

Technical Instructions (Basic)

MINAS-BL KV series

Brushless Amplifier

- Thank you very much for your purchase of Panasonic product.
- Please read this instruction manual carefully for proper use.
- In particular, be sure to read Safety precautions (P.2 to 4) before use for safety.
- Keep this manual with care after reading, and read as necessary.

Be sure to give this Instruction manual to an end user.



* This product image is 200 W type of KV-series.

- Label of safety precaution is affixed to the product.

If you are the first user of this product, please be sure to read the instruction Manual (Overall) from our Web Site.


[Web address of Panasonic Industry Co., Ltd.]
industrial.panasonic.com/ac/e/


This product is for industrial equipment. Don't use this product at general household.

Safety Precautions Important

The following explanations are for things that must be observed in order to prevent harm to people and damage to property.

- Misuses that could result in harm or damage are shown as follows, classified according to the degree of potential harm or damage.

 **Danger** Indicates great possibility of death or serious injury.

 **Caution** Indicates the possibility of injury or property damage.

- The following indications show things that must be observed.



Indicates something that must not be done.



Indicates something that must be done.

DANGER

Do not touch the rotating part of the motor while operating.



The failure could result in injuries.

Do not expose the cables to sharp objects, excessive pressing or pinching forces, and heavy loads.



The failure could result in electric shocks, damages, or malfunction.

Do not climb or stand on the brushless equipment.



The failure could result in electric shocks, injuries, damages, or malfunction.

Do not place inflammable matter near the motor, amplifier and external regenerative resistor.



The failure could result in fire.

Do not touch the motor, amplifier, and external regenerative resistor, since they become hot.



The failure could result in burns.

Do not subject the product to water, corrosive or flammable gases, and combustibles.



The failure could result in fire.

Do not put your hands in the brushless amplifier.



The failure could result in burns, or electric shocks.

Do not connect the cable (U, V and W) of the brushless motor directly to the commercial power source.



The failure could result in fire, malfunction or damage.

Ground the earth of the brushless motor and brushless amplifier.



The failure could result in electric shocks.

Install an external emergency stop device to shut down the main power source in any emergency.



The failure could result in electric shocks, injuries, fire, damages or malfunction.

Make sure to secure the safety after the earthquake.



The failure could result in electric shocks, injuries, or fire.

Mount the brushless motor, brushless amplifier and external regenerative resistor on incombustible material such as metal.



The failure could result in electric shocks, injuries, or fire.

Arrange the phase sequence of the motor and wiring of the CS sensor.



The failure could result in injuries, damages, or malfunction.

An over-current protection, earth leakage breaker, over temperature protector and emergency stop device must be installed.



The failure could result in electric shocks, injuries, or fire.

Install the product properly to avoid personal accidents or fire in case of an earthquake.



The failure could result in electric shocks, injuries, or fire.

Only persons who are trained and qualified to work with or on electrical equipment are permitted to operate or maintain this equipment.



The failure could result in electric shocks.

Transportation, wiring and checking must be performed with power source turned off and after making sure that there is no risk of electric shock.



The failure could result in electric shocks or injuries.

CAUTION

Do not approach to the equipment after recovery from the power failure because they may restart suddenly.



The failure could result in injuries.

Do not hold the cables or motor shaft when transporting the motor.



The failure could result in injuries.

Do not drive the motor from the external power.



The failure could result in fire.

Never start and stop the motor by magnet contactor which is provide on the main line.



The failure could result in damages.

Safety Precautions

Important

CAUTION

Do not frequently turn on and off the master power source.



The failure could result in malfunction.

Do not subject the brushless amplifier, motor or shaft to high impact.



The failure could result in malfunction.

Do not modify, dismantle or repair the product.



The failure could result in electric shocks, injuries, or fire.

If trip occurs, remove the causes of the trip and secure the safety before restarting.



The failure could result in injuries.

Execute the trial-operations with the motor fixed and a load unconnected. Connect a load to the motor after the successful trial-operations.



The failure could result in injuries.

Use the specified voltage on the product.



The failure could result in electric shocks, injuries, or fire.

Install a safety device against idling or locking of gear head, and leakage of grease.



The failure could result in injuries, damages, and contaminations.

Do not place any obstacle that blocks ventilation around the brushless amplifier and the motor.



The failure could result in burns or fire.

Do not block the heat dissipation hole.



The failure could result in electric shocks, or fire.

Be sure to turn off power when not using it for a prolonged time.



The failure could result in injuries due to unintentional operation.

Maintenance and check must be performed by an expert.



The failure could result in injuries and electric shock.

Conduct proper installation according to product weight or rated output.



The failure could result in injuries, or damages.

Use the motor and amplifier with the specified combination.



The failure could result in fire.

Ambient temperature of installed motor and amplifier should be under permissible one.



The failure could result in damages.

This product should be treated as an industrial waste when it is disposed.

Introduction/ Checking the model

After unpacking

- Make sure that the model is what you have ordered.
- Check whether the product has been damaged or not during transportation.

If any deficiency should be found, contact the dealer store where you bought this product.

Checking the model of Amplifier and Motor

This amplifier is designed for use in combination with a motor to be specified by us. Check a name of series, rated output, voltage specifications you wish to use. You must not use any other combinations than those listed below:

Standard

Voltage	Out put	Amplifier Type	Applicable Motor
Single phase AC100 to 120 V	50 W	MBEK5A1BCV	MBMS5AZBL□
	100 W	MBEK011BCV	MBMS011BL□
	200 W	MBEK021BCV	MBMS021BL□
Single phase/3-phase AC200 to 240 V	50 W	MBEK5A5BCV	MBMS5AZBL□
	100 W	MBEK015BCV	MBMS012BL□
	200 W	MBEK025BCV	MBMS022BL□
	400 W	MBEK045BCV	MBMS042BL□
3-phase AC200 to 240 V	750 W	MBEK083BCV	MBMS082BL□

* Suffix of "□" in the motor model represents shape of shaft.

Oil seal		Shaft		
		Round	Keyway, center tap	D-cut
	without	A	S	N
	with	C	U	Q

Checking the model of brushless amplifier

Nameplate

Model name: MBEK083BCV
 input/output voltage: 200-240 V
 input/output phase: 3φ
 Rated input/output current: 4.0 A
 input/output Frequency: 50/60 Hz
 Rated output: 750 W

Serial Number: Ex.: P 13030001 *
 Consecutive number: 1
 Month of production: 03
 Year of production (Lower 2 digits of AD year): 00
 Production Date: Ex.: 20130301
 day of Production: 01
 month of Production: 03
 year of Production (AD year): 2013

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Check the Model Name

MBEK 5A 1 B C V

KV Series motor drive
 Output: 5A: 50 W, 01: 100 W, 02: 200 W, 04: 400 W, 08: 750 W

Function 1: B: with circuit for regenerative resistor
 Input power supply: C: RS485 communication, Signal input/Sink type (NPN transistor)

V: speed control
 Function 2: V: Single phase AC100 to 120 V, 3: 3-phase AC200 to 240 V, 5: Single phase/3-phase AC200 to 240 V

Name of part

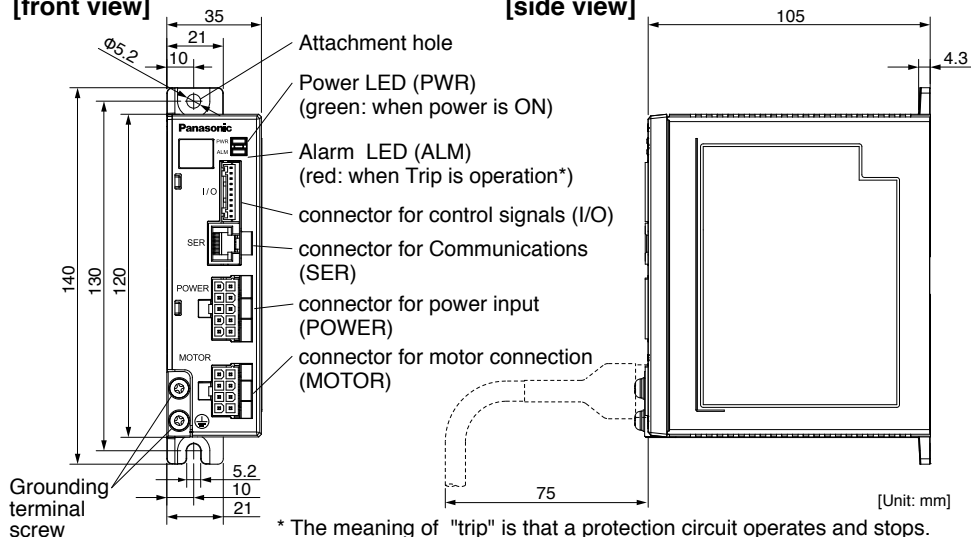
Name of part

Brushless amplifier

● 50 W, 100 W

[front view]

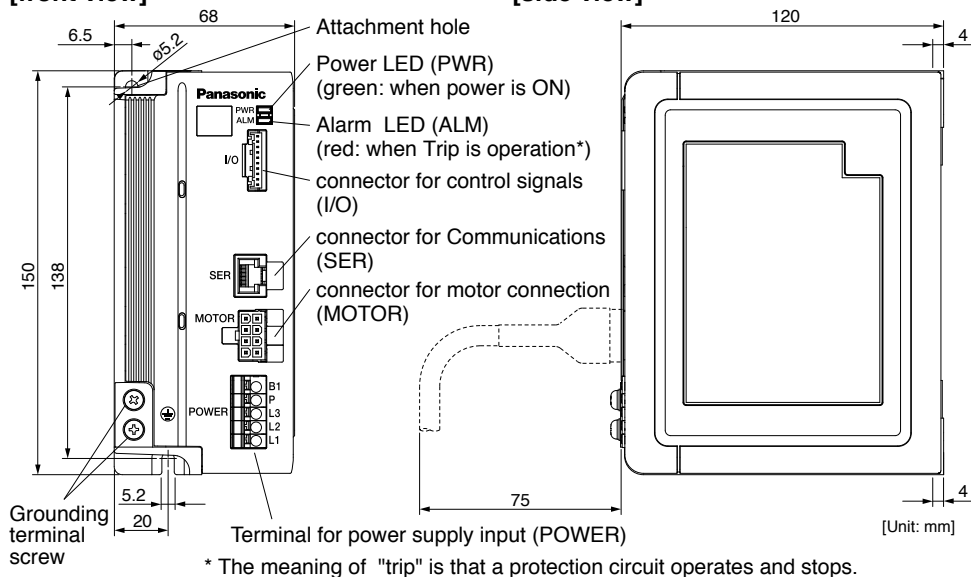
[side view]



● 200 W, 400 W, 750 W

[front view]

[side view]



Installation

Install the brushless amplifier properly for preventing failure and accident.

Transport

- Use caution enough in transporting the unit to prevent injury by drop or fall, and avoid damage to the equipment.

Storage

- Keep the unit indoors in a clean and dry place free from vibration with little change of temperature.
- In keeping a gear head alone, direct the output shaft down.
(Otherwise, grease leaking is possible.)

Location

- Location gives great influence upon the life of brushless amplifier, therefore choose a place in conformance with the conditions below:
 - (1) Indoors where the motor is not subjected to rain water and direct sun beam.
 - (2) Do not use the motor in corrosive atmosphere such as hydrogen sulfide, sulfurous acid, chlorine, ammonia, sulfur, gas chloride, gas sulfide, acid, alkali, and salt, in the atmosphere of combustible gas, or in the vicinity of flammables.
 - (3) Place not exposed to grinding liquid, oil mist, iron powder, and cutting particle.
 - (4) Well-ventilated place with little moisture, oil, or inundation, and place far from heat source such as a furnace.
 - (5) Place easy to check and clean
 - (6) Place free from vibration
 - (7) Do not use the unit in an enclosed environment. Enclosing may raise the temperature of motor (amplifier), and shorten their life.

Environmental condition

Item	Condition
Ambient temperature	0 °C to 50 °C (free from freezing) *1
Ambient humidity	20 to 85 % RH (free from condensation)
Storage temperature	At normal temperature and normal humidity*2
Protection structure	Equivalent to IP20
Vibration	Not greater than 5.9 m/s ² (10 to 60 Hz)
Altitude	Not greater than 1000 m

*1 Ambient temperature is measured at a distance of 5 cm from the product.

*2 Temperature which is acceptable for a short time, such as during transportation, is -20 °C to 60 °C (free from freezing).

How to Install

The amplifier is a vertical placement type. Install it vertically and provide at least 10 cm space around it for ventilation.

(1) When installing with screw

Determine the fastening torque of the fixing screw based on the strength of the screw and material of the mounting surface, to ensure secure and safe installation.

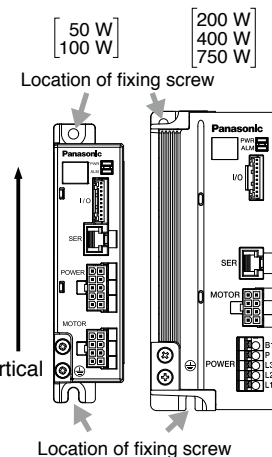
Example:

To install to steel plate with steel screw (M4): 1.35 to 1.65 N·m

(2) When installing to DIN rail (50 W, 100 W)

The DIN rail mounting unit is available as option.

For details, refer to the Instruction Manual (Overall).



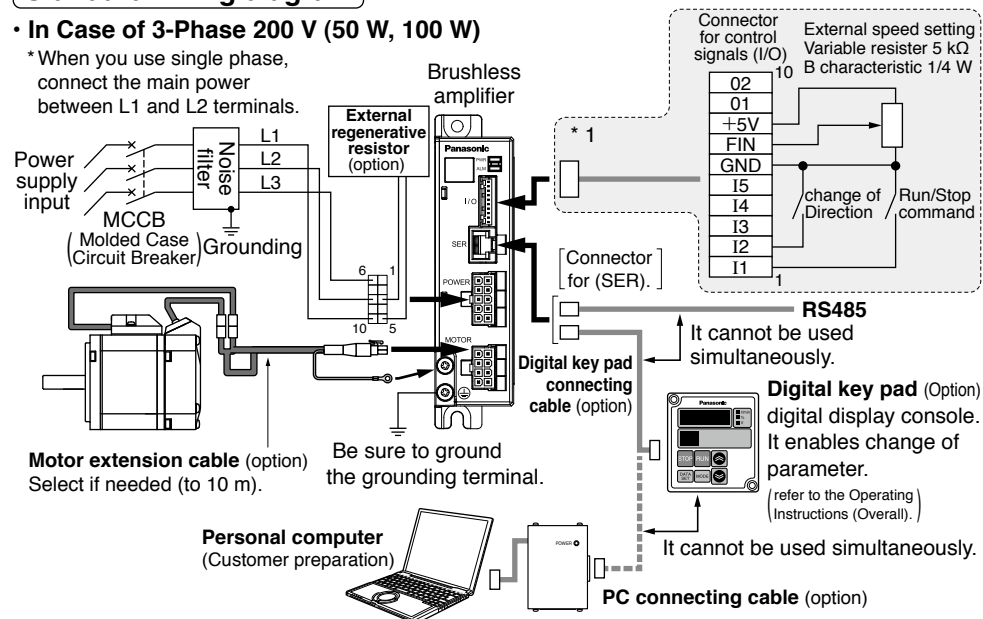
System configuration and wiring

System configuration/ general wiring diagram

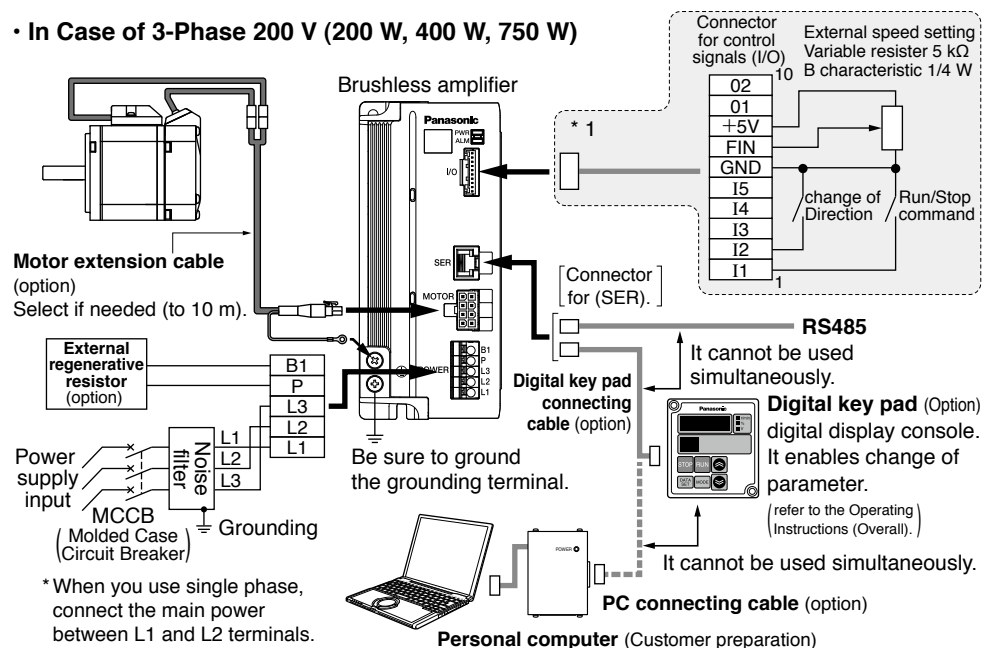
Standard wiring diagram

• In Case of 3-Phase 200 V (50 W, 100 W)

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



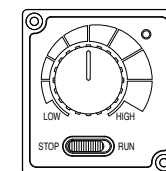
• In Case of 3-Phase 200 V (200 W, 400 W, 750 W)



Wiring

- 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.
Fastening torque of earth screws to be 0.49 to 0.98 N·m.
- For details of parameters, refer to the Instruction Manual (Overall).
- For the wiring of communication connector (SER), see P10.
- When a personal computer is connected, please use communicating software "PANATERM for BL" (it is gratis download from URL).
Change of parameter and the monitor of operational status can be performed.
If your PC does not have RS232 port, use RS232-USB converter.

*1 You can use the Console A(option) and a Console A connecting cable (option) for connection with the Connector for control signals (I/O)



Console A (option)

Function of terminal

Connector for power supply (POWER)

• 50 W, 100 W

Connector on Amplifier Side: Part No. 5569-10A1-210 (Molex Inc.) or equivalent

Terminal number	Terminal Symbol	Terminal name	Terminal explanation
3	B	terminal for Regenerative resistor	Please connect Regenerative resistor of an option if needed. Regenerative resistor name: 100 V type DV0P2890 (50 Ω) 200 V type DV0PM20068 (200 Ω)
5	P	Terminal for Power supply input	Connect the terminal to commercial power supply conforming to voltage specification. When you use single phase, connect the main power between L1 and L2 terminals.
6	L3		
8	L2		
10	L1		
1,2,4,7,9	NC	—	Do not connect anything to NC.

Terminal for power supply input (POWER)

• 200 W, 400 W, 750 W

Terminal number	Terminal Symbol	Terminal name	Terminal explanation
5	B1	terminal for Regenerative resistor	Please connect Regenerative resistor of an option if needed. Regenerative resistor name: 100 V type DV0P2890 (50 Ω) 200 V type DV0PM20068 (200 Ω)
4	P	Terminal for Power supply input	Connect the terminal to commercial power supply conforming to voltage specification. When you use single phase, connect the main power between L1 and L2 terminals.
3	L3		
2	L2		
1	L1		

Recommended Pin Terminal: NICHIFU TERMINAL Ind. TGN TC-1.25-11T

Wiring

Connector for control signals (I/O)

Connector on amplifier side: Parts No. S10B-PASK-2 (J.S.TMfg.,Co.,Ltd.) or equivalent.

Mating connector:(Example of optional I/O connector kit)

Housing PAP-10 V-S, terminal SPHD-002 T-P0.5 (for AWG24-28) (J.S.TMfg.,Co.,Ltd.)

Terminal number	Terminal Symbol	Terminal name	Terminal explanation
1	I1 ^{*1}	Signal input 1	Operation instruction input ^{*1} Motor runs when " I1" and "GND" are shorted, and stops when they are opened.
2	I2 ^{*1}	Signal input 2	Rotation changeover input ^{*1} CW operation when " I2" and "GND" are shorted, and CCW operation when they are opened. ^{*2}
3	I3 ^{*1}	Signal input 3	Free-run stop input ^{*1} Free-run stop when " I3" and "GND" are shorted,
4	I4 ^{*1}	Signal input 4	Trip reset input ^{*1} cancels a trip state when " I4" and "GND" are shorted,
5	I5 ^{*1}	Signal input 5	Free-run stop input ^{*1} Free-run stop when " I5" and "GND" are shorted,
6	GND ^{*3}	signal ground	common ground of analog speed input and input/output signal ^{*3}
7	FIN	For speed setting Input	Speed can be set by applying voltage DC0 to 5 V. Input impedance 100 kΩ.
8	+5 V	The power supply for external speed setting	Power output dedicated when connecting an external variable resistor (5 kΩ, B characteristics) to FIN input (Cannot be used for any other purpose.)
9	O1 ^{*1}	Signal output 1	Trip signal output. ^{*1} "L" in trip (Contact ON) Open collector Vce max: DC30 V, Ic max: 50 mA
10	O2 ^{*1}	Signal output 2	Velocity pulse output. ^{*1} (24 pulses / 1 rotation) Open collector Vce max; DC 30 V, Ic max; 50 mA

^{*1} Function of input/output can be changed by the Digital key pad or panaterm for BL. Default is shown.

Please refer to an operation manual (Overall) for details.

^{*2} Rotation direction is that on motor shaft. (CW: Rotation clockwise when see from the motor shaft, CCW: Rotation counterclockwise when see from the motor shaft)

^{*3} When resistor and control GND are disconnected in use of external variable resistor, 5 V is input to FIN irrespective of setting of variable resistor, and upper speed limit is directed; therefore use caution enough for connecting GND.

•The terminal number of the connector for control signals,pin No.1 is the grounding terminal side.

• When a control signal line is extended, please give as below 5 m.

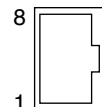
Connector for communications (SER)

Modular jack: 85503-0001 (Japan Molex Inc.) or equivalent (RJ45)

Terminal number	Terminal Symbol	Terminal explanation	
1	—	Do not connect anything.	
2	+5 V	DC5 V power supply for digital key pad	
3	SOT	Interface for digital key pad or	
4	SIN	PANATERM for BL	
5	RS485+	for connect RS485+	
6	RS485–	for connect RS485–	
7	GND	power supply GNG for Digital key pad	
8	SCK	Interface for digital key pad	

• Connection of digital key pad of an option is possible. digital key pad connecting cable of an option (DV0P383**) is required.

• The terminal number of a modular jack is the following figure



• Refer to operation manual (Overall) for the correspondence procedure of RS485.

Maintenance/inspections/ How to reset a trip

Maintenance/ inspections

Routine maintenance and inspection are essential for proper and satisfactory operation of the motor.

Maintenance/ Inspection item

Maintenance/ Check item	Inspection procedure	Condition
Input voltage	Voltmeter	Must be within ± 10 % of rating.
Input current	Ammeter	Must be within rated input current described on nameplate.
Insulation resistance	Insulation resistance tester	Measure the insulation resistance with 500 V Megger. It must be above 1 MΩ. Measuring position: Between power input line (L1, L2,L3) and grounding wire
Noise	Hearing	Noise level must not be different from the usual level. In addition, abnormal noise such as rumbling noise must not be heard.
Vibration	By hand	Free from abnormal vibration.
Installation bolt	Torque wrench	Check for loosening of bolt, and tighten additionally as necessary.
Use environment	By sight	Check the ambient temperature and humidity, and make sure that dirt, dust, or foreign substance is not found. check the waste thread etc don't attached to the windhole of brushless amplifier.

Caution

- Power-on/off operations should be done by the check operator themselves for ensuring safety in checking.
- Do not touch the motor while it is running or immediately after it stops because it gets hot and stays hot for a while after power has been turned off.
- The DC500 V megger testing should be performed only on the main circuit. Be sure to disconnect the power supply. Otherwise, failure will occur. The resistance should be 1 MΩ between the ground with L1, L2 and L3 short-circuited.

When disassembly, troubleshooting, etc., is needed, be sure to contact our service department or the sales agent of purchase.

How to clear trip

If the motor trips (alarm LED is lit), remove the cause and use one of the following clearing procedures.

- Turn off power, and when the power LED goes off, turn on power again.
- For clearing procedure using the panel B or an input terminal, refer to the Instruction Manual (Overall).

<CAUTION>

Before clearing the trip, be sure to locate and remove the cause.

Conformance to EC directive and UL standard

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 meet the EC Directives for Low Voltage Equipment so that the machine or equipment comprising our AC servo can meet relevant EC Directives.

EMC Directives

Our brushless motor 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 servo systems 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 standard

	Applicable standard		Installation condition
UL	UL508 C	Standard for electric converter equipment	Class I equipment Pollution degree 2 SCCR ^{*1}
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 Group 1 Class A Category III 2nd environment
	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)	
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.

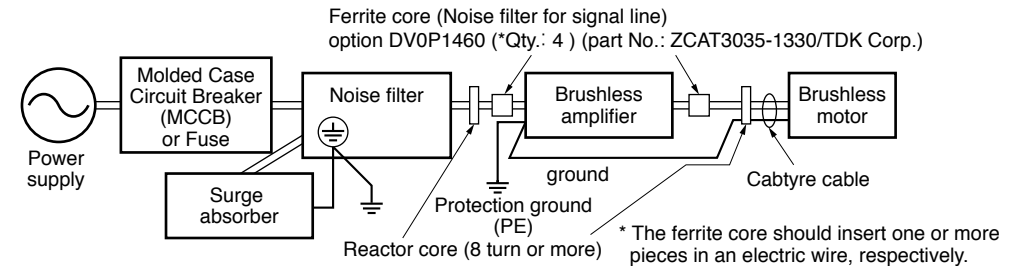
(대상기종 : Brushless Amplifier)

Conformance to EC directive and UL standard

Configuration of peripheral equipment

Power supply	<ul style="list-style-type: none"> 100 V system: Single phase 100 V to 120 V \pm 10 %, 50/60 Hz 200 V system: Single phase/3-phase 200 V to 240 V \pm 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



List of compatible peripheral equipment

Part name	Optional part number (option)	Manufacturer's part No.	Qty.	Manufacturer
Noise filter(single phase)	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)	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 Co.Ltd.,
Reactor core	—	RJ8035	—	Konno Kogyosho CO.,Ltd.

Recommended circuit breaker

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

Specifications

Item		Specifications							
Model name	Brushless amplifier	MBEK 5A1BCV	MBEK 5A5BCV	MBEK 011BCV	MBEK 015BCV	MBEK 021BCV	MBEK 025BCV	MBEK 045BCV	MBEK 083BCV
	Brushless motor	MBMS5AZBL□		MBMS 011BL□	MBMS 012BL□	MBMS 021BL□	MBMS 022BL□	MBMS 042BL□	MBMS 082BL□
Rated output (W)		50		100		200		400	750
Power input	Voltage (V) Tolerance ±10 %	Single phase 100 to 120	Single/ 3-phase 200 to 240	Single phase 100 to 120	Single/ 3-phase 200 to 240	Single phase 100 to 120	Single/ 3-phase 200 to 240	Single/ 3-phase 200 to 240	3-phase 200 to 240
	Frequency (Hz)	50/60							
	Rated input current (A)	1.8	0.9/0.5	2.4	1.3/0.7	4.2	2.1/1.2	3.8/2.1	4.0
Motor Rated Current (A)		0.74		1.4	0.76	2.9	1.8	2.8	3.6
Rated torque (N·m)		0.16		0.32		0.64		1.27	2.4
Starting torque (N·m)		0.3		0.7		1.4		3	5.2
Rated rotation speed		3000 r/min							
Speed control range		100 r/min to 4000 r/min (Speed ratio 1:40)							
Speed fluctuation factor	With load	±0.5 % or below (at 0 to rated torque, rated rotation speed)							
	With voltage	±0.5 % or below (at supply voltage ±10 %, rated rotation speed)							
	With temperature	±0.5 % or below							
Acceleration/ Deceleration time		0.3 sec ^{*1}							
Stopping procedure		Free-run stop (A slowdown stop and a free-run stop to selection is possible) ^{*1}							
Speed control range		100 to 4000 r/min (analogue voltage (0 to 5 V), console A), 100 to 4000 r/min (Setting selection by parameter on Digital key pad)							
Speed setting Resolution		Analogue: About 1/ 200 of Upper speed limit Digital: 1 r/min							
Speed setting precision (at 20 °C)		Analogue: ±3 % or below of upper limit speed (±90 r/min or below at upper limit speed 3000 r/min) [Digital: 1 % or below of upper limit speed]							
Regenerating brake		Regenerative braking resistor can be externally connected.							
Protective function		Overload, Overcrrrent, Overvoltage, Parameter error, CPU error, Overspeed, Sensor error, Overheat, setting change.External forced trip, RS485 communication error, User parameter error, System parameter error							
Overload protection		Inverse time-lag overload protection Protection level 115 (Torque command)							
Amplifier mass (kg)		0.37				1.0			

*1 Can be set by using the optional Digital key pad DV0P3510 (sold separately) or PANATERM for BL or through communication over RS485.

Cautions for Proper Use

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.
- Parts are subject to minor change to improve performance.
- 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.
- 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.
- If you are planning to use this product under special environment, such as atomic power control, aerospace equipment, traffic organization, medical equipment, various safety systems, and equipment which requires cleanliness, please contact us.
- 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.
- When this product is operated without the shaft electrically grounded, such as in driving the fan, bearing noise may become higher due to the occurrence of electrocorrosion depending on the motor used or setting environment, so confirm and verify the condition on the customer side in such a case.
- 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 sulphur or sulphuric gases, as sulphuration 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.

After-Sale Service (Repair)

Repair

Consult to a dealer from whom you have purchased the product for details of repair. When the product is incorporated to the machine or equipment you have purchased, consult to the manufacuter or the dealer of the machine or equipment.

Technical information

Technical information of this product (Instruction Manual, CAD data) can be downloaded from the following web site.
industrial.panasonic.com/ac/e/

■ Authorized Representative in EU
Panasonic Marketing Europe GmbH
Panasonic Testing Centre
Winsbergring 15, 22525 Hamburg, Germany

■ Authorized Representative in UK
Panasonic UK, a branch of Panasonic Marketuin Europe GmbH,
Mzxis 2, Western Road, Bracknell, Berkshire, RG12 1RT

For your records:

The model number and serial number of this product can be found on either the back or the bottom of the unit. Please note them in the space provided and keep for future reference.

Model No.	MBEK <input type="text"/> <input type="text"/> <input type="text"/> BCV		Serial No.	
Date of purchase				
Dealer	Name			
	Address			
	Phone	()	-	

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