Panasonic

Brushless Motor 2013

BRUSHLESS MOTOR

MINAS-BL GV series
KV series
GP series

Panasonic Corporation, Appliances Company, Motor Business Unit

http://industrial.panasonic.com/ww/i_e/25000/motor_fa_e/motor_fa_e.html

Compact and high-efficiency brushless motors

High-efficiency energy saving eco-friendly MINAS series* technology adopted more compact and higher-output brushless motors.

* MINAS series is a registered trademark for Panasonic AC servo motors.

•90 mm square 130 W

•60 mm square 200 W

MINAS-BL GV series
Speed Control Type 50 W to 130 W

Typical options


Console A


Digital key pad

Power Supply DC 24 V Type
•80 mm square 50 W only

GV series, input voltage 24 V type made to order item. Please contact us if you'd like detailed information

MINAS-BL KV series
Speed Control Type 50 W to 750 W

Typical options


Console A


Digital key pad

MINAS-BL

•80 mm square 50 W

MINAS-BL GP series

Position Control Type 50 W to 130 W

Typical options

Digital key pad

Motor Business coexisting

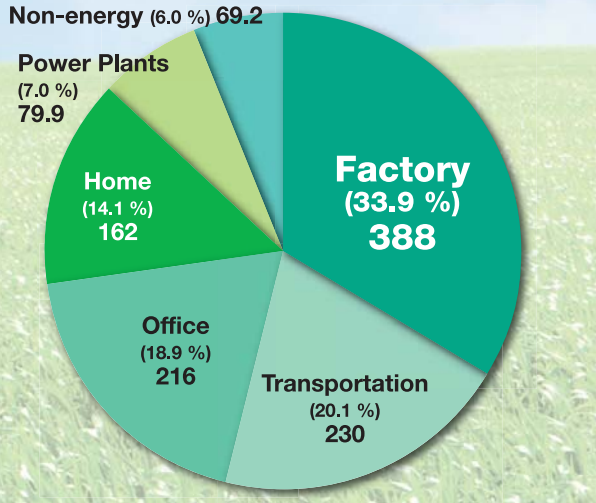
Panasonic Corporation, Appliances Company, Motor Business Unit promotes preservation of the environment together with industrial activities and aims to “Company Coexisting with Global Environment”

Environmental conservation activities in industrial field

Environmental conservation activities have been required widely from home level to company level nowadays, and the role of conservation in the industrial sector has become more important. Total emissions of CO_2 in 2009 in Japan were approximately 1.1 billion tons, out of which 380 million tons belong to factory and industrial field.
It has become a huge amount which significantly exceeded transportation and business sectors.

■CO_2 Emissions (2009)

Source:CO_2 Inventory Office “Japan CO_2 emission data” (Units: million tons)



With the spread of high-efficiency motors that minimizes the loss of electrical energy, We aim to achieve significant energy savings for the entire industry.

with Global Environment

Basic attitude

Based on “Environmental Declaration” of Panasonic, Motor Business Unit of Appliances Company also established the "Environmental Policy" as the basic attitude to environmental conservation. Based on this, we create more specific policies and manuals, and have been promoting environmental conservation activities.

Environmental Policy

Motor Business Unit of Appliances Company of Panasonic Corporation recognizes that the preservation of global environment is the important mission as a good corporate citizen of society. Our philosophy is “Coexisting with the Global Environment”, and run sound business activities harmonized with nature.

Motor holds the key to global environmental protection

From small one used in mobile phones, to big one used in factories, motor has become indispensable in every aspect of our society. It has been consuming more than half part of electricity in Japan which is equal to 573 billion kWh.

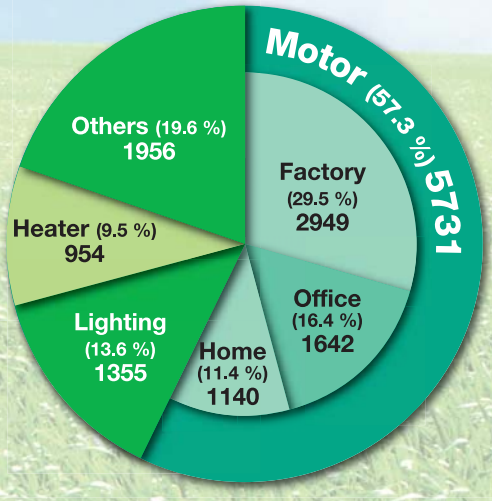
If motor power consumption reduced by 1 % (4.59 billion kWh)

→

Equivalent to annual one thermal power plant stop (500K kWh×8760H)

■Japan Domestic electricity consumption (2005)

Source:Motor Business Unit Research (Units: Hundred million kWh)



KV series •60 mm square 200 W

GV series •80 mm square 50 W

GP series •80 mm square 50 W

eco ideas

Panasonic is committed to the development of eco-friendly products.

Brushless motors of MINAS-BL series

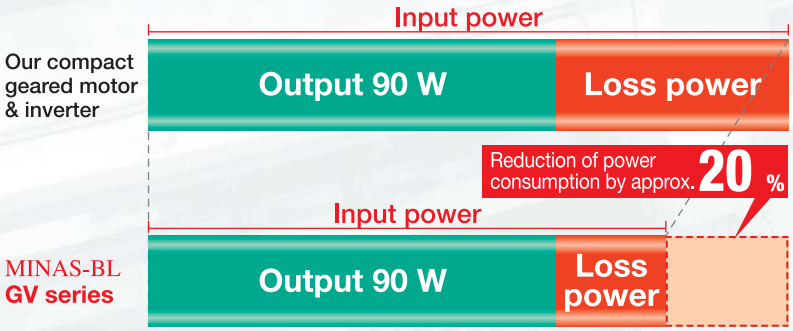
Commutation brushless motor with advanced controlling technology features high efficiency and low power loss. In addition, "Split Core Structure" developed for and proven in MINAS series AC servo motors is introduced to these new brushless motors to further reduce their sizes but increase power. These motors promote "three saving" activities — Energy saving, Cost saving and Space saving.

Energy Saving

GV KV GP Reduce loss and increase efficiency

A permanent magnet on a rotor reduces secondary loss. It also reduces power consumption by 20 % compared with those of our small geared motors.

■Comparison of input power with our conventional motors (90 W)



Energy saving effects are significantly seen when these new models are used on multi-axis machines, e.g. textile machinery.

MINAS-BL series Provide More Features

GV GP

Speed control range 30 r/min ~4000 *1 r/min

Proprietary CS sensor for sinewave driving

Wide 1:133 variable speed range

*1 Rated rotational speed: 3000 r/min

GV KV GP

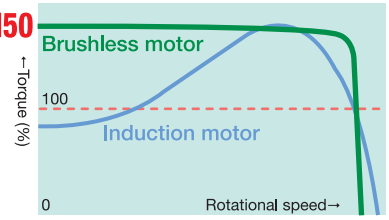
Start torque 150 % (comparison of rated values)

Unlike induction motor

Stable operation startup at lower speed

GV KV GP

Flat torque characteristic



Proprietary CS sensor for

Smooth operation

realize “Three Savings”.

Space Saving

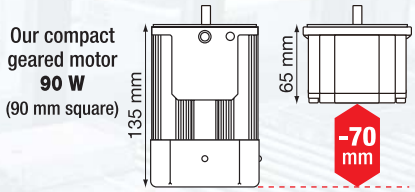
GV KV GP For simultaneous pursuit of miniaturization and high power

“Split core structure” developed for and proven in MINAS series AC servo motors is introduced to these new models to significantly reduce size and weight but increase output power compared with induction motors.

▲Split core structure

■Comparison in size between GV/GP series and our compact geared motors (90 W)

Reduction in profile by approx. 55 %



Comparison of KV series with general purpose induction motors:
Approx. 1/7 in volume and approx. 1/4 in mass

■Comparison in mass between GV/GP series and our compact geared motors

Lighter by approx. 1/3

Output	GV/GP series (motor)	Our compact geared motor
50 W	0.7 kg	2.4 kg(40 W)
90 W	1.0 kg	3.2 kg
130 W	1.2 kg	—

•The size of a GV/GP series brushless amplifier is almost equal to that of a postcard and weights approx. 370 g.

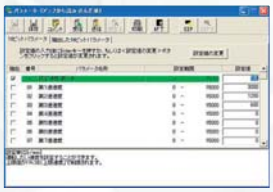
Enable downsizing of embedded device.

Cost Saving

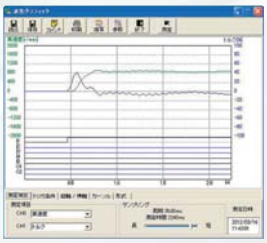
GV KV GP They also reduce maintenance and setup cost.

Commutatorless and brushless design reduces associated costs such as maintenance cost. Our setup support software helps prompt startup and reduction in operation management process.

■Setup support software PANATERM for BL



▲Parameter setting
File saving
(Batch reading/writing)

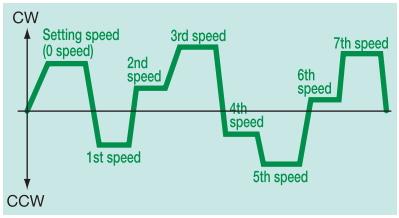


▲Waveform graphical display
Example: Velocity and torque
Status of I/O can also be monitored.

The PANATERM for BL allows easy setup of parameters. Waveform graphical display can be used for precisely and accurately monitoring motor conditions, reducing setup and maintenance workload.

GV KV

8-speed operation

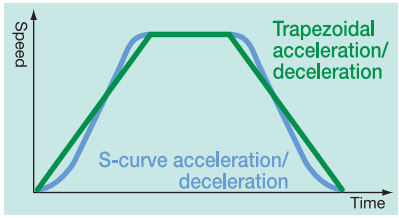


Stable operation maintains high productivity and yield ratio.
The speed is regulated at 0.5 % or less variation.

*2 Within rated torque

GP

Positioning at 4 points



Not only trapezoidal waveform,
S-curve acceleration/ deceleration can be set.

(Under application)
GV KV GP

Compatible with international standards

Compatible with wider power source voltage range

(Single-phase: 100 V –120 V
Single-/Three-phase: 200 V –240 V)

Speed Control
Type
GV series KV series

•90 mm square 130 W

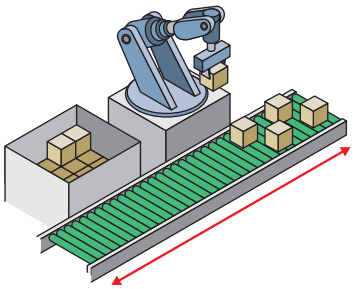
•60 mm square 200 W

MINAS-BL GV series
Speed Control Type 50 W to 130 W

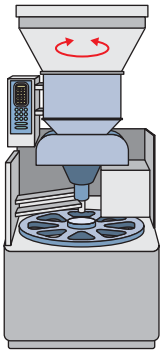
MINAS-BL KV series
Speed Control Type 50 W to 750 W

- High efficiency brushless motors realize energy saving.
- Distinctively controlled CS signal provides smooth operation through sinewave driving.
- Compatible with international standards, CE, UL, CCC and KC (KV series will also be compatible with the standards in the near future), and wider power source voltage range.
- The digital keypad (sold separately) and setup support software PANATERM for BL (available from our website, free of charge) enable parameter setting and monitoring.
- The proprietary CS sensor extends variable speed control range.
- Installation compatibility: GV series is compatible with our compact geared motors
  KV series is compatible with our AC servo motors
- Environmental protection: IP65

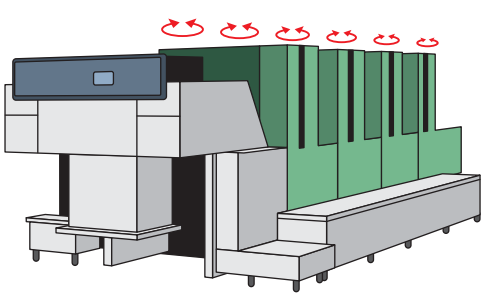
Typical applications



Conveyer



Food processor (agitating)



Textile machinery

Position Control
Type
GP series

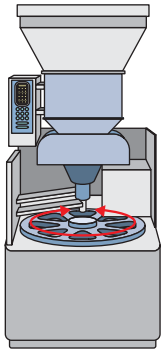
•80 mm square 50 W

MINAS-BL GP series

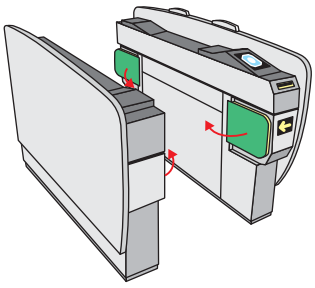
Position Control Type 50 W to 130 W

- Simple NC function enables easier positioning without help of a pulse unit.
- The proprietary CS sensor enables positioning without help of an external encoder.
- Compatible with international standards (CE, UL, CCC and KC), and wider power source voltage range.
- Internal teaching capability simplifies positioning operation.
- The digital keypad (sold separately) and setup support software PANATERM for BL (available from our website, free of charge) enable parameter setting and monitoring.
- Installation is compatible with our compact geared motors.
- Environmental protection: IP65

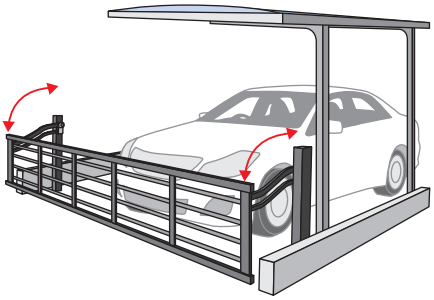
Typical applications



Food processor (turntable)



Automatic ticket gate



Gate

MINAS-BL GP series

Position Control Type 50 W to 130 W

• 80 mm square 50 W

Contents

Check the model number

<Motor>

MBMU 5A Z A B

- **MBMU** — **Type**
- **5A** — **Motor rated output**
  - 5A: 50 W
  - 9A: 90 W
  - 1E: 130 W
- **Z** — **Input power supply**
  - 1: 100 V
  - 2: 200 V
  - Z: 100 V/200 V
- **A** — **Function**
  - A: Standard
- **B** — **Shape of shaft**
  - B: MB type Gear head

<Gear head>

M B 8 G 30 BV

- **M B** — **Type**
  - B: For GP series
- **8 G** — **Gear head**
  - **Size**
    - 8: 80 mm sq.
    - 9: 90 mm sq.
- **30** — **Reduction ratio**
  - (Example) 30: Reduction ratio of 1/30
  - 5, 10, 15, 20, 30, 50
- **BV** — **Bearing**
  - BV: Ball bearing

Brushless motor specifications

Item	Specifications				
Flange size	80 mm sq.	90 mm sq.			
Motor model No.	**MBMU5AZAB**	**MBMU9A1AB**	**MBMU9A2AB**	**MBMU1E1AB**	**MBMU1E2AB**
Motor rated output (W)	50	90		130	
Voltage (V)	for 100/200	for 100	for 200	for 100	for 200
Rated torque (N·m)	0.16	0.29		0.41	
Starting torque*1 (N·m)	0.24	0.43		0.62	
Rated input current (A(rms))	0.53	1.00	0.50	1.30	0.72
Moment of inertia of rotor ($\times 10^{-4}$ kg·m^2)	0.12	0.27		0.36	
Rating	Continuous				
Rated rotation speed*2 (r/min)	3000				
Speed control range (r/min)	30 to 4000				
Ambient temperature	−10 ℃ to +40 ℃ (free from freezing) * Ambient temperature is measured at a distance of 5 cm from the motor.				
Ambient humidity	20 % to 85 % RH (free from condensation)				
Altitude	Lower than 1000 m				
Vibration	4.9 m/s^2 or less X, Y, Z (Center of frame)				
Motor insulation class	130(B)				
Protection structure	IP65*3,*4				
Number of poles	8				
Motor mass (kg)	0.7	1.0		1.2	

*1 Representative value

*2 Motor shaft speed: to be multiplied by the reduction ratio when the gear head is used.

*3 Excluding the shaft pass-through section and cable end connector.

*4 These motors conform to the test conditions specified in EN standards (EN60529, EN60034-5).
Do not use these motors in application where water proof performance is required such as continuous wash-down operation.

<Brushless amplifier> **MBEG** **5A** **5** **B** **C** **P**

Type

- **Motor rated output**
  5A : 50 W
  9A : 90 W
  1E : 130 W
- **Function 1**
  B: with circuit for regenerative resistor
- **Input power supply**
  1: Single phase AC100 V to 120 V
  5: Single phase/ 3-phase AC200 V to 240 V
- **Function 2**
  C: RS485 communication,
  Signal input/Sink type (NPN transistor)
  D: RS485 communication,
  Signal input/Source type (PNP transistor)
  Source type made to order item.
  Please contact us if you'd like detailed information.
- **Control mode**
  P: position control

Brushless amplifier specifications (GP series)

Item		Specifications								
Amplifier model No.		MBEG5A1BCP	MBEG5A5BCP		MBEG9A1BCP	MBEG9A5BCP		MBEG1E1BCP	MBEG1E5BCP	
Applicable Motor		MBMU5AZAB			MBMU9A1AB	MBMU9A2AB		MBMU1E1AB	MBMU1E2AB	
Motor rated output (W)		50			90			130		
Input power supply voltage (V)		Single phase 100 to 120	Single phase	3-phase	Single phase 100 to 120	Single phase	3-phase	Single phase 100 to 120	Single phase	3-phase
			200 to 240			200 to 240			200 to 240	
Frequency (Hz)		50/60								
Rated input current (A)		1.5	0.7	0.35	2.2	1.1	0.5	2.8	1.5	0.7
Voltage tolerance		±10 %								
Control method		Position control by CS signal, PWM sine wave driving system								
Ambient temperature		0 ℃ to +50 ℃ (free from freezing) * Ambient temperature is measured at a distance of 5 cm from the amplifier.								
Ambient humidity		20 % to 85 % RH (free from condensation)								
Location		Indoor (No corrosive gas, A place without garbage, and dust)								
Altitude		Lower than 1000 m								
Vibration		5.9 m/s^2 or less (10 Hz to 60 Hz)								
Protection structure/ Cooling system		Equivalent to IP20/ Self cooling								
Storage temperature		Normal temperature * Temperature which is acceptable for a short time, such as during transportation is –20 ℃ to 60 ℃ (free from freezing)								
Storage humidity		Normal humidity								
Number of positioning points		4 points (Travel distance, speed, acceleration time, deceleration time, and relative/absolute can be set per point)								
Positioning resolution		288 pulse/rotation (Accuracy: Within ±5° degrees at 20 ℃ at no load)								
Signal input		4 inputs								
Signal output		2 outputs (Open collector)								
Communication function	RS485	Max 31 units. Setting of parameter, monitoring of control condition. Communication speed: Choose from 2400 bps/ 4800 bps/ 9600 bps								
	RS232	Setting of parameter and monitoring of control condition are enabled with commercial PC.*1								
Digital key pad		Parameter change, status monitor, etc. can be executed through the optional Digital key pad DV0P3510.*2								
Protective function		Warning : Overload warning, Setting change warning Protect : Overload, Overcurrent, Overvoltage, Undervoltage, System error, Over-speed, Sensor error, Overheat, Position error, External forced trip, Position error counter overflow, RS485 communication error, Operation execution error, Homing error, present position overflow, Hardware limit error, Digital key pad communication trouble, user parameter error, and system parameter error								
Regenerating brake		Regenerative braking resistor can be externally connected.*3 Instantaneous braking torque 150 %, Continuous regenerative power 10 W (Regenerative operation with which motor shaft is rotated by load, e.g. load lowering operation, should not be continued.)								
Protection level		Overload protection: 115 %, Time characteristics: 150 % 60 sec								
Amplifier mass (kg)		0.37								

*1 PANATERM for BL (Download from our web site.), PC connection cable (DV0P4140), Digital key pad connection cable (DV0P383*0) is required. If your PC does not have RS232 port, use RS232-USB converter.
*2 Digital key pad connection cable (DV0P383*0) is required. *3 Use optional external regenerative resistor (sold separately).

System configuration

Power supply	Rated rotation speed (r/min)	output (W)	Motor	Gear head (Note 1)	Brushless amplifier	Brushless amplifier (supplied with power cable) (Note 2)	Optional parts: External regenerative resistor	Optional parts: Noise filter	Optional parts: Surge absorber	Optional parts: Reactor
						Reference page p. 74	p. 71	p. 67	p. 67	p. 73
Single phase 100 V	3000	50	**MBMU5AZAB**	**MB8G□BV**	**MBEG5A1BCP**	**MBEG5A1BCPC**	for 100 V **DV0P2890**	for single phase power supply **DV0P4170**	for single phase power supply **DV0P4190**	for single phase power supply **DV0P227**
		90	**MBMU9A1AB**	**MB9G□BV**	**MBEG9A1BCP**	**MBEG9A1BCPC**				
		130	**MBMU1E1AB**	**MB9G□BV**	**MBEG1E1BCP**	**MBEG1E1BCPC**				
Single/ 3-phase 200 V		50	**MBMU5AZAB**	**MB8G□BV**	**MBEG5A5BCP**	**MBEG5A5BCPC**	for 200 V **DV0PM20068**	for single phase power supply **DV0P4170** for 3-phase power supply **DV0PM20042**	for single phase power supply **DV0P4190** for 3-phase power supply **DV0P1450**	for single phase power supply **DV0P227** for 3-phase power supply **DV0P220**
		90	**MBMU9A2AB**	**MB9G□BV**	**MBEG9A5BCP**	**MBEG9A5BCPC**				
		130	**MBMU1E2AB**	**MB9G□BV**	**MBEG1E5BCP**	**MBEG1E5BCPC**				

(Note 1) A figure representing reduction ratio in □ .
(Note 2) Refer to p. 74 for a power supply connecting cable.
This part number is the ordering part number for the amplifier and power cable, not for ordering amplifier only.
* When installing the reactor, refer to p. 73.

*** Be sure to use a set of matched components (series, power source, capacity, output, etc.)**
*** This motor is not provided with a holding brake. If it is used to drive a vertical shaft, the movable section may fall down by its own weight as power is turned off.**

■ Options

Optional parts		Parts number	Reference page
Motor extension cable	1 m	**DV0PQ1000110**	P.69
	3 m	**DV0PQ1000130**	
	5 m	**DV0PQ1000150**	
	10 m	**DV0PQ10001A1**	
Power supply connector kit		**DV0P2870**	P.70
Digital key pad*1		**DV0P3510**	P.68
Digital key pad connection cable	1 m	**DV0P38310**	P.68
	3 m	**DV0P38330**	
	5 m	**DV0P38350**	

Optional parts		Parts number	Reference page
Control signal cable	2 m	**DV0PM20076**	P.70
I/O connector kit		**DV0PM20070**	P.71
PC connection cable*2	1.5 m	**DV0P4140**	P.70
Noise filter for signal line		**DV0P1460**	P.67
DIN rail mounting unit		**DV0P3811**	P.72

* For details of cable, refer to p. 68 to 70.

*1 When using Digital key pad, the Digital key pad connection cable (DV0P383*0) is required.
*2 When connecting PC, the PC connection cable (DV0P4140) and the Digital key pad connection cable (DV0P383*0) are required.

■ Wiring equipment

Selection of circuit breaker (MCCB), magnetic contactor and electric wire. (To check conformity with international standards, refer to p. 93 Conformity with international safety standards.)

Voltage	Power capacity	MCCB Rated current	Magnetic contactor Rated Current (Contact composition)	Core of electric wire (mm^2)	
				Main circuit, Grounding	Control circuit
Single phase 100 V	50 W to 130 W	5 A	20 A (3P+1a)	0.5 (AWG20)	0.13 (AWG26)
Single phase 200 V					
3-phase 200 V					

■ **Be sure to connect the earth terminal to ground.**
In wiring to power supply (outside of equipment) from MCCB, use an electric wire of 1.6 mm diameter (2.0 mm^2) or more both for main circuit and grounding. Apply grounding class D (100 Ω or below) for grounding.

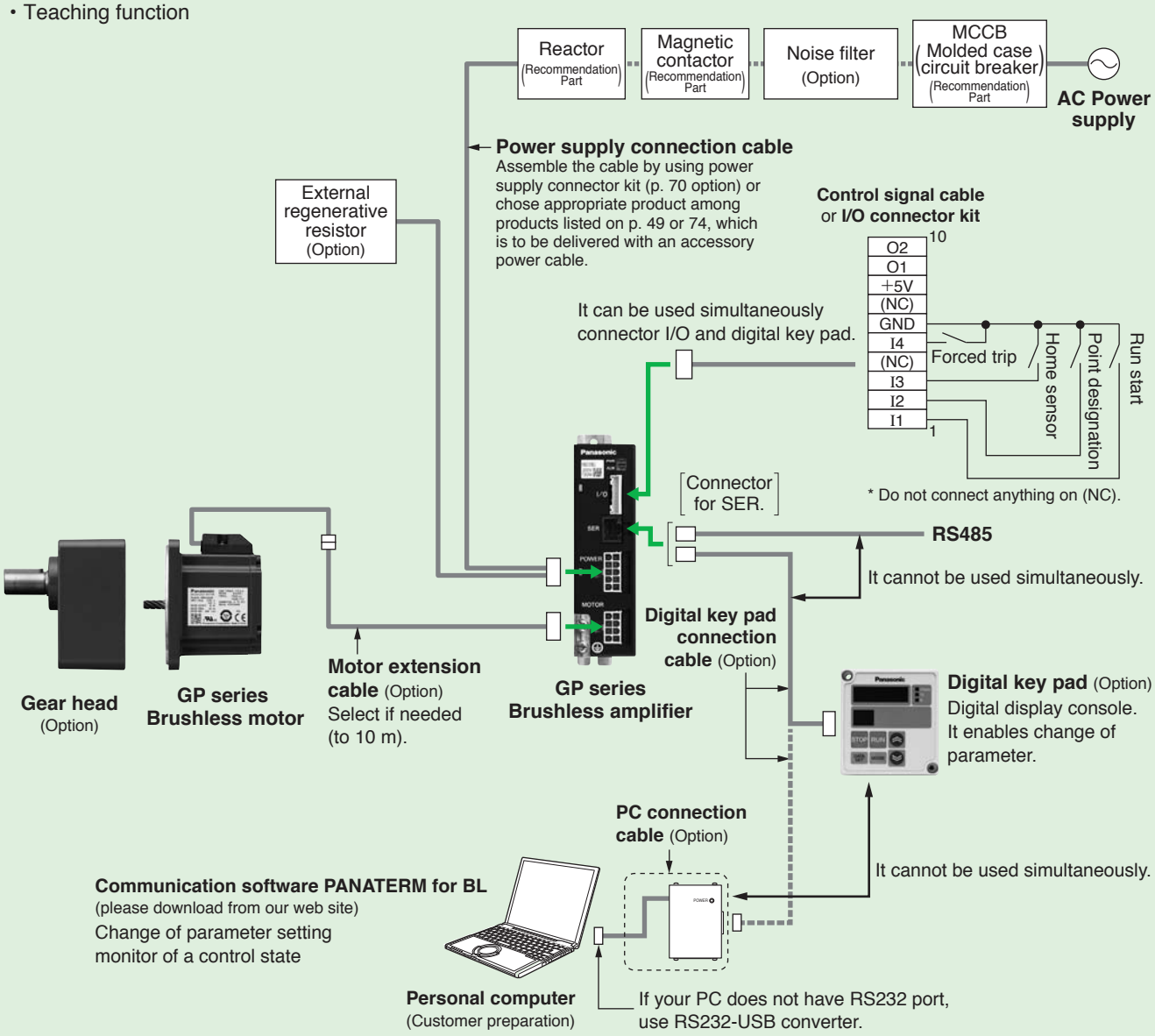
● **Selection of relay**
A relay used in a control circuit, e.g. at the control input terminal should be small signal relay (Min. guaranteed current 1 mA or less) for positive contact.
Example: Panasonic: DS, NK or HC series, OMRON: G2A series

● **Selection of control circuit switch**
When using a switch in place of relay, select a switch rated at minute electric current, to assure positive contact.
Example: Nihon Kaiheiki Ind.: M-2012J-G

System configuration diagram

● Example of digital setting (Digital key pad)

- Monitoring (rotation speed, Current position, trip history etc.)
- Parameter setting, initialization, and copying function.
- Teaching function



Parameter list of brushless amplifier

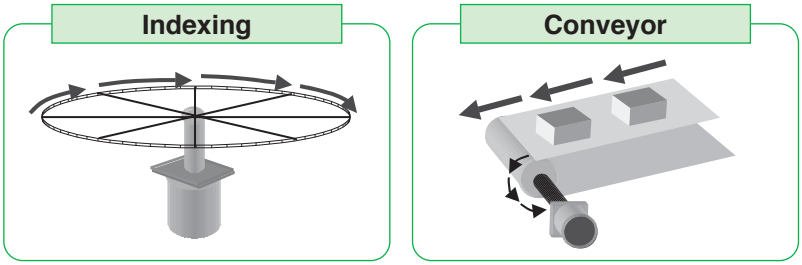
Parameter No.	Parameter name		Explanation	Setting range
00	The 1st point	The 1st target position (rotation number)	You can set travel distance in rotation numbers and pulses. (288 pulses per rotation)	–16384 to 16383
01		The 1st target position (Pulse)		–288 to 288
02		The 1st coordinate setting	You can select positioning system to the 1st point. 0: Relative travel, 1: Absolute travel	0, 1
03		The 1st setting speed (r/min)	You can set the speed moving to the 1st point.	0 to 4000
04		The 1st acceleration time (ms)	You can set time taken for reaching the 1st setting speed.	1 to 30000
05		The 1st deceleration time (ms)	You can set time taken from the 1st setting speed to stop.	1 to 30000
06		The 1st block setting	0: Normal operation 1: Continuous block operation (1st point → 2nd point) 2: Combined block operation (1st point + 2nd point)	0 to 2
07		The 1st block timer setting (ms)	Start commanding of 2nd point after this setting time elapses and command of 1st point is completed.	0 to 30000
08	The 2nd point	The 2nd target position (rotation number)	You can set travel distance in rotation numbers and pulses. (288 pulses per rotation)	–16384 to 16383
09		The 2nd target position (pulse)		–288 to 288
0A		The 2nd coordinate setting	You can select positioning system to the 2nd point. 0: Relative travel, 1: Absolute travel	0, 1
0b		The 2nd setting speed (r/min)	You can set the speed moving to the 2nd point.	0 to 4000
0C		The 2nd acceleration time (ms)	You can set time taken for reaching the 2nd setting speed.	1 to 30000
0d		The 2nd deceleration time (ms)	You can set time taken from the 2nd setting speed to stop.	1 to 30000
0E		The 2nd block setting	0: Normal operation, 1: Continuous block operation (2nd point → 3rd point)	0, 1
0F		The 2nd block timer setting (ms)	Start commanding of 3rd point after this setting time elapses and command of 2nd point is completed.	0 to 30000
10	The 3rd point	The 3rd target position (rotation number)	You can set travel distance in rotation numbers and pulses. (288 pulses per rotation)	–16384 to 16383
11		The 3rd target position (Pulse)		–288 to 288
12		The 3rd coordinate setting	You can select positioning system to the 3rd point. 0: Relative travel, 1: Absolute travel	0, 1
13		The 3rd setting speed (r/min)	You can set the speed moving to the 3rd point.	0 to 4000
14		The 3rd acceleration time (ms)	You can set time taken for reaching the 3rd setting speed.	1 to 30000
15		The 3rd deceleration time (ms)	You can set time taken from the 3rd setting speed to stop.	1 to 30000
16		The 3rd block setting	0: Normal operation, 1: Continuous block operation (3rd point → 4th point) 2: Combined block operation (3rd point + 4th point)	0 to 2
17		The 3rd block timer setting (ms)	Start commanding of 4th point after this setting time elapses and command of 3rd point is completed.	0 to 30000
18	The 4th point	The 4th target position (rotation number)	You can set travel distance in rotation numbers and pulses. (288 pulses per rotation)	–16384 to 16383
19		The 4th target position (Pulse)		–288 to 288
1A		The 4th coordinate setting	You can select positioning system to the 4th point. 0: Relative travel, 1: Absolute travel	0, 1
1b		The 4th setting speed (r/min)	You can set the speed moving to the 4th point.	0 to 4000
1C		The 4th acceleration time (ms)	You can set time taken for reaching the 4th setting speed.	1 to 30000
1d		The 4th deceleration time (ms)	You can set time taken from the 4th setting speed to stop.	1 to 30000
1E		The 4th block setting	0: Normal operation, 1: Continuous block operation (4th point → 1st point)	0, 1
1F		The 4th block timer setting (ms)	Start commanding of 1st point after this setting time elapses and command of 4th point is completed.	0 to 30000
20	Acceleration mode		You can select running pattern in acceleration.	0, 1
21	Deceleration mode		You can select running pattern in deceleration.	0, 1
22	Sequential run maximum point number		You can set the maximum point number for positioning by use of sequential run signal.	1 to 4
23	Coordinate system setting		0: CCW rotation in + direction, 1: CW rotation in + direction	0, 1
28	Position loop gain (the 1st gain)		You can determine the response of position control.	0 to 100
29	Velocity loop gain (the 1st gain)		You can determine the response of velocity loop.	0 to 10000
2A	Velocity loop integration gain (the 1st gain)		You can determine the rigidity of velocity loop.	0 to 10000
2b	Velocity feed forward gain (the 1st gain) (%)		This is the function to forward (add) position command to speed command.	0 to 100
2C	Speed detection filter (the 1st gain)		You can set the time constant of low-pass filter of speed feedback.	5 to 20
2d	Velocity feed forward-timeconstant (Common to the 1st/2nd gain) (ms)		This is a filter in velocity feed forward section.	0 to 500
2E	Torque limit setting (the 1st gain)		Output torque of motor is limited.	50 to 150
2F	Torque filter timeconstant (Common to the 1st/2nd gain)		You can set the time constant of primary delay filter of torque instruction.	0 to 500
30	The 2nd position loop gain (the 2nd gain)		You can determine the response of position control.	0 to 100
31	The 2nd velocity loop gain (the 2nd gain)		You can determine the response of velocity loop.	0 to 10000
32	The 2nd velocity loop integration gain (the 2nd gain)		You can determine the rigidity of velocity loop.	0 to 10000
33	The 2nd velocity feed forward gain (the 2nd gain) (%)		Set it at 0 in normal use. This is the function to forward (add) position command to speed command during on the 2nd gain.	0 to 100
34	The 2nd speed detection filter (the 2nd gain)		Use the default setting normally. You can set the time constant of low-pass filter in speed feedback.	5 to 20
35	The 2nd torque limit setting (the 2nd gain) (%)		Output torque of the motor is limited.	50 to 150
36	Gain switching mode selection		0: Fixed at the 1st gain, 1: Fixed at the 2nd gain 2: Automatic switching (In running = the 2nd gain, In standstill = the 1st gain)	0 to 2
37	Gain switching time (ms)		When the gain switching mode is set to automatic switching, after the output of instruction, the 2nd gain (in running) changes to the 1st gain (in standstill) when time setting has elapsed.	0 to 10000

Parameter No.	Parameter name	Explanation	Setting range
38	In-position range	In-position signal is turned on when position error (difference between command position and actual position) is below setting.	0 to 16383
39	Position error set-up	Abnormal detect when deviation value exceeds the set value × 8.	0 to 16383
3A	Position error invalidation	0: Effective, 1: Ineffective (Motor does not trip but keeps on operating.)	0, 1
3E	Run-command selection	You can select the run-command. 0: I/O, 1: RS485	0, 1
40	Homing mode	Select homing method.	0 to 5
41	Homing direction	You can set the detection direction of home.	0, 1
42	Homing speed (r/min)	You can set the speed in homing action.	0 to 4000
43	Homing limit	Sets the limit of the amount of movement during homing. Homing error detect if travel distance has exceeded this setting.	0 to 16383
44	Homing acceleration/deceleration time (ms)	You can set time taken for reaching the homing speed.	1 to 30000
45	Bumping torque detection value (%)	You can limit the output torque of motor when returning to bumping home.	50 to 150
46	Bumping detection time (ms)	You can set the detection time of bumping toque in returning to bumping home.	0 to 15000
47	Home offset (pulse)	You can set the offset from home detection position.	–16384 to 16383
48	Homing function	0: Required, 1: Not required (Position when power is turned on is the home.) 2: When homing is not completed yet, homing operation is executed by positioning start signal.	0 to 2
49	Homing selection when motor is free	0: When homing is unavailable after motor free state is reset (when trip occurs, after trip is reset), positioning operation is enabled. 1: When motor is free (trip occurs), homing is required again.	0, 1
4A	Present position overflow permission	You can set operation when the present position counter of motor has overflowed (exceeded ±32767 rotations). 0: Prohibited (motor trip), 1: Permitted (no motor trip)	0, 1
4b	Jog speed (r/min)	You can set the operation speed in jog operation.	0 to 4000
4C	Jog acceleration time (ms)	You can set time taken for reaching jog speed.	1 to 30000
4d	Jog deceleration time (ms)	You can set time taken from jog speed until stopping.	1 to 30000
4E	Teaching speed (r/min)	You can set speed used in applying teaching function of Digital key pad.	0 to 4000
50	I1 function selection	You can assign functions to I1 through I4. 0: Forced trip, 1: Instantaneous stop, 2: Deceleration stop 3: Homing start, 4: Forward jog, 5: Reverse jog, 6: Point designation 1 7: Point designation 2, 8: Run start, 9: Sequential run start 10: Trip reset, 11: Home sensor, 12: Limit in + direction 13: Limit in – direction, 14: Direction switching, 15: Motor-free	0 to 15
51	I2 function selection		
52	I3 function selection		
53	I4 function selection		
54	I1 Input logic selection	0: Normal logic (Input is effective (ON) when connected to GND.) 1: Reverse rotation logic (Input is effective (ON) when OPEN (open)) Set the reverse rotation logic to the input desired to be operated on wiring break side such as forced trip (emergency stop input).	0, 1
55	I2 Input logic selection		
56	I3 Input logic selection		
57	I4 Input logic selection		
58	Trip reset function enable	0: Disable, 1: Enable (Operation start signal longer than 1 second enables execution of trip reset.)	0, 1
59	Deceleration time in instantaneous stop (ms)	Set the deceleration time in executing instantaneous stop.	0 to 30000
5C	O1 function selection	You can assign functions to O1 and O2. 0: Trip output, 1: In-position, 2: In-motion signal (BUSY) 3: Homing completion, 4: Overload detection, 5: Torque under restriction	0 to 5
5d	O2 function selection		
5E	O1 output polarity selection	0: Normal logic (Output transistor ON at enabled, OFF at disabled) 1: Reversed logic (Output transistor OFF at enabled, ON at disabled) When only trip output is normal logic, output transistor is off in tripping, and output transistor is on in no tripping.	0, 1
5F	O2 output polarity selection		
60	RS485 device number	Set the device number of amplifier in communication (Amplifier ID).	128 to 159 (80h to 9Fh)
61	RS485 communication speed	Set the communication speed of RS485 communication.	0 to 2
62	RS485 communication standard	Set the communication standard of RS485 communication.	0 to 11
63	RS485 communication response time (ms)	Communication response time is the shortest time for setting transmission mode in RS485 bus for response after the amplifier has received communication data.	10 to 100
64	RS485 retry times of communication	Set the retry times of RS485 communication.	0 to 9
65	RS485 protocol timeout (seconds)	Protocol timeout is the time allowed from reception of a character code to reception of the next one in communication.	1 to 255
6A	Trip history clear	When “(yes)” is set, trip history (Pr6b to 6F) is cleared.	0(No), 1(Yes)
6b	Trip history 1	Display the latest trip.	—
6C	Trip history 2	Display the 2nd latest trip.	—
6d	Trip history 3	Display the 3rd latest trip.	—
6E	Trip history 4	Display the 4th latest trip.	—
6F	Trip history 5	Display the 5th latest trip.	—
77	Parameter copy function	This function is only available with use of the Digital key pad.	No/P.INIT/ P.LOAD/P.PROG
7A	Monitor mode switching	You can choose monitor screen to be displayed first when the Digital key pad is connected.	0 to 6
7b	Numerator of command pulse ratio	You can set the division multiplier ratio of travel distance.	1 to 20000
7C	Denominator of command pulse ratio		
7F	For manufacturer use	It cannot be changed.	—

Example setting of motion pattern

Indexing (feeding by fixed length)

• When feeding by fixed length of travel



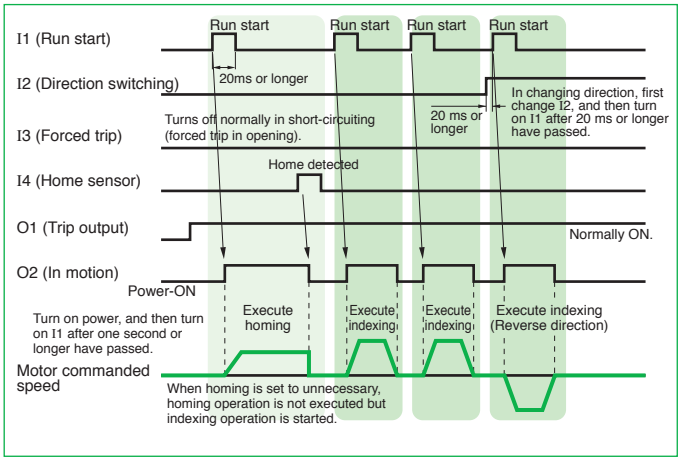
<Example of setting>

- Every time I1 is turned on, the motor runs for fixed travel distance.
- Homing operation is executed and the home is set when I1 is turned on just once after power-on. (It is also possible to set power-on position to the home.)

[Signal function setting]

Terminal symbol	Terminal number	Terminal name	Description of function
I1	1	Signal input 1	Operates when "I1" and "GND" are shorted (Homing operation for the first time after power-on)
I2	2	Signal input 2	CW operation when "I2" and "GND" are shorted, CCW operation when they are opened (including homing operation mode)
I3	11	Signal input 3	Motor trips when "I3" and "GND" are open.
I4	4	Signal input 4	Home detected when "I4" and "GND" are shorted.
O1	6	Signal output 1	Trip output (Normally on, and off in tripping)
O2	12	Signal output 2	In motion signal (including homing operation)

[Operation timing chart]



[Parameter setting] Indicates only the point changed from default setting. (Parameter marked with * is effective after power resetting.)

Function	Parameter No. (Pr□□)	Name of parameter	Setting	Remarks
Selection of signal function	50*	I1 function selection	8	Run start (used only for the 1st point)
	51*	I2 function selection	14	Direction switching input
	52*	I3 function selection	0	Forced trip input
	53*	I4 function selection	11	Home sensor input
	56*	I3 input logic selection	1	Changes the polarity of 3 to effective when open (forced trip in this case).
	5C	01 function selection	0	Trip output
	5d	02 function selection	2	In-motion signal
Homing function	40	Homing mode	0, 1, 5	Set homing in which to use home sensor.
	41	Homing direction	0, 1	Set any desired homing direction.
	42	Homing speed	200	Set any desired operation speed.
	44	Homing acceleration/deceleration time	200	Set any desired acceleration/deceleration time.
	48*	Homing function	2	Set to 1 when setting power-on position to the home.
	49	Selecting homing when motor is free	1	Set to 1 (homing is required again when tripping occurs.)
	4A	Present position overflow permission	1	Set to 1 (permits overflow).
The 1st point (indexing length)	00	The 1st target position (rotation number)	10	Set the travel distance by rotation number and pulse (one rotation per 288 pulses). When the setting does not represent proper mechanical reduction gear ratio, accumulated error occurs, which results in dislocation.
	01	The 1st target position (pulse)	0	
	02	The 1st coordinate setting	0	Set relative travel.
	03	The 1st setting speed	2000	Set any desired operation speed.
	04, 05	The 1st acceleration time/ The 1st deceleration time	200	Set any desired acceleration time and deceleration time.
	06	The 1st block setting	0	Set normal operation.

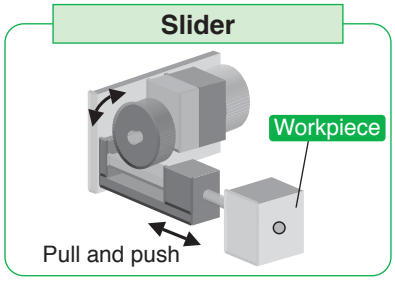
<Information>

In this setting, I3 is set to forced trip when open. Connect an emergency stop switch or the like which is shorted but open at error to I3 terminal.

Please note that the motor will not run due to forced trip without such connection.

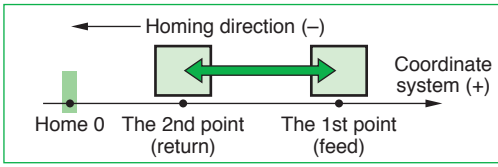
Reciprocating

• When executing reciprocating run between fixed positions



<Example of setting>

- Every time I1 is turned on, feed action → return action → feed action is repeated in turn.
- When power is on, homing operation is executed and home is set by I1.

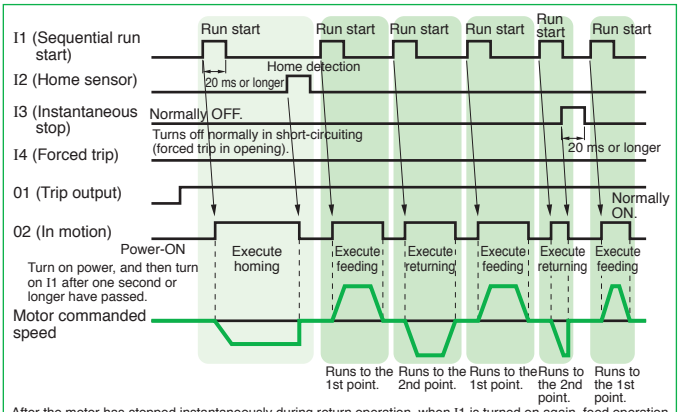


Coordinate system + direction depends on configuration of gear head and machine. When setting the rotation direction CCW of motor shaft to +, set Pr23 at "0", and when setting CW to +, set Pr23 at "1".

[Signal function setting]

Terminal symbol	Terminal number	Terminal name	Description of function
I1	1	Signal input 1	Operates when "I1" and "GND" are shorted (Homing operation for the first time after power-on)
I2	2	Signal input 2	Home detected when "I2" and "GND" are shorted.
I3	11	Signal input 3	Operation stops when "I3" and "GND" are shorted.
I4	4	Signal input 4	Motor trips when "I4" and "GND" are open.
O1	6	Signal output 1	Trip output (Normally on, and off in tripping)
O2	12	Signal output 2	In motion signal (including homing operation)

[Operation timing chart]



After the motor has stopped instantaneously during return operation, when I1 is turned on again, feed operation is executed from stop position. Similarly, after the motor has stopped instantaneously during feed operation, when I1 is turned on again, return operation is executed.

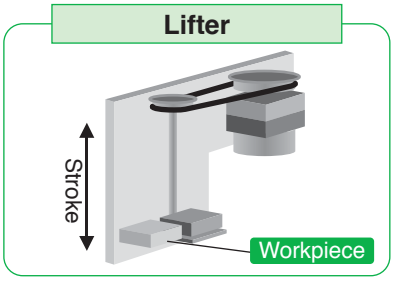
[Parameter setting] Indicates only the point changed from default setting. (Parameter marked with * is effective after power resetting.)

Function	Parameter No. (Pr□□)	Name of parameter	Setting	Remarks
Selection of signal function	50*	I1 function selection	9	Sequential run start
	51*	I2 function selection	11	Home sensor input
	52*	I3 function selection	1	Instantaneous stop input
	53*	I4 function selection	0	Forced trip input
	57*	I4 input logic selection	1	Changes the polarity of I4 to effective when open (forced trip in this case).
	5C	01 function selection	0	Trip output
	5d	02 function selection	2	In-motion signal
Homing function	40	Homing mode	0	Set homing in which to use home sensor.
	41	Homing direction	1	Set the homing direction normally to minus direction (return direction).
	42	Homing speed	200	Set any desired operation speed.
	44	Homing acceleration deceleration time	200	Set any desired acceleration/deceleration time.
	48*	Homing function	2	Homing operation by initial I1 input when power is turned on.
	49	Selecting homing when motor is free	0	Homing is not required when tripping occurs.
	4A	Present position overflow permission	0	Overflow is not permitted because absolute travel is set.
	23*	Coordinate system setting	0, 1	Set so that homing is in minus direction.
The 1st point (feed position)	00	The 1st target position (rotation number)	10	Set the feed position coordinates.
	01	The 1st target position (pulse)	0	
	02	The 1st coordinate setting	1	Set absolute travel.
	03	The 1st setting speed	2000	Set any desired travel.
	04, 05	The 1st acceleration time/ The 1st deceleration time	200	Set any desired acceleration time and deceleration time.
	06	The 1st block setting	0	Set normal operation.
The 2nd point (return position)	08	The 2nd target position (rotation number)	2	Set the return position coordinate. (Set 0 when the position is the same as home.)
	09	The 2nd target position (pulse)	0	
	0A	The 2nd coordinate setting	1	Set absolute travel.
	0b	The 2nd setting speed	2000	Set any desired travel.
	0C, 0d	The 2nd acceleration time/ The 2nd deceleration time	200	Set any desired acceleration time and deceleration time.
	0E	The 2nd block setting	0	Set normal operation.
Others	22	Sequential run Maximum point number	2	Restricts the maximum point number in sequential operation. When this parameter is set to 2, whenever I1 is turned on, system operates in turn from the 1st point → the 2nd point → the 1st point ....

Example setting of motion pattern

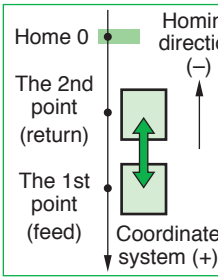
Automatic reciprocating

• When executing fixed reciprocating sequence operation with single run start signal



<Example of setting>

- When I1 is turned on, the unit moves to target position (feed position), waits for a specified time, and returns to original position (return position).
- When power is on, homing operation is executed and home is set by I1.

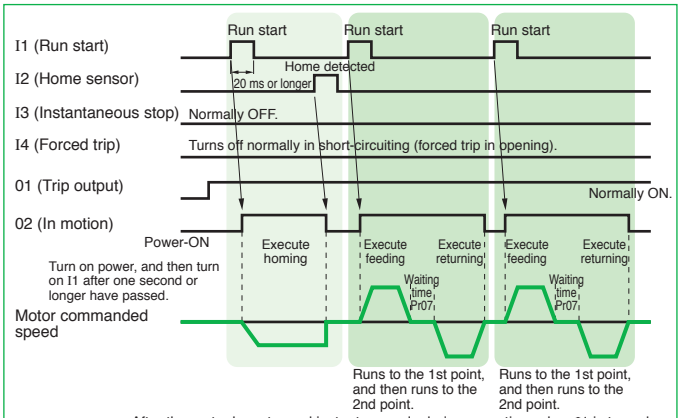


Coordinate system + direction depends on configuration of gear head and machine. When setting the rotation direction CCW of motor shaft to +, set Pr23 at "0", and when setting CW to +, set Pr23 at "1".

[Signal function setting]

Terminal symbol	Terminal number	Terminal name	Description of function
I1	1	Signal input 1	Operates when "I1" and "GND" are shorted (Homing operation for the first time after power-on)
I2	2	Signal input 2	Home detected when "I2" and "GND" are shorted.
I3	11	Signal input 3	Operation stops when "I3" and "GND" are shorted. (Motor does not operate during short-circuit.)
I4	4	Signal input 4	Motor trips when "I4" and "GND" are open.
O1	6	Signal output 1	Trip output (Normally on, and off in tripping)
O2	12	Signal output 2	In motion signal (including homing operation)

[Operation timing chart]



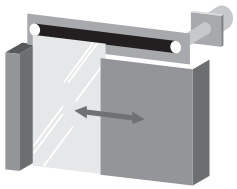
[Parameter setting] Indicates only the point changed from default setting. (Parameter marked with * is effective after power resetting.)

Function	Parameter No. (Pr□□)	Name of parameter	Setting	Remarks
Selection of signal function	50*	I1 function selection	8	Run start
	51*	I2 function selection	11	Home sensor input
	52*	I3 function selection	1	Instantaneous stop input
	53*	I4 function selection	0	Forced trip input
	57*	I4 input logic selection	1	Changes the polarity of I4 to effective when open (forced trip in this case).
	5C	01 function selection	0	Trip output
	5d	02 function selection	2	In-motion signal
Homing function	40	Homing mode	0	Set homing in which to use home sensor.
	41	Homing direction	1	Set the homing direction normally to minus direction (return direction).
	42	Homing speed	200	Set any desired operation speed.
	44	Homing acceleration/deceleration time	200	Set any desired acceleration/deceleration time.
	48*	Homing function	2	Homing operation by initial I1 input when power is turned on.
	49	Selecting homing when motor is free	0	Homing is not required when tripping occurs.
	4A	Present position overflow permission	0	Overflow is not permitted because absolute travel is set.
	23*	Coordinate system setting	0, 1	Set so that homing is in minus direction.
The 1st point (feed position)	00	The 1st target position (rotation number)	10	Set the feed position coordinates.
	01	The 1st target position (pulse)	0	
	02	The 1st coordinate setting	1	Set absolute travel.
	03	The 1st setting speed	2000	Set any desired operation speed.
	04, 05	The 1st acceleration time/ The 1st deceleration time	200	Set any desired acceleration/deceleration time.
	06	The 1st block setting	1	Execute running to the 2nd point, after executing running to the 1st point.
	07	The 1st block timer setting	500	The 2nd point operation is started in 500 ms.
The 2nd point (return position)	08	The 2nd target position (rotation number)	2	Set the return position coordinate. (Set 0 when the position is the same as home.)
	09	The 2nd target position (pulse)	0	
	0A	The 2nd coordinate setting	1	Set absolute travel.
	0b	The 2nd setting speed	2000	Set any desired operation speed.
	0C, 0d	The 2nd acceleration time/ The 2nd deceleration time	200	Set any desired acceleration/deceleration time.
	0E	The 2nd block setting	0	Set normal operation.
	0F	The 2nd block timer setting	0	Ineffective because 0E is 0.

Door opening/closing

• When executing reciprocating operation between 2 points

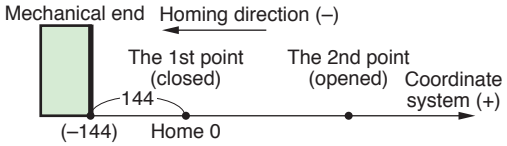
Automatic door



<Example of setting>

- When open/close is chosen and I1 is input, open/close operation is executed.
- When the door is stopped in any position on the way of action, opening or closing operation is enabled from such position. (It is the same when the door is moved by hand with motor disabled.)
- Use of bumping homing enables elimination of home sensor.
- Holding torque when motor is stopped can be changed.

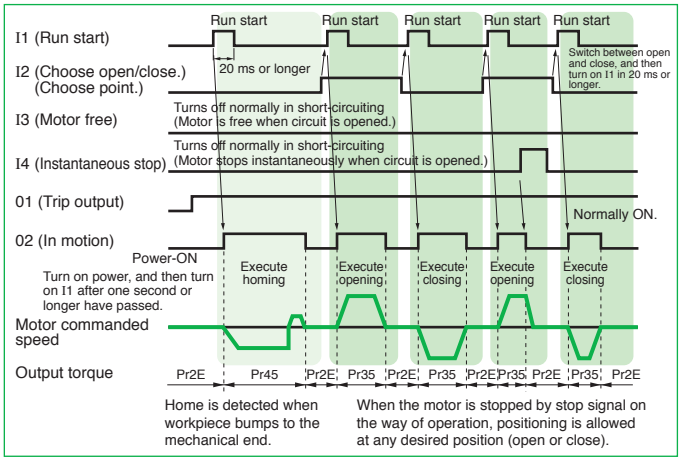
- Coordinate system + direction depends on configuration of gear head and machine. When setting the rotation direction CCW of motor shaft to +, set Pr23 at "0", and when setting CW to +, set Pr23 at "1".
- When setting the Mechanical end offset value to –144, the Home is the point which has moved 144 pulses to the + direction seen from the Mechanical end.



[Signal function setting]

Terminal symbol	Terminal number	Terminal name	Description of function
I1	1	Signal input 1	Operates when "I1" and "GND" are shorted (Homing operation for the first time after power-on)
I2	2	Signal input 2	Opening (point 2) operation when "I2" and "GND" are shorted, and closing (point 1) operation when they are open.
I3	11	Signal input 3	Motor is free when "I3" and "GND" are open. (Servo lock released)
I4	4	Signal input 4	Operation is stopped when "I4" and "GND" are open. (Motor is not activated while they are open.)
O1	6	Signal output 1	Trip output (Normally on, and off in tripping)
O2	12	Signal output 2	In motion signal (including homing operation)

[Operation timing chart]



[Parameter setting] Indicates only the point changed from default setting. (Parameter marked with * is effective after power resetting.)

Function	Parameter No. (Pr□□)	Name of parameter	Setting	Remarks
Selection of signal function	50*	I1 function selection	8	Run start
	51*	I2 function selection	6	Point designation 1 input (choosing the 1st/2nd point)
	52*	I3 function selection	15	Motor-free input
	53*	I4 function selection	1	Instantaneous stop input
	56*	I3 input logic selection	1	Changes the polarity of I3 to effective when open (motor-free in this case).
	57*	I4 input logic selection	1	Changes the polarity of I4 to effective when open (instantaneous stop in this case).
	5C	01 function selection	0	Trip output
	5d	02 function selection	2	In-motion signal
Homing function	40	Homing mode	3	Bumping homing
	41	Homing direction	1	Set the homing direction normally to minus direction (closing direction).
	42	Homing speed	200	Set any desired operation speed.
	44	Homing acceleration/deceleration time	200	Set any desired acceleration/deceleration time.
	45	Bumping torque detection value	50	Torque limit during bumping homing
	46	Bumping torque detection time	100	Home is detected when torque restriction continues for one second.
	47	Home offset	–144	Set the distance from the home desired to be set to the mechanical end.
	48*	Homing function	2	When power is turned on, homing operation is executed by initial I1 input.
	49	Homing selection when motor is free	0	Homing is not required when tripping occurs.
	4A	Present position overflow permission	0	Overflow is not permitted because absolute travel is set.
	23*	Coordinate system setting	0, 1	Set so that homing is in minus direction.
The 1st point (door closing position)	00	The 1st target position (rotation number)	0	Set the door closing position coordinate. (Coordinate is 0 when closing position is the same as home position.)
	01	The 1st target position (pulse)	0	
	02	The 1st coordinate setting	1	Set absolute travel.
	03	The 1st setting speed	2000	Set any desired operation speed.
	04, 05	The 1st acceleration time/ The 1st deceleration time	200	Set any desired acceleration time and deceleration time.
	06	The 1st block setting	0	Set normal operation.
The 2nd point (door opening position)	08	The 2nd target position (rotation number)	40	Set the door opening position coordinate.
	09	The 2nd target position (pulse)	0	
	0A	The 2nd coordinate setting	1	Set absolute travel.
	0b	The 2nd setting speed	2000	Set any desired operation speed.
	0C, 0d	The 2nd acceleration time/ The 2nd deceleration time	200	Set any desired acceleration time and deceleration time.
	0E	The 2nd block setting	0	Set normal operation.

For automatically changing the retention torque (retention force) when door is stopped

Gain switching function	2E	Torque limit setting	100	Sets the retention torque when door is stopped. The smaller the value is, the weaker the retention force becomes.
	35	The 2nd torque limit setting	150	Maximum output torque when door is operating.
	36	Gain switching mode selection	2	Set to 0 when executing no switching.
	37	Gain switching time	100	Torque is changed in 100 ms after completion of operation instruction.

Specification (For Common specification, see p. 47, 48)

Size	Model No. / Amplifier and Motor		Rated output (W)	Input power supply for Amplifier				Rated torque (N·m)	Starting torque (N·m)	Rated speed (r/min)	Maximum rotation speed (r/min)
	Brushless Amplifier	Motor		Voltage AC (V)	Allowed range (%)	Frequency (Hz)	Rated input current (A)				
80 mm sq.	MBEG5A1BCP	MBMU5AZAB	50	Single phase 100 to 120	±10	50/60	1.5	0.16	0.24	3000	4000
	MBEG5A5BCP			Single phase /3-phase 200 to 240			Single phase 0.7 3-phase 0.35				

* Starting torque: Representative value

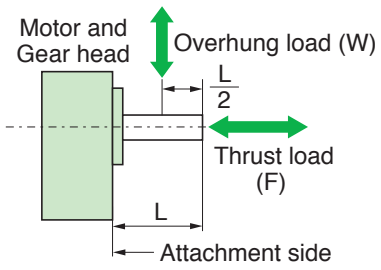
Permissible torque at output shaft of gear head (N·m)

Applicable Gear head	Reduction ratio		5	10	15	20	30	50
MB8G□BV	motor rotation speed (r/min)	3000 or less	0.71	1.4	2.2	2.8	4.0	6.8
		3000 to 4000	0.53	1.1	1.7	2.1	3.0	5.1
	Rotational direction		Same as motor rotational direction				Reverse to motor rotational direction	

Permissible load inertia moment (×10⁻⁴ kg·m²)

Reduction ratio	5	10	15	20	30	50
Applicable Gear head MB8G□BV	3.42	13.8	30.6	55.8	127	342

Permissible shaft load

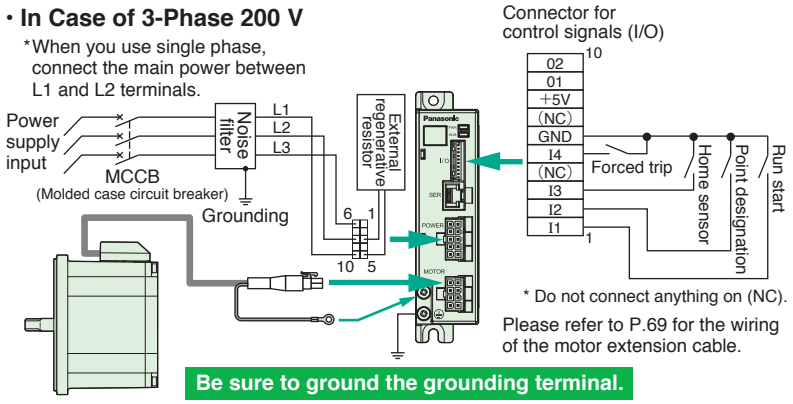


		Overhung load (W)	Thrust load (F)
Applicable Gear head	MB8G5BV	245 N	98 N
	MB8G10BV, 15BV, 20BV	343 N	
	MB8G30BV, 50BV	539 N	

Wiring diagram

• **In Case of 3-Phase 200 V**

*When you use single phase, connect the main power between L1 and L2 terminals.



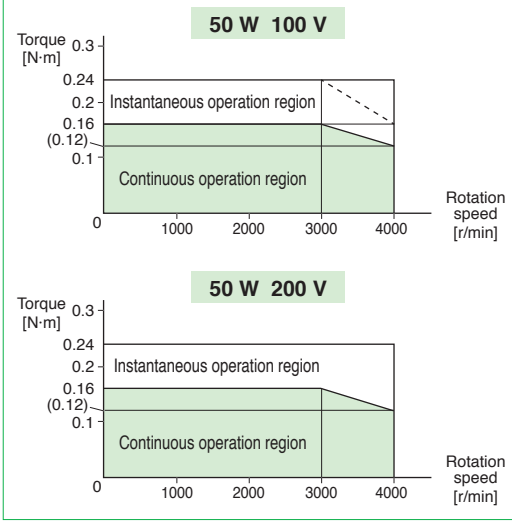
Please refer to P.69 for the wiring of the motor extension cable.

Be sure to ground the grounding terminal.

In wiring to power supply (outside of equipment) from MCCB, use an electric wire of 1.6 mm diameter (2.0 mm²) or more both for main circuit and grounding. Apply grounding class D (100 Ω or below) for grounding. Do not tighten the ground wires together, but connect them individually.

Speed-torque characteristic

〈Dotted line shows a characteristic curve when supply voltage drops by 10 %.〉

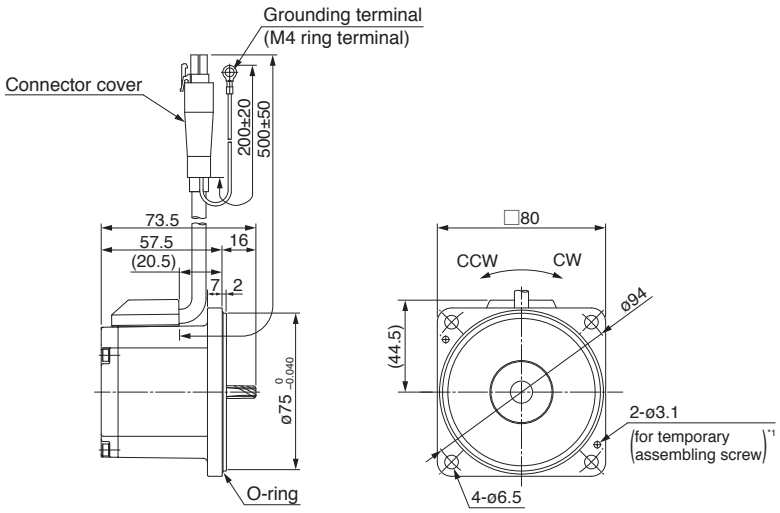


* Before using, be sure to read “Instruction manual” to check precautions and correct procedure.

Motor (dimensions)

Unit mm

mass 0.7 kg



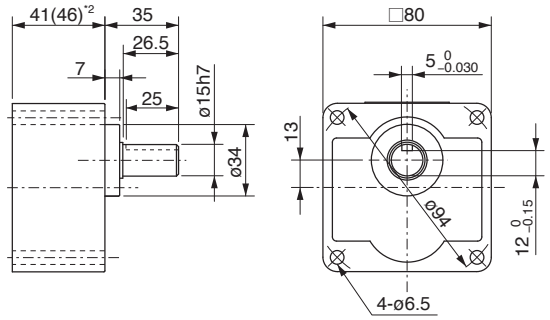
*1 Before installing the equipment, assemble the motor and gear head temporarily, which will ensure stable installation of the equipment.

Gear head (dimensions)

Unit mm

MB8G□BV

mass 0.8 kg (0.9 kg) *2



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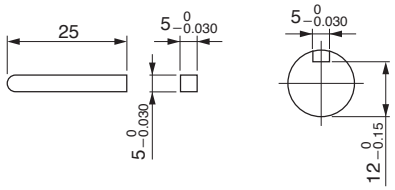
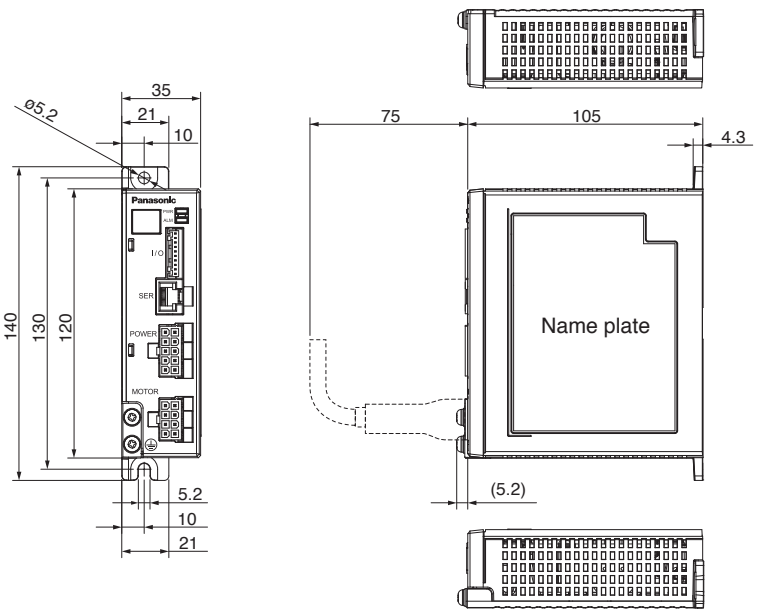


*2 Dimensions and mass with ( ) is the gearhead of gear ratio greater than 30.

Brushless amplifier (dimensions)

Unit mm

mass 0.37 kg



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

■ Specification (For Common specification, see p. 47, 48)

Size	Model No. / Amplifier and Motor		Rated output (W)	Input power supply for Amplifier				Rated torque (N·m)	Starting torque (N·m)	Rated speed (r/min)	Maximum rotation speed (r/min)
	Brushless Amplifier	Motor		Voltage AC (V)	Allowed range (%)	Frequency (Hz)	Rated input current (A)				
90 mm sq.	MBEG9A1BCP	MBMU9A1AB	90	Single phase 100 to 120	±10	50/60	2.2	0.29	0.43	3000	4000
	MBEG9A5BCP	MBMU9A2AB		Single phase /3-phase 200 to 240			Single phase 1.1 3-phase 0.5				

* Starting torque: Representative value

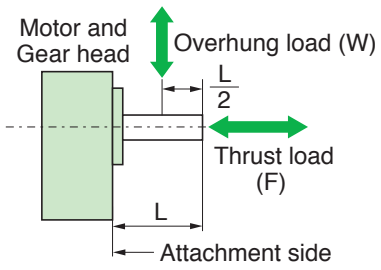
■ Permissible torque at output shaft of gear head (N·m)

Applicable Gear head	Reduction ratio		5	10	15	20	30	50
MB9G□BV	motor rotation speed (r/min)	3000 or less	1.2	2.5	3.6	4.9	7.0	11.6
		3000 to 4000	0.90	1.9	2.7	3.7	5.3	8.7
	Rotational direction		Same as motor rotational direction				Reverse to motor rotational direction	

■ Permissible load inertia moment (×10⁻⁴ kg·m²)

Reduction ratio	5	10	15	20	30	50
Applicable Gear head MB9G□BV	16.4	67.6	142	257	589	1684

■ Permissible shaft load

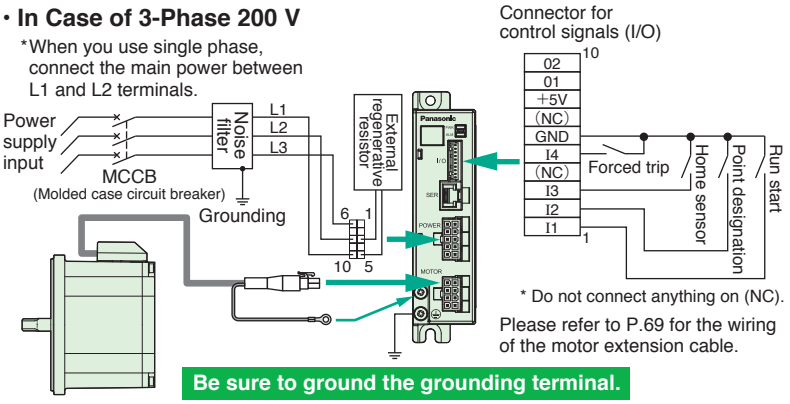


		Overhung load (W)	Thrust load (F)
Applicable Gear head	MB9G5BV	294 N	147 N
	MB9G10BV, 15BV, 20BV	490 N	
	MB9G30BV, 50BV	637 N	

■ Wiring diagram

• **In Case of 3-Phase 200 V**

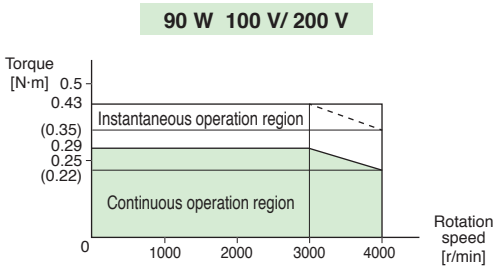
*When you use single phase, connect the main power between L1 and L2 terminals.



Be sure to ground the grounding terminal.

In wiring to power supply (outside of equipment) from MCCB, use an electric wire of 1.6 mm diameter (2.0 mm²) or more both for main circuit and grounding. Apply grounding class D (100 Ω or below) for grounding. Do not tighten the ground wires together, but connect them individually.

■ Speed-torque characteristic 〈Dotted line shows a characteristic curve when supply voltage drops by 10 %.〉

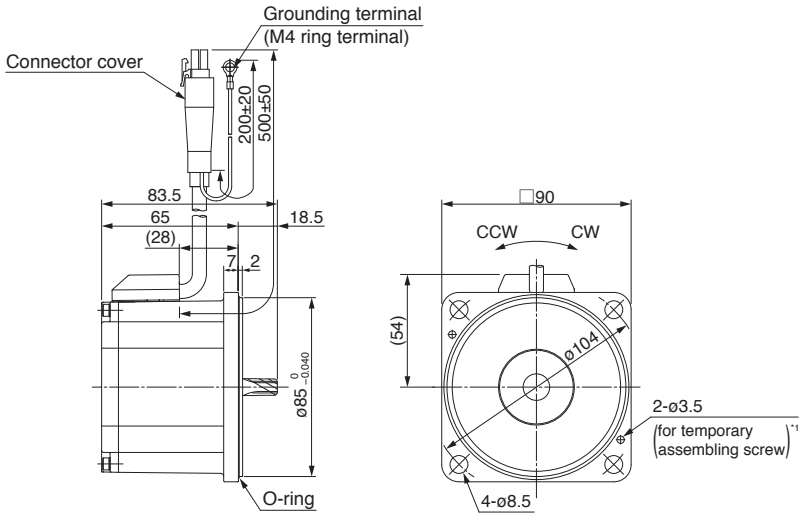


* Before using, be sure to read “Instruction manual” to check precautions and correct procedure.

Motor (dimensions)

Unit mm

mass 1.0 kg



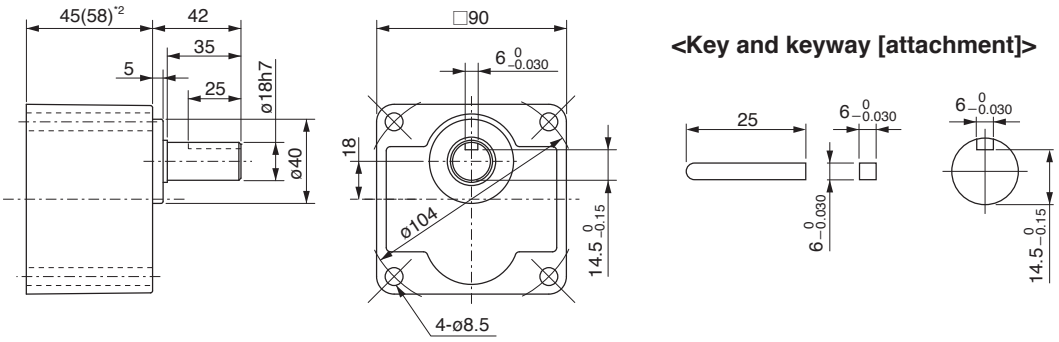
*1 Before installing the equipment, assemble the motor and gear head temporarily, which will ensure stable installation of the equipment.

Gear head (dimensions)

Unit mm

MB9G□BV

mass 1.1 kg (1.4 kg) *2

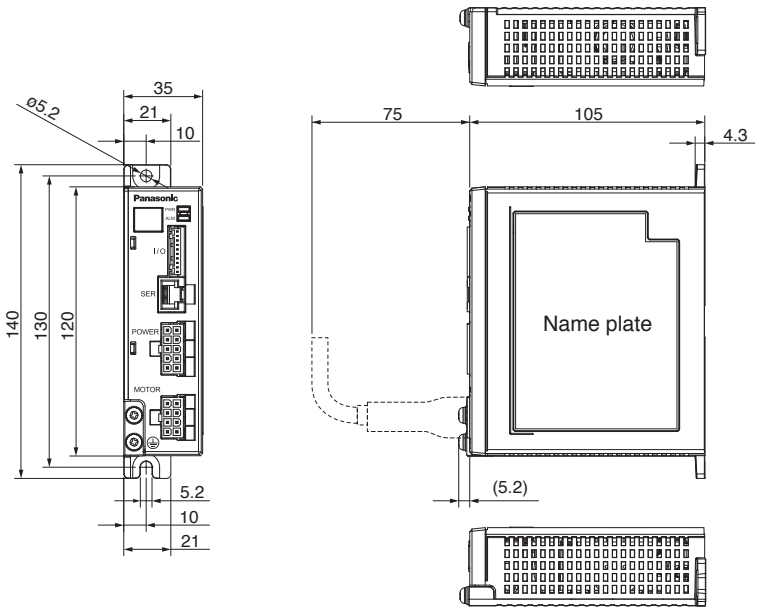


*2 Dimensions and mass with ( ) is the gearhead of gear ratio greater than 30.

Brushless amplifier (dimensions)

Unit mm

mass 0.37 kg



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

■ Specification (For Common specification, see p. 47, 48)

Size	Model No. / Amplifier and Motor		Rated output (W)	Input power supply for Amplifier				Rated torque (N·m)	Starting torque (N·m)	Rated speed (r/min)	Maximum rotation speed (r/min)
	Brushless Amplifier	Motor		Voltage AC (V)	Allowed range (%)	Frequency (Hz)	Rated input current (A)				
90 mm sq.	MBEG1E1BCP	MBMU1E1AB	130	Single phase 100 to 120	±10	50/60	2.8	0.41	0.62	3000	4000
	MBEG1E5BCP	MBMU1E2AB		Single phase /3-phase 200 to 240			Single phase 1.5 3-phase 0.7				

* Starting torque: Representative value

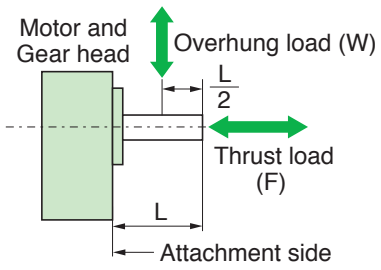
■ Permissible torque at output shaft of gear head (N·m)

Applicable Gear head	Reduction ratio			5	10	15	20	30	50
MB9G□BV	motor rotation speed (r/min)	3000 or less		1.9	3.7	5.6	7.4	10.7	17.7
		3000 to 4000	100 V	1.1	2.1	3.3	4.3	6.2	10.3
			200 V	1.4	2.8	4.2	5.6	8.0	13.3
	Rotational direction			Same as motor rotational direction				Reverse to motor rotational direction	

■ Permissible load inertia moment (×10⁻⁴ kg·m²)

Reduction ratio	5	10	15	20	30	50
Applicable Gear head MB9G□BV	16.4	67.6	142	257	589	1684

■ Permissible shaft load

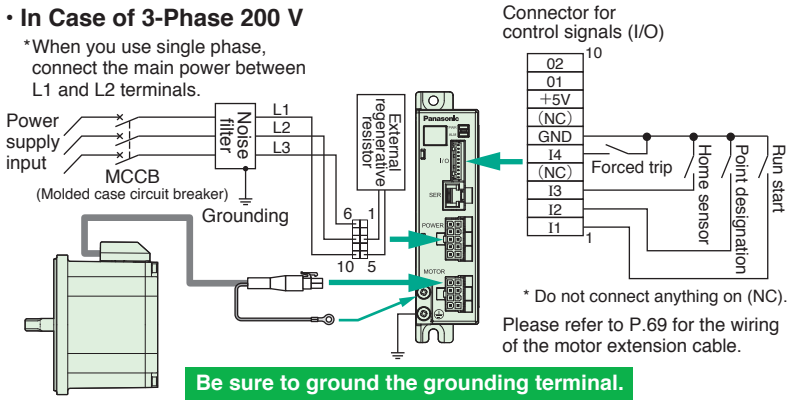


		Overhung load (W)	Thrust load (F)
Applicable Gear head	MB9G5BV	294 N	147 N
	MB9G10BV, 15BV, 20BV	490 N	
	MB9G30BV, 50BV	637 N	

■ Wiring diagram

• **In Case of 3-Phase 200 V**

*When you use single phase, connect the main power between L1 and L2 terminals.

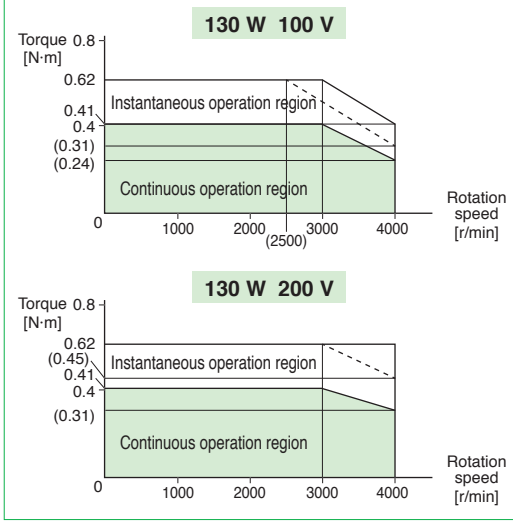


Be sure to ground the grounding terminal.

In wiring to power supply (outside of equipment) from MCCB, use an electric wire of 1.6 mm diameter (2.0 mm²) or more both for main circuit and grounding. Apply grounding class D (100 Ω or below) for grounding. Do not tighten the ground wires together, but connect them individually.

■ Speed-torque characteristic

〈Dotted line shows a characteristic curve when supply voltage drops by 10 %.〉

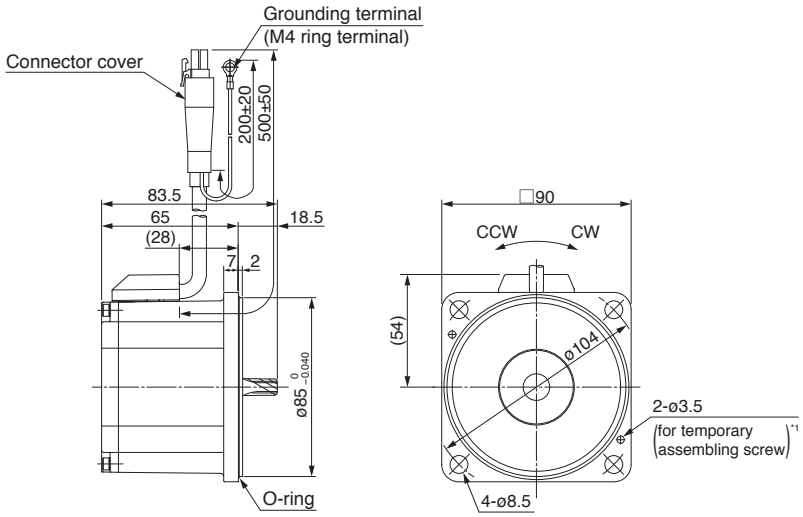


* Before using, be sure to read “Instruction manual” to check precautions and correct procedure.

Motor (dimensions)

Unit mm

mass 1.2 kg



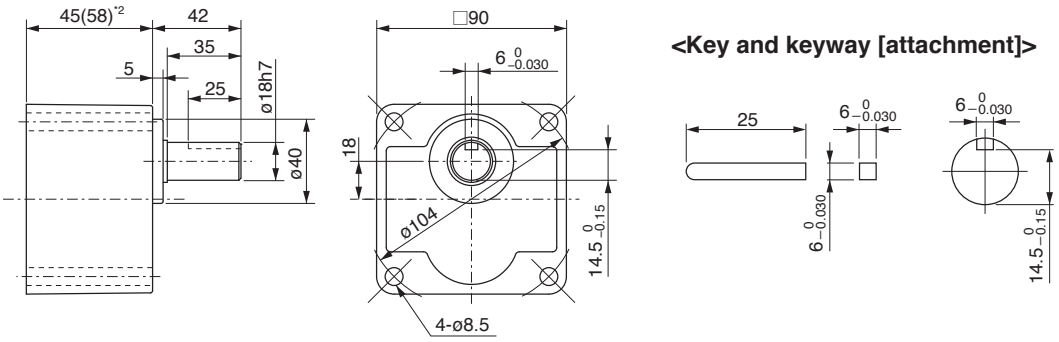
*1 Before installing the equipment, assemble the motor and gear head temporarily, which will ensure stable installation of the equipment.

Gear head (dimensions)

Unit mm

MB9G□BV

mass 1.1 kg (1.4 kg) *2

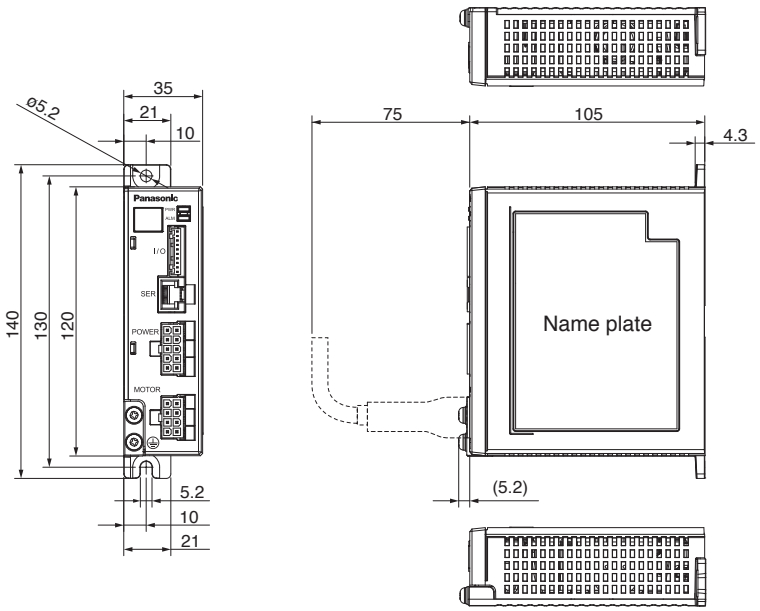


*2 Dimensions and mass with ( ) is the gearhead of gear ratio greater than 30.

Brushless amplifier (dimensions)

Unit mm

mass 0.37 kg



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

Gear head GP series

Outline of gear head

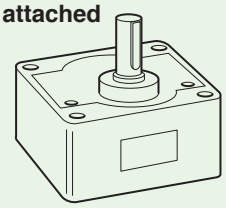
Reduction ratio

• Reduction ratio are 6 types 1/5 to 1/50.

Gear type/size

MB8：50 W (Hinge not attached)
MB9：90 W, 130 W (Hinge not attached)

• Hinge not attached



Backlash

Less than 2 ° (design value)

■ **Type of gear head and reduction ratio**

Gear type/size	Motor capacity	Reduction ratio					
		1/5	1/10	1/15	1/20	1/30	1/50
MB8	50 W	○	○	○	○	○	○
MB9	90 W, 130 W	○	○	○	○	○	○

Check the Model number

M B 8 G 30 BV

- **Type** B: For GP series
- **Size** 8 : 80 mm sq. 9 : 90 mm sq.
- **Gear head**
- **Reduction ratio** (Example) 30: Reduction ratio of 1/30 5, 10, 15, 20, 30, 50
- **Bearing** BV : Ball bearing

* The motor and gear are sold separately.

Calculation of torque at output shaft of gear head

■ **Standard gear head only**

$$N_G = \frac{N_M}{i}$$

$$T_G = T_M \times i \times \eta$$

N_G : Speed of gear head [r/min]
N_M : Motor speed [r/min]
i : Reduction ratio of gear head
T_G : Output torque of gear head [N·m]
T_M : Motor torque [N·m]
η : Gear head efficiency

Maximum permissible torque

There is a limit to the strength of a gear due to its material and construction. The usable load torque determined based on this limit is called permissible torque. As can be seen from the above-mentioned formula, the load becomes larger when the reduction ratio is increased. If the gear head is used with the load exceeding the permissible torque, its life expectancy will be shortened significantly. Refer to the permissible torque for each model and use the gear head at an appropriate load.

Nominal reduction ratio and actual reduction ratio

Actual reduction ratio of MB8, MB9 is the same as the nominal reduction ratio.

■ **Gear head**

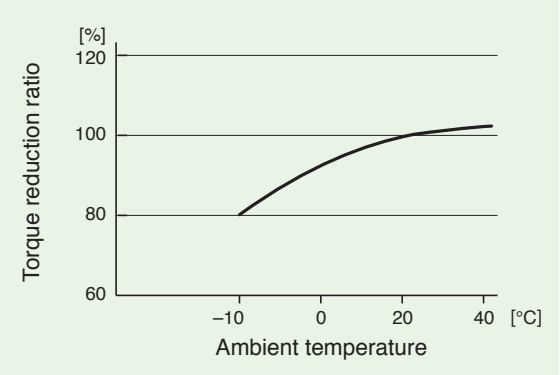
Nominal reduction ratio	Actual reduction ratio	
	MB8G□BV	MB9G□BV
1／5	1／5	1／5
1／10	1／10	1／10
1／15	1／15	1／15
1／20	1／20	1／20
1／30	1／30	1／30
1／50	1／50	1／50

Gear head efficiency

Model No.	Reduction ratio					
	5	10	15	20	30	50
MB8G□BV	90 %				86 %	
MB9G□BV	90 %				86 %	

Gear head efficiency and ambient temperature

Calculate the actual gear head efficiency by multiplying the above-shown gear head efficiency at room temperature by the torque reduction ratio shown below.



<Important>

The gear heads MB8G□BV and MB9G□BV are designed for use with GP series, and MX8G□B, MZ9G□B and MY9G□B are designed for use with GV series, respectively, and they are not compatible with gear heads of different series.

Gear head GP series

Model list of gear head

Gear head

■ **Ball bearing**

Size	Reduction ratio	Model No.
80 mm sq. (50 W)	1/5, 1/10, 1/15	**MB8G5BV、 MB8G10BV、MB8G15BV**
	1/20, 1/30	**MB8G20BV、MB8G30BV**
	1/50	**MB8G50BV**
90 mm sq. (90 W•130 W Common use)	1/5	**MB9G5BV**
	1/10, 1/15	**MB9G10BV、MB9G15BV**
	1/20, 1/30, 1/50	**MB9G20BV、MB9G30BV、MB9G50BV**

* For the specifications for each item, refer to the page of the motor to which it can be applied.

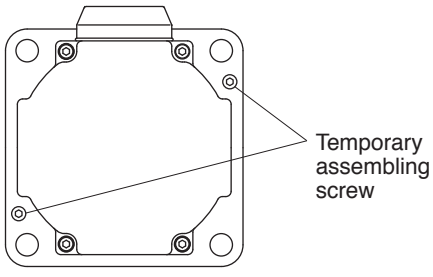
Gear head accessory

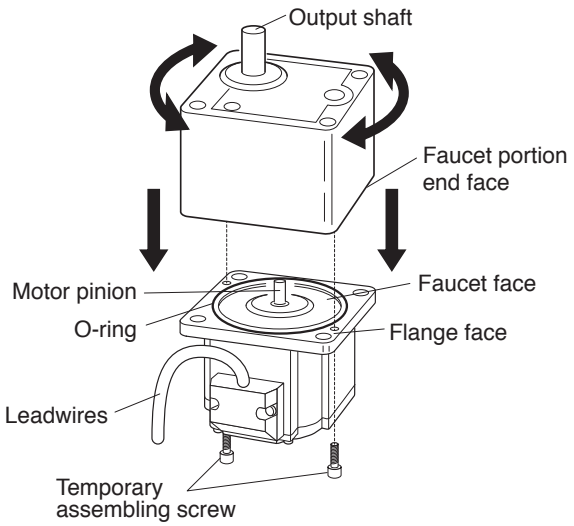
■ **Ball bearing**

Size	Reduction ratio	Model No.	Accessory				
			Screw (mm)	Flat washer	Hexagon nut	For temporary assembling screw hexagon socket head bolt	Key
80 mm sq.	1/5 to 1/20	**MB8G5BV** to **MB8G20BV**	**M6×65 hexagon socket head bolt : 4**	**for M6: 4**	**M6: 4**	**M2.6×12 : 2**	**5×5×25 one-end round : 1**
	1/30, 1/50	**MB8G30BV、MB8G50BV**	**M6×70 hexagon socket head bolt : 4**	**for M6: 4**	**M6: 4**	**M2.6×12 : 2**	**5×5×25 one-end round : 1**
90 mm sq.	1/5 to 1/20	**MB9G5BV** to **MB9G20BV**	**M8×75 hexagon socket head bolt : 4**	**for M8: 4**	**M8: 4**	**M3×12 : 2**	**6×6×25 one-end round : 1**
	1/30, 1/50	**MB9G30BV、MB9G50BV**	**M8×90 hexagon socket head bolt : 4**	**for M8: 4**	**M8: 4**	**M3×12 : 2**	**6×6×25 one-end round : 1**

<Information>

MB type gear head is provided with temporary assembling screw (two hexagon socket head bolt). Before installing the equipment, assemble the motor and gear head temporarily, which will ensure stable installation of the equipment. In installing to the equipment, be sure to use four “mounting screws” attached to the gear head for secure installation.





- Assemble with motor pinion faced up.
- Outward direction of motor leadwire can be aligned with any one of 4 sides of gear head with an output shaft at a different position.

Options

Contents

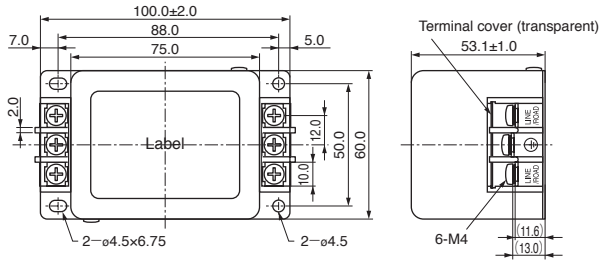
Option

Noise filter/ Surge absorber/ MCCB

Part name	Optional parts number (option)	Manufacturer's parts number	Qty.	Manufacturer
Noise filter (single phase 100 V, 200 V)	DV0P4170	SUP-EK5-ER-6	1	OKAYA ELECTRIC IND. CO., LTD.
Noise filter (3-phase)	DV0PM20042	3SUP-HU10-ER-6	1	
Surge absorber (single phase 100 V, 200 V)	DV0P4190	R•A•V-781BWZ-4	1	
Surge absorber (3-phase)	DV0P1450	R•A•V-781BXZ-4	1	
Noise filter for control signals	DV0P1460	ZCAT3035-1330	4	TDK Corporation

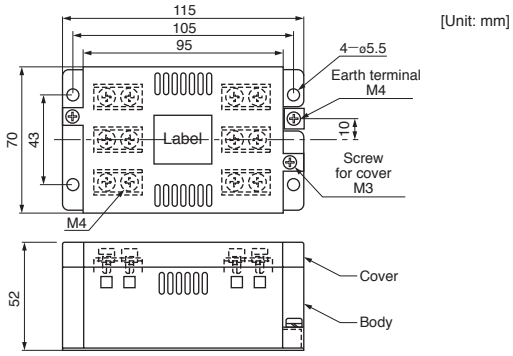
Noise filter GV KV GP

• DV0P4170



[Unit: mm]

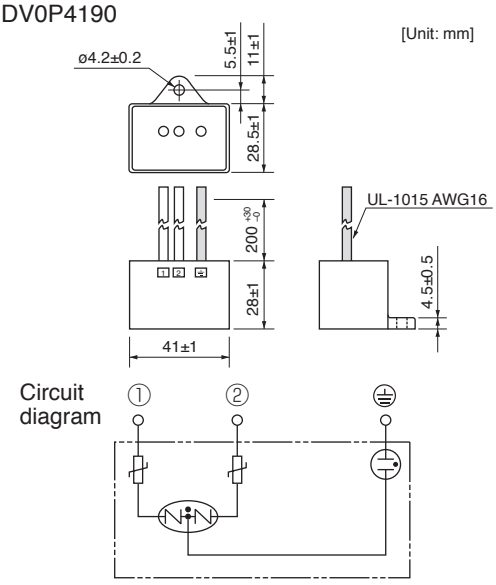
• DV0PM20042



[Unit: mm]

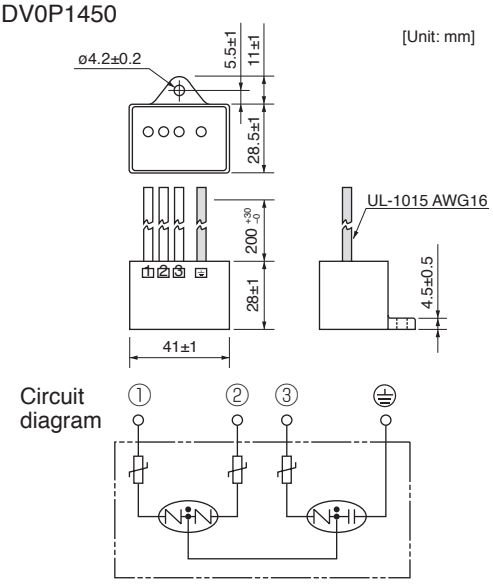
Surge absorber GV KV GP

• DV0P4190



[Unit: mm]

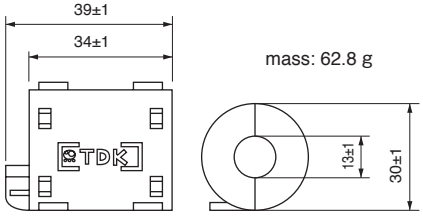
• DV0P1450



[Unit: mm]

Noise filter for control signals GV KV GP

• DV0P1460



[Unit: mm]

Recommended circuit breaker (MCCB)

Made by Sensata Technologies Japan Limited: Type IELH-1-11-63-5A-M (single phase) Type IELH-1-111-63-5A-M (3-phase)
(Rated current 5A, cutoff characteristics DELAY63)
• Recommended cutoff characteristics: DELAY61-63

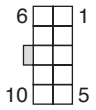
Settings

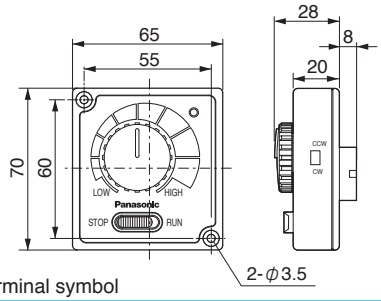
Console A GV KV

Optional part number
DV0P3500

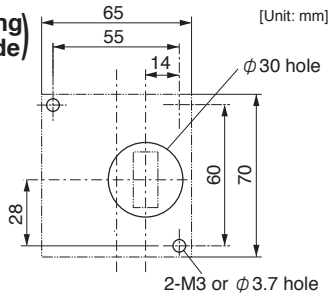
- Speed adjusting knob
- RUN/STOP switch
- Rotation direction selector switch

Console A connector pin No.





(Mounting hole side)



Console A connector terminal symbol

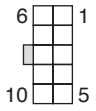
Terminal No.	1	2	3	4	5	6	7	8	9	10
Terminal name	I1	I2	GND	FIN	+5V	—	—	—	—	—

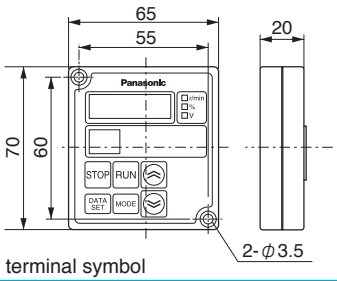
Digital key pad GV KV GP

Optional part number
DV0P3510

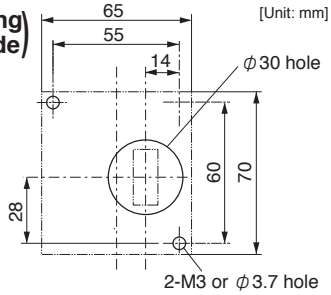
- Digital display (Speed, torque, voltage)
- Parameter settings change
- Parameter storage (read/write)

Digital key pad connector pin No.





(Mounting hole side)



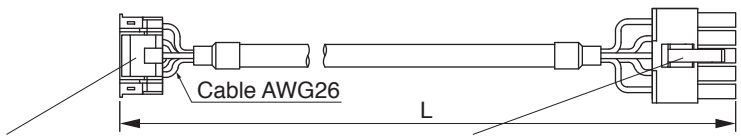
Digital key pad connector terminal symbol

Terminal No.	1	2	3	4	5	6	7	8	9	10
Terminal name	—	—	GND	—	+5V	—	SCK	SIN	SOT	—

Cable

Console A connection cable GV KV

Optional parts number	Length (L)
DV0PM2006910	1 m
DV0PM2006930	3 m
DV0PM2006950	5 m



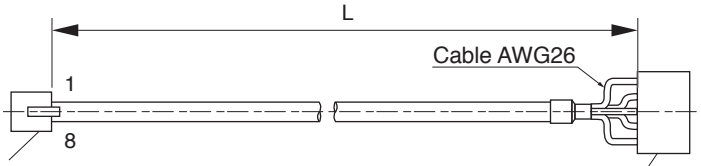
Amp.I/O side connector (J.S.T Mfg.Co.,Ltd.)
Connector : PAP-10V-S
Connector pin : SPHD-002T-P0.5

Console A side connector (Molex Inc.)
Connector : 39-01-2105 (5557-10R-210)
Connector pin : 39-00-0046 (5556T2)
or
39-00-0047 (5556T2L)

Amp.I/O side connector pin No.	1	2	3	4	5	6	7	8	9	10
Lead color of a cable	Brown	Red				Orange	Yellow	Green		
Console A side connector pin No.	1	2	—	—	—	3	4	5	—	—

Digital key pad connection cable GV KV GP

Optional parts number	Length (L)
DV0P38310	1 m
DV0P38330	3 m
DV0P38350	5 m



Amp.side connector (SER)/modular plug RJ45

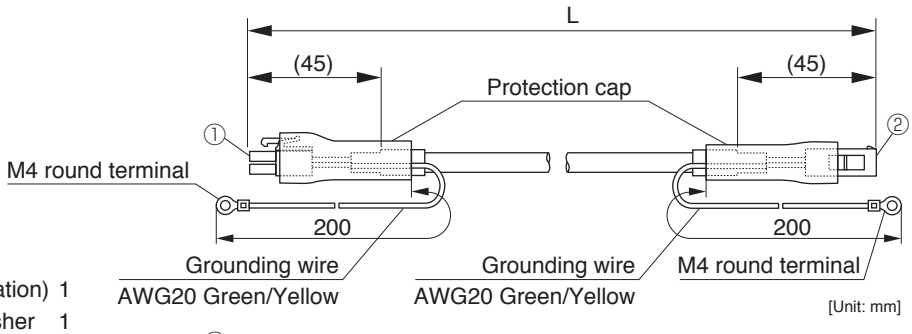
Digital key pad side connector (Molex Inc.)
Connector : 39-01-2105 (5557-10R-210)
Connector pin : 39-00-0046 (5556T2)
or
39-00-0047 (5556T2L)

Amp.side connector pin No.(SER)	1	2	3	4	5	6	7	8
Terminal name	—	+5V	SOT	SIN	—	—	GND	SCK
Digital key pad side connector pin No.	—	5	9	8	—	—	3	7

Option

Motor extension cable GV GP

Optional parts number	Length (L)
DV0PQ1000110	1 m
DV0PQ1000130	3 m
DV0PQ1000150	5 m
DV0PQ10001A1	10 m

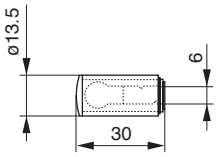


[Unit: mm]

● Accessories

- Insulating cap (for grounding wire insulation) 1
- M4 × 6 pan head screw with spring washer 1
- M4 hex. nut 1

Insulating cap (for grounding wire insulation)



[Unit: mm]

①Brushless amplifier side connector (Molex Inc.)
Connector : 39-01-2085 (5557-08R-210)
Connector pin : 39-00-0039 (5556TL) 〔for AWG 20〕
39-00-0047 (5556T2L) 〔for AWG 26〕
②Motor side connector (Molex Inc.)
Connector : 39-01-2086 (5559-08P-210)
Connector pin : 39-00-0041 (5558TL) 〔for AWG 20〕
39-00-0049 (5558T2L) 〔 for AWG 26〕

■ When using motor extension cable, be sure to connect its grounding wire to the grounding wire of the motor, and connect the other end of grounding wire of the extension cable to the earth terminal of the brushless amplifier.
For connecting grounding wire of motor and motor extension cable, use M4 screw and insulating cap supplied as accessories.

<Connector wiring>

• Brushless amplifier side

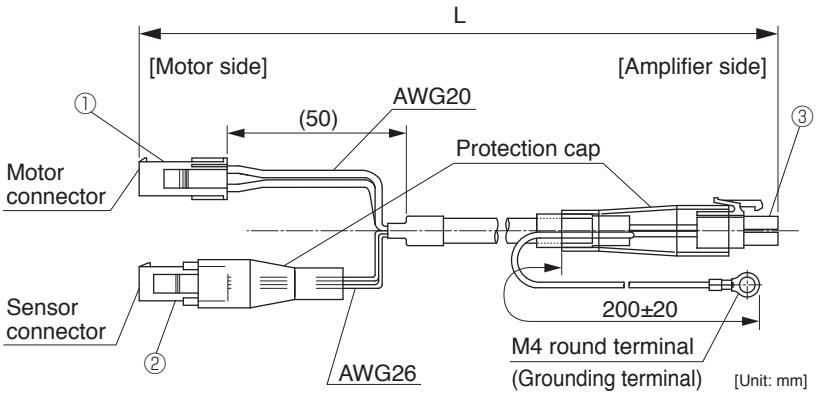
Pin No.	Signal	Wire color	Wire size
1	U	Red	AWG20
2	V	White	AWG20
3	W	Black	AWG20
4	Vcc	White	AWG26
5	CS1	Red	AWG26
6	CS2	Blue	AWG26
7	CS3	Yellow	AWG26
8	0V	Black	AWG26
M4 round terminal	E	Green/Yellow	AWG20

• Motor side

Pin No.
1
2
3
4
5
6
7
8
M4 round terminal

Motor extension cable KV

Optional parts number	Length (L)
DV0PQ1000310	1 m
DV0PQ1000330	3 m
DV0PQ1000350	5 m
DV0PQ10003A1	10 m



[Unit: mm]

<Wiring of motor side connector>

• Motor connector

Pin No.	Signal	Wire color
1	U	Red
2	V	White
3	W	Black
4	E	Green/Yellow

• Sensor connector

Pin No.	Signal	Wire color
1	CS1	Red
2	CS2	Blue
3	CS3	Yellow
4	Vcc	White
5	0V	Black
6	NC	—

Do not connect anything on (NC).

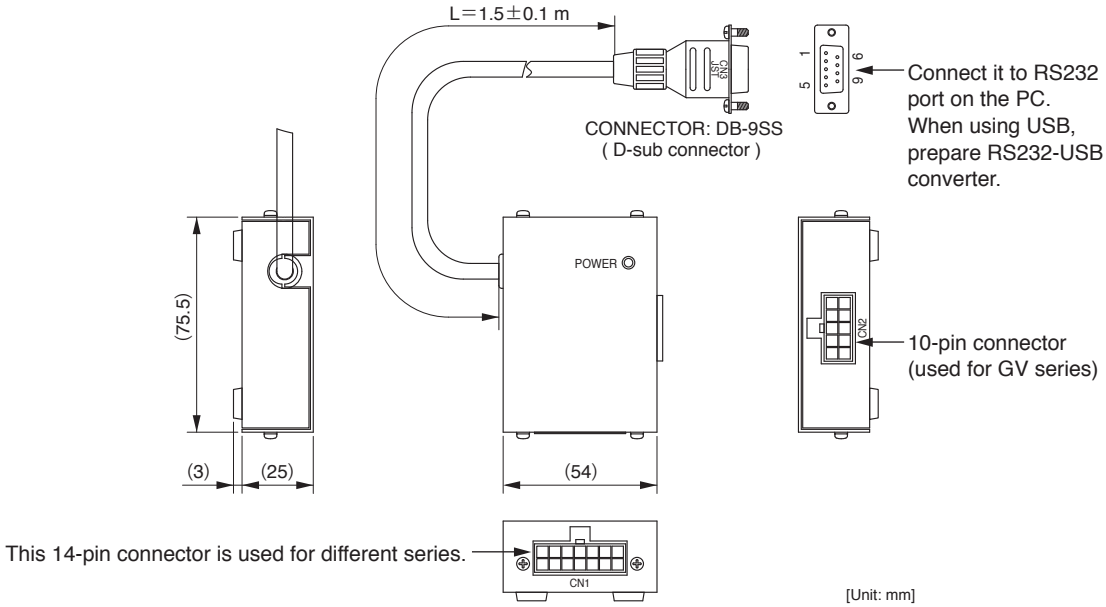
①Motor side motor connector (Tyco Electronics.)
Connector : 172159-1
Connector pin : 170366-1 〔for AWG 20〕
②Motor side sensor connector (Molex Inc.)
Connector : 39-01-2066 (5559-06P-210)
Connector pin : 39-00-0049 (5558T2L) 〔for AWG 26〕
③Brushless amplifier side connector (Molex Inc.)
Connector : 39-01-2085 (5557-08R-210)
Connector pin : 39-00-0039 (5556TL) 〔for AWG 20〕
39-00-0047 (5556T2L) 〔for AWG 26〕

<Connector wiring of amplifier side>

Pin No.	Signal	Wire color	Wire size
1	U	Red	AWG20
2	V	White	AWG20
3	W	Black	AWG20
4	Vcc	White	AWG26
5	CS1	Red	AWG26
6	CS2	Blue	AWG26
7	CS3	Yellow	AWG26
8	0V	Black	AWG26
M4 round terminal	E	Green/Yellow	AWG20

PC connection cable (10-pin D-sub connector pin 1.5 m) GV KV GP

Optional parts number	Length (L)
DV0P4140	1.5 m



Communication software GV KV GP

Model No.	
PANATERM for BL	Can be downloaded from our web site, free of charge. http://industrial.panasonic.com/ww/i_e/25000/motor_fa_e/motor_fa_e.html

Connector Kit/ Cable/ External speed setter

Power supply connector kit GV KV (50 W, 100 W) GP

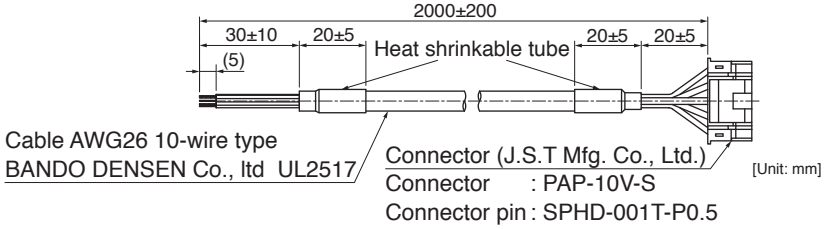
Optional part number	Name	Manufacturer's parts No.	Qty.	Manufacturer	Note
DV0P2870	Connector	39-01-2105 (5557-10R-210)	1	Molex Inc	Fits to power supply connector (POWER)
	Connector pin	39-00-0060 (5556PBTL)	6		

• 39-01-2105 (5557-10R-210)

Control signal cable (Cable with an I/O connector) GV KV GP

Optional parts number	Length (L)
DV0PM20076	2 m

* Do not connect anything to the pin no.4 and pin no.7 in case of use the GP series.



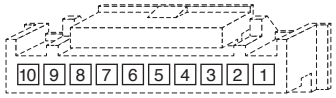
<For your reference>
For tools such as crimp tools necessary to assemble the cable, access the connector manufacturer's web site or consult the manufacturer: refer to p. 74 "List of peripheral equipment manufacturers".

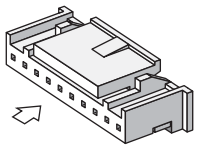
Option

I/O connector kit GV KV GP

Optional part number	Name	Manufacturer's parts No.	Qty.	Manufacturer	Note
DV0PM20070	Connector	PAP-10V-S	1	J.S.T Mfg.Co.,Ltd.	Fits to I/O connector
	Connector pin	SPHD-002T-P0.5	10		

• PAP-10V-S



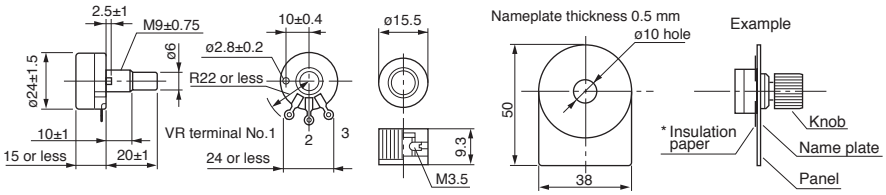


External speed setter GV KV

Optional part number
DV0PM20078

5 kΩ B characteristic 1/4 W

[Unit: mm]

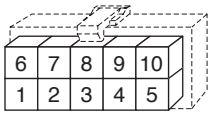


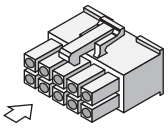
* Insert the insulation paper to positively isolate the terminals and chassis.

Panel connector kit (Fits to Console A) GV KV

Optional part number	Name	Manufacturer's parts No.	Qty.	Manufacturer	Note
DV0P3610	Connector	39-01-2105 (5557-10R-210)	1	Molex Inc	Fits to Console A
	Connector pin	39-00-0047 (5556T2L)	10		

• 39-01-2105 (5557-10R-210)

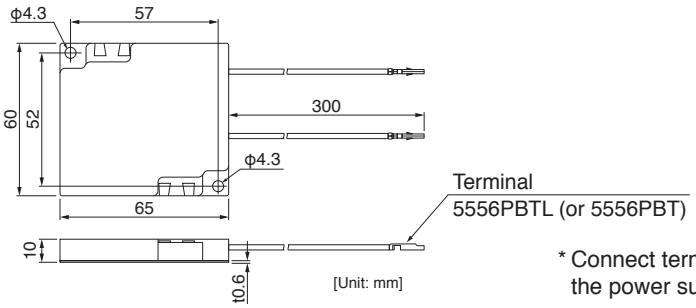




External regenerative resistor GV KV GP

Optional parts number	Specifications	Manufacturer
DV0P2890	100 V, 50 Ω 10 W	Iwaki Musen Kenkyusho Co., Ltd
DV0PM20068	200 V, 200 Ω 10 W	

• DV0P2890, DV0PM20068



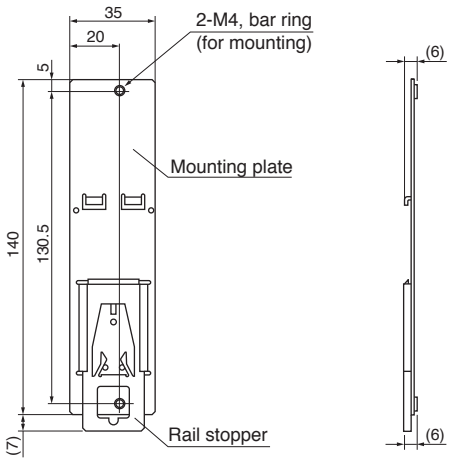
* Connect terminals to pins No. 3 and No. 5 of the power supply connector, respectively.

<For your reference>

For tools such as crimp tools necessary to assemble the cable, access the connector manufacturer's web site or consult the manufacturer: refer to p. 74 "List of peripheral equipment manufacturers".

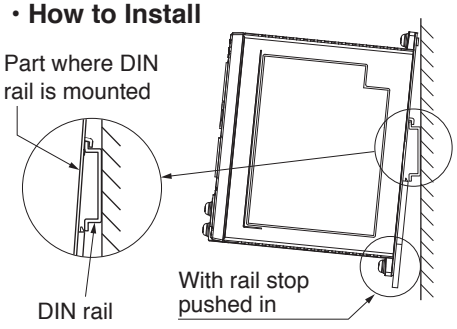
DIN rail mounting unit GV KV (50 W, 100 W) GP

Optional part number
DV0P3811

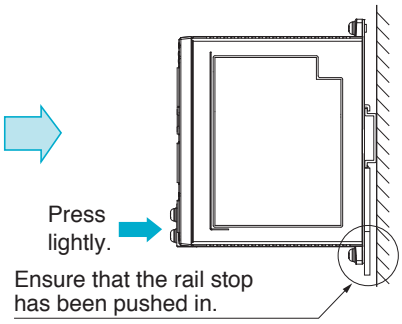


[Unit: mm]

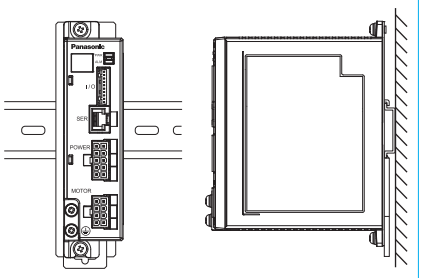
• How to Install



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

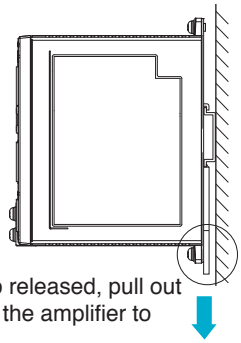


Press lightly the lower part of the main body of amplifier.

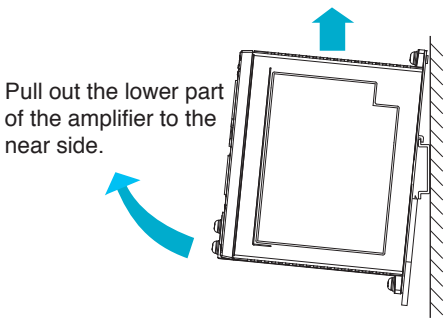


Amplifier mounted to DIN rail

• Removing from DIN Rail



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

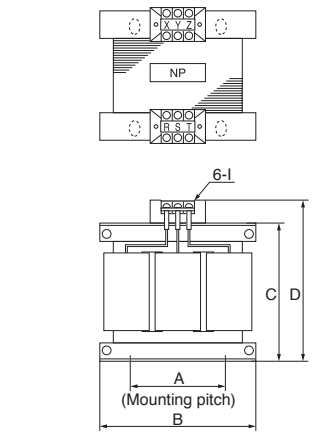


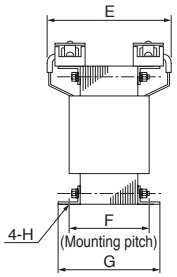
By lifting the amplifier, you can remove it from the DIN rail.

Option

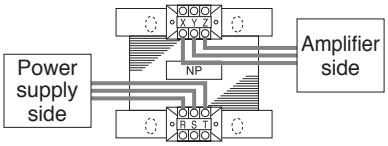
Reactor GV KV GP

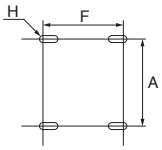
Fig.1





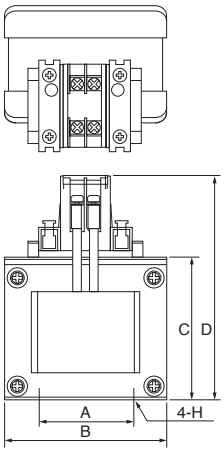
• **Wiring of the reactor**
<3-Phase 200 V>

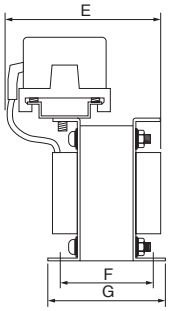




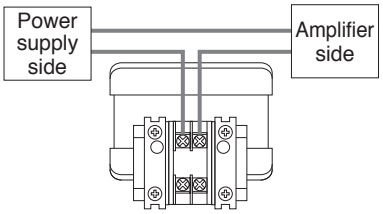
F: Center-to-center distance on outer circular arc

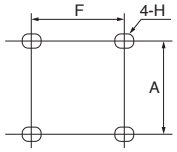
Fig.2





• **Wiring of the reactor**
<Single phase 100 V, 200 V>





F: Center-to-center distance on slotted hole

[Unit: mm]

	Optional parts number	A	B	C	D	E (Max)	F	G	H	I	Inductance (mH)	Rated current (A)
Fig.1	**DV0P220**	65±1	125±1	(93)	136Max	155	70+3/−0	85±2	4-7□×12	M4	6.81	3
Fig.2	**DV0P227**	55±0.7	80±1	66.5±1	110Max	90	41±2	55±2	4-5□×10	M4	4.02	5
	DV0P228	55±0.7	80±1	66.5±1	110Max	95	46±2	60±2	4-5□×10	M4	2	8

* For applicability of reactor, refer to the corresponding table on p. 95.

Harmonic restraint

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

With products for Japan, on September, 1994, “Guidelines for harmonic restraint on heavy consumers who receive power through high voltage system or extra high voltage system” and “Guidelines for harmonic restraint on household electrical appliances and general-purpose articles” established by the Agency for Natural Resources and Energy of the Ministry of Economy, Trade and Industry (the ex-Ministry of International Trade and Industry). According to those guidelines, the Japan Electrical Manufacturers’ Association (JEMA) have prepared technical documents (procedure to execute harmonic restraint:

JEM-TR 198, JEM-TR 199 and JEM-TR 201) and have been requesting the users to understand the restraint and to cooperate with us. On January, 2004, it has been decided to exclude the general-purpose inverter and servo driver from the “Guidelines for harmonic restraint on household electrical appliances and general-purpose articles”. After that, the “Guidelines for harmonic restraint on household electrical appliances and general-purpose articles” was abolished on September 6, 2004.

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

1. All types of the general-purpose inverters and servo drivers used by specific users are under the control of the “Guidelines for harmonic restraint on heavy consumers who receive power through high voltage system or extra high voltage sytem”. 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 brushless amplifier.

List of peripheral equipments

Manufacturer	Tel No. / Home page	Peripheral components
TDK Corporation	+81-3-5201-7229 http://www.tdk.co.jp/	Noise filter for signal lines
Okaya Electric Industries Co. Ltd.	+81-3-4544-7040 http://www.okayatec.co.jp/	Surge absorber Noise filter
Sensata Technologies Japan Limited	+81-49-283-7575 www.sensata.com/japan	Circuit breaker (MCCB)
Japan Molex Inc.	+81-462-65-2313 http://www.molex.co.jp	Connector
J.S.T. Mfg. Co., Ltd.	+81-45-543-1271 http://www.jst-mfg.com/index_i.html	
Iwaki Musen Kenkyusho Co., Ltd.	+81-44-833-4311 http://www.iwakimusen.co.jp/	Regenerative resistor

* This list is for reference only and subject to change without notice.

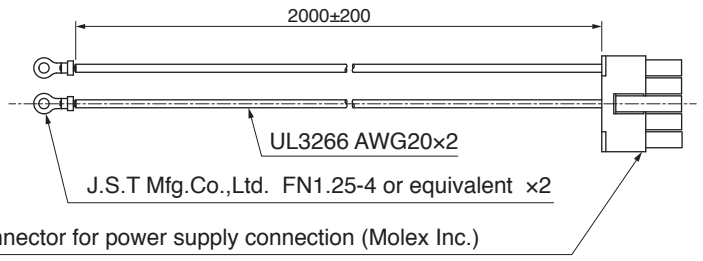
Power cable (single phase 100 V, 200 V) with connector GV KV (50 W, 100 W) GP

When the following part number is specified in the order, the power cable is delivered with the product.

		50 W	90 W	100 W	130 W
GV series	100 V	**MBEG5A1BCVC**	**MBEG9A1BCVC**	—	**MBEG1E1BCVC**
	200 V	**MBEG5A5BCVC**	**MBEG9A5BCVC**		**MBEG1E5BCVC**
KV series	100 V	**MBEK5A1BCVC**	—	**MBEK011BCVC**	—
	200 V	**MBEK5A5BCVC**		**MBEK015BCVC**	
GP series	100 V	**MBEG5A1BCPC**	**MBEG9A1BCPC**	—	**MBEG1E1BCPC**
	200 V	**MBEG5A5BCPC**	**MBEG9A5BCPC**		**MBEG1E5BCPC**

- When supplying 3-phase power source to a 200 V brushless amplifier, use the supplied power cable and connect 2 conductors to L1 and L2.
- When supplying 3-phase power, use a power connection kit and connect three conductors to L1, L2 and L3.
- For location of L1, L2 and L3, refer to the wiring diagram on pages 17, 19 and 21 (GV series), pages 55, 57 and 59 (GP series).

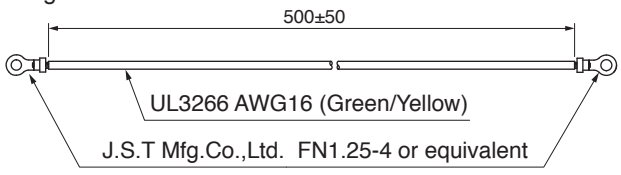
■ Cable specification



[Unit: mm]

Connector for power supply connection (Molex Inc.)
Connector : 39-01-2105 (5557-10R-210)
Connector pin : 39-00-0038 (5556T) or 39-00-0039 (5556T2)

• Grounding wire



MEMO

Information

Contents

Guide to the international system of units (SI)

Organization of the system of units

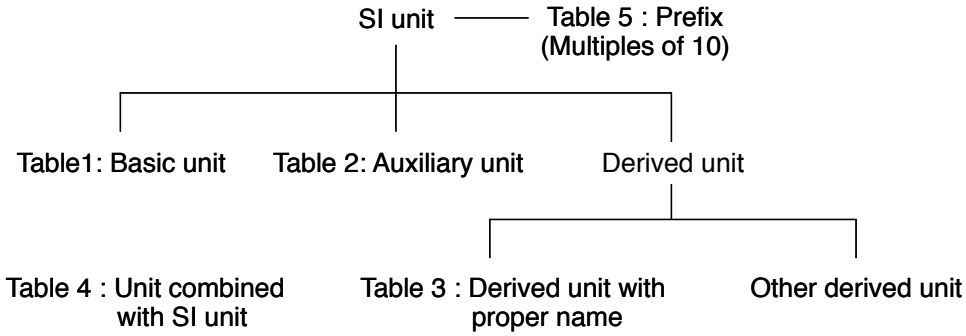


Table1: Basic unit

Quantity	Name of unit	Symbol of unit
Length	meter	m
Weight	kilogram	kg
Time	second	s
Current	ampere	A
Thermodynamic temperature	kelvin	K
Amount of substance	mol	mol
Luminous intensity	candela	cd

Table 2: Auxiliary unit

Quantity	Name of unit	Symbol of unit
Plane angle	radian	rad
Solid angle	steradian	sr

Table 3: Major derived unit with proper name

Quantity	Name	Symbol of unit	Derivation from basic unit, auxiliary unit or other derived unit
Frequency	hertz	Hz	1 Hz = 1 s^{-1}
Force	newton	N	1 N = 1 kg·m/s^2
Pressure, Stress	pascal	Pa	1 Pa = 1 N/m^2
Energy, Work, Amount of heat	joule	J	1 J = 1 N·m
Amount of work, Work efficiency, Power, Electric power	watt	W	1 W = 1 J/s
Electric charge, Amount of electricity	coulomb	C	1 C = 1 A·s
Electric potential, Potential difference, Voltage, Electromotive force	volt	V	1 V = 1 J/C
Electrostatic capacity, Capacitance	farad	F	1 F = 1 C/V
Electric resistance	ohm	Ω	1 Ω = 1 V/A
Electric conductance	siemens	S	1 S = 1 $Ω^{-1}$
Magnetic flux	weber	Wb	1 Wb = 1 V·s
Magnetic flux density, Magnetic induction	tesla	T	1 T = 1 Wb/m^2
Inductance	henry	H	1 H = 1 Wb/A
Degree centigrade (Celsius)	degree centigrade (Celsius)/ degree	˚C	t ˚C = (t+273.15) K
Luminous flux	lumen	lm	1 lm = 1 cd·sr
Illuminance	lux	lx	1 lx = 1 lm/m^2

Table 4: Unit combined with SI unit

Quantity	Name	Symbol of unit
Time	minute	min
	hour	h
	day	d
Plane angle	degree	°
	minute	'
	second	"
Volume	liter	l, L
Weight	ton	t

Table 5: Prefix

Multiples powered to unit	Prefix	
	Name	Symbol
10^{18}	exa	E
10^{15}	peta	P
10^{12}	tera	T
10^{9}	giga	G
10^{6}	mega	M
10^{3}	kilo	k
10^{2}	hecto	h
10	deca	da
10^{-1}	deci	d
10^{-2}	centi	c
10^{-3}	milli	m
10^{-6}	micro	μ
10^{-9}	nano	n
10^{-12}	pico	p
10^{-15}	femto	f
10^{-18}	atto	a

Major compatible unit

Quantity	Symbol of conventional unit	Symbol of SI unit and compatible unit	Conversion value
Length	μ (micron)	μm	1 μ = 1 μm (micrometer)
Acceleration	Gal	m/s^2	1 Gal = 10^{-2} m/s^2
	G	m/s^2	1 G = 9.80665 m/s^2
Frequency	c/s, c	Hz	1 c/s = Hz
Revolving speed, Number of revolutions	rpm	s^{-1} or min^{-1}, r/min	1 rpm = 1 min^{-1}
Weight	kgf	–	Same value
Mass	–	kg	
Weight flow rate	kgf/s	–	Same value
Mass flow rate	–	kg/s	
Specific weight	kgf/m^3	–	Same value
Density	–	kg/m^3	
Specific volume	m^3/kgf	m^3/kg	Same value
Load	kgf	N	1 kgf = 9.80665 N
Force	kgf	N	1 kgf = 9.80665 N
	dyn	N	1 dyn = 10^{-5} N
Moment of force	kgf-m	N·m	1 kgf-m = 9.806 N·m
Pressure	kgf/cm^2	Pa, bar (1) or kgf/cm^2	1 kgf/cm^2 = 9.80665 x 10^4 Pa = 0.980665 bar
	at (Engineering atmospheric pressure)	Pa	1 at = 9.80665 x 10^4 Pa
	atm (Atmospheric pressure)	Pa	1 atm = 1.01325 x 10^5 Pa
	mH_2o, mAq	Pa	1 mH_2O = 9.80665 x 10^3 Pa
	mmHg	Pa or mmHg (2)	1 mmHg = 133.322 Pa
	Torr	Pa	
Stress	kgf/mm^2	Pa or N/m^2	1 kgf/mm^2 = 9.80665 x 10^6 Pa =9.80665 x 10^6 N/m^2
	kgf/cm^2	Pa or N/m^2	1 kgf/cm^2 = 9.80665 x 10^4 Pa = 9.80665 x 10^4 N/m^2
Elastic modulus	kgf/m^2	Pa or N/m^2	1 kgf/m^2 = 9.80665 Pa = 9.80665 N/m^2 1 kgf/cm^2 = 9.80665 x 10^4 N/m^2
Energy, Work	kgf-m	J (joule)	1 kgf·m = 9.80665 J
	erg	J	1 erg = 10^{-7} J
Work efficiency, Power	kgf-m/s	W (watt)	1 kgf-m/s = 9.80665 W
	PS	W	1 PS = 0.7355 kW
Viscosity	PP	Pa·s	1 P = 0.1 Pa·s
Kinetic viscosity	St	mm^2/s	10^{-2} St = 1 mm^2/s
Thermodynamic temperature	K	K (kelvin)	1 K = 1 K
Temperature interval	deg	K (3)	1 deg = 1 K
Amount of heat	cal	J	1 cal = 4.18605 J
Heat capacity	cal/˚C	J/K (3)	1 cal/˚C = 4.18605 J/K
Specific heat, Specific heat capacity	cal/ (kgf·˚C)	cal/ (kgf·K)(3)	1 cal/ (kgf·˚C) = 4.18605 J/ (kg·K)
Entropy	cal/K	J/K	1 cal/K = 4.18605 J/K
Specific entropy	cal/ (kgf·K)	J/(kg·K)	1 cal/ (kgf·K) = 4.18605 J/ (kg·K)
Internal energy (Enthalpy)	cal	J	1 cal = 4.18605 J
Specific internal energy (Specific enthalpy)	cal/kgf	J/kg	1 cal/kgf = 4.18605 J/kg
Heat flux	cal/h	W	1 kcal/h = 1.16279 W
Heat flux density	cal/ ($h·m^2$)	W/m^2	1 kcal/ ($h·m^2$) = 1.16279 W/m^2
Thermal conductivity	cal/ (h·m·˚C)	W/ (m·K) (3)	1 kcal/ (h·m·˚C) = 1.16279 W/ (m·K)
Coefficient of thermal conductivity	cal/ ($h·m^2$·˚C)	W/ (m^2·K) (3)	1 kcal/ ($h·m^2$·˚C) = 1.16279 W/ (m^2·K)
Intensity of magnetic field	Oe	A/m	1 Oe = 10^3 / (4π) A/m
Magnetic flux	Mx	Wb (weber)	1 Mx = 10^{-8} Wb
Magnetic flux density	Gs,G	T (tesla)	1 Gs = 10^{-4} T

Note
(1) Applicable to liquid pressure. Also applicable to atmospheric pressure of meteorological data, when “bar” is used in international standard.
(2) Applicable to scale or indication of blood pressure manometers.
(3) “˚C” can be substituted for “K”.

Selecting motor capacity

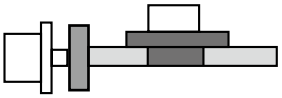
Flow of motor selection

1. Definition of mechanism to be driven by motor.

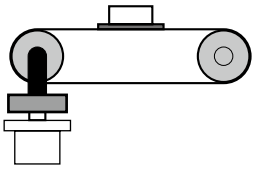
Define details of individual mechanical components (ball screw length, lead and pulley diameters, etc.)

<Typical mechanism>

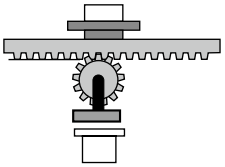
Ball screw mechanism



Belt mechanism

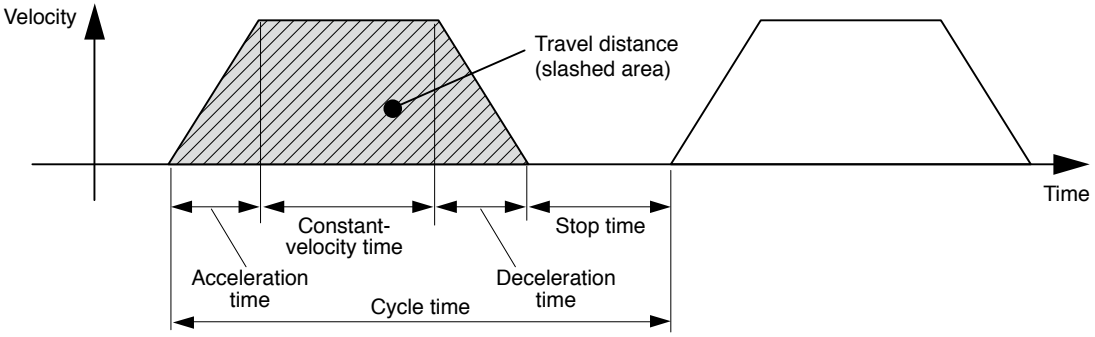


Rack & pinion, etc.



2. Definition of operating pattern.

Acceleration/deceleration time, Constant-velocity time, Stop time, Cycle time, Travel distance



Note) Selection of motor capacity significantly varies depending on the operating pattern.
The motor capacity can be reduced if the acceleration/deceleration time and stop time are set as long as possible.

3. Calculation of load inertia and inertia ratio.

Calculate load inertia for each mechanical component. (Refer to "General inertia calculation method" described later.)

Divide the calculated load inertia by the inertia of the selected motor to check the inertia ratio.

For calculation of the inertia ratio, note that the catalog value of the motor inertia is expressed as "× 10^{-4} kg·m^2".

4. Calculation of motor velocity

Calculate the motor velocity from the moving distance, acceleration / deceleration time and constant-velocity time.

5. Calculation of torque

Calculate the required motor torque from the load inertia, acceleration/deceleration time and constant-velocity time.

6. Calculation of motor

Select a motor that meets the above 3 to 5 requirements.

Description on the items related to motor selection

1. Torque

(1) Peak torque

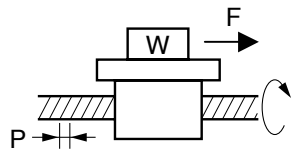
Indicate the maximum torque that the motor requires during operation (mainly in acceleration and deceleration steps). The reference value is 80 % or less of the maximum motor torque. If the torque is a negative value, a regenerative discharge resistor may be required.

(2) Traveling torque, Stop holding torque

Indicates the torque that the motor requires for a long time. The reference value is 80 % or less of the rated motor torque. If the torque is a negative value, a regenerative discharge resistor may be required.

Traveling torque calculation formula for each mechanism

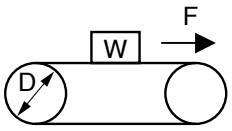
Ball screw mechanism



Traveling torque $T_f = \frac{P}{2\pi\eta}(\mu g W + F)$

W : Weight [kg]
P : Lead [m]
F : External force [N]
η : Mechanical efficiency
μ : Coefficient of friction
g : Acceleration of gravity 9.8 [m/s²]

Belt mechanism



Traveling torque $T_f = \frac{D}{2\eta}(\mu g W + F)$

W : Weight [kg]
P : Pulley diameter [m]
F : External force [N]
η : Mechanical efficiency
μ : Coefficient of friction
g : Acceleration of gravity 9.8 [m/s²]

(3) Effective torque

Indicates a root-mean-square value of the total torque required for running and stopping the motor per unit time. The reference value is approx. 80 % or less of the rated motor torque.

$$Trms = \sqrt{\frac{T_a^2 \times t_a + T_f^2 \times t_b + T_d^2 \times t_d}{t_c}}$$

Ta : Acceleration torque [N·m]
Tf : Traveling torque [N·m]
Td : Deceleration torque [N·m]
ta : Acceleration time [s]
tb : Constant-velocity time [s]
td : Deceleration time [s]
tc : Cycle time [s] (Run time + Stop time)

2. Motor velocity

Maximum velocity

Maximum velocity of motor in operation: The reference value is the rated velocity or lower value.
When the motor runs at the maximum velocity, you must pay attention to the motor torque and temperature rise.
For actual calculation of motor velocity, see "Example of motor selection" described later.

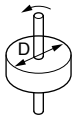
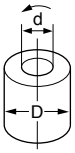
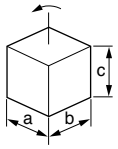
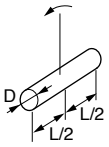
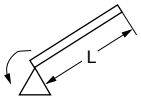
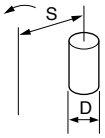
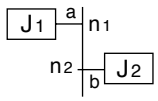
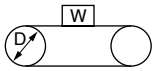
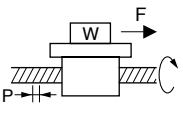
Selecting motor capacity

Description on the items related to motor selection

3. Inertia and inertia ratio

Inertia is like the force to retain the current moving condition.
Inertia ratio is calculated by dividing load inertia by rotor inertia.
Generally, for motors with 750 W or lower capacity, the inertia ratio should be “20” or less. For motors with 1000 W or higher capacity, the inertia ratio should be “10” or less.
If you need quicker response, a lower inertia ratio is required.
(For example, when the motor takes several seconds in acceleration step, the inertia ratio can be further increased.)

General inertia calculation method

Shape	J calculation formula	Shape	J calculation formula
Disk 	$J = \frac{1}{8} WD^2$ [kg·m²] **W** : Weight [kg] **D** : Outer diameter [m]	**Hollow cylinder** 	$J = \frac{1}{8} W(D^2 + d^2)$ [kg·m²] **W** : Weight [kg] **D** : Outer diameter [m] **d** : Inner diameter [m]
Prism 	$J = \frac{1}{12} W\ (a^2 + b^2)$ [kg·m²] **W** : Weight [kg] **a, b, c** : Side length [m]	**Uniform rod** 	$J = \frac{1}{48} W(3D^2 + 4L^2)$ [kg·m²] **W** : Weight [kg] **D** : Outer diameter [m] **L** : Length [m]
Straight rod 	$J = \frac{1}{3} WL^2$ [kg·m²] **W** : Weight [kg] **L** : Length [m]	**Separated rod** 	$J = \frac{1}{8} WD^2 + WS^2$ [kg·m²] **W** : Weight [kg] **D** : Outer diameter [m] **S** : Distance [m]
Reduction gear 	Inertia on shaft "a" $J = J_1 + (\frac{n_2}{n_1})^2 J_2$ [kg·m²] n_1 : A rotational speed of a shaft [r/min] n_2 : A rotational speed of b shaft [r/min]		
Conveyor 	$J = \frac{1}{4} WD^2$ [kg·m²] **W** : Workpiece weight on conveyor [kg] **D** : Drum diameter [m] * Excluding drum J	**Ball screw** 	$J = J_B + \frac{W \cdot P^2}{4\pi^2}$ [kg·m²] **W** : Weight [kg] **P** : Lead [m] J_B : J of ball screw

If weight (W [kg]) is unknown, calculate it with the following formula:

Weight W [kg] = Density ρ [kg/m³] × Volume V [m³]

Density of each material

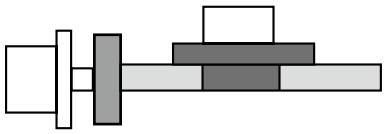
Iron ρ = 7.9 × 103 [kg/m³] Aluminum ρ = 2.8 × 103 [kg/m³]

Brass ρ = 8.5 × 103 [kg/m³]

To drive ball screw mechanism

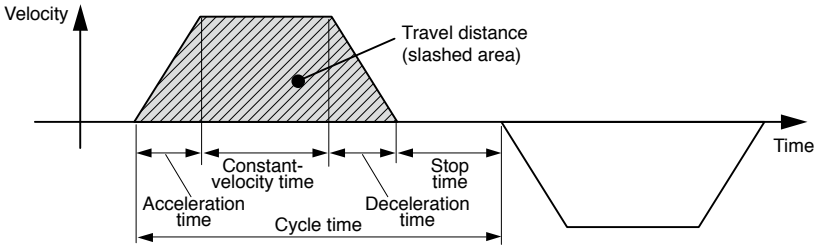
1. Example of motor selection for driving ball screw mechanism

Workpiece weight W_A = **10** [kg]
Ball screw length B_L = **0.5** [m]
Ball screw diameter B_D = **0.02** [m]
Ball screw lead B_P = **0.02** [m]
Ball screw efficiency B_η = **0.9**
Travel distance **0.3** [m]
Coupling inertia $J_C = 10 \times 10^{-6}$ [kg·m²] (Use manufacturer-specified catalog value, or calculation value.)



2. Running pattern :

Acceleration time t_a = **0.7** [s]
Constant-velocity time t_b = **1.3** [s]
Deceleration time t_d = **0.7** [s]
Cycle time t_c = **4** [s]
Travel distance **0.3** [m]



3. Ball screw weight

$$B_W = \rho \times \pi \times \left(\frac{B_D}{2}\right)^2 \times B_L = 7.9 \times 10^3 \times \pi \times \left(\frac{0.02}{2}\right)^2 \times 0.5$$
$$= 1.24 \text{ [kg]}$$

4. Load inertia

$$J_L = J_C + J_B + J_W = J_C + \frac{1}{8} B_W \times B_D^2 + \frac{W_A \cdot B_P^2}{4\pi^2}$$
$$= 0.00001 + (1.24 \times 0.02^2) / 8 + 10 \times 0.02^2 / 4\pi^2$$
$$= 1.73 \times 10^{-4} \text{ [kg·m}^2\text{]}$$

5. Provisional motor selection

In case of GP series 50 W, gear ratio 1/5. Permissible load inertia moment = 3.42×10^{-4} [kg·m²]

6. Inertia moment compared

Permissible load inertia moment = 3.42×10^{-4} [kg·m²] > Load inertia
= 1.73×10^{-4} [kg·m²] Cleared specification

7. Calculation of maximum velocity (Vmax)

$$\frac{1}{2} \times \text{Acceleration time} \times \text{Vmax} + \text{Constant-velocity time} \times \text{Vmax} + \frac{1}{2} \times \text{Deceleration time} \times \text{Vmax} = \text{Travel distance}$$
$$\frac{1}{2} \times 0.7 \times \text{Vmax} + 1.3 \times \text{Vmax} + \frac{1}{2} \times 0.7 \times \text{Vmax} = 0.3$$
$$2.0 \times \text{Vmax} = 0.3$$
$$\text{Vmax} = 0.3 / 2.0 = 0.15 \text{ [m/s]}$$

8. Calculation of motor velocity (N [r/min]) Ball screw lead per resolution: B_P = 0.02 [m]

N = 0.15 / 0.02 = 7.5 [r/s]
= 7.5 × 60 = 450 [r/min] < 600 [r/min] (rated rotation speed of GP series 50 W, gear ratio 1/5)

9. Calculation of torque

Traveling torque
$$T_f = \frac{B_P}{2\pi B_\eta} (\mu g W_A + F) = \frac{0.02}{2\pi \times 0.9} (0.1 \times 9.8 \times 10 + 0)$$
$$= 0.035 \text{ [N·m]}$$

Acceleration torque
$$T_a = \frac{J_L \times 2\pi N \text{ [r/s]}}{\text{Acceleration time [s]}} + \text{Traveling torque} = \frac{1.73 \times 10^{-4} \times 2\pi \times 7.5}{0.7} + 0.035$$
$$= 0.012 + 0.035 = 0.047 \text{ [N·m]}$$

Deceleration torque
$$T_d = \frac{J_L \times 2\pi N \text{ [r/s]}}{\text{Deceleration time [s]}} - \text{Traveling torque} = \frac{1.73 \times 10^{-4} \times 2\pi \times 7.5}{0.7} - 0.035$$
$$= 0.012 - 0.035 = -0.023 \text{ [N·m]}$$

Selecting motor capacity

10. Verification of maximum torque

Acceleration torque = T_a

= 0.047 [N·m] < 0.71 [N·m] (GP series 50 W, 1/5 gear, Permissible torque at output shaft of gear head)

11. Verification of effective torque

$$Trms = \sqrt{\frac{T_a^2 \times t_a + T_f^2 \times t_b + T_d^2 \times t_d}{t_c}}$$

$$= \sqrt{\frac{0.047^2 \times 0.7 + 0.035^2 \times 1.3 + (-0.023)^2 \times 0.7}{4}}$$

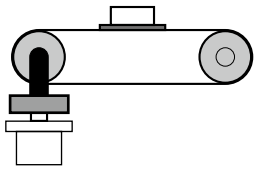
= 0.030 [N·m] < 0.71 [N·m] (GP series 50 W, 1/5 gear, Permissible torque at output shaft of gear head)

12. Load torque, load inertia moment are cleared specification.

Example of motor selection for timing belt mechanism

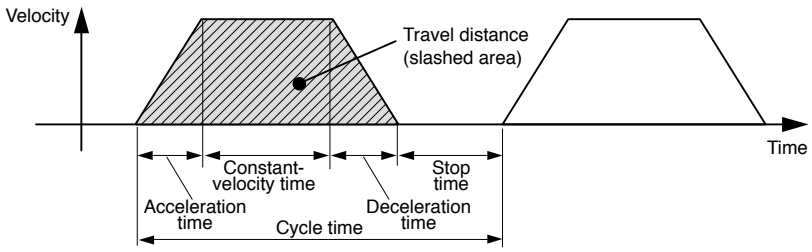
1.Mechanism

Workpiece weight	W_A= **2** [kg] (including belt)
Pulley diameter	P_D = **0.05** [m]
Pulley weight	W_P= **0.5** [kg] (Use manufacturer-specified catalog value, or calculation value.)
Mechanical efficiency	B_η = **0.8**
Coupling inertia	J_C = **0** (Direct connection to motor shaft)



2. Running pattern

Acceleration time	t_a = **1.0** [s]
Constant-velocity time	t_b = **1.0** [s]
Deceleration time	t_d = **1.0** [s]
Cycle time	t_c = **4** [s]
Travel distance	**1** [m]



3. Load inertia

$J_L = J_C + J_B + J_P$

$$= J_C + \frac{1}{4} W_A \times P_D^2 + \frac{1}{8} W_P \times P_D^2 \times 2$$

$$= 0 + \frac{1}{4} \times 2 \times 0.05^2 + \frac{1}{8} \times 0.5 \times 0.05^2 \times 2$$

$= 0.00156 = 15.6 \times 10^{-4}$ [kg·m²]

4. Provisional motor selection

In case of GP series 50 W, gear ratio 1/15. Permissible load inertia moment = 30.6×10^{-4} [kg·m²]

5. Inertia moment compared

30.6×10^{-4} [kg·m²] > $15.6 - 10^{-4}$ [kg·m²]

6. Calculation of maximum velocity (Vmax)

$\frac{1}{2}$ × Acceleration time × Vmax + Constant-velocity time × Vmax + $\frac{1}{2}$ × Deceleration time × Vmax = Travel distance

$\frac{1}{2} \times 1.0 \times Vmax + 1.0 \times Vmax + \frac{1}{2} \times 1.0 \times Vmax = 1$

$2.0 \times Vmax = 1$

$Vmax = 1 / 2.0 = 0.5$ [m/s]

7. Calculation of motor velocity (N [r/min])

A single rotation of pulley : $\pi \times \mathbf{P_D} = 0.157$ [m]

$N = 0.5 / 0.157 = 3.18$ [r/s]

$= 3.18 \times 60 = 191$ [r/min] $<$ 200 [r/min] (rated rotation speed of GP series 50 W, gear ratio 1/15)

8. Calculation of torque

Traveling torque $\mathbf{T_f} = \frac{\mathbf{P_D}}{2\eta} (\mu g \mathbf{W_A} + \mathbf{F}) = \frac{0.05}{2 \times 0.8} (0.1 \times 9.8 \times 2 + 0)$

$= 0.061$ [N·m]

Acceleration torque $\mathbf{T_a} = \frac{\mathbf{J_L} \times 2\pi N \text{ [r/s]}}{\text{Acceleration time [s]}}$ + Traveling torque

$= \frac{15.6 \times 10^{-4} \times 2\pi \times 3.18}{1.0} + 0.061$

$= 0.031 + 0.061 = 0.092$ [N·m]

Deceleration torque $\mathbf{T_d} = \frac{\mathbf{J_L} \times 2\pi N \text{ [r/s]}}{\text{Deceleration time [s]}}$ – Traveling torque

$= \frac{15.6 \times 10^{-4} \times 2\pi \times 3.18}{1.0} - 0.061$

$= 0.031 - 0.061 = -0.03$ [N·m]

9. Verification of maximum torque

Acceleration torque

$\mathbf{T_a} = 0.092$ [N·m] $<$ 2.2 [N·m] (GP series 50 W, 1/15 gear, Permissible torque at output shaft of gear head)

10. Verification of effective torque

$$Trms = \sqrt{\frac{\mathbf{T_a}^2 \times \mathbf{t_a} + \mathbf{T_f}^2 \times \mathbf{t_b} + \mathbf{T_d}^2 \times \mathbf{t_d}}{\mathbf{t_c}}}$$

$$= \sqrt{\frac{0.092^2 \times 1.0 + 0.061^2 \times 1.0 + (-0.03)^2 \times 1.0}{4}}$$

$= 0.057$ [N·m] $<$ 2.2 [N·m] (GP series 50 W, 1/15 gear, Permissible torque at output shaft of gear head)

11. A GP series 50 W, 1/15 gear selected by following the above procedure will cause no problem.

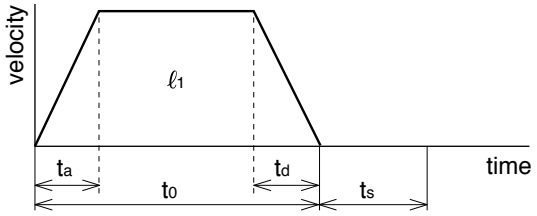
Request sheet for motor selection

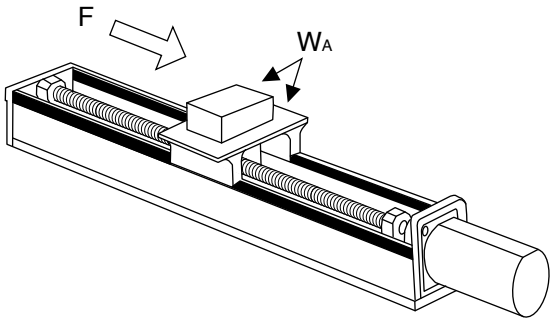
Request for motor selection Ⅰ : Ball screw drive

1. Driven mechanism and running data

1)	Travel distance of the work load per one cycle	ℓ_1:	mm
2)	Cycle time	t_0:	s
	(Fill in items 3) and 4) if required.)		
3)	Acceleration time	t_a:	s
4)	Deceleration time	t_d:	s
5)	Stopping time	t_s:	s
6)	Max. velocity	V:	mm/s
7)	External force	F:	N
8)	Positioning accuracy of the work load	±	mm
9)	Total weight of the work load and the table	W_A:	kg
10)	Power supply voltage		V
11)	Diameter of the ball screw		mm
12)	Total length of the ball		mm
13)	Lead of the ball screw		mm

Running pattern





14)	Traveling direction (horizontal, vertical etc.)	

2. Other data (Fill the details on specific mechanism and its configurations in the following blank.)

Company name :

Department/Section :

Name :

Address :

Tel :

Fax :

E-mail address:

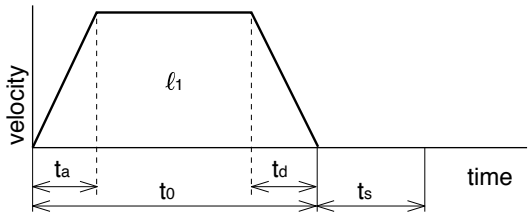
Request sheet for motor selection

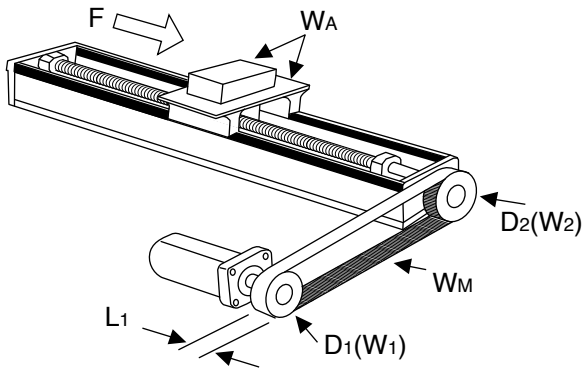
Request for motor selection Ⅱ : Timing pulley + Ball screw drive

1. Driven mechanism and running data

						Motor side	Ball screw side
1)	Travel distance of the work load per one cycle	ℓ_1: mm		15)	Diameter of the pulley	D_1: mm	D_2: mm
2)	Cycle time	t_0: s		16)	Weight of the pulley	W_1: kg	W_2: kg
	(Fill in items 3) and 4) if required.)				(or item 17) and 18))		
3)	Acceleration time	t_a: s		17)	Width of the pulley	L_1: mm	
4)	Deceleration time	t_d: s		18)	Material of the pulley		
5)	Stopping time	t_s: s		19)	Weight of the belt	W_M: kg	
6)	Max. velocity	V: mm/s					
7)	External force	F: N					
8)	Positioning accuracy of the work load	± mm					
9)	Total weight of the work load and the table	W_A: kg					
10)	Power supply voltage	V					
11)	Diameter of the ball screw	mm					
12)	Total length of the ball screw	mm					
13)	Lead of the ball screw	mm					
14)	Traveling direction (horizontal, vertical etc.)						

Running pattern





2. Other data (Fill the details on specific mechanism and its configurations in the following blank.)

Company name :

Department/Section :

Name :

Address :

Tel :

Fax :

E-mail address:

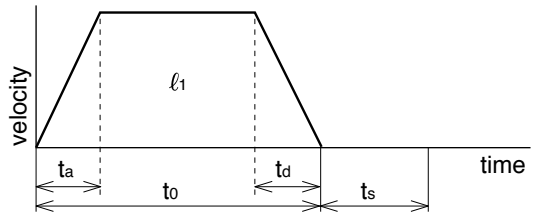
Request sheet for motor selection

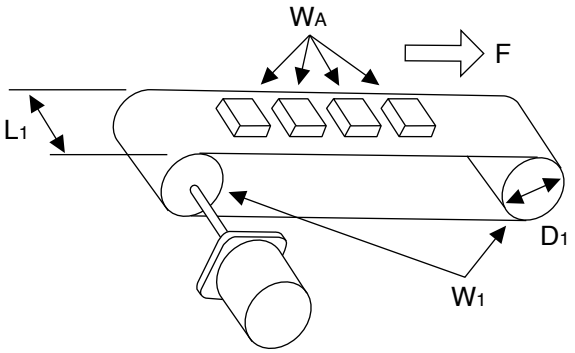
Request for motor selection Ⅲ : Belt drive

1. Driven mechanism and running data

1)	Travel distance of the work load per one cycle	ℓ_1:	mm
2)	Cycle time	t_0:	s
	(Fill in items 3) and 4) if required.)		
3)	Acceleration time	t_a:	s
4)	Deceleration time	t_d:	s
5)	Stopping time	t_s:	s
6)	Max. velocity	V:	mm/s
7)	External force	F:	N
8)	Positioning accuracy of the work load	±	mm
9)	Total weight of the work load	W_A:	kg
10)	Power supply voltage		V
11)	Weight of the belt	W_M:	kg
12)	Diameter of the driving pulley	D_1:	mm
13)	Total weight of the pulley	W_1:	kg

Running pattern





(or item 14) and 15))

14)	Width of the pulley	L_1:	mm
15)	Material of the pulley		
16)	Traveling direction (horizontal, vertical etc.)		

2. Other data (Fill the details on specific mechanism and its configurations in the following blank.)

Company name :

Department/Section :

Name :

Address :

Tel :

Fax :

E-mail address:

Request sheet for motor selection

Request for motor selection Ⅳ : Timing pulley + Belt drive

1. Driven mechanism and running data

1)	Travel distance of the work load per one cycle	ℓ_1:	mm
2)	Cycle time	t_0:	s

(Fill in items 3) and 4) if required.)

3)	Acceleration time	t_a:	s
4)	Deceleration time	t_d:	s
5)	Stopping time	t_s:	s
6)	Max. velocity	V:	mm/s
7)	External force	F:	N
8)	Positioning accuracy of the work load	±	mm
9)	Total weight of the work load and the table	W_A:	kg
10)	Power supply voltage		V
11)	Weight of motor side belt	W_M:	kg

		Motor side		Belt side	
12)	Diameter of the pulley	D_1:	mm	D_2:	mm
13)	Weight of the pulley	W_1:	kg	W_2:	kg

(or item 14) and 15))

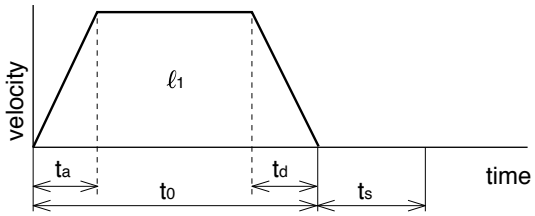
14)	Width of the belt	L_1:	mm
15)	Material of the pulley		

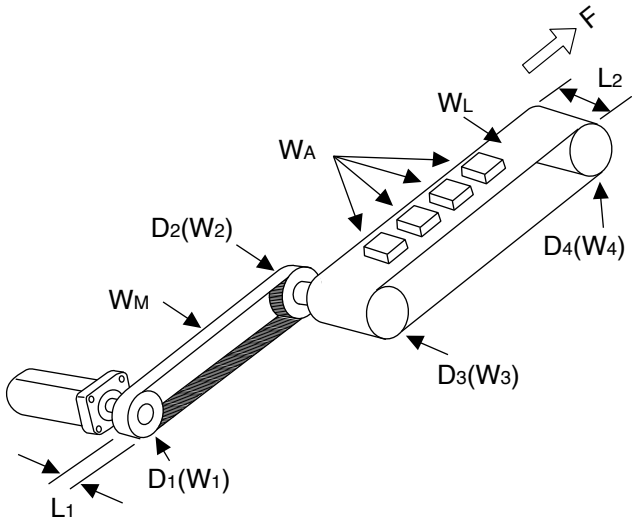
		Motor side		Belt side	
16)	Diameter of the pulley	D_3:	mm	D_4:	mm
17)	Weight of the pulley	W_3:	kg	W_4:	kg

(or item 18) and 19))

18)	Width of the pulley	L_2:	mm
19)	Material of the pulley		
20)	Weight of the belt	W_M:	kg
21)	Traveling direction (horizontal, vertical etc.)		

Running pattern





2. Other data (Fill the details on specific mechanism and its configurations in the following blank.)

Company name :

Department/Section :

Name :

Address :

Tel :

Fax :

E-mail address:

Request sheet for motor selection

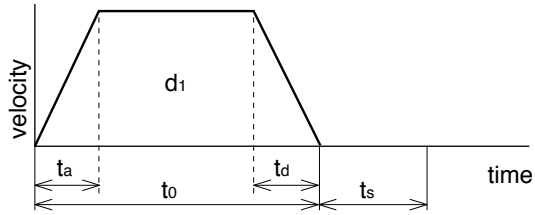
Request for motor selection Ⅴ : Turntable drive

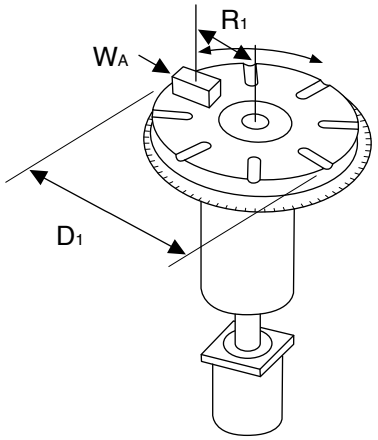
1. Driven mechanism and running data

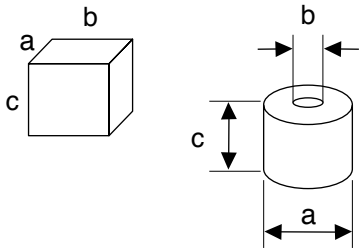
1)	Travel distance of the work load per one cycle	d_1:	deg
2)	Cycle time	t_0:	s
	(Fill in items 3) and 4) if required.)		
3)	Acceleration time	t_a:	s
4)	Deceleration time	t_d:	s
5)	Stopping time	t_s:	s
6)	Max. rotational speed of the table	v:	deg/s
	(or)	V:	r/s
7)	Positioning accuracy of the work load	±	deg
8)	Weight of one work load	W_A:	kg
9)	Driving radius of the center of gravity of the work	R_1:	mm
10)	Diameter of the table	D_1:	mm
11)	Mass of the table	W_1:	kg
12)	Diameter of the table support	T_1:	mm
13)	Power supply voltage		V

		Prism	Cylinder
14)	Dimensions of the work load	a: mm	a: mm
		b: mm	b: mm
		c: mm	c: mm
15)	Number of work loads		pcs

Running pattern







2. Other data (Fill the details on specific mechanism and its configurations in the following blank.)

Company name :

Department/Section :

Name :

Address :

Tel :

Fax :

E-mail address:

Request sheet for motor selection

Request for motor selection Ⅵ : Timing pulley + Turntable drive

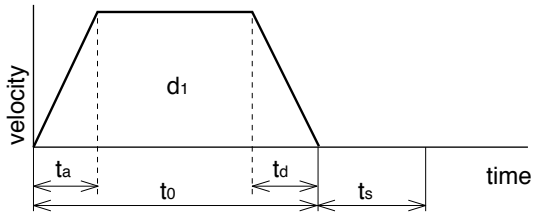
1. Driven mechanism and running data

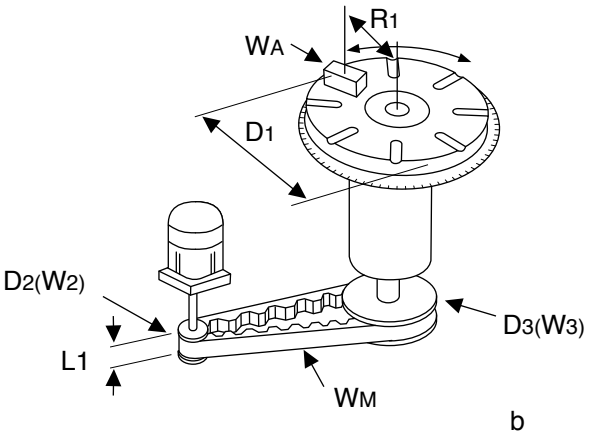
1)	Travel distance of the work load per one cycle	d_1:	deg
2)	Cycle time	t_0:	s
	(Fill in items 3) and 4) if required.)		
3)	Acceleration time	t_a:	s
4)	Deceleration time	t_d:	s
5)	Stopping time	t_s:	s
6)	Max. rotational speed of the table	v:	deg/s
	(or)	V:	r/s
7)	Positioning accuracy of the work load	±	deg
8)	Weight of one work load	W_A:	kg
9)	Driving radius of the center of gravity of the work	R_1:	mm
10)	Diameter of the table	D_1:	mm
11)	Mass of the table	W_1:	kg
12)	Diameter of the table support	T_1:	mm
13)	Power supply voltage		V

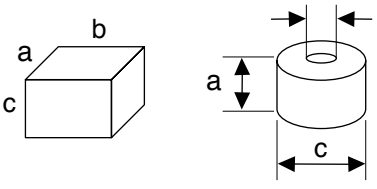
		(Prism)		(Cylinder)	
14)	Dimension of the work load	a:	mm	a:	mm
		b:	mm	b:	mm
		c:	mm	c:	mm
15)	Number of work loads		pcs		

		Motor side		Turntable side	
16)	Diameter of the pulley	D_2:	mm	D_3:	mm
17)	Weight of the pulley	W_2:	kg	W_3:	kg
	(or item 18) and 19))				
18)	Width of the pulley	L_1:	mm		
19)	Material of the pulley				
20)	Weight of the belt	W_M:	kg		

Running pattern







2. Other data (Fill the details on specific mechanism and its configurations in the following blank.)

	Company name :
	Department/Section :
	Name :
	Address :
	Tel :
	Fax :
	E-mail address:

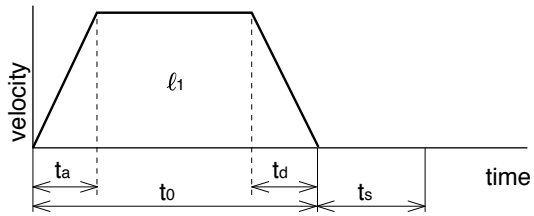
Request sheet for motor selection

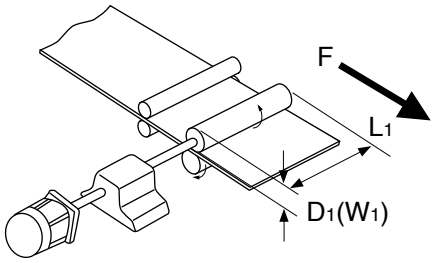
Request for motor selection Ⅶ : Roller feed drive

1. Driven mechanism and running data

1)	Travel distance of the work load per one cycle	ℓ_1:	mm
2)	Cycle time	t_0:	s
	(Fill in items 3) and 4) if required.)		
3)	Acceleration time	t_a:	s
4)	Deceleration time	t_d:	s
5)	Stopping time	t_s:	s
6)	Max. velocity	v:	mm/s
7)	External pulling force	F:	N
8)	Positioning accuracy of the work load	±	mm
9)	Number of rollers		pcs
10)	Power supply voltage		V
11)	Diameter of the roller	D_1:	mm
12)	Mass of the roller	W_1:	kg

Running pattern





(or item 13) and 14))

13)	Width of the roller	L_1:	mm
14)	Material of the roller		

2. Other data (Fill the details on specific mechanism and its configurations in the following blank.)

Company name :

Department/Section :

Name :

Address :

Tel :

Fax :

E-mail address:

Request sheet for motor selection

Request for motor selection Ⅷ : Driving with Rack & Pinion

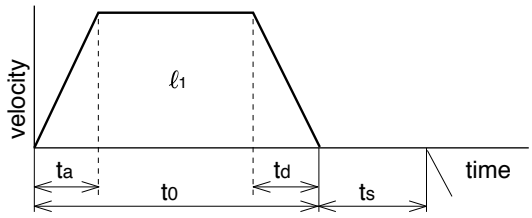
1. Driven mechanism and running data

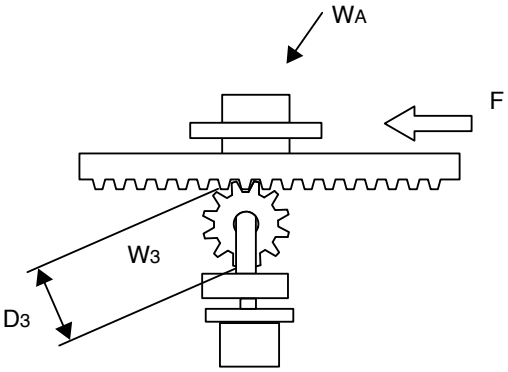
1)	Travel distance of the work load per one cycle	ℓ_1:	mm
2)	Cycle time	t_0:	s

(Fill in items 3) and 4) if required.)

3)	Acceleration time	t_a:	s
4)	Deceleration time	t_d:	s
5)	Stopping time	t_s:	s
6)	Max. velocity	V:	mm/s
7)	External force	F:	N
8)	Positioning accuracy of the work load	±	mm
9)	Total weight of the work load	W_A:	kg
10)	Power supply voltage		V
11)	Diameter of the pinion	D_3:	mm
12)	Mass of the pinion	W_3:	kg
13)	Traveling direction (horizontal, vertical, etc.)		

Running pattern





2. Other data (Fill the details on specific mechanism and its configurations in the following blank.)

Company name :
Department/Section :
Name :
Address :
Tel :
Fax :
E-mail address:

Conformance to international safety standards

Conformance to international standards (KV series : Under application)

EC Directives

The EC directives apply to all such electronic products as those having specific functions and directly sold to general consumers in EU countries. These products are required to meet the EU unified standards and to be furnished with CE marking.
Our brushless motor and brushless amplifier meet the EC Directives for Low Voltage Equipment so that the machine or equipment comprising our brushless motor and brushless amplifier can meet relevant EC Directives.

Conformity to UL Standards

Observe the following conditions of (1) and (2) to make the system conform to UL508C (E164620).
(1) Use the driver in an environment of Pollution Degree 2 or 1 prescribed in IEC60664-1.
(e.g. Install in the control box with IP54 enclosure.)
(2) Make sure to install a circuit breaker or fuse which are UL recognized (Listed Ⓤ marked) between the power supply and the noise filter.
Use a copper cable with temperature rating of 75 ☒ or higher.

EMC Directives

Our brushless motor and brushless amplifier can meet EMC Directives and related standards. However, to meet these requirements, the systems must be limited with respect to configuration and other aspects, e.g. the installation and some special wiring conditions must be met. This means that in some cases machines and equipment comprising our brushless motor and brushless amplifier may not satisfy the requirements for wiring and grounding conditions specified by the EMC Directives. Therefore, conformance to the EMC Directives (especially the requirements for emission noise and noise terminal voltage) should be examined based on the final products that include our system.

	Applicable standards		Installation condition
UL	UL1004 UL508C	Standard for electric motor Standard for electric converter equipment	Class I equipment Pollution degree 2 SCCR *1
CSA (c-UL)	C22.2 No.100	Standard for electric motor	
CE	EN61800-5-1	Adjustable speed electrical power drive systems. – Safety requirements. Electrical, thermal and energy	Overvoltage category II Class I equipment Pollution degree 2
	EN60034-1	Standard for rotary electric machine (low voltage directive)	
	EN60034-5	Standard for rotary electric machine (low voltage directive)	
	EN61800-3	Adjustable speed electrical power drive systems. – EMC requirements and specific test methods	
	EN55011	Radio interference wave characteristics of industrial, scientific, and medical high-frequency equipment	
	EN61000-6-2	Standards for immunity in industrial environment (EMC directive)	
CCC	GB12350	Motor safety standard	
KC	Korea Radio Law *2	Class A Instrument (commercial broadcast communications equipment)	—

*1 SCCR: Symmetrical current 5,000 Arms, Max. 240 V
Motor over-temperature protection is not provided.
Motor over-load-temperature protection shall be provided at the final installation upon required by the NEC (National Electric Code).
*2 Information related to the Korea Radio Law
This brushless amplifier is a Class A commercial broadcasting radio wave generator not designed for home use. The user and dealer should be aware of this fact.

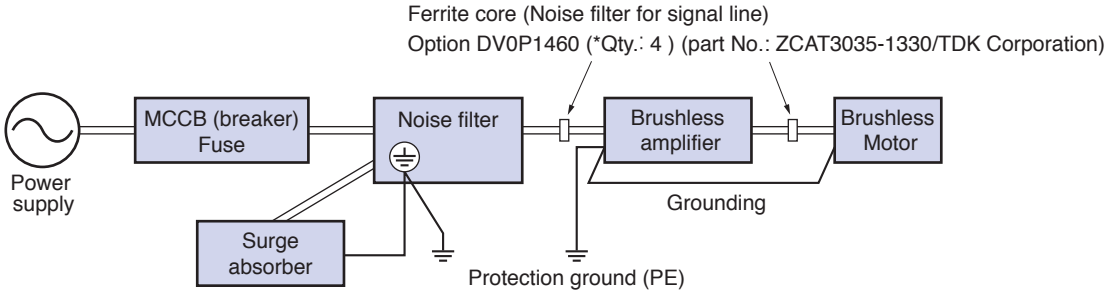
A 급 기기 (업무용 방송통신기자재)
이 기기는 업무용(A 급) 전자파적합기기로서 판매자
또는 사용자는 이 점을 주의하시기 바라며, 가정외의
지역에서 사용하는 것을 목적으로 합니다.

(대상기종 : Brushless Amplifier**)**

Configuration of peripheral equipment

Power supply	• 100 V system: Single phase 100 V ± 10 % to 120 V ± 10 %, 50/60 Hz 200 V system: Single/3-phase 200 V ± 10 % to 240 V ± 10 %, 50/60 Hz • Use the equipment under the environment of overvoltage category II specified by IEC60664-1. In order to obtain overvoltage category III, insert a transformer conforming to EN standard or IEC standard to the input of brushless motor. • Use an electric wire size suitable to EN60204-1.
MCCB (breaker) Fuse	Be sure to connect a specified MCCB certified by IEC standard and UL, or a fuse certified by UL between power supply and noise filter. Observance of this condition allows conformance with UL508C (file No. E164620) .
Noise filter	When installing one noise filter at the power supply for more than one brushless motor used, contact the manufacturer of noise filter.
Surge absorber	Install a surge absorber on the primary side of noise filter. However, in performing the voltage resistance test of machine and equipment, be sure to remove the surge absorber; otherwise, the surge absorber may be ruptured.
Grounding	Be sure to connect the grounding Terminal of brushless amplifier and protective grounding wire (PE) of system for preventing electric shock. Do not tighten the grounding wires together but connect them individually.

Wiring of peripheral equipment



* The ferrite core should insert one or more pieces in an electric wire, respectively.

List of compatible peripheral equipment

Part name	Optional parts number (option)	Manufacturer's parts number	Qty.	Manufacturer	Reference page
Noise filter (single phase 100 V, 200 V)	DV0P4170	SUP-EK5-ER-6	1	OKAYA ELECTRIC IND. CO., LTD.	P.67
Noise filter (3-phase)	DV0PM20042	3SUP-HU10-ER-6	1		
Surge absorber (single phase 100 V, 200 V)	DV0P4190	R•A•V-781BWZ-4	1		
Surge absorber (3-phase)	DV0P1450	R•A•V-781BXZ-4	1		
Noise filter for control signals	DV0P1460	ZCAT3035-1330	4	TDK Corporation	

Table of model numbers and options

GV series

Power supply	Rated rotation speed (r/min)	output (W)	Motor	Gear head (Note 1)	Brushless amplifier	Brushless amplifier (supplied with power cable) (Note 2)	External regenerative resistor	Noise filter	Surge absorber	Reactor
Single phase 100 V	3000	50	MBMU5AZAX	MX8G□B	MBEG5A1BCV	MBEG5A1BCVC	for 100 V DV0P2890	for single phase power supply DV0P4170	for single phase power supply DV0P4190	for single phase power supply DV0P227
			MBMU5AZAS	—						
		90	MBMU9A1AZ	MZ9G□B MY9G□B	MBEG9A1BCV	MBEG9A1BCVC				
			MBMU9A1AS	—						
		130	MBMU1E1AZ	MZ9G□B MY9G□B	MBEG1E1BCV	MBEG1E1BCVC				
			MBMU1E1AS	—						
Single phase/ 3-phase 200 V		50	MBMU5AZAX	MX8G□B	MBEG5A5BCV	MBEG5A5BCVC	for 200 V DV0PM20068	for single phase power supply DV0P4170 for 3-phase power supply DV0PM20042	for single phase power supply DV0P4190 for 3-phase power supply DV0P1450	for single phase power supply DV0P227 for 3-phase power supply DV0P220
			MBMU5AZAS	—						
		90	MBMU9A2AZ	MZ9G□B MY9G□B	MBEG9A5BCV	MBEG9A5BCVC				
			MBMU9A2AS	—						
		130	MBMU1E2AZ	MZ9G□B MY9G□B	MBEG1E5BCV	MBEG1E5BCVC				
			MBMU1E2AS	—						

KV series

Power supply	Rated rotation speed (r/min)	output (W)	Motor (Note 3)	Gear head	Brushless amplifier	Brushless amplifier (supplied with power cable) (Note 2)	External regenerative resistor	Noise filter	Surge absorber	Reactor
Single phase 100 V	3000	50	MBMS5AZBL○	—	MBEK5A1BCV	MBEK5A1BCVC	for 100 V DV0P2890	for single phase power supply DV0P4170	for single phase power supply DV0P4190	for single phase power supply DV0P227
		100	MBMS011BL○		MBEK011BCV	MBEK011BCVC				
		200	MBMS021BL○		MBEK021BCV	—				for single phase power supply DV0P228
Single phase/ 3-phase 200 V		50	MBMS5AZBL○		MBEK5A5BCV	MBEK5A5BCVC	for 200 V DV0PM20068	for single phase power supply DV0P4170 for 3-phase power supply DV0PM20042	for single phase power supply DV0P4190 for 3-phase power supply DV0P1450	for single phase power supply DV0P227 for 3-phase power supply DV0P220
		100	MBMS012BL○		MBEK015BCV	MBEK015BCVC				
		200	MBMS022BL○		MBEK025BCV	—				
3-phase 200 V		400	MBMS042BL○		MBEK043BCV			for 3-phase power supply DV0PM20042	for 3-phase power supply DV0P1450	for 3-phase power supply DV0P220
		750	MBMS082BL○		MBEK083BCV					

GP series

Power supply	Rated rotation speed (r/min)	output (W)	Motor	Gear head (Note 1)	Brushless amplifier	Brushless amplifier (supplied with power cable) (Note 2)	External regenerative resistor	Noise filter	Surge absorber	Reactor
Single phase 100 V	3000	50	MBMU5AZAB	MB8G□BV	MBEG5A1BCP	MBEG5A1BCPC	for 100 V DV0P2890	for single phase power supply DV0P4170	for single phase power supply DV0P4190	for single phase power supply DV0P227
		90	MBMU9A1AB	MB9G□BV	MBEG9A1BCP	MBEG9A1BCPC				
		130	MBMU1E1AB	MB9G□BV	MBEG1E1BCP	MBEG1E1BCPC				
Single phase/ 3-phase 200 V		50	MBMU5AZAB	MB8G□BV	MBEG5A5BCP	MBEG5A5BCPC	for 200 V DV0PM20068	for single phase power supply DV0P4170 for 3-phase power supply DV0PM20042	for single phase power supply DV0P4190 for 3-phase power supply DV0P1450	for single phase power supply DV0P227 for 3-phase power supply DV0P220
		90	MBMU9A2AB	MB9G□BV	MBEG9A5BCP	MBEG9A5BCPC				
		130	MBMU1E2AB	MB9G□BV	MBEG1E5BCP	MBEG1E5BCPC				

(Note 1) A figure representing reduction ratio in □ .

(Note 2) Refer to p. 74 for a power supply connecting cable.
This part number is the ordering part number for the amplifier and power cable, not for ordering amplifier only.

(Note 3) Suffix of " ○ " in the motor model represents shape of shaft. For more information, please refer to p. 27.

(Note 4) When connecting PC, the PC connection cable (DV0P4140) and the Digital key pad connection cable (DV0P383*0) are required.
If your PC does not have RS232 port, use RS232-USB converter.

- When installing the reactor, refer to p. 73.
- Be sure to use a set of matched components (series, power source, capacity, output, etc.)

	Motor extension cable	Power supply connector kit	Console A	Console A connection cable	Digital key pad	Digital key pad connection cable	External speed setter	Control signal cable	I/O connector kit	Panel connector kit	PC connection cable (Note 4)	Noise filter for signal line	DIN rail attachment unit
	1 m DV0PQ1000110 3 m DV0PQ1000130 5 m DV0PQ1000150 10 m DV0PQ10001A1	DV0P2870	DV0P3500	1 m DV0PM2006910 3 m DV0PM2006930 5 m DV0PM2006950	DV0P3510	1 m DV0P38310 3 m DV0P38330 5 m DV0P38350	DV0PM20078	2 m DV0PM20076	DV0PM20070	DV0P3610	1.5 m DV0P4140	DV0P1460	DV0P3811

	Motor extension cable	Power supply connector kit	Console A	Console A connection cable	Digital key pad	Digital key pad connection cable	External speed setter	Control signal cable	I/O connector kit	Panel connector kit	PC connection cable (Note 4)	Noise filter for signal line	DIN rail attachment unit
	1 m DV0PQ1000310	DV0P2870	DV0P3500	1 m DV0PM2006910	DV0P3510	1 m DV0P38310	DV0PM20078	2 m DV0PM20076	DV0PM20070	DV0P3610	1.5 m DV0P4140	DV0P1460	DV0P3811
	3 m DV0PQ1000330	—		3 m DV0PM2006930		3 m DV0P38330							—
	5 m DV0PQ1000350	DV0P2870		5 m DV0PM2006950		5 m DV0P38350							DV0P3811
	10 m DV0PQ10003A1	—											—

	Motor extension cable	Power supply connector kit	Console A	Console A connection cable	Digital key pad	Digital key pad connection cable	External speed setter	Control signal cable	I/O connector kit	Panel connector kit	PC connection cable (Note 4)	Noise filter for signal line	DIN rail attachment unit
	1 m DV0PQ1000110 3 m DV0PQ1000130 5 m DV0PQ1000150 10 m DV0PQ10001A1	DV0P2870	—	—	DV0P3510	1 m DV0P38310 3 m DV0P38330 5 m DV0P38350	—	2 m DV0PM20076	DV0PM20070	—	1.5 m DV0P4140	DV0P1460	DV0P3811

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Model No.	Specifications	Page

MBEK (For KV series amplifier)

MBEK011BCV	100 W Single phase 100 V to 120 V	37
MBEK011BCVC	100 W Single phase 100 V to 120 V (Power cable included)*	37
MBEK015BCV	100 W Single/3-Phase 200 V to 240 V	37
MBEK015BCVC	100 W Single/3-Phase 200 V to 240 V (Power cable included)*	37
MBEK021BCV	200 W Single phase 100 V to 120 V	39
MBEK025BCV	200 W Single/3-Phase 200 V to 240 V	39
MBEK043BCV	400 W 3-Phase 200 V to 240 V	41
MBEK083BCV	750 W 3-Phase 200 V to 240 V	43
MBEK5A1BCV	50 W Single phase 100 V to 120 V	35
MBEK5A1BCVC	50 W Single phase 100 V to 120 V (Power cable included)*	35
MBEK5A5BCV	50 W Single/3-Phase 200 V to 240 V	35
MBEK5A5BCVC	50 W Single/3-Phase 200 V to 240 V (Power cable included)*	35

* This part number is the ordering part number for the amplifier and power cable, not for ordering amplifier only.

MBMS (For KV series motor)

MBMS011BLA	60 mm sq. 100 W	Round shaft motor Single phase 100 V to 120 V	Without oil seal	37
MBMS011BLC	60 mm sq. 100 W	Round shaft motor Single phase 100 V to 120 V	With oil seal	37
MBMS011BLN	60 mm sq. 100 W	D-cut shaft motor Single phase 100 V to 120 V	Without oil seal	37
MBMS011BLQ	60 mm sq. 100 W	D-cut shaft motor Single phase 100 V to 120 V	With oil seal	37
MBMS011BLS	60 mm sq. 100 W	Keyway, center tap shaft motor Single phase 100 V to 120 V	Without oil seal	37
MBMS011BLU	60 mm sq. 100 W	Keyway, center tap shaft motor Single phase 100 V to 120 V	With oil seal	37
MBMS012BLA	60 mm sq. 100 W	Round shaft motor Single/3-Phase 200 V to 240 V	Without oil seal	37
MBMS012BLC	60 mm sq. 100 W	Round shaft motor Single/3-Phase 200 V to 240 V	With oil seal	37
MBMS012BLN	60 mm sq. 100 W	D-cut shaft motor Single/3-Phase 200 V to 240 V	Without oil seal	37
MBMS012BLQ	60 mm sq. 100 W	D-cut shaft motor Single/3-Phase 200 V to 240 V	With oil seal	37
MBMS012BLS	60 mm sq. 100 W	Keyway, center tap shaft motor Single/3-Phase 200 V to 240 V	Without oil seal	37
MBMS012BLU	60 mm sq. 100 W	Keyway, center tap shaft motor Single/3-Phase 200 V to 240 V	With oil seal	37
MBMS021BLA	60 mm sq. 200 W	Round shaft motor Single phase 100 V to 120 V	Without oil seal	39
MBMS021BLC	60 mm sq. 200 W	Round shaft motor Single phase 100 V to 120 V	With oil seal	39
MBMS021BLN	60 mm sq. 200 W	D-cut shaft motor Single phase 100 V to 120 V	Without oil seal	39
MBMS021BLQ	60 mm sq. 200 W	D-cut shaft motor Single phase 100 V to 120 V	With oil seal	39
MBMS021BLS	60 mm sq. 200 W	Keyway, center tap shaft motor Single phase 100 V to 120 V	Without oil seal	39
MBMS021BLU	60 mm sq. 200 W	Keyway, center tap shaft motor Single phase 100 V to 120 V	With oil seal	39
MBMS022BLA	60 mm sq. 200 W	Round shaft motor Single/3-Phase 200 V to 240 V	Without oil seal	39
MBMS022BLC	60 mm sq. 200 W	Round shaft motor Single/3-Phase 200 V to 240 V	With oil seal	39
MBMS022BLN	60 mm sq. 200 W	D-cut shaft motor Single/3-Phase 200 V to 240 V	Without oil seal	39
MBMS022BLQ	60 mm sq. 200 W	D-cut shaft motor Single/3-Phase 200 V to 240 V	With oil seal	39
MBMS022BLS	60 mm sq. 200 W	Keyway, center tap shaft motor Single/3-Phase 200 V to 240 V	Without oil seal	39
MBMS022BLU	60 mm sq. 200 W	Keyway, center tap shaft motor Single/3-Phase 200 V to 240 V	With oil seal	39
MBMS042BLA	60 mm sq. 400 W	Round shaft motor 3-Phase 200 V to 240 V	Without oil seal	41
MBMS042BLC	60 mm sq. 400 W	Round shaft motor 3-Phase 200 V to 240 V	With oil seal	41
MBMS042BLN	60 mm sq. 400 W	D-cut shaft motor 3-Phase 200 V to 240 V	Without oil seal	41
MBMS042BLQ	60 mm sq. 400 W	D-cut shaft motor 3-Phase 200 V to 240 V	With oil seal	41
MBMS042BLS	60 mm sq. 400 W	Keyway, center tap shaft motor 3-Phase 200 V to 240 V	Without oil seal	41
MBMS042BLU	60 mm sq. 400 W	Keyway, center tap shaft motor 3-Phase 200 V to 240 V	With oil seal	41
MBMS082BLA	80 mm sq. 750 W	Round shaft motor 3-Phase 200 V to 240 V	Without oil seal	43
MBMS082BLC	80 mm sq. 750 W	Round shaft motor 3-Phase 200 V to 240 V	With oil seal	43
MBMS082BLN	80 mm sq. 750 W	D-cut shaft motor 3-Phase 200 V to 240 V	Without oil seal	43
MBMS082BLQ	80 mm sq. 750 W	D-cut shaft motor 3-Phase 200 V to 240 V	With oil seal	43
MBMS082BLS	80 mm sq. 750 W	Keyway, center tap shaft motor 3-Phase 200 V to 240 V	Without oil seal	43
MBMS082BLU	80 mm sq. 750 W	Keyway, center tap shaft motor 3-Phase 200 V to 240 V	With oil seal	43
MBMS5AZBLA	38 mm sq. 50 W	Round shaft motor Single phase 100 V to 120 V, Single/3-Phase 200 V to 240 V	Without oil seal	35
MBMS5AZBLC	38 mm sq. 50 W	Round shaft motor Single phase 100 V to 120 V, Single/3-Phase 200 V to 240 V	With oil seal	35
MBMS5AZBLN	38 mm sq. 50 W	D-cut shaft motor Single phase 100 V to 120 V, Single/3-Phase 200 V to 240 V	Without oil seal	35
MBMS5AZBLQ	38 mm sq. 50 W	D-cut shaft motor Single phase 100 V to 120 V, Single/3-Phase 200 V to 240 V	With oil seal	35
MBMS5AZBLS	38 mm sq. 50 W	Keyway, center tap shaft motor Single phase 100 V to 120 V, Single/3-Phase 200 V to 240 V	Without oil seal	35
MBMS5AZBLU	38 mm sq. 50 W	Keyway, center tap shaft motor Single phase 100 V to 120 V, Single/3-Phase 200 V to 240 V	With oil seal	35

MBMU (For GP series motor)

MBMU1E1AB	90 mm sq. 130 W	Pinion shaft motor Single phase 100 V to 120 V	61
MBMU1E2AB	90 mm sq. 130 W	Pinion shaft motor Single/3-Phase 200 V to 240 V	61
MBMU5AZAB	80 mm sq. 50 W	Pinion shaft motor Single phase 100 V to 120 V, Single/3-Phase 200 V to 240 V	57
MBMU9A1AB	90 mm sq. 90 W	Pinion shaft motor Single phase 100 V to 120 V	59
MBMU9A2AB	90 mm sq. 90 W	Pinion shaft motor Single/3-Phase 200 V to 240 V	59

MBMU (For GV series motor)

MBMU1E1AZ	90 mm sq. 130 W	Pinion shaft motor Single phase 100 V to 120 V	21
MBMU1E2AZ	90 mm sq. 130 W	Pinion shaft motor Single/3-Phase 200 V to 240 V	21
MBMU1E1AS	90 mm sq. 130 W	Round shaft motor Single phase 100 V to 120 V	21
MBMU1E2AS	90 mm sq. 130 W	Round shaft motor Single/3-Phase 200 V to 240 V	21
MBMU5AZAX	80 mm sq. 50 W	Pinion shaft motor Single phase 100 V to 120 V, Single/3-Phase 200 V to 240 V	17
MBMU5AZAS	80 mm sq. 50 W	Round shaft motor Single phase 100 V to 120 V, Single/3-Phase 200 V to 240 V	17
MBMU9A1AZ	90 mm sq. 90 W	Pinion shaft motor Single phase 100 V to 120 V	19
MBMU9A2AZ	90 mm sq. 90 W	Pinion shaft motor Single/3-Phase 200 V to 240 V	19
MBMU9A1AS	90 mm sq. 90 W	Round shaft motor Single phase 100 V to 120 V	19
MBMU9A2AS	90 mm sq. 90 W	Round shaft motor Single/3-Phase 200 V to 240 V	19

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MEMO

Sales office

[Panasonic sales office of motors]

(January 2013)

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			Website: http://www.plenty.co.th	
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