Panasonic
ideas for life

Brushless Motor | 2012/8

BRUSHLESS MOTOR

MINAS-BL GV 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 motor
MINAS-BL

eco ideas
Panasonic group always aims for environmentally-friendly products.

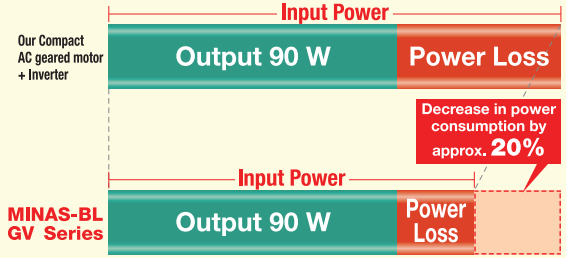
Energy Saving

Brushless structure and optimized controlling reduce power loss and increase efficiency.

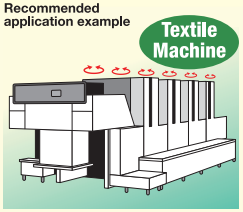
- Permanent magnet rotor reduces secondary loss. Realize 20% less input power compared with our Compact AC geared motors.

Speed Control type
MINAS-BL GV Series
(MINAS-BL Motor is compatible with our Compact AC geared motor for mounting)

■ Comparison of input power with our existing Compact geared motor (90 W)



Recommended application example

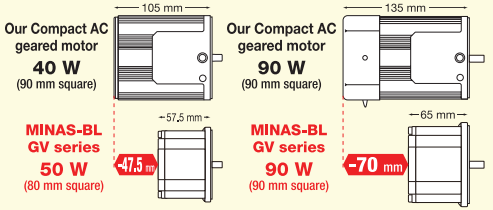


Drive of many shafts by brushless motor significantly contributes in energy saving.

Space Saving

Small size Split Cores Structure that has proven high output power in AC servomotor MINAS series is also used in MINAS-BL.

- The MINAS-BL GV series motor is considerably small and light compared with those of our Compact AC geared motors (induction motors).



■ Mass comparison between GV series and Compact AC geared motors

Output	GV series (motor)	Our Compact AC 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	

- Brushless amplifier is also postcard-sized and mass is 370 g.

▲Split cores

Recommended application example

Adoption of the space saving motor further contributes to downsize machine. The IP65 compliant construction is best suitable for use on food processor.

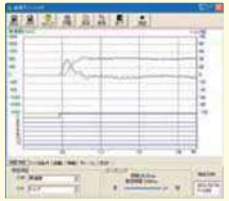
Cost Saving

Motors without commutator and brush do not require costly and time-consuming maintenance. Setup support software is available for quick system set up and labor-saving for operation management.

■ Setup support software **PANATERM for BL**

◀**Parameter setting File saving**
[Batch reading
Batch writing]

◀**Monitoring**
Status of I/O, speed, torque and load



◀**Graphic waveform display**
Example—speed and torque
Condition of I/O can also be monitored.

◀**Alarm (trip)**
Records current alarm and last 10 history

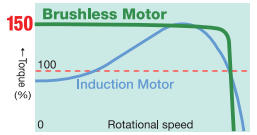
Speed control range 30 ~ 4000 r/min
* Rated rotation speed :3000 r/min.

Starting torque 150% (comparing to rated ratio)

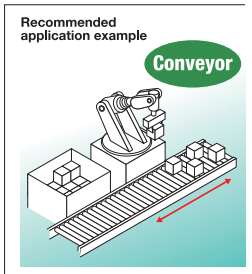
Speed fluctuation rate below 1%*
* Within rated torque.

8-speed multispeed operation

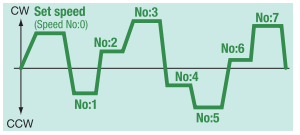
- Achieved Sine Wave Drive by our original CS sensor, wide range variable speed and smooth operation.



Recommended application example



Due to small speed fluctuation rate, motor can be operated at a constant rate.



Overseas Standards (CE/UL/CCC/KC)

Wide supply voltage range
(Single- phase: 100 V ~ 120 V
Single phase / Three phase : 200 V ~ 240 V)

Position Control Type
MINAS-BL GP Series
Will be available soon

- Positioning is possible without pulse unit or encoder because of original CS sensor and simple NC function adoption.

Check the Model number

<Motor>

MBMU 5A Z A X

- **Type**
- **Motor rated output**
  - 5A : 50 W
  - 9A : 90 W
  - 1E : 130 W
- **Input power supply**
  - 1 : 100 V
  - 2 : 200 V
  - Z : 100/200 V
- **Function**
  - A: Standard
- **Shape of shaft**
  - X: For gear head MX8G
  - Z: For gear head MZ9G/MY9G
  - S: Round shaft

<Gear head>

M X 8 G 30 B

- **Motor rated output**
  - X : 50 W
  - Z : 90 W, 130W
  - Y : 90 W, 130W
- **Size**
  - 8 : 80 mm sq.
  - 9 : 90 mm sq.
- **Reduction ratio**
  - (Example) 30: Reduction ratio of 1/30
  - 3, 3.6, 5, 6, 7.5, 9, 10, 12.5, 15, 18, 20, 25, 30, 36, 50, 60, 75, 90, 100, 120, 150, 180, (200)
  - * 1/200 only for 90mm sq.
- **Bearing**
  - B : Ball bearing

<Brushless amplifier>

MBEG 5A 5 B C V

- **Type**
- **Motor rated output**
  - 5A : 50 W
  - 9A : 90 W
  - 1E : 130 W
- **Input power supply**
  - 1: Single phase AC100 to 120 V
  - 5: Single phase/ 3-phase AC200 to 240 V
- **Function 1**
  - B: with circuit for regenerative resistor
- **Function 2**
  - C: RS485 communication
- **Control mode**
  - V: speed control

Brushless motor specifications

Item	Specifications					
Flange size	80 mm sq.		90 mm sq.			
Motor model No. *1	MBMU5AZA○		MBMU9A1A○	MBMU9A2A○	MBMU1E1A○	MBMU1E2A○
Motor rated output (W)	50		90		130	
Voltage	for 100 V/200 V		for 100 V	for 200 V	for 100 V	for 200 V
Rated torque (N・m)	0.16		0.29		0.41	
Starting torque *2 (N・m)	0.24		0.43		0.62	
Rated input current (A(rms))	0.53	0.53	1.00	0.50	1.30	0.72
Moment of inertia of rotor ($\times10^{-4}$kg・m^2)	0.12		0.27		0.36	
Rating	Continuous					
Rated rotation speed *3 (r/min)	3000					
Speed control range (r/min)	30 to 4000					
Ambient temperature	−10 °C to +40 °C (free from freezing) * Ambient temperature is measured at a distance of 5 cm from the motor.					
Ambient humidity	20% to 85% RH or below (free from condensation)					
Altitude	Lower than 1000 m					
Vibration	4.9 m/s^2 or less (10 to 60 Hz) X, Y, Z					
Motor insulation class	130(B) (UL certified 105 (A))					
Protection structure	IP65 *4,*5					
Number of poles	8					
Motor mass (kg)	0.7		1.0		1.2	

*1 Suffix of "○" in the motor model represents shape of shaft.
*2 Representative value
*3 Motor shaft speed: to be multiplied by the reduction ratio when the gear head is used.
*4 Excluding the shaft pass-through section and cable end connector.
*5 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 specifications

Item		Specifications								
Amplifier model No.		MBEG5A1BCV	MBEG5A5BCV		MBEG9A1BCV	MBEG9A5BCV		MBEG1E1BCV	MBEG1E5BCV	
Applicable Motor *1		MBMU5AZA○			MBMU9A1A○	MBMU9A2A○		MBMU1E1A○	MBMU1E2A○	
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%								
Ambient temperature		0 °C to +50 °C (free from freezing) * Ambient temperature is measured at a distance of 5 cm from the amplifier.								
Ambient humidity		20% to 85% RH or below (free from condensation)								
Altitude		Lower than 1000 m								
Vibration		5.9 m/s^2 or less (10 to 60 Hz)								
Protection structure/ Cooling system		Equivalent to IP20/ Self cooling								
Rated rotation speed		3000 r/min								
Speed control range		30 to 4000 r/min (Speed ratio 1:133)								
Speed fluctuation factor	With load	±1% or below (at 0 to Rated torque, Rated rotation speed)								
	With voltage	±1 % or below (at supply voltage ±10%, rated rotation speed)								
	With temperature	±1% or below (at 0 to 50 °C, rated rotation speed)								
Acceleration/ Deceleration time		0.01 to 300 sec (time for changing 1000 r/min) *1								
Stopping procedure		Slowdown stop/ Free-run stop *1								
Speed setting		30 to 4000 r/min (analogue voltage (0 to 5 V), console A), 30 to 4000 r/min (Setting selection by parameter on Digital key pad)								
Speed setting resolution		Analog: approx. 1/200 of upper speed limit Digital: 1 r/min								
Speed setting precision (at 20 °C)		Analogue: ±3% or below of upper speed limit (±90 r/min or below at upper speed limit 3000 r/min) [Digital: 1% or below of upper speed limit]								
Protective function		Warning : Undervoltage *2, Overload, setting change. Protect : Undervoltage *2, Overload, Overcrrent, Overvoltage, Overheat, Overspeed, Sensor error, RS485 error, External forced trip ,User parameter error, System parameter error, System error.								
Regenerating brake		Regenerative braking resistor can be externally connected. *3 Instantaneous braking torque 150%, Continuous regenerative ratio 10% (Regenerative operation with which motor shaft is rotated by load, e.g. load lowering operation, should not be continued.)								
Protection level		115%/ Overload protection time characteristics 150% 60 sec								
Amplifier mass (kg)		0.37								

*1 Suffix of "○" in the motor model represents shape of shaft. *2 Can be changed from PANATERM for BL or Digital key pad.
*3 Use optional external regenerative resistor (sold separately).

GV series 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	Noise filter	Surge absorber	Reactor
						Reference page p. 31	p. 26	p. 22	p. 22	p. 27
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	DV0P227
			MBMU5AZAS	—						
		90	MBMU9A1AZ	MZ9G□B MY9G□B	MBEG9A1BCV	MBEG9A1BCVC				
			MBMU9A1AS	—						
		130	MBMU1E1AZ	MZ9G□B MY9G□B	MBEG1E1BCV	MBEG1E1BCVC				DV0P228
			MBMU1E1AS	—						
Single/ 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	DV0P227 (single phase) DV0P220 (3-phase)
			MBMU5AZAS	—						
		90	MBMU9A2AZ	MZ9G□B MY9G□B	MBEG9A5BCV	MBEG9A5BCVC				
			MBMU9A2AS	—						
		130	MBMU1E2AZ	MZ9G□B MY9G□B	MBEG1E5BCV	MBEG1E5BCVC				
			MBMU1E2AS	—						

(Note 1) A figure representing reduction ration in □ .
(Note 2) Refer to p. 28 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. 27.

*** 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.24
	3 m	DV0PQ1000130	
	5 m	DV0PQ1000150	
	10 m	DV0PQ10001A1	
Power supply connector kit		DV0P2870	P.25
Console A*1		DV0P3500	P.23
Console A connection cable	1 m	DV0PM2006910	P.23
	3 m	DV0PM2006930	
	5 m	DV0PM2006950	
Digital key pad*2		DV0P3510	P.23

Optional parts		Parts number	Reference page
Digital key pad connection cable	1 m	DV0P38310	P.23
	3 m	DV0P38330	
	5 m	DV0P38350	
External speed setter		DV0PM20078	P.25
Control signal cable	2 m	DV0PM20076	P.25
I/O connector kit		DV0PM20070	P.25
Panel connector kit		DV0P3610	P.25
PC connection cable*3	1.5 m	DV0P4140	P.24
Noise filter for signal line		DV0P1460	P.22
DIN rail mounting unit		DV0P3811	P.26

* For details of cable, refer to p. 23 to 25.
*1 When using Console A, the Console A connection cable (DV0PM20069*0) is required.
*2 When using Digital key pad, the Digital key pad connection cable (DV0P383*0) is required.
*3 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. 21 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 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

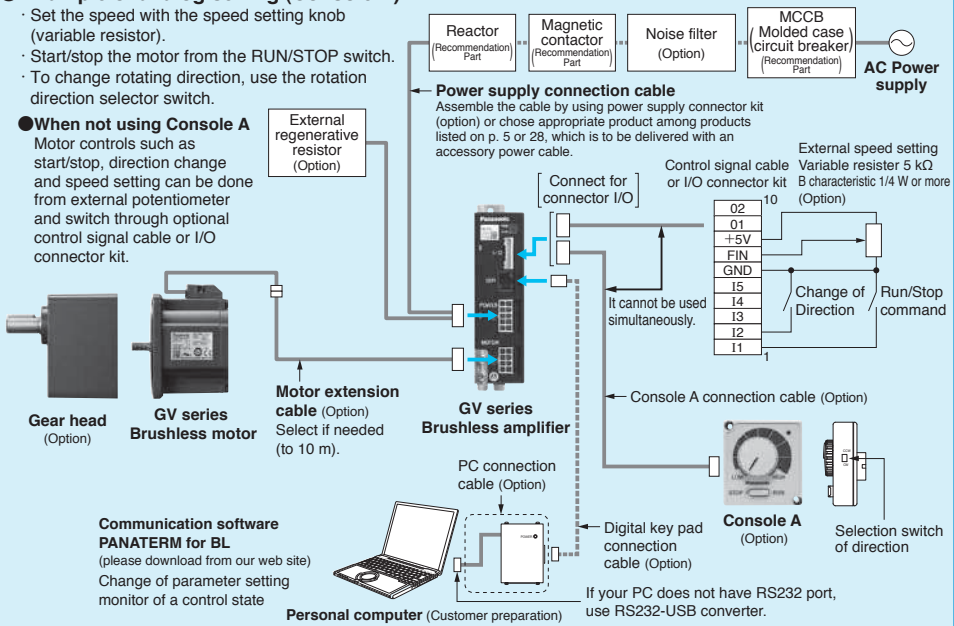
● Selection of control circuit switch
When using a switch in place of relay, select a switch rated at minute electric current, to assure positive contact.
Example: Nihon Kaiheiki Ind.: M-2012J-G

System configuration diagram

● Example of analog setting (Console A)

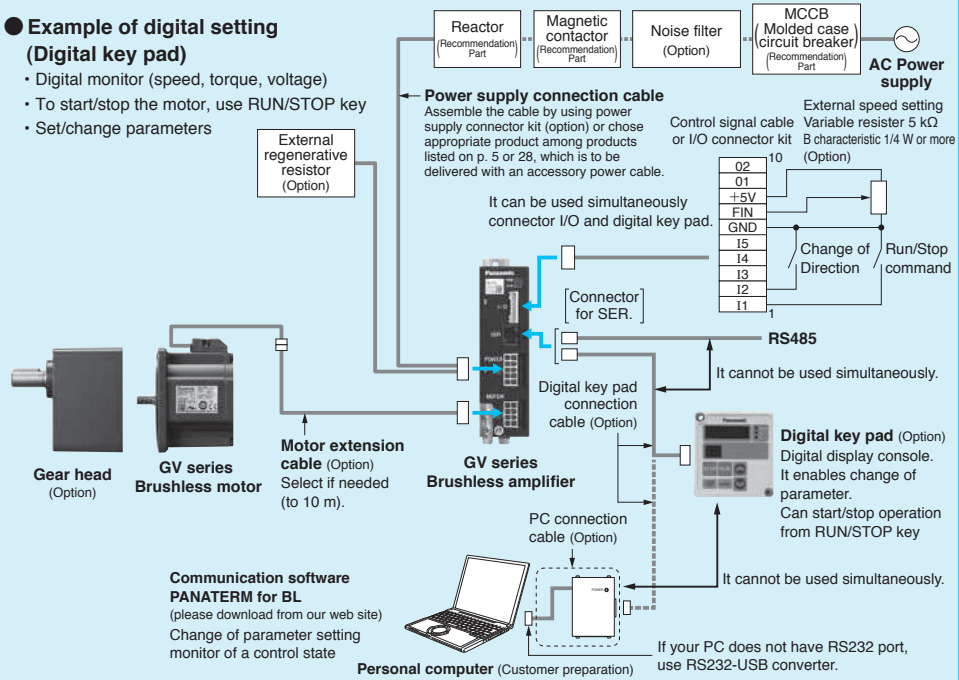
· Set the speed with the speed setting knob (variable resistor).
· Start/stop the motor from the RUN/STOP switch.
· To change rotating direction, use the rotation direction selector switch.

●When not using Console A
Motor controls such as start/stop, direction change and speed setting can be done from external potentiometer and switch through optional control signal cable or I/O connector kit.



● Example of digital setting (Digital key pad)

• Digital monitor (speed, torque, voltage)
• To start/stop the motor, use RUN/STOP key
• Set/change parameters

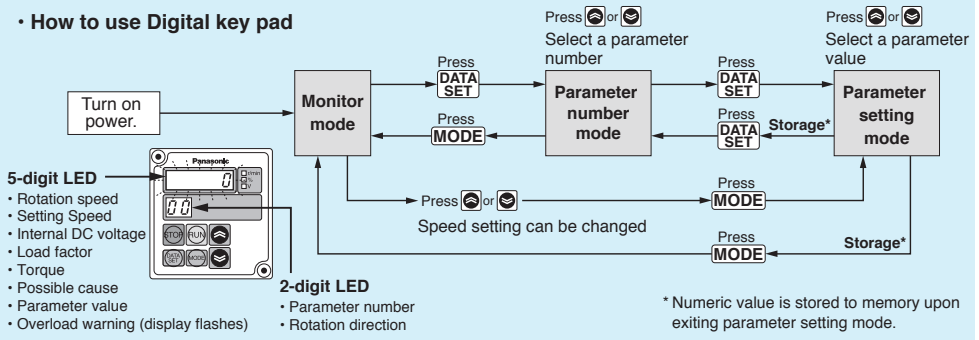


Parameter list of brushless amplifier

Parameter name	Explanation	Setting range
Internal speed (0-th speed)	Desired running speed can be set with the Digital key pad.	0 to Upper speed limit [Minimum unit 1 r/min]
1st speed to 7th speed	Speed in multi-speed running can be set.	0 to Upper speed limit [Minimum unit 1 r/min]
1st acceleration time 2nd acceleration time	The change factor of output speed in acceleration can be determined. Set by time for changing 1000 r/min.	0.01 to 300 sec to 3 sec: Incremented by 0.01 second 3 to 30 sec: Incremented by 0.1 second 30 to 300 sec: Incremented by 1 second
1st deceleration time 2nd deceleration time	The change factor of output speed in deceleration can be determined. Set by time for changing 1000 r/min.	
Acceleration mode selection Deceleration mode selection	Straight line acceleration/deceleration and curve (S-shape) acceleration and deceleration can be chosen individually for acceleration and deceleration. LINEAR “S” SHAPE-1 “S” SHAPE-2 Rotation speed, 0, Time	
Stop mode selection	You can select how to stop the motor when stop command is input: free-run stop or stop after deceleration.	
Free-run waiting time	When the stop mode is set to deceleration stop, the zero speed (servo lock time) after deceleration can be adjusted.	0.0 to 10.0 sec [Minimum unit 0.1 sec]
Velocity loop proportional gain	Enables setting of proportional gain of velocity amplifier.	0 to 10000 [Minimum unit 0.1]
Velocity loop integration gain	Enables setting of integration gain of velocity amplifier.	0 to 10000 [Minimum unit 0.1]
Run command selection	Run command can be applied through: Digital key pad, input terminal “I1”, “I2” or RS485 communication, whichever selected.	
Speed command selection	You can choose whether to use “00 Internal speed (0-th speed)” or analog input terminal for speed command.	
Operation mode selection	Parameter for choosing operation mode Setting / Operation made / Function of signal input (I3, I4, I5) 1: 1st speed operation mode 2: 2nd speed operation mode — I3: Speed setting 4: 4th speed operation mode — I3: Speed setting; I4: Speed setting 8: 8th speed operation mode — I3: Speed setting; I4: Speed setting; I5: Speed setting I4: Free-run stop / External forced trip / 2nd acceleration/deceleration time / Trip reset	
I1/I2 function selection I3 function selection I4 function selection I5 function selection	Signal input functions I1 to I5 can be individually selected.	Free-run stop External forced trip 2nd acceleration/deceleration time Trip reset
Lower speed limit	When speed command selection is set to analog, set the motor speed at 0 V input. Speed instruction value Upper speed limit Lower speed limit Input voltage 0 0.5 4.5 5 V	0 to Upper speed limit [Minimum unit 1 r/min]
Upper speed limit	Upper limit of motor command speed.	0 to 4000 r/min [Minimum unit 1 r/min]

Parameter name	Explanation	Setting range
Torque limit	Upper limit of motor output torque is set.	50 to 150% [Minimum unit 1%]
O1 function selection O2 function selection	The type of signals from output terminals “01” and “02” can be selected.	Trip: ON, Speed is reached to a command value: ON, Running: ON, Free run: ON, CCW run: ON, CW run: ON, Load exceeds 100%: ON, Speed pulse signal
O1 output polarity selection O2 output polarity selection	This is a function for inverting the polarity of signal output terminal O1 and O2.	
Speed matching range	“Matching range” of arriving signal can be adjusted.	20 to Upper speed limit [Minimum unit 1 r/min]
Output pulse count selection	Set the number of pulses to be output to output terminals “01” and “02”.	1, 2, 3, 4, 6, 8, 12, 24
Monitor mode selection	You can choose description to be displayed on 5-digit LED when turning on power.	Rotation speed, Speed command, Internal DC voltage, Load factor, Torque
Numerator of display magnification factor Denominator of display magnification factor	By setting the multiplying factor of a value displayed on 5-digit LED, the rotation speed of gear output shaft and conveyor speed can be displayed.	
Trip history clear	Trip history can be cleared.	
Trip history 1 to Trip history 5	Trip history for 5 times in the past is stored.	
Undervoltage trip selection	You can select whether tripping occurs upon detection of undervoltage.	
Retrial selection	Automatic reset in trip (trip retrial) can be set here.	
Retrial start time	You can set waiting time until retrial operation is performed after tripping is found.	1 to 120 sec [Minimum unit 1 r/min]
Parameter initializing	Parameters can be initialized to the factory default.	
Parameter copy	Parameters can be copied.	
RS485 device number	Set the device number of Amplifier in communication (Amplifier ID)	
RS485 communication speed	Set the communication speed of RS485 communication.	
RS485 communication standard	Set the communication standard of RS485 communication.	
RS485 communication response time	You can set the shortest time necessary to set the RS485 bus to transmission mode to response upon receiving communication data.	
RS485 retry times of communication	Set the retry times of RS485 communication.	
RS485 protocol timeout	You can set the permissible time interval between successively received character codes.	

• How to use Digital key pad



80 mm sq. 50W

Specification (For Common specification, see p. 3, 4)

Size	Model No. / Amplifier and Motor: Brushless Amplifier	Model No. / Amplifier and Motor: Motor	Rated output (W)	Input power supply for Amplifier: Voltage AC (V)	Allowed range (%)	Frequency (Hz)	Rated input current (A)	Rated torque (N·m)	Starting torque* (N·m)	Rated speed (r/min)	Maximum rotation speed (r/min)
80 mm sq.	MBEG5A1BCV	MBMU5AZA○	50	Single phase 100 to 120	±10	50/60	1.5	0.16	0.24	3000	4000
	MBEG5A5BCV	MBMU5AZA○		Single phase /3-phase 200 to 240			Single phase 0.7 / 3-phase 0.35				

* Suffix of "○" in the motor model No. represents shape of shaft.

* Starting torque: Representative value

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

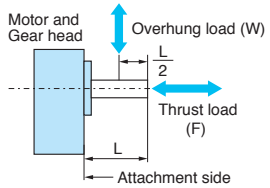
Applicable Gear head	Reduction ratio		3	3.6	5	6	7.5	9	10	12.5	15	18	20	25	30	36	50	60	75	90	100	120	150	180
MX8G□B	motor rotation speed (r/min)	3000 or less	0.39	0.46	0.64	0.77	0.96	1.16	1.29	1.61	1.92	2.33	2.59	3.23	3.61	4.33	5.93	7.29	7.84					
		3000 to 4000	0.29	0.35	0.48	0.58	0.72	0.87	0.97	1.21	1.44	1.75	1.94	2.42	2.71	3.25	4.45	5.47	6.84	7.84				
	Rotational direction		Same as motor rotational direction												Reverse to motor rotational direction									

Permissible load inertia moment (×10⁻⁴kg·m²) Acceleration/Deceleration time is 0.3 sec (Initial setting)

Reduction ratio	3	3.6	5	6	7.5	9	10	12.5	15	18	20	25	30	36	50	60	75	90	100	120	150	180	Round shaft
Applicable Gear head																							
MX8G□B	1.25	1.79	3.42	4.90	7.72	11.2	13.8	21.6	30.6	45.2	55.8	86.9	127	183	342								2.5

* Acceptable value on round shaft applies when stopping operation in free-run stop. In deceleration stop, the value is 1/4 of that indicated above due to regeneration (only with round shaft). If the inertia is not to be decreased, set a longer deceleration time.

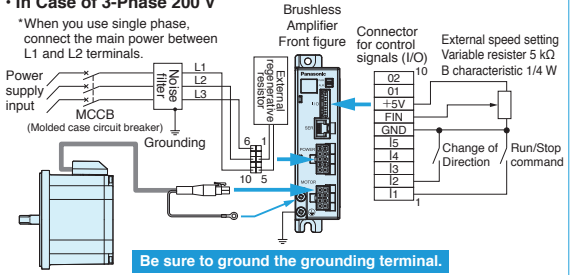
Permissible shaft load



		Overhung load (W)	Thrust load (F)
Motor shaft	Output 50 W	100N	10N
Applicable Gear head	MX8G□B	294N	49N

Wiring diagram

• In Case of 3-Phase 200 V

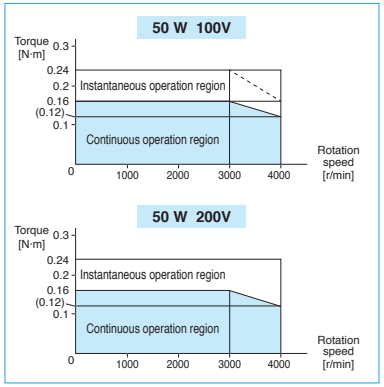


Be sure to ground the grounding terminal.

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%.〉

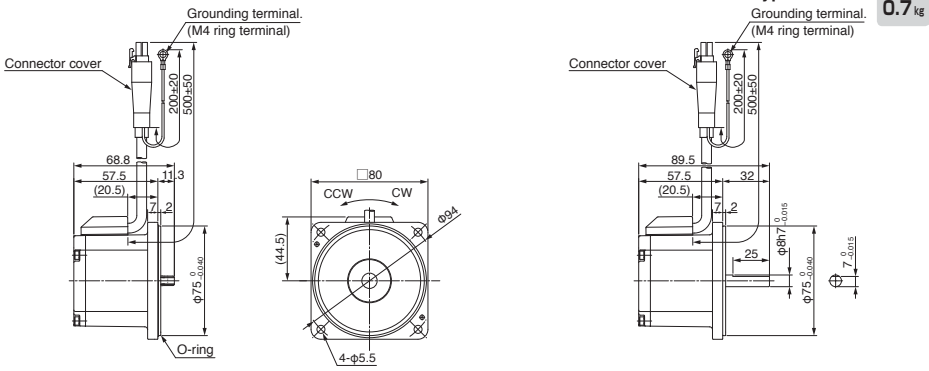


* Before using, be sure to read "Instruction manual" to check precautions and correct procedure.

Motor (dimensions) Unit mm

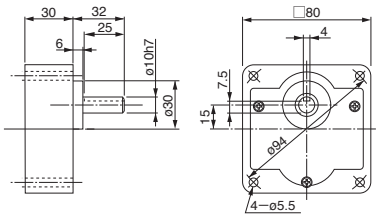
mass 0.7 kg

<Round shaft type>

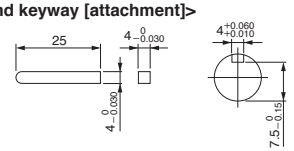


Gear head (dimensions) Unit mm

MX8G□B mass 0.6 kg

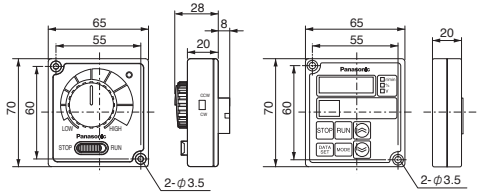


<Key and keyway [attachment]>



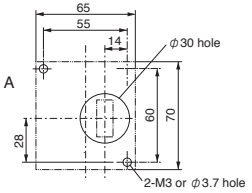
Console A, Digital key pad (dimensions) [option] Unit mm

<Console A> <Digital key pad>

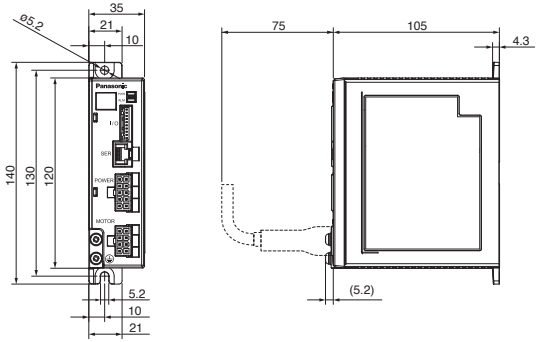


(Mounting hole side)

* Same hole for Console A and Digital key pad



Brushless Amplifier (dimensions) Unit mm



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

90 mm sq. 90W

Specification (For Common specification, see p. 3, 4)

Size	Model No. / Amplifier and Motor: Brushless Amplifier	Model No. / Amplifier and Motor: Motor	Rated output (W)	Input power supply for Amplifier: Voltage AC (V)	Allowed range (%)	Frequency (Hz)	Rated input current (A)	Rated torque (N·m)	Starting torque* (N·m)	Rated speed (r/min)	Maximum rotation speed (r/min)
90 mm sq.	MBEG9A1BCV	MBMU9A1A○	90	Single phase 100 to 120	±10	50/60	2.2	0.29	0.43	3000	4000
	MBEG9A5BCV	MBMU9A2A○		Single phase /3-phase 200 to 240			Single phase 1.1 / 3-phase 0.5				

* Suffix of "○" in the motor model No. represents shape of shaft.
* Starting torque: Representative value

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

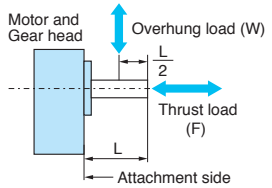
Applicable Gear head	Reduction ratio		3	3.6	5	6	7.5	9	10	12.5	15	18	20	25	30	36	50	60	75	90	100	120	150	180	200
MZ9G□B MY9G□B	motor rotation speed (r/min)	3000 or less	0.67	0.81	1.12	1.34	1.69	2.02	2.28	2.54	3.06	3.72	4.11	5.27	6.22	6.96	9.81	11.7	14.7	17.3	19.0	19.6			
		3000 to 4000	0.50	0.61	0.84	1.01	1.27	1.52	1.71	1.91	2.30	2.79	3.08	3.95	4.67	5.22	7.36	8.78	11.0	13.0	14.3	17.0	19.6		
	Rotational direction		Same as motor rotational direction					Reverse to motor rotational direction								Same as motor rotational direction									

Permissible load inertia moment (×10⁻⁴kg·m²) Acceleration/Deceleration time is 0.3 sec (Initial setting)

Reduction ratio	3	3.6	5	6	7.5	9	10	12.5	15	18	20	25	30	36	50	60	75	90	100	120	150	180	200	Round shaft
Applicable Gear head																								
MZ9G□B／MY9G□B	5.93	8.47	16.4	23.6	37.3	53.4	67.6	98.3	142	211	257	423	589	847	1684									5.6

* Acceptable value on round shaft applies when stopping operation in free-run stop. In deceleration stop, the value is 1/4 of that indicated above due to regeneration (only with round shaft). If the inertia is not to be decreased, set a longer deceleration time.

Permissible shaft load

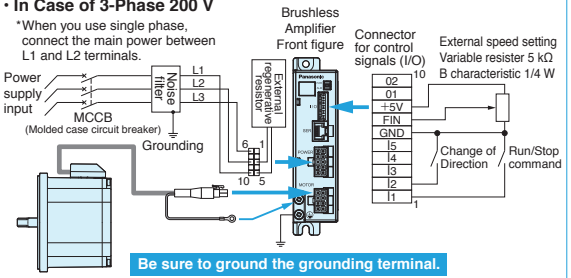


		Overhung load (W)	Thrust load (F)
Motor shaft	Output 90 W	150N	20N
Applicable Gear head	MZ9G□B MY9G□B	588N	147N

Wiring diagram

• In Case of 3-Phase 200 V

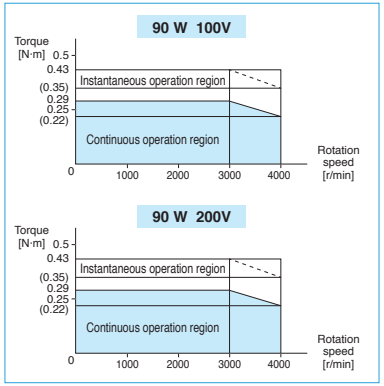
*When you use single phase, connect the main power between L1 and L2 terminals.



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%.〉

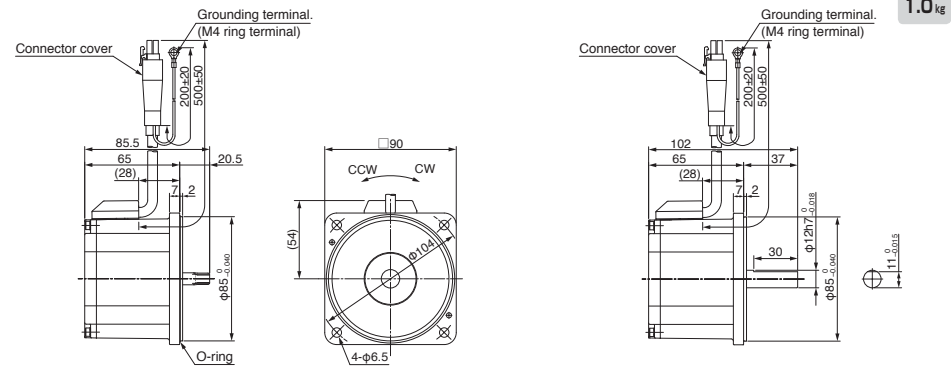


* Before using, be sure to read "Instruction manual" to check precautions and correct procedure.

Motor (dimensions) Unit mm

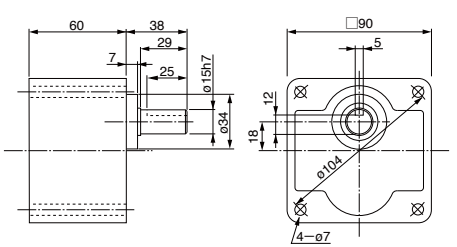
mass 1.0 kg

<Round shaft type>

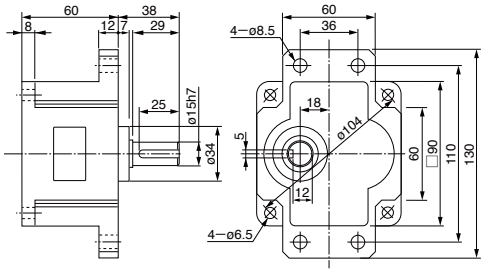


Gear head (dimensions) Unit mm

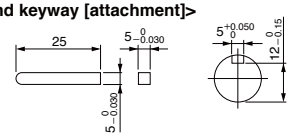
MZ9G□B (Ball bearing/Hinge not attached) mass 1.4 kg



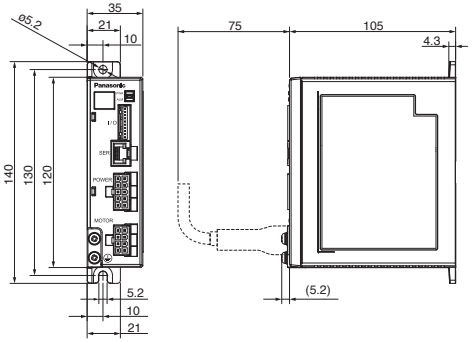
MY9G□B (Ball bearing/Hinge attached) mass 1.4 kg



<Key and keyway [attachment]>

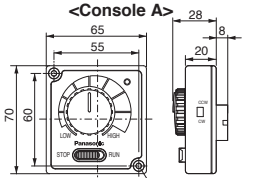


Brushless Amplifier (dimensions) Unit mm

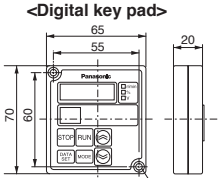


Console A, Digital key pad (dimensions) [option] Unit mm

<Console A>

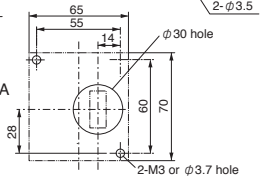


<Digital key pad>



(Mounting hole side)

* Same hole for Console A and Digital key pad



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

90 mm sq. 130W

Specification (For Common specification, see p. 3, 4)

Size	Model No. / Amplifier and Motor: Brushless Amplifier	Model No. / Amplifier and Motor: Motor	Rated output (W)	Input power supply for Amplifier: Voltage AC (V)	Allowed range (%)	Frequency (Hz)	Rated input current (A)	Rated torque (N·m)	Starting torque* (N·m)	Rated speed (r/min)	Maximum rotation speed (r/min)
90 mm sq.	MBEG1E1BCV	MBMU1E1A○	130	Single phase 100 to 120	±10	50/60	2.8	0.41	0.62	3000	4000
	MBEG1E5BCV	MBMU1E2A○		Single phase /3-phase 200 to 240			Single phase 1.5 / 3-phase 0.7				

* Suffix of "○" in the motor model No. represents shape of shaft.

* Starting torque: Representative value

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

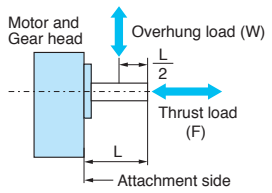
Applicable Gear head	Reduction ratio		3	3.6	5	6	7.5	9	10	12.5	15	18	20	25	30	36	50	60	75	90	100	120	150	180	200
MZ9G□B MY9G□B	motor rotation speed (r/min)	3000 or less	1.01	1.21	1.69	2.02	2.54	3.04	3.42	3.82	4.59	5.58	6.17	7.91	9.34	10.5	14.7	17.5	19.6						
		3000 to 4000 100 V	0.59	0.71	0.99	1.18	1.49	1.78	2.00	2.24	2.69	3.27	3.61	4.63	5.47	6.15	8.60	10.2	12.9	15.4	17.2	19.6			
		3000 to 4000 200 V	0.76	0.91	1.27	1.52	1.91	2.28	2.57	2.87	3.44	4.19	4.63	5.93	7.01	7.88	11.0	13.1	16.5	19.6					
	Rotational direction		Same as motor rotational direction					Reverse to motor rotational direction								Same as motor rotational direction									

Permissible load inertia moment (×10⁻⁴kg·m²) Acceleration/Deceleration time is 0.3 sec (Initial setting)

Reduction ratio	3	3.6	5	6	7.5	9	10	12.5	15	18	20	25	30	36	50	60	75	90	100	120	150	180	200	Round shaft
Applicable Gear head																								
MZ9G□B／MY9G□B	5.93	8.47	16.4	23.6	37.3	53.4	67.6	98.3	142	211	257	423	589	847	1684									5.6

* Acceptable value on round shaft applies when stopping operation in free-run stop. In deceleration stop, the value is 1/4 of that indicated above due to regeneration (only with round shaft). If the inertia is not to be decreased, set a longer deceleration time.

Permissible shaft load

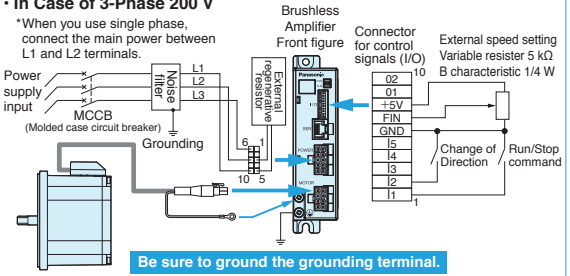


		Overhung load (W)	Thrust load (F)
Motor shaft	Output 130 W	150N	20N
Applicable Gear head	MZ9G□B MY9G□B	588N	147N

Wiring diagram

• In Case of 3-Phase 200 V

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

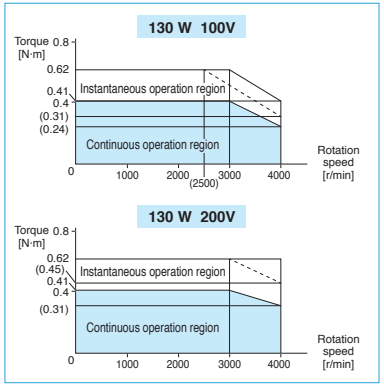


Be sure to ground the grounding terminal.

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%.〉

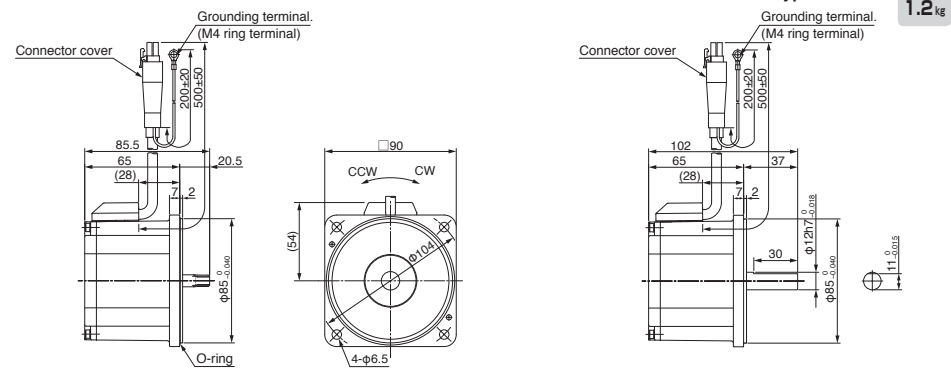


* Before using, be sure to read "Instruction manual" to check precautions and correct procedure.

Motor (dimensions) Unit mm

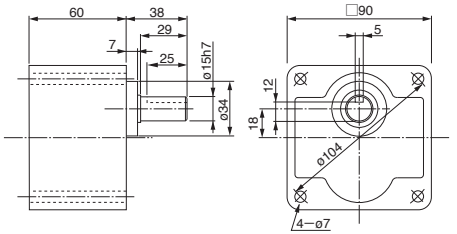
mass 1.2kg

<Round shaft type>

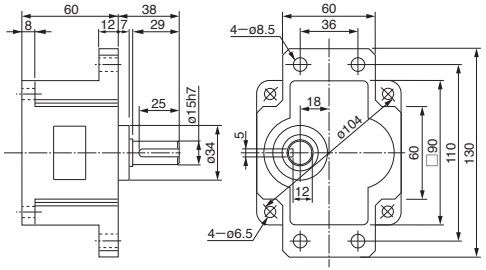


Gear head (dimensions) Unit mm

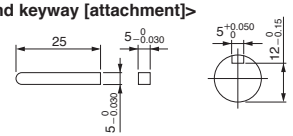
MZ9G□B (Ball bearing/Hinge not attached) mass 1.4 kg



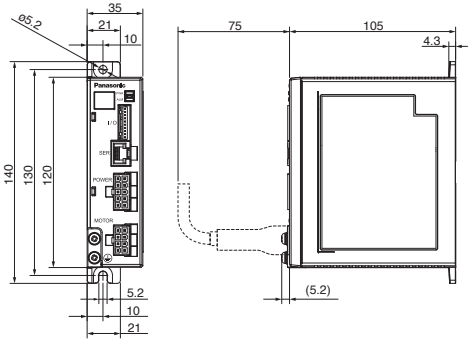
MY9G□B (Ball bearing/Hinge attached) mass 1.4 kg



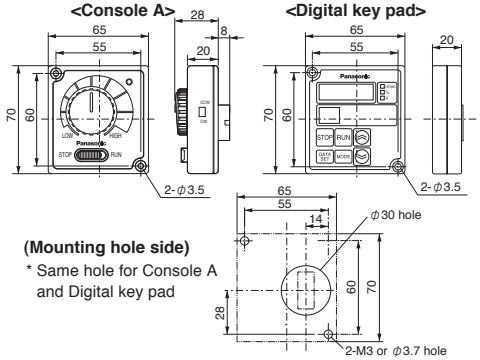
<Key and keyway [attachment]>



Brushless Amplifier (dimensions) Unit mm



Console A, Digital key pad (dimensions) [option] Unit mm



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

Gear head

Outline of gear head

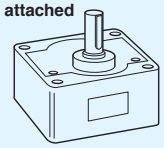
Reduction ratio

• 22 reduction ratios from 1/3 to 1/180 are available for the X type; 23 reduction ratios from 1/3 to 1/200 are available for the Y and Z types.

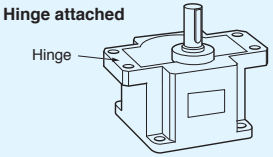
Gear type

X: 50 W
Z: 90 W, 130 W (Hinge not attached)
Y: 90 W, 130 W (Hinge attached)

• Hinge not attached



• Hinge attached



■ Type of gear head and reduction ratio

Gear type	Motor capacity	Reduction ratio																						
		1/3	1/3.6	1/5	1/6	1/7.5	1/9	1/10	1/12.5	1/15	1/18	1/20	1/25	1/30	1/36	1/50	1/60	1/75	1/90	1/100	1/120	1/150	1/180	1/200
X	50 W	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	–
Z, Y	90 W, 130 W	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

Check the Model number

M Z 9 G 30 B

- Output Type
  X : 50 W
  Z, Y : 90 W, 130W
- Size (Gear head)
  8 : 80 mm sq.
  9 : 90 mm sq.
- Reduction ratio
  (Example) 30: Reduction ratio of 1/30
- Bearing
  B : Ball bearing

* The motor and gear are sold separately.

Calculation of torque at output shaft of gear head

■ Standard gear head only

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

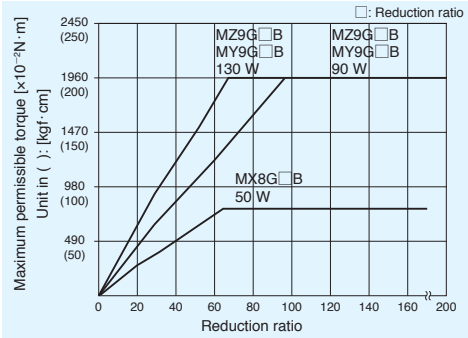
$$T_G = T_M \times i \times \eta$$

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 following graph and the permissible torque for each model and use the gear head at an appropriate load.

■ Maximum permissible torque



Nominal reduction ratio and actual reduction ratio

Note that there is a difference between the nominal reduction ratio and actual reduction ratio of each gear head.
Refer to the table below.

■ Gear head

Nominal reduction ratio	Actual reduction ratio	
	MX8G□	MZ9G□, MY9G□
1/3	1/3.01	1/3.02
1/3.6	1/3.60	1/3.61
1/5	1/4.98	1/5.03
1/6	1/5.96	1/6.02
1/7.5	1/7.48	1/7.58
1/9	1/9.00	1/9.06
1/10	1/9.99	1/10.2
1/12.5	1/12.5	1/12.3
1/15	1/14.9	1/14.8
1/18	1/18.1	1/18.0
1/20	1/20.1	1/19.9
1/25	1/25.1	1/25.5
1/30	1/30.3	1/30.1
1/36	1/36.4	1/36.1
1/50	1/49.8	1/50.9
1/60	1/61.2	1/60.5
1/75	1/76.2	1/76.0
1/90	1/90.5	1/89.8
1/100	1/98.0	1/98.6
1/120	1/122.5	1/121.2
1/150	1/148.9	1/150.4
1/180	1/183.5	1/182.1
1/200	—	1/202.1

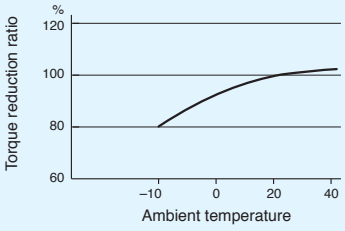
* 1/200: only 90 mm sq. size

Gear head efficiency

Model No.	Reduction ratio																						
	3	3.6	5	6	7.5	9	10	12.5	15	18	20	25	30	36	50	60	75	90	100	120	150	180	200
MX8G□B						81%												75%					—
MZ9G□B MY9G□B				81%						75%								70%					

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.

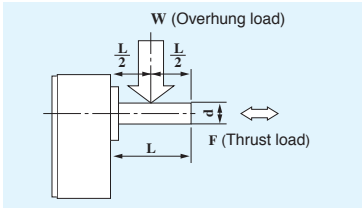


Gear head

Overhung load and thrust load

The overhung load is defined as a load applied to the output shaft in the right-angle direction. This load is generated when the gear head is coupled to the machine using a chain, belt, etc., but not when the gear head is directly connected to the coupling.
As shown in the figure below, the permissible value is determined based on the load applied to the L/2 position of the output shaft.
The thrust load is defined as a load applied to the output shaft in the axial direction.
Because the overhung load and thrust load significantly affect the life of the bearing, take care not to allow the load during operation to exceed the permissible overhung load and thrust load shown in the table below.

■ **Overhung load and thrust load**



■ **Permissible load list**

Size	Model No.	Permissible overhung load N(kgf)	Permissible thrust load N(kgf)
80 mm sq.	MX8G□B	294 (30)	49 (5)
90 mm sq.	MZ9G□B MY9G□B	588 (60)	147 (15)

Service factor

Life expectancy of motor varies depending on load fluctuation. To determine the life expectancy, a factor called service factor, as shown in the table below is used. First choose the appropriate service factor according to the type of load and multiply the result by the required power to determine the design power.

■ **Service factor**

Type of load	Typical load	Service factor		
		5 hours/day	8 hours/day	24 hours/day
Constant	Belt conveyor, One-directional rotation	1.0	1.0	1.5
Light-impact	Start/Stop, Cam-drive	1.2	1.5	2.0
Medium-impact	Instant FWD/REV, Instant stop	1.5	2.0	2.5
Heavy-impact	Frequent medium-impact	2.0 to 2.5	2.5 to 3.0	3.0 to 3.5

The required allowable shaft torque T_A of the gear head can be determined based on the service factor and actual load torque T_1:

$T_A = T_1 \times S_f$

T_A : Allowable torque of gear head (N·m)
T_1 : Actual load torque (N·m)
S_f : Service factor

Use the motor so that the allowable torque T_A calculated from the formula above falls within the allowable torque range.

Standard life expectancy

■ **Conditions for standard life of 5,000 hours**

- Motor rotation speed is equal to or less than 3,000 r/min.
- Operated at a normal temperature and humidity under uniform load (permissible shaft torque range of gear head)
- Operated for 8 hours per day (service factor: Sf = 1)

When the motor (round shaft) is solely operated at a normal temperature and humidity under uniform load (at up to rated torque), the standard life is 10,000 hours.
Note that standard life of oil seal is 5,000 hours.

■ **Standard life expectancy**

	Life (hours)
Ball bearing	5,000 hours

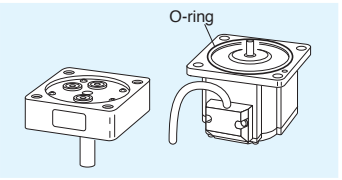
■ **Expected life**

When the service factor is 2.0, the expected life is standard life 5,000 hours/2.0 = 2,500 (hours).

To obtain the standard life of motor running at 3,000 to 4,000 r/min, use the formula shown below.
Standard life (hours) = 5,000 (hours) × 3,000 (r/min) / rotating speed (r/min)

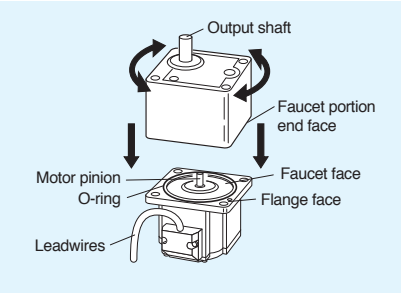
Preparation

(1) Prepare a gear head that matches a motor described in this manual.
Use of incompatible gear head will cause malfunction.
(2) Check O-ring being correctly placed in a right place. If it is not, this may result in grease in the gear head coming out.
(3) Wipe off any grease on the gear head flange surface.



Assembling

(1) Place the unit so that the motor shaft faces up.
Direction of the motor lead and output shaft of gear head must match an application.
(2) Do not contact a tooth tip of pinion shaft to a tooth tip of gear head. Set each tooth of motor and gear head correctly and gently press and turn the gear head in counter and counter-clockwise.
(3) To attach the gear head to an application, use the "attaching screws" supplied with the gear head and tighten the screws with appropriate torque and with care not to pinch the O-ring, so that the there is no gap between motor flange and gear flange.
(4) The recommended torque is shown below.

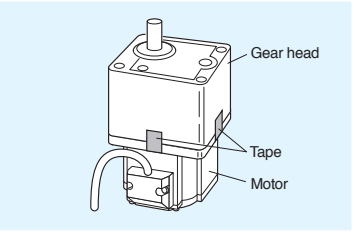


Size	Screw size	Tightening torque
80 mm sq.	M5	2.5 to 3 N·m
90 mm sq.	M6	3.5 to 4.5 N·m

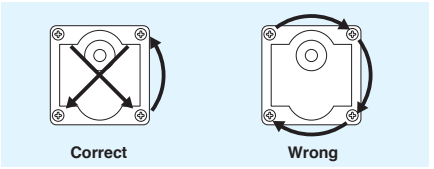
<Precautions>

Keep the gear head attached to the motor. Otherwise, the O-ring may become distorted or damaged, causing grease leakage.

- When reassembling, first replace the O-ring with a new one.
- When installing a motor associated with the gear head to the application device, temporarily secure the motor and gear head with a tape until assembly completes.



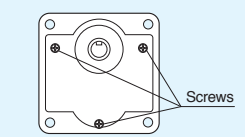
(5) Tighten 4 mounting screws in crisscross pattern.



<Note>

Do not forcedly assemble the motor and gear head.
Do not damage the tooth of the motor pinion and gear head.
Incorrect assembly results in abnormal noise generation or shortened unit life.

DON'T	**Don't touch screws on the output shaft of gear head.**	Will cause malfunction.



Gear head

Considerations for installation of gear head

You may experience a slipping gear contact due to broken pinion tooth, locked gear or leaked grease as the gear head life comes closer. Place a safety device to keep safe operation at any time even if such problems take place.

- Place a drop-proof device in an vertically motioned application like a lifter.
- Place a device to open the door in a door application just in case the gear head is locked.
- Place an oil pan to prevent oil from coming out in an application like food/textile etc.
- Do not place an encoder, sensor, contact, etc near a gear head where the grease may leaking out. If not, please have a protection from grease.
- Have a routine check of the gear head to avoid unexpected accident.

Considerations for storage of gear head

When storing the gear head as a single unit, place it with the output shaft facing down.
(To prevent grease leakage)

Model list of gear head

Gear head

■ **Ball bearing**

Size	Reduction ratio	Model No.	Hinge
80 mm sq.	1/3, 1/3.6, 1/5, 1/6, 1/7.5, 1/9, 1/10, 1/12.5, 1/15, 1/18	**MX8G3B** to **MX8G18B**	
	1/20, 1/25, 1/30, 1/36	**MX8G20B** to **MX8G36B**	
	1/50, 1/60, 1/75, 1/90, 1/100, 1/120, 1/150, 1/180	**MX8G50B** to **MX8G180B**	
90 mm sq. (90 W・130 W Common use)	1/3, 1/3.6, 1/5, 1/6, 1/7.5, 1/9	**MZ9G3B** to **MZ9G9B**	
	1/10, 1/12.5, 1/15, 1/18	**MZ9G10B** to **MZ9G18B**	
	1/20, 1/25, 1/30, 1/36, 1/50, 1/60	**MZ9G20B** to **MZ9G60B**	
	1/75, 1/90, 1/100, 1/120, 1/150, 1/180, 1/200	**MZ9G75B** to **MZ9G200B**	
	1/3, 1/3.6, 1/5, 1/6, 1/7.5, 1/9	**MY9G3B** to **MY9G9B**	○
	1/10, 1/12.5, 1/15, 1/18	**MY9G10B** to **MY9G18B**	○
	1/20, 1/25, 1/30, 1/36, 1/50, 1/60	**MY9G20B** to **MY9G60B**	○
	1/75, 1/90, 1/100, 1/120, 1/150, 1/180, 1/200	**MY9G75B** to **MY9G200B**	○

* 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		Key	
80 mm sq.	1/3 to 1/180	**MX8G3B** to **MX8G180B**	M5 P0.8×55 pan head screw	: 4	for M5 P0.8	: 4	M5 P0.8	: 4	4×4×25 one-end round	: 1
90 mm sq.	1/3 to 1/200	**MZ9G3B** to **MZ9G200B**	M6 P1.0×85 hexagon socket head bolt	: 4	for M6 P1.0	: 4	M6 P1.0	: 4	5×5×25 one-end round	: 1
	1/3 to 1/200	**MY9G3B** to **MY9G200B**	M6 P1.0×25 hexagon socket head bolt	: 4	for M6 P1.0	: 4	M6 P1.0	: 4	5×5×25 one-end round	: 1

Conformance to international safety standards

Conformance to international standards

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 °C 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.

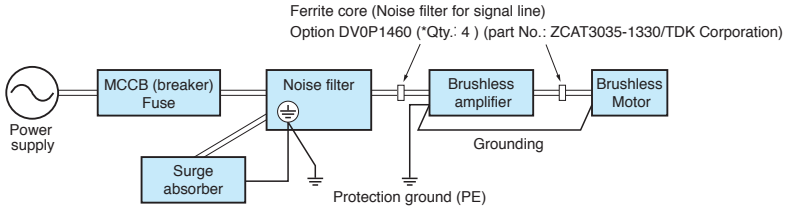
(대상기종 : Brushless Amplifier**)**

Conformance to international safety standards

Configuration of peripheral equipment

Power supply	· 100 V system: Single phase 100 V to 120 V ± 10%, 50/60 Hz 200 V system: Single/3-phase 200 V 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



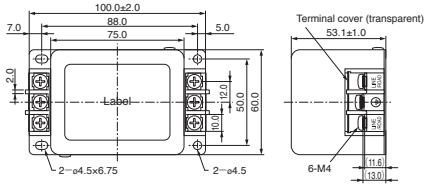
* The ferrite core should insert one or more pieces in an electric wire, respectively.

List of compatible peripheral equipment

Part name	Optional parts number (option)	Manufacturer's parts number	Qty.	Manufacturer
Noise filter (single phase 100, 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, 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

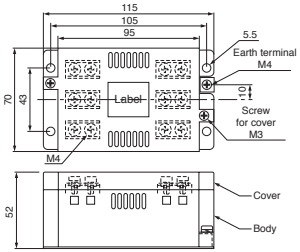
Noise filter

• DV0P4170



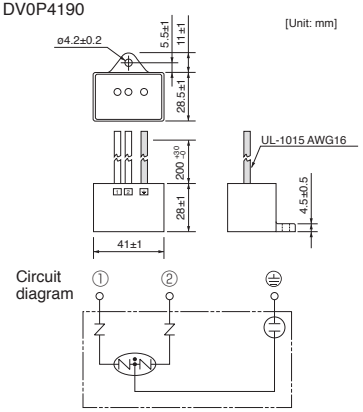
[Unit: mm]

• DV0PM20042

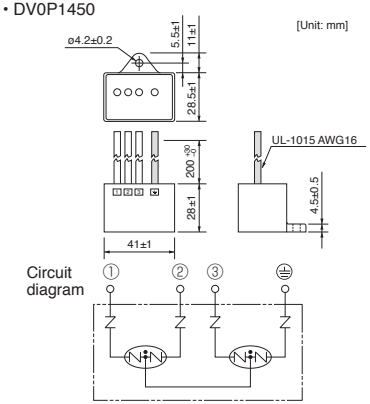


Surge absorber

• DV0P4190

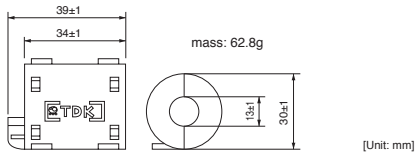


• DV0P1450



Noise filter for control signals

• 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

Option

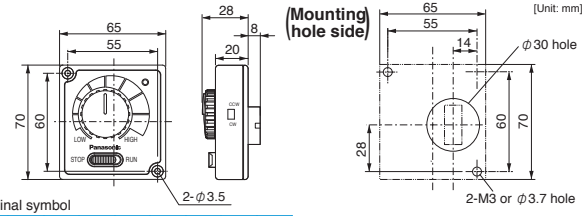
Settings

Console A

Optional part number
DV0P3500

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

Console A connector pin No.



Console A connector terminal symbol

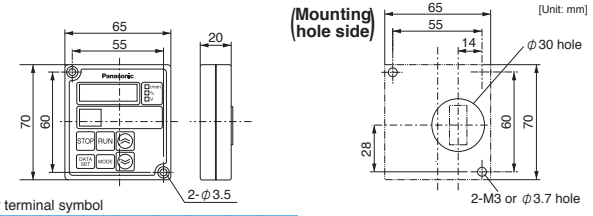
Terminal No.	1	2	3	4	5	6	7	8	9	10
Terminal name	I1	I2	GND	FIN	+5V	—	—	—	—	—

Digital key pad

Optional part number
DV0P3510

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

Digital key pad connector pin No.



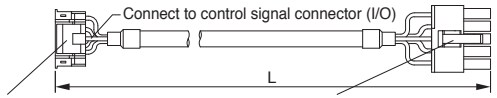
Digital key pad connector terminal symbol

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

Cable

Console A connection cable

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



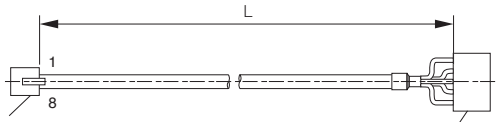
<Control signal connector I/O side> (J.S.T Mfg.Co.,Ltd.)
Housing : PAP-10V-S : PAP-10V-S
Terminal : SPHD-001T-P05 : SPHD-001T-P05

<Console A side connector> (MoleX.)
Housing : 39-01-2105(5557-10R-210)
Terminal : 39-00-0046(5556T2)
or
39-00-0047(5556T2L)

Terminal No. of I/o terminal	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

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



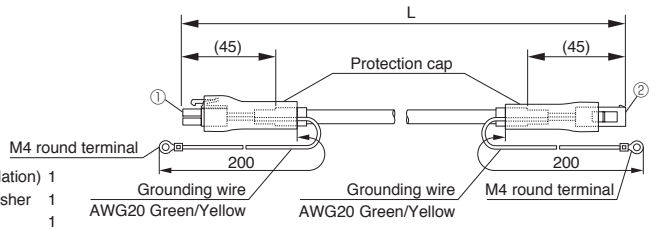
Brushless amplifier side connector (modular plug RJ45)
Connected to (SER)

<Digital key pad side connector> (MoleX.)
Housing : 39-01-2105(5557-10R-210)
Terminal : 39-00-0046(5556T2)
or
39-00-0047(5556T2L)

Terminal No. of SER connector	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

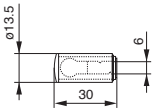
Motor extension cable

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



● **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]

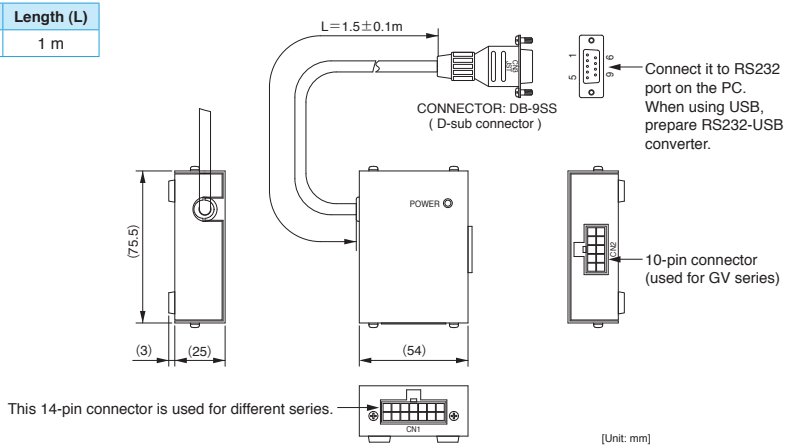
①Brushless amplifier side connector (MoleX.)
Connector : 39-01-2085
Connector pin : 39-00-0038 or 39-00-0039(for AWG 20)
39-00-0046 or 39-00-0047(for AWG 26)

②Motor side connector (MoleX.)
Connector : 39-01-2086
Connector pin : 39-00-0040 or 39-00-0041(for AWG 20)
39-00-0048 or 39-00-0049(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.

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

Optional part number	Length (L)
DV0P4140	1 m



[Unit: mm]

Communication software

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

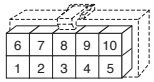
Option

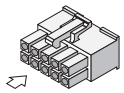
Connector Kit/ Cable/ External speed setter

Power supply connector kit

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		

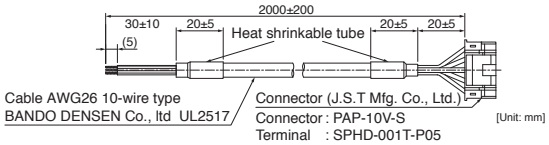
• 39-01-2105 (5557-10R-210)





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

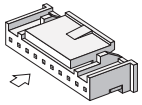
Optional part number	Length (L)
DV0PM20076	2 m



I/O connector kit

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		

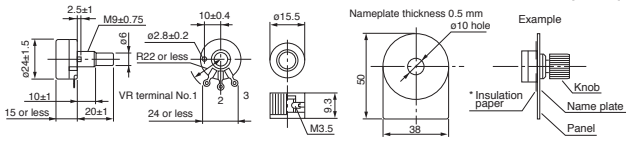
• PAP-10V-S



External speed setter

Optional part number
DV0PM20078

5 kΩ B characteristic 1/4 W [Unit: mm]

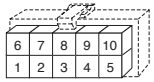


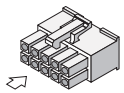
* Insert the insulation paper to positively isolate the terminals and chassis.

Panel connector kit (Fits to Console A)

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)



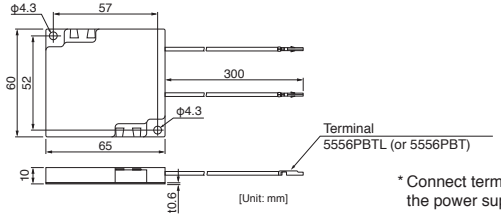


<For your reference>
For tools such as crimp tools necessary to assemble the cable, access the connector manufacturer's web site or consult the manufacturer: refer to p. 28 "List of peripheral equipment manufacturers".

External regenerative resistor

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

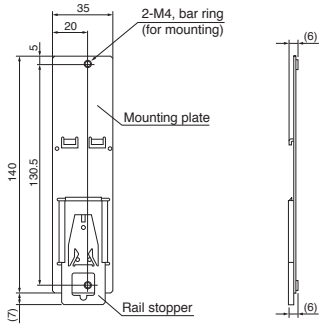
• DV0P2890, DV0PM20068



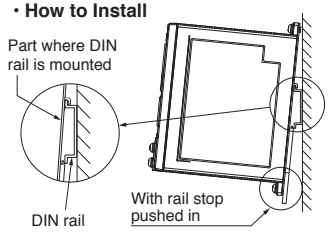
* Connect terminals to pins No. 3 and No. 5 of the power supply connector, respectively.

DIN rail attachment unit

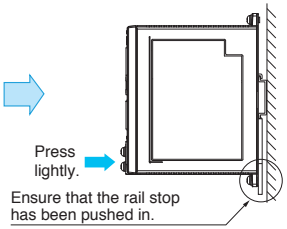
Optional part number
DV0P3811



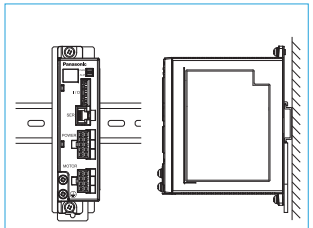
• How to Install



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

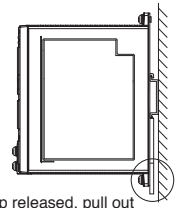


Press lightly the lower part of the main body of amplifier.

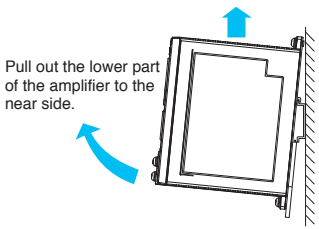


Amplifier mounted to DIN rail

• 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

Fig.1

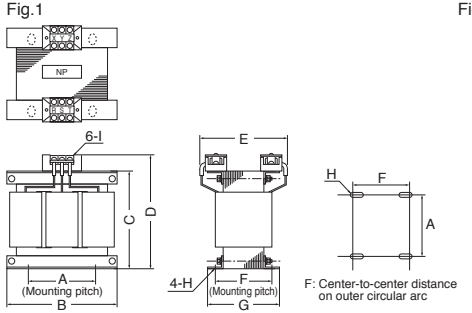
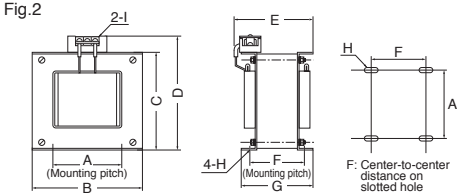


Fig.2



	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	4-7φ×12	M4	6.81	3
Fig.2	**DV0P227**	55±0.7	80±1	66.5±1	110Max	90	41±2	55±2	4-5φ×10	M4	4.02	5
	DV0P228	55±0.7	80±1	66.5±1	110Max	95	46±2	60±2	4-5φ×10	M4	2	8

* For applicability of reactor, refer to the corresponding table on p. 5.

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 co-operate 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.

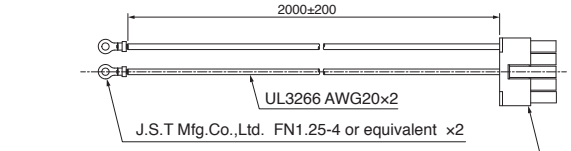
Power cable (single phase 100 V, 200 V) with connector

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

	50 W	90 W	130 W
100 V	**MBEG5A1BCVC**	**MBEG9A1BCVC**	**MBEG1E1BCVC**
200 V	**MBEG5A5BCVC**	**MBEG9A5BCVC**	**MBEG1E5BCVC**

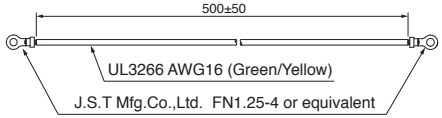
- When supplying 3-phase power source to a 200 V brushless amplifier, use the supplied power cable and connect 2 conductors to L1 and L2.
- When supplying 3-phase power, use a power connection kit and connect three conductors to L1, L2 and L3.
- For location of L1, L2 and L3, refer to the wiring diagram on pages 9, 11 and 13.

■ Cable specification



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

• Grounding wire



Motor Business coexisting with Global Environment

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

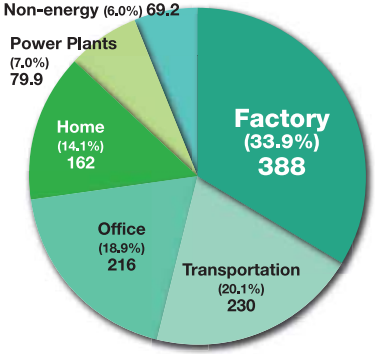
eco ideas

Panasonic group always aims for environmentally-friendly products.

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
(Units: million tons) 「Japan CO_2 emission data」

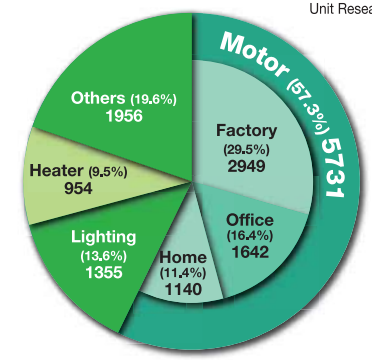


Motor holds the key to global environmental protection

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



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.

Index

Sales office

[Panasonic Sales Office of Motors]

(Apr.01.2012)

Country	Company Name	City	Address	TEL / FAX
U.S.A.	Panasonic Industrial Devices Sales Company of America (PIDSA)	New Jersey	Three Panasonic Way, 7E-2 Secaucus, NJ 07094 U.S.A.	+1-201-348-5217
				+1-201-392-4315
	Panasonic Electric Works Corporation of America (PEWA)	New Jersey	629 Central Avenue New Providence, NJ 07974 U.S.A	+1-908-464-3550 Technical Support: +1-877-624-7872
				+1-908-771-5655
Spain	Panasonic Electric Works Espana S.A.	Madrid	Barajas Park, San Severo 20, 28042 Madrid,Spain	+34-91-329-3875
				+34-91-329-2976
Germany	Panasonic Electric Works Europe AG	Munich	Rudolf-Diesel-Ring 2, 83607 Holzkirchen, Germany	+49-8024-648-0
				+49-8024-648-555
Italy	Panasonic Electric Works Italia srl	Verona	Via del Commercio 3-5 (Z.I. Ferlina), 37012 Bussolengo (VR), Italy	+39-045-6752711
				+39-045-6700444
United Kingdom	Panasonic Electric Works UK Ltd.	Milton Keynes	Sunrise Parkway,Linford Wood, Milton Keynes, MK14 6 LF, the United Kingdom	+44-1908-231-555
				+44-1908-231-599
Taiwan	Panasonic Industrial Devices Sales Taiwan Co.,Ltd (PIDST)	Taipei	12F, No.9, SongGao Rd., Taipei 110, Taiwan, R.O.C.	+886-2-2757-1900
				+886-2-2757-1977
Singapore	Panasonic Industrial Devices Sales Asia Pte. Ltd. (PIDS)	Singapore	300 Beach Road #16-01 The Concourse Singapore 199555	+65-6390-3718
				+65-6390-3801
China	Panasonic Industrial Devices Sales (China) Co.,Ltd. (PIDSCN)	Shanghai	Floor 7, China Insurance Building, 166 East Road LuJiaZui PuDong New District, Shanghai, China	+86-21-3855-2442
				+86-21-3855-2375
	Panasonic Shun Hing Industrial Devices Sales (Hong Kong) Co.,Ltd. (PSIDSHK)	Hong kong	Level 33, Office Tower, Langham Place, 8 Argyle Street, Mongkok, Kin., Hong Kong	+852-2529-7322
				+852-2598-9743
	Panasonic SH Industrial Devices Sales (Shenzhen) Co.,Ltd. (PSIDSSZN)	Shenzhen	6th Floor, Excellence Times Square, #4068 Yitian Road, Futian District, Shenzhen, China	+86-755-8255-8551
				+86-755-8255-8668
India	Panasonic Industrial Devices Sales India (PIDSIN) (A division company of Panasonic India Pvt Ltd.)	New Delhi	7th Floor, ABW Tower, IFFCO Chowk, MG Road, Sector 25, Gurgaon-122 001, Haryana, India.	+91-124-4596600
				+91-124-4596625
Korea	Panasonic Industrial Devices Sales Koea Co., Ltd. (PIDSKR)	Seoul	14F,West-gate Bldg 332 Migeun-dong, Seodaemun-gu, Seoul,120-020 Korea	+82-2-795-9600
				+82-2-795-1542

Cautions for Proper Use

- Practical considerations for exporting the product or assembly containing the product
  When the end user of the product or end use of the product is associated with military affair or weapon, its export may be controlled by the Foreign Exchange and Foreign Trade Control Law. Complete review of the product to be exported and export formalities should be practiced.
- This product is intended to be used with a general industrial product, but not designed or manufactured to be used in a machine or system that may cause personal death when it is failed.
- Installation, wiring, operation, maintenance, etc., of the equipment should be done by qualified and experienced personnel.
- Apply adequate tightening torque to the product mounting screw by taking into consideration strength of the screw and the characteristics of material to which the product is installed. Overtightening can damage the screw and/or material; undertightening can result in loosening.
  Example) Steel screw (M5) into steel section: 2.7-3.3 N·m.
- Install a safety equipments or apparatus in your application, when a serious accident or loss of property is expected due to the failure of this product.
- Consult us if the application of this product is under such special conditions and environments as nuclear energy control, aerospace, transportation, medical equipment, various safety equipments or equipments which require a lesser air contamination.
- We have been making the best effort to ensure the highest quality of the products, however, application of exceptionally larger external noise disturbance and static electricity, or failure in input power, wiring and components may result in unexpected action. It is highly recommended that you make a fail-safe design and secure the safety in the operative range.
- If the motor shaft is not electrically grounded, it may cause an electrolytic corrosion to the bearing, depending on the condition of the machine and its mounting environment, and may result in the bearing noise. Checking and verification by customer is required.
- Failure of this product depending on its content, may generate smoke of about one cigarette. Take this into consideration when the application of the machine is clean room related.
- Please be careful when using in an environment with high concentrations of sulfur or sulfuric gases, as sulfuration can lead to disconnection from the chip resistor or a poor contact connection.
- Take care to avoid inputting a supply voltage which significantly exceeds the rated range to the power supply of this product. Failure to heed this caution may result in damage to the internal parts, causing smoking and/or a fire and other trouble.
- The user is responsible for matching between machine and components in terms of configuration, dimensions, life expectancy, characteristics, when installing the machine or changing specification of the machine. The user is also responsible for complying with applicable laws and regulations.
- The product will not be guaranteed when it is used outside its specification limits.
- Parts are subject to minor change to improve performance.
- Read and observe the instruction manual without fail for proper usage of the products.

Repair	Consult to the dealer from whom you have purchased this product for details of repair work. When the product is incorporated to the machine you have purchased, consult to the machine manufacturer or its dealer.
URL	Electronic data of this product (Instruction Manual, CAD data) can be downloaded from the following web site; <http://industrial.panasonic.com/ww/i_e/25000/motor_fa_e/motor_fa_e.html>

Contact to :

Panasonic Corporation,
Appliances Company,
Motor Business Unit
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Tel : +81-72-871-1212
Fax: +81-72-870-3151

The contents of this catalog apply to the products as August 2012

ISO14001 Certificate division
CERTIFICATE OF APPROVAL ISO14001

ISO9001 Certificate division
CERTIFICATE OF APPROVAL ISO9001

- Printed colors may be slightly different from the actual products.
- Specifications and design of the products are subject to change without notice for the product improvement.

<12.8Ⓢ>