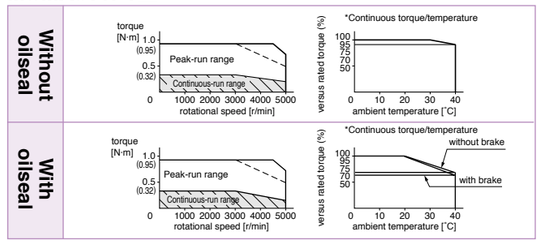
Symbol	Format	Pulse counts	Resolution	Wires
P	Incremental	2500 P/r	10000	5

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

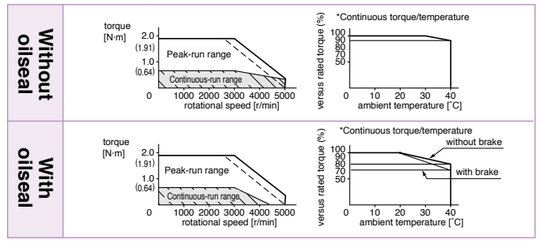
MUMA5AZP1□



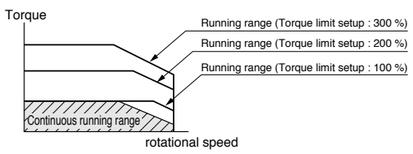
MUMA011P1□

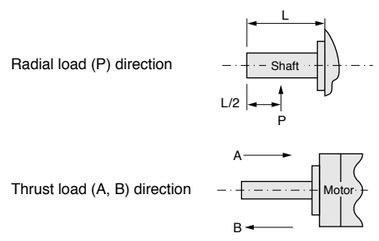


MUMA021P1□



*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 = (load moment of inertia) / (rotor moment of inertia).
- When the motor speed exceeds the rated speed, regenerative brake frequency is in inverse proportion to the square of (running speed/rated speed).
- Power supply voltage is 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 continuosly 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)

200 V MUMA 50 W to 400 W [Low inertia Small drives]

		AC200 V			
Motor model	MUMA	5AZP1□	012P1□	022P1□	042P1□
Applicable driver	Model No.	MKDET1505P		MKDET1310P	MLDET2310P
				MKDET2210P	MLDET2510P
	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) Note)1	Without option	No limit Note)2			
	DV0P2891 x 1	No limit Note)2			
Rated rotational speed (r/min)		3000			
Max. rotational speed (r/min)		5000			
Moment of inertia of rotor ($\times 10^{-4}$ kg·m^2)	Without brake	0.021	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 <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)	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	DC 24 V 10 %	

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

For motor dimensions, refer to P.231, and for the driver, refer to P.226.

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	Type
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
2	200 V
Z	100/200 V (50 W only)

Design order
1 : Standard

Motor structure

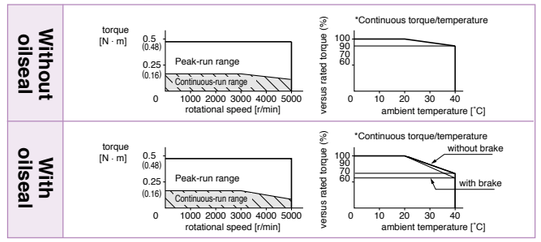
Symbol	Shaft	Holding brake		Oil seal	
	Key-way, center tap	without	with	without	with
S	●	●		●	
T	●		●	●	

Rotary encoder specifications

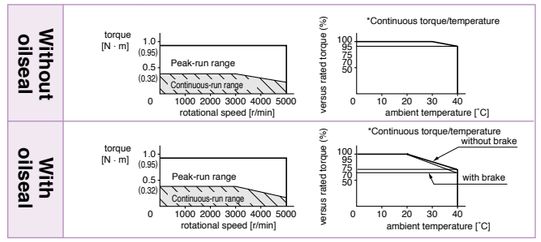
Symbol	Format	Pulse counts	Resolution	Wires
P	Incremental	2500 P/r	10000	5

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

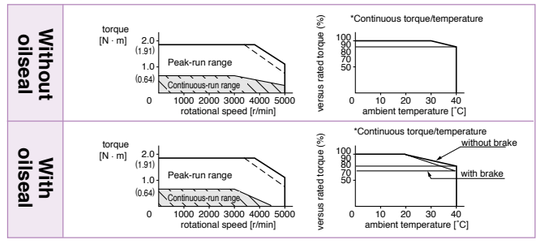
MUMA5AZP1□



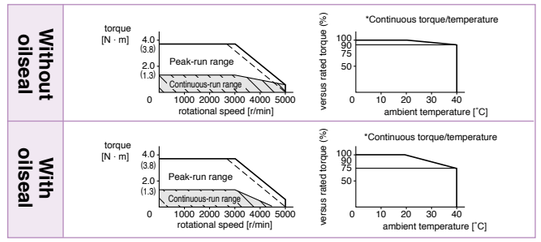
MUMA012P1□



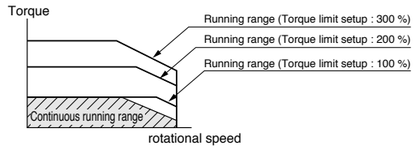
MUMA022P1□

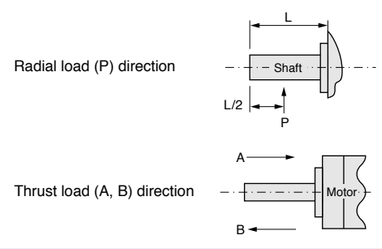


MUMA042P1□



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



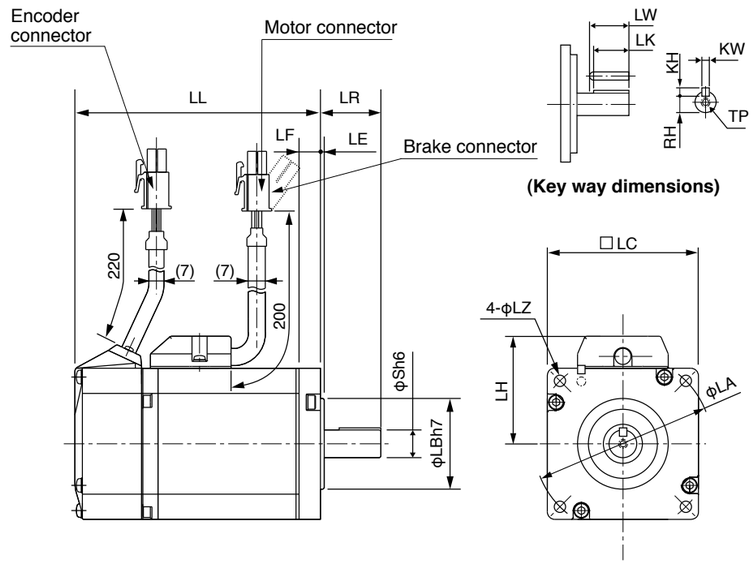


Note) 1. Regenerative brake frequency represents the frequency of the motor's stops from the rated speed with deceleration without load.
- If the load is connected, frequency will be defined as 1/(m+1), where m = (load moment of inertia) / (rotor moment of inertia).
- When the motor speed exceeds the rated speed, regenerative brake frequency is in inverse proportion to the square of (running speed/rated speed).
- Power supply voltage is 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 continuosly 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)

MUMA 50 W to 400 W

[Unit: mm]



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

[Unit: mm]

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 × 6 (depth)	M3 × 6 (depth)	M4 × 8 (depth)	M5 × 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.239, P.240.			

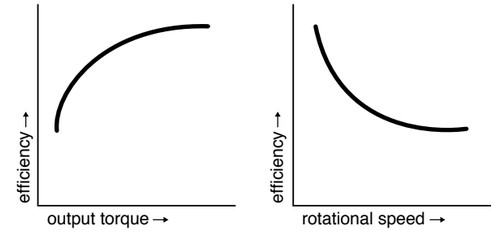
<Cautions>
Reduce the moment of inertia ratio if high speed response operation is required.
Read the Instruction Manual carefully and understand all precautions and remarks before using the products.

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	Type
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	wuthout	with
3	●	●	
4	●		●

Specifications of Motor with Gear Reducer

Motor type		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
	Protective structure	IP44 (at gear reducer)
Environment	Ambient temperature	0 to 40 ˚C
	Ambient humidity	85 %RH (free from condensation) or less
	Vibration resistance	49 m/s² or less (at motor frame)
	Impact resistance	98 m/s² or less

Table of Motor Specifications/ The Combination of the Driver and the Motor

Table of Motor Specifications

Model	Motor	MUMA with gear reducer											
	Output	Reduction ratio	Output	Rated speed	Max. speed	Rated torque	Peak max. torque	Moment of inertia (motor + reducer/converted to motor shaft)		Mass		Permissible radial load	Permissible thrust load
								w/o brake	w/ brake	w/o brake	w/ brake		
	(W)		(W)	(r/min)	(r/min)	(N·m)	(N·m)	J (× 10^{-4}kg·m^2)		(kg)		(N)	(N)
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.235.

The Combination of the Driver and the Motor

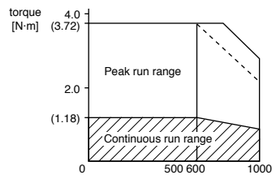
Combination with driver		100 V		200 V		
Encoder	Motor output	Part No. of motor with reducer	Single phase, 100 V Part No. of driver	Part No. of motor with reducer	3-phase, 200 V Part No. of driver	Single phase, 200 V Part No. of driver
2500 P/r Incremental	100 W	MUMA011P□□N	MKDET1110P	MUMA012P□□N	MKDET1505P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

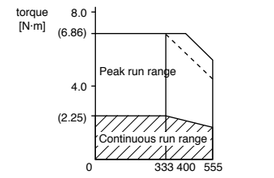
For dimensions, refer to P.235.

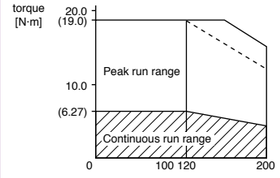
Torque Characteristics

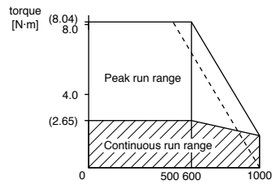
For High Precision (MUMA Series 100 W to 400 W)

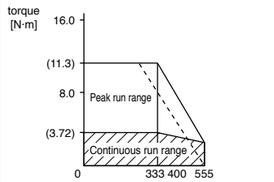
Supply voltage to driver	Motor output \ Reduction ratio	1/5	1/9	1/25
100 V	100 W	MUMA011P□1N	MUMA011P□2N	MUMA011P□4N
	200 W	MUMA021P□1N	MUMA021P□2N	MUMA021P□4N
	400 W	MUMA042P□1N	MUMA042P□2N	MUMA042P□4N
200 V	100 W	MUMA012P□1N	MUMA012P□2N	MUMA012P□4N
	200 W	MUMA022P□1N	MUMA022P□2N	MUMA022P□4N
	400 W	MUMA042P□1N	MUMA042P□2N	MUMA042P□4N

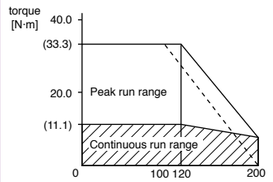


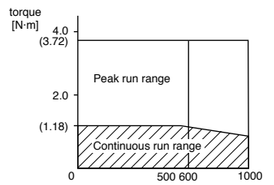


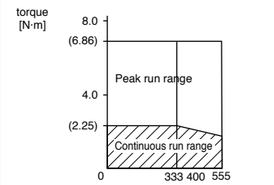


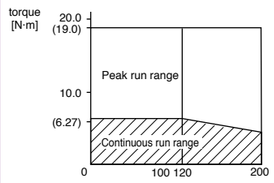


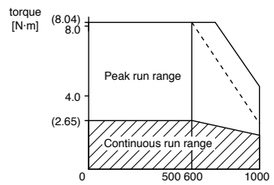


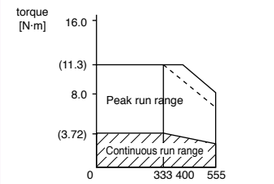


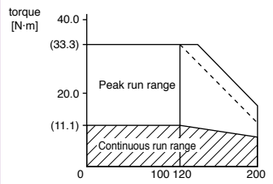


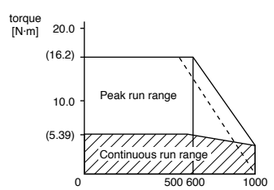


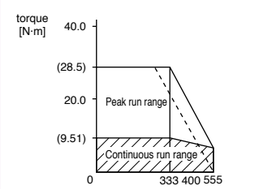


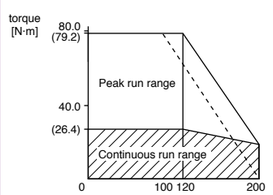










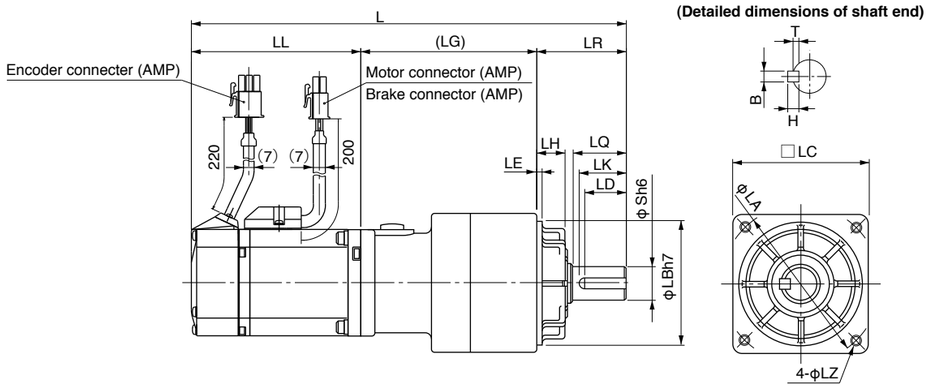


Dotted line represents the torque at 10 % less supply voltage.

Motor Dimensions

MUMA series with Gear Reducer

[Unit: mm]



2500 P/r Encoder

[Unit: mm]

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		1 / 9	192	92.5													
			223.5	124													
MUMA01□P□4N		1/25	234.5	92.5	50	30	78	70	90	19	17	M6 (Depth: 20)	26	92		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		4×4×16	2.5
			233.5	129													
MUMA02□P□2N		1 / 9	235.5	96	50	30	78	70	90	19	17	M6 (Depth: 20)	26	89.5		6×6×22	3.5
			268.5	129													
MUMA02□P□4N		1/25	246	96										100			
			279	129													
MUMA042P□1N	400 W	1 / 5	263	123.5										89.5			
			296	156.5													
MUMA042P□2N		1 / 9	263	123.5													
			296	156.5													
MUMA042P□4N		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													

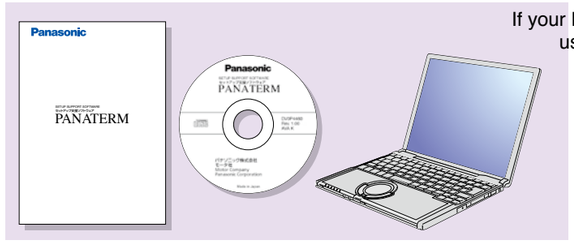
Upper column : without brake
Lower column : with brake

Setup Support Software

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.



If your PC does not have RS232 port, use RS232-USB converter.



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

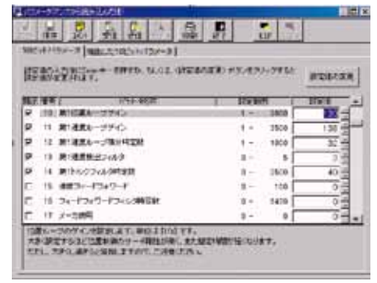
● Auto tuning
- Gain adjustment and inertia ratio measurement

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

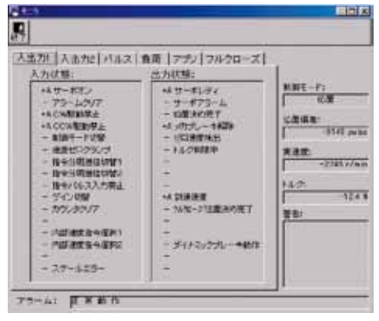
● Absolute encoder setup
- Clears absolute encoder at the origin.
- Displays single revolution/multi-revolution data.
- Displays absolute encoder status.

Analysis of Mechanical Operation Data

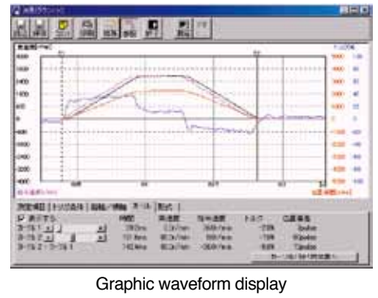
● Frequency analysis
- Measures frequency characteristics of the machine, and displays Bode diagram.



Parameter



Monitor



Graphic waveform display

■ Can not use with A5 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

Cable part No. Designation

Encoder Cable

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

Cable end treatment (Driver side)

M	Connector (MUMA)

Cable end treatment (Encoder side)

A	Tyco Electronics, AMP connector

Cable type

E	PVC cable with shield by Oki Electric Cable Co., 0.20 mm² × 3P

Cable length

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

Type classification

MFECA: Encoder cable

Motor Cable, Brake Cable

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

Cable end treatment at driver side

B	Molex Inc.
T	Clamp terminal

Cable end treatment at motor side

E	Tyco Electronics, AMP connector

Cable type

A	ROBO-TOP® 4-wire (DYDEN CORPORATION)
G	ROBO-TOP® 2-wire (DYDEN CORPORATION)

Cross section of cable core

0	0.75 mm²
1	1.25 mm²
2	2.0 mm²
3	3.5 mm²

Type classification

A	Standerd
B	Special
⋮	Design Oder

Cable length

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

AC servo motor cable

ROBO-TOP® is a trade mark of DYDEN CORPORATION

Cable

Cable Set (3 m)

Part No.	DV0P37300

1) Interface cable : DV0P0800
2) Encoder cable (3 m) : MFECA0030EAM
3) Motor cable (3 m) : MFMCA0030AEB
4) Connector kit for driver power supply connection : DV0P2870

Cable Set (5 m)

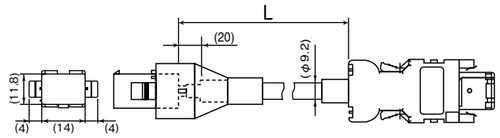
Part No.	DV0P39200

1) Interface cable : DV0P0800
2) Encoder cable (5 m) : MFECA0050EAM
3) Motor cable (5 m) : MFMCA0050AEB
4) Connector kit for driver power supply connection : DV0P2870

Encoder Cable

Part No.	MFECA0 ＊＊ 0EAM

[Unit: mm]



Title	Part No.	Manufacturer
Connector (Driver side)	3E206-0100KV	Sumitomo 3M or equivalent
Shell kit	3E306-3200-008	
Connector	172160-1	Tyco Electronics
Connector Pin	170365-1	
Cable	0.20 mm² × 3P	Oki Electric Cable Co., Ltd.

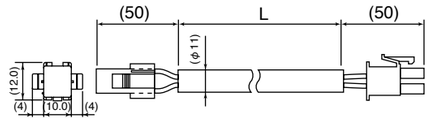
L (m)	Part No.
3	MFECA0030EAM
5	MFECA0050EAM
10	MFECA0100EAM
20	MFECA0200EAM

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

ROBO-TOP® is a trade mark of DYDEN CORPORATION

Part No.	MFMCA0 ＊＊ 0AEB

[Unit: mm]



Title	Part No.	Manufacturer
Connector	172159-1	Tyco Electronics
Connector Pin	170362-1, 170366-1	
Connector	5557-06R-210	Molex Inc
Connector Pin	5556T	
Cable	ROBO-TOP 600 V 0.75 mm²	Daiden Co.,Ltd.

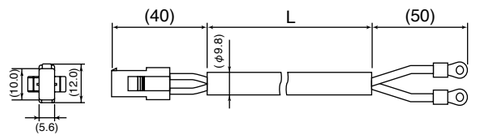
L (m)	Part No.
3	MFMCA0030AEB
5	MFMCA0050AEB
10	MFMCA0100AEB
20	MFMCA0200AEB

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

ROBO-TOP® is a trade mark of DYDEN CORPORATION

Part No.	MFMCB0 ＊＊ 0GET

[Unit: mm]



Title	Part No.	Manufacturer
Connector	172157-1	Tyco Electronics
Connector Pin	170362-1, 170366-1	
Nylon insulated round terminal	N1.25-M4	J.S.T Mfg. Co., Ltd.
Cable	ROBO-TOP 600 V 0.75 mm²	Daiden Co.,Ltd.

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

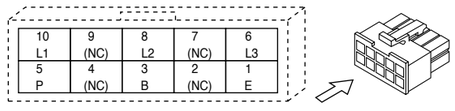
Connector Kit for Power Supply Connection

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>

1. 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.
2. Refer to P.224 for wiring and connection.
3. 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.)

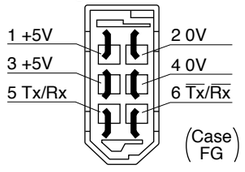
● Parts composition

Title	Part No.	Number	Manufacturer	Note
Connector (Driver side)	3E206-0100 KV	1	Sumitomo 3M or equivalent	For connector, CN X4 (6 pins)
Shell kit	3E306-3200-008	1		
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



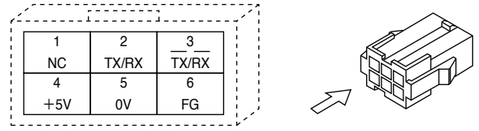
● Recommended manual crimping tool (to be prepared by customer)

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

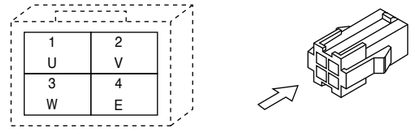
<Remarks>

1. 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.
2. Connect the shield of the wire to the case (FG) without fail.
3. For wiring and connection, refer to P.224.

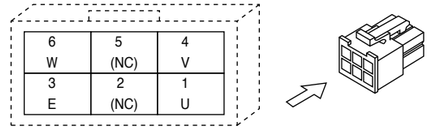
● Pin configuration of encoder cable junction



● Pin configuration of motor power cable junction



● Pin configuration of mating connector to CN X3 connector



<Cautions>

1. 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.
2. Refer to P.224 for wiring and connection.

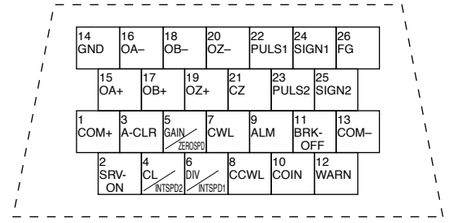
Connector Kit for External Peripheral Equipment

Part No. DV0P0770

● Parts composition

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

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



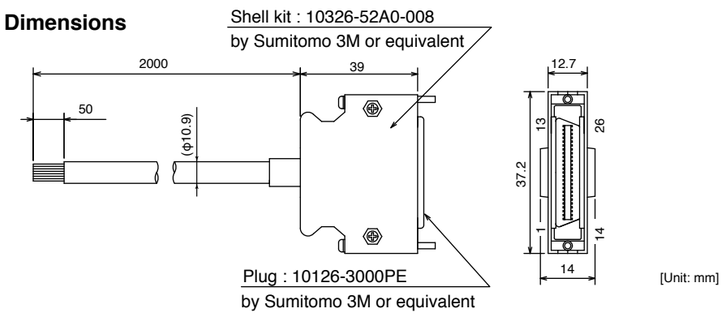
<Cautions>

1. Make a correct wiring by checking the stamped pin numbers on the connector itself.
2. Refer to P.225 for symbols and functions of the above signals.

Interface Cable

Part No.	DV0P0800	Cable of 2 m is connected.

● **Dimensions**



[Unit: mm]

● **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>

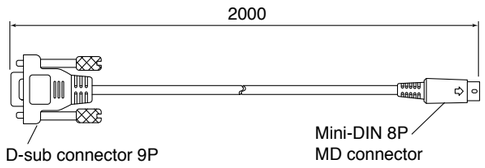
e. g. of Pin No. designation : Pin No. 1 ..... Wire color is orange, and one red dot.
Pin No. 12 ... Wire color is orange, and two black dot.

<Remarks>

The shield of this cable is not connected to a connector pin. To connect the shield to FG or GND at the driver side, use a connector kit for external device connection.

Communication Cable (For Connection with PC)

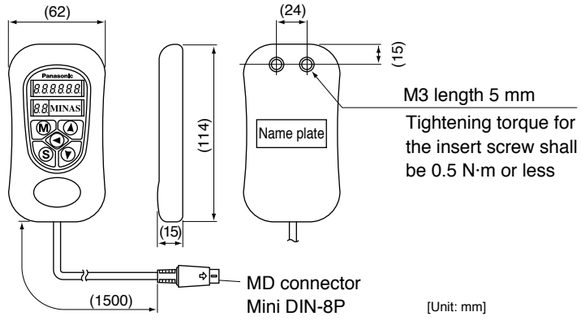
Part No.	DV0P1960



[Unit: mm]

Console

Part No.	DV0P4420

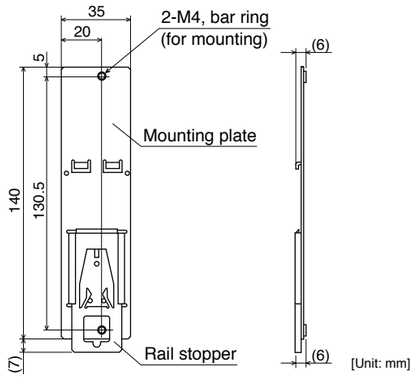


[Unit: mm]

DIN Rail Mounting Unit

Part No.	DV0P3811

● **Dimensions**



[Unit: mm]

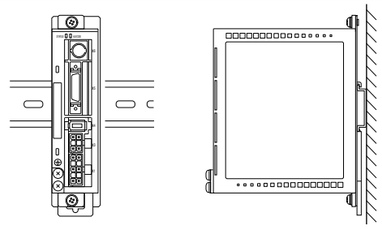
<Notes>

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

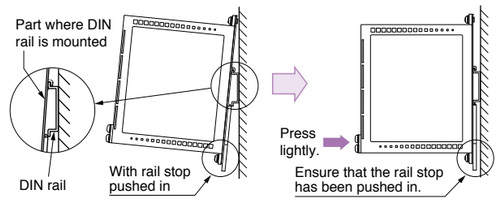
<Cautions>

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

・Driver mounted to DIN rail



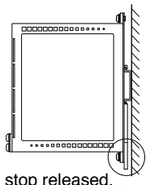
・**How to Install**



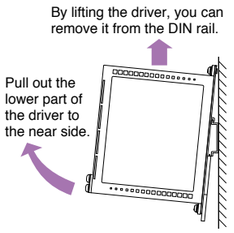
Hook the upper side of DIN rail mounting part on the DIN rail.

Press lightly the lower part of the main body of driver.

・**Removing from DIN Rail**



With the rail stop released, pull out the lower part of the driver to the near side.

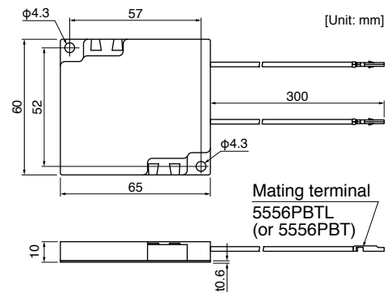


External Regenerative Resistor

Part No.	Manufacturer's Part No.	Specifications			Note (Input Power of drive)
		Resistance	Rated power	Activation temperature of built-in fuse	
		Ω	W	°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 Kenkyuusho Co., Ltd.

● **Dimensions**



<Caution>

Regenerative resistor gets very hot.

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

<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)

Reactor/ Surge Absorber for Motor Brake

Reactor

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

Fig.1

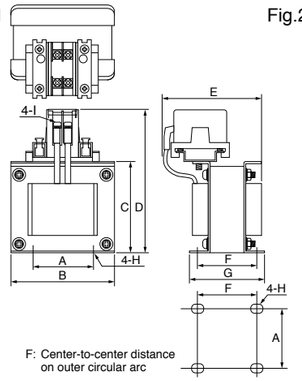
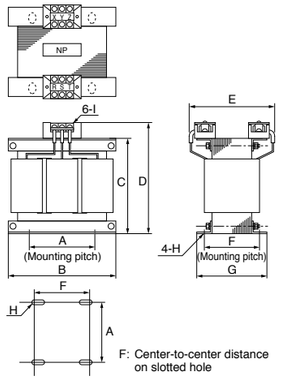


Fig.2



[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 on general-purpose inverter and servo driver

On September, 1994, Guidelines for harmonic restraint on heavy consumers who receive power through high voltage system or extra high voltage system and Guidelines for harmonic restraint on household electrical appliances and general-purpose articles established by the Agency for Natural Resources and Energy of the Ministry of Economy, Trade and Industry (the ex-Ministry of International Trade and Industry). According to those guidelines, the Japan Electrical Manufacturers Association (JEMA) have prepared technical documents (procedure to execute harmonic restraint: JEM-TR 198, JEM-TR 199 and JEM-TR 201) and have been requesting the users to understand the restraint and to cooperate with us. On January, 2004, it has been decided to exclude the general-purpose inverter and servo driver from the Guidelines for harmonic restraint on household electrical appliances and general-purpose articles". After that, the Guidelines for harmonic restraint on household electrical appliances and general-purpose articles was abolished on September 6, 2004.

We inform you that the procedure to execute the harmonic restraint on general-purpose inverter and servo driver will be modified as follows.

1. All types of the general-purpose inverters and servo drivers used by specific users are under the control of the Guidelines for harmonic restraint on heavy consumers who receive power through high voltage system or extra high voltage system". The users who are required to apply the guidelines must calculate the equivalent capacity and harmonic current according to the guidelines and must take appropriate countermeasures if the harmonic current exceeds a limit value specified in a contract demand. (Refer to JEM-TR 210 and JEM-TR 225.)
2. The Guidelines for harmonic restraint on household electrical appliances and general-purpose articles was abolished on September 6, 2004. However, based on conventional guidelines, JEMA applies the technical documents JEM-TR 226 and JEM-TR 227 to any users who do not fit into the Guidelines for harmonic restraint on heavy consumers who receive power through high voltage system or extra high voltage system from a perspective on enlightenment on general harmonic restraint. The purpose of these guidelines is the execution of harmonic restraint at every device by a user as usual to the utmost extent.

<Remarks>

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

■ Recommended components

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 Components

List of Peripheral Components

Manufacturer	Tel No. / Home Page	Peripheral components
Panasonic Corporation Eco Solutions Company	http://panasonic.net/es/	Circuit breaker
Panasonic Corporation Automotive & Industrial Systems Company	http://panasonic.net/id/	Surge absorber Swich, 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/	Noise filter for signal lines
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	+81-44-844-8052 http://www.te.com/ja/home.html	
Japan Molex Inc.	+81-462-65-2313 http://www.molex.co.jp	
DYDEN CORPORATION	+81-3-5805-5880 http://www.dyden.co.jp/english/index.htm	Cable

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

MEMO