

brother at your side

Low Voltage Brushless DC Gearmotor Driver

Instruction Manual (abridged edition)

<Read this Manual before the use of the product.>

Introduction

Thank you for purchasing the Brother Brushless DC series.

Related instruction manuals and software

Name	Description	Availability
Driver Instruction Manual	Unabridged instruction manual that provides information such as details of user-defined constants for this driver.	Our web site
Parameter setting software ACD-PSTool	This is the software for setting the parameters for the driver.	Our web site
ACD-PSTool Instruction Manual	This instruction manual describes the wiring of the parameter setting tools for the driver.	Our web site
Gearmotor Instruction Manual	Instruction manual that describes the gearmotor wiring method, precautions, etc.	Our web site
Gearmotor Instruction Manual (abridged edition)	Abridged edition of the Gearmotor Instruction Manual.	Included in gearmotor packaging

Safety precautions

- Be sure to read the contents described in this instruction manual carefully and to master how to use the product correctly before using it.
- Extents of hazard/damage expected to occur in the case of mishandling are basically classified and indicated into ranks of "Danger", "Warning" and "Caution" in this instruction manual. The definitions and indications are as follows:

Danger	Cases where mishandling possibly causes a dangerous situation to occur, which may lead to death or serious injury. The degree of danger is assumed to be extremely high.
Warning	Cases where mishandling possibly causes a dangerous situation to occur, which may lead to death or serious injury.
Caution	Cases where mishandling possibly causes a dangerous situation to occur, which may lead to a medium degree of injury or minor one.

Items described even in "Caution" may lead to a serious result depending on situations. Be sure to observe every instruction which deals with important contents.

	- mark denotes "Items about which care should be taken." (Left example shows electric shock hazard.)
	- mark denotes "Items that must not be done." Indication inside the mark is specific details of prohibition. (Left example shows no disassembling.)
	- mark denotes "Items that must be done." Indication inside the mark is specific details of instructions. (Left example shows ground connection.)

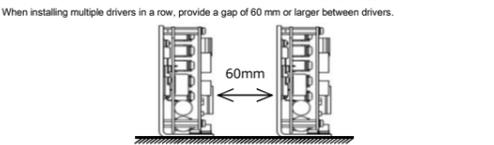
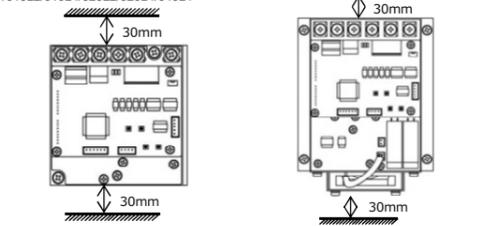
Danger	If the product is used in a device such as a personnel transport device, make sure to install a protective device for safety purpose. Negligence may cause accidents leading to injuries or death, or damage to the device.
Warning	If the product is used in an elevator, install a safety device on the device side to prevent it from falling. Negligence may cause accidents leading to injury or death, or damage to the device due to falling down of the elevator.
Caution	Do not use the product in an explosive environment. Negligence may cause explosion, ignition of fire, fire, electric shock, injuries, and damage to the device.
Caution	Do not change wiring while the product is energized. Negligence may cause fire, electric shock, or damage to the device.
Caution	Install a fuse and a circuit breaker on the power supply side to immediately stop the operations and cut off the power supply in the event of current overflow. Negligence may cause accidents leading to fire, electric shock, damage to the device, or other accidents.

Installation

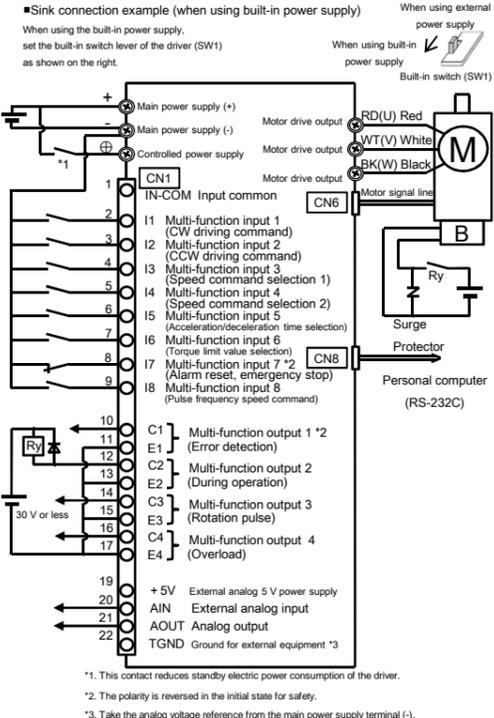
Installation environment	-10~+50°C
Ambient temperature	95%RH or less (no condensation allowed)
Ambient humidity	1,000 m or lower
Altitude	Well-ventilated place free from corrosive gas, explosive gas, vapor, and dust.
Atmosphere	2.0 G or less
Vibration	Indoor
Installation location	When installing the driver, place it in a switchboard or the like to prevent foreign materials from entering.

There is no restriction on the mounting direction of the driver, but please provide a gap of 30mm or larger at the top and bottom of the driver.

■A-BLDC005L1/005L2/010L1/010L2/010L4/020L2/020L4/040L4 ■A-BLDC040L2(with cooling fan)



Interconnection Diagram



*1. This contact reduces standby electric power consumption of the driver.
*2. The polarity is reversed in the initial state for safety.
*3. Take the analog voltage reference from the main power supply terminal (-).

Warning

	Never use the product in a location where water may splatter, in an atmosphere with corrosive substance or inflammable gas, or near flammable objects. Negligence may cause fire or accidents.
	The operators in charge of installation, wiring, operation, handling, maintenance, and inspection should have enough knowledge and technical skill related to the product. Negligence may cause fire, electric shock, injuries, and damage to the device.
	Input voltage to this driver must be within the allowable range. Using the driver with voltage outside this range may cause failure/damage to the driver or accidents.
	Correctly connect the positive and negative sides of input voltage to this driver. Negligence may cause failure/damage to the driver or accidents.
	Regenerative energy is supplied to the power supply unit through this driver. When using a load that generates regenerative energy, the customer is required to take measures appropriate for the power supply unit. Negligence may cause malfunction of/damage to the driver or accidents.
	This driver is not equipped with the function to prevent inrush current when power is supplied. When power is supplied repeatedly at a frequency of once/hour or more or when inrush current becomes a problem for the instrument, the customer is requested to take appropriate treatment. Negligence may cause malfunction of/damage to the driver or accidents.
	When the operation has stopped due to error occurrence or safeguards, do not start the operation until the causes of error are determined, and countermeasures are taken. Negligence may cause damage to instrument, injuries, fire, electric shock or burns.
	The equipment might suddenly start operating after recovering from the power failure. Make sure not to go near the equipment. Negligence may cause injuries.
	Do not repair, disassemble or remodel the product. Negligence may cause injuries, fire, electric shock or burns.

Caution

	When changing the setting of the built-in trimmer, use a slotted screwdriver made of resin. Negligence may cause electric shock or burns.
	Never perform operations with wet hands. Negligence may cause electric shock.
	Use the specified combination of the motor and driver. Negligence may cause fire and damage to the equipment.
	Do not touch the motor or driver when the power is on or immediately after turning off the power, as their surfaces may be hot. Negligence may cause burns.
	Immediately stop the product if any abnormality is noticed. Negligence may cause fire and injuries.
	Do not keep any combustible material near the product. Negligence may cause fire.
	Operate the product under the conditions specified in this instruction manual. Negligence may cause damage to the equipment or injuries.
	Do not keep any object that will block circulation of the air around the product. Negligence can cause abnormal overheating of the product. It may cause fire and burns.
	Do not allow any foreign materials to enter the driver. Negligence may cause fire, electric shock, or malfunction of the driver.
	Do not step on or place any heavy object on the product. Negligence may cause injuries.
	Do not damage or strongly pull the cable. Negligence may cause injuries, fire or electric shock.
	Keep the product away from any type of strong impact. Negligence may cause failure of the product or injuries.
	Ensure that the wires to the power supply, motor, and driver are connected properly and securely. Negligence may cause malfunction of the equipment, resulting in injuries.
	Do not touch the rotating part of the motor. Negligence may cause injuries.

Note

When disposing of the product, dispose of it as a general industrial waste. However, follow local laws and regulations if any applies and take appropriate treatment.

Notice

We shall assume no responsibility or liability for any troubles caused by usage against the cautions above. The contents of this Manual may be changed without notice in future.

We have made every possible effort to make the contents of this Manual precise. If there is any point not understandable, error or finding, however, we would appreciate your comment.

External I/F Specifications

IF is not isolated from the main power supply. Pay extreme attention when wiring.

Connector specifications

Code	Manufacturer	Part number	Remarks
Terminal block (TM1-6)	-	-	Tightening torque : 0.8~1.2 N·m (M4) 1.6~2.0 N·m (M5)
CN1	J.S.T.MFG.CO.,LTD.	S22B-PUDSS-1	Applicable housing : PUDP-22V-S Applicable crimping terminal : SPUD-001T-P0.5
CN6	J.S.T.MFG.CO.,LTD.	S05B-XASK-1	Applicable housing : XAP-05V-1 Applicable crimping terminal : SKA-001T-P0.6
CN8	J.S.T.MFG.CO.,LTD.	S4B-XH-A	Applicable housing : XHP-4 Applicable crimping terminal : SXH-001T-P0.6N

Layout of Terminal Block

Terminal symbol	Function name	Description
⊕	Controlled power supply (+)	Plus side of the controlled power supply
-	Main power supply (-)	Minus side of the main power supply common to the minus side of the controlled power supply
+	Main power supply (+)	Plus side of the main power supply
RD (U)	Motor drive output U-phase	Connected with motor *
WT (V)	Motor drive output V-phase	
BK (W)	Motor drive output W-phase	

* Pay attention to the wiring of the motor phases. If the wiring is incorrect, the motor will not operate.

I/O connector layout (CN1)

Terminal No.	Terminal name	Function name	Initial setting
1	IN_COM	Input common *1	
2	I1	Multi-function input 1	CW driving command
3	I2	Multi-function input 2	CCW driving command
4	I3	Multi-function input 3	Speed command selection 1
5	I4	Multi-function input 4	Speed command selection 2
6	I5	Multi-function input 5	Acceleration/deceleration time selection
7	I6	Multi-function input 6	Torque limit value selection 1
8	I7	Multi-function input 7	Alarm reset, emergency stop *2
9	I8	Multi-function input 8	Pulse frequency speed command
10	C1	Multi-function output 1	Error detection *2
11	E1		
12	C2		
13	E2		
14	C3	Multi-function output 3 (Correspond to high-speed pulse output) *3	Rotation pulse
15	E3		
16	C4	Multi-function output 4 (Correspond to high-speed pulse output) *3	Overload
17	E4		
18	-	Not used	
19	+5V	External analog 5 V power supply *4	
20	AIN	External analog input	Speed command
21	AOUT	Analog output	Speed (output actual speed of motor)
22	TGND	Ground for external equipment *5	

*1. Short-circuited with the ground in the driver when the built-in switch lever is set to use the built-in power supply. When the built-in power source is used, do not connect any other terminals here.
*2. The I/O polarity is reversed when initially set.
*3. Multi-function outputs 3 and 4 conform to the high-speed pulse output. When selecting the rotation pulse, clockwise rotation pulse and counterclockwise rotation pulse of output functions, assign the functions to multi-function outputs 3 and 4.
*4. This is the power supply output terminal. Do not connect the power supply from the outside.
*5. Connect this terminal only when using an external setting unit. When an external setting unit is not used, do not connect any other terminals here.

Layout of motor signal connector (CN6) *1

Terminal No.	Terminal name	Function name
1	+15V	Power supply 15 V
2	HALL_U	Hall sensor input U-phase
3	HALL_V	Hall sensor input V-phase
4	HALL_W	Hall sensor input W-phase
5	GND	Ground *2

*1. The maximum extension length is 5 m.
*2. Do not connect the main power source (-) here.

Layout of communication connector (CN8)

Terminal No.	Terminal name	Function name
1	+5V	Power supply 5 V
2	TxD	Data transmission
3	RxD	Data receipt
4	GND	Ground *

* Do not connect the main power source (-) here.

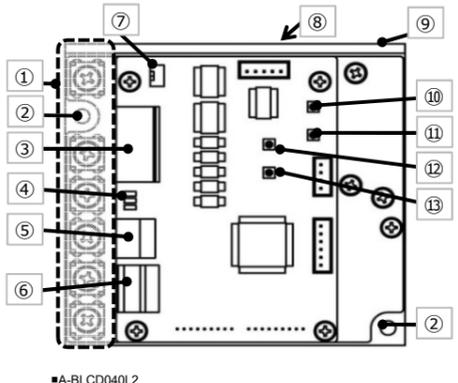
Model configuration

Combinations of voltage and motor power are as follows.

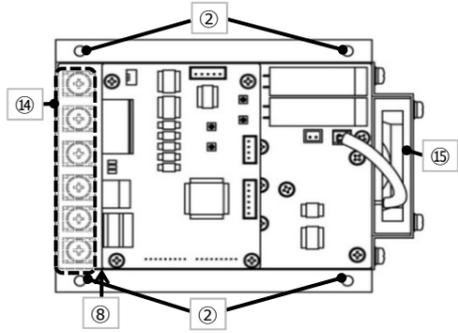
Motor power	Voltage			
	12V	24V	48V	
50 W	A-BLDC005L1	A-BLDC005L2	A-BLDC010L4	
0.1 kW	A-BLDC010L1	A-BLDC010L2	A-BLDC020L4	
0.2 kW	A-BLDC020L1	A-BLDC020L2	A-BLDC040L4	
0.4 kW	A-BLDC040L2	A-BLDC040L4		

Section Names

■A-BLDC005L1/005L2/010L1/010L2/010L4/020L2/020L4/040L4



■A-BLDC040L2



No.	Names	No.	Names
①	Main circuit terminal block (M4)	⑩	Heat Sink
②	Mounting hole	⑪	Built-in trimmer 3 (VR3)
③	Connector for control signal (CN1)	⑫	Built-in trimmer 4 (VR4)
④	Status display LED lamps 1-3 (red/yellow/green)	⑬	Built-in trimmer 2 (VR2)
⑤	Connector for communication (CN8)	⑭	Built-in trimmer 1 (VR1)
⑥	Connector for motor signal (CN6)	⑮	Main circuit terminal block (M5)
⑦	Built-in switch (SW1)	⑯	Cooling fan
⑧	Nameplate (attached to the side face)		

■Status display LED lamps
The status of the driver is shown with LED lamps. See "Driver Instruction Manual" for details.

■Built-in trimmer
A part of command values can be adjusted by adjusting the trimmer position. See "Driver Instruction Manual" for details.

Specifications

Item	Description			
Applicable motor power	50W	100W	200W	400W
Output current (Rated max)	12V	5.9A/11.8A	12.4A/24.8A	-
	24V	2.7A/5.4A	5.8A/11.6A	9.8A/19.6A
	48V	-	2.7A/5.4A	5.1A/10.2A
Main circuit/control circuit input voltage range	For 12V : DC 10~15VDC			
	For 24V : DC 20~30VDC			
	For 48V : DC 40~60VDC			
Environment	Ambient temperature	-10°C~50°C		
	Ambient storage temperature	-25°C~70°C		
	Ambient humidity	95%RH or less (no condensation)		
	Altitude	1,000 m or lower		
	Vibration	2G		
Conformance to international standard	CE (EMC directive), KC			
Protection structure	IP00			
RoHS directive	Conforming			
Motor-driver wiring distance	Maximum extended length: 5 m			

Conformity to International Standard (CE, KC)

■Compliance with CE Marking (EMC Directive)
This driver is tested in accordance with European standards EN61800-3:2004+A1:2012 and complies with EMC Directive. The following conditions must be met to ensure continued compliance with EMC Directive.
- Insert the surge absorber to the input side.

The compatibility of the final machine to EMC varies depending on the other control systems used with the motor/driver, the configuration of electric parts, wiring, the arrangement state and degree of risk, etc. Therefore, it is necessary to confirm the compatibility by conducting EMC tests for the machine by the customer in the end use.

■Compliance with KC Mark
This driver complies with the radio law in Korea.
When using this product in Korea, pay attention to the following.

Class A equipment (business-purpose broadcast and communication equipment)

This device is the business-purpose broadcast and communication equipment (class A) and intended to be used in a location other than households. Sellers and users must be careful for this point.

This product complies with the radio law in Korea under preconditions that the following countermeasures for EMC are taken. Correctly take the countermeasures for EMC before use.

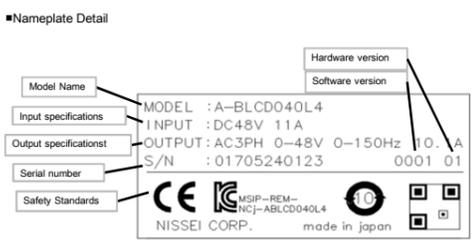
① Insert the surge absorber to the input side of the driver. Use the recommended surge absorbers listed in the table. Conformity of surge immunity is evaluated according to these combinations.

② Shield the power cable and signal cable. In this case, make the wiring distance as short as possible. Separate the power cable and signal cable as much as possible, and avoid parallel wiring and bundling. Cross those cables if these cannot be separated for an unavoidable reason.

③ Radiation noise can be suppressed further more if the driver is installed in the sealed metallic control panel. In addition, securely ground the metal plate and the main unit of the control panel using the thickest and shortest possible cable, separated from the power line.

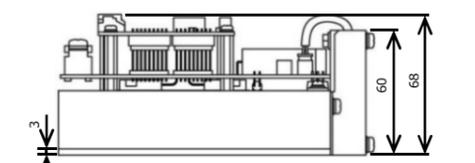
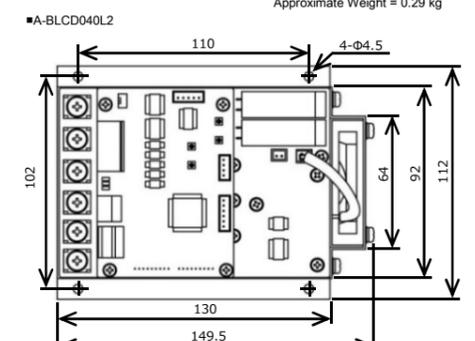
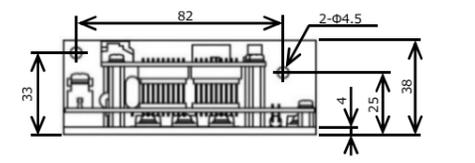
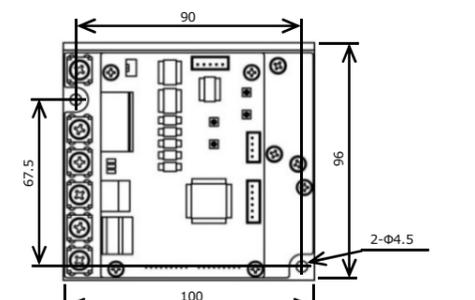
Recommended surge absorber

Manufacturer	Part number
OTOWA ELECTRIC Co., LTD	LT-C12G801WS



External Dimensions

■A-BLDC005L1/005L2/010L1/010L2/010L4/020L2/020L4/040L4



Approximate Weight = 0.29 kg

Approximate Weight = 0.73kg

Standard Terms and Conditions of Sale

■General
These standard Terms and Conditions of Sale shall be incorporated into any contract between Purchaser and Brother International Corporation (hereafter Brother) and shall apply to all purchase orders issued by Purchaser. Unless specifically provided herein or in a separate written agreement duly executed by Brother, the quotation and this form constitute the entire agreement between Brother and Purchaser and no other terms or conditions oral or written shall be of any effect. All orders, whether placed pursuant to a quotation or not, are accepted only upon express condition that purchaser agrees to the Terms and Conditions as specified herein.

■Price and Delivery Terms
Price and delivery terms are F.O.B. Brothers nearest U.S. facility and do not include sales, use, excise, or any other taxes. Our responsibility ceases when delivery is made to the transportation company and any claims for loss or damage in transit must be handled by the Purchaser with the carrier.

■Packing
No charges is made for standard boxing for domestic shipments. Purchaser will be quoted and charged separately for export or special packing requirements.

■Payment Terms
To Purchasers with credit standing satisfactory to Brother, terms of payment are cash in full, net 30 days. If at any time Br other deems that by reason of financial condition of the Purchaser or otherwise, the continuance of production or shipments is not justified, Brother may revoke its extension of credit, enforce any security interest(s) created hereby on all goods furnished by Brother to the Purchaser and otherwise secure itself as to Purchaser's performance of its obligation.

■Cancellation
Changes, suspension or cancellation of any order by Purchaser may be made only upon written approval of an authorized officer of Brother.

■Warranty
All Brother gearmotor product are warranted against defects in materials and workmanship for a period of 2 years from the date of manufacture. This constitutes Brother's only warranty in connection with this sale, and is in lieu of all other warranties expressed or implied, written or oral. There are no implied warranties of merchantability or fitness for a particular purpose that apply to this sale. If performance guarantees are requested, they should be requested in writing. Full consideration will be given to such requests when complete details of the proposed application are included.

■Limitation of Remedy
Brother will repair or replace, at Brother's option, F.O.B. Brother's factory, freight prepaid, any Brother gearmotor proved defective in materials or workmanship if immediate written notice of claim is made to Brother by Purchaser within 2 years from the date of manufacture. It is agreed that such repair or replacement is the exclusive remedy available from Brother. Under no circumstances shall Brother be liable to anyone for any special, incidental or consequential damages, whether the result of negligence or otherwise.

■Warranty Exclusions
The Warranty of Brother gearmotor products does not cover and Brother makes no warranty with respect to:
1. Failures not reported in writing to Brother within the warranty period of 2 years after the date of manufacture.
2. Failures or damages due to miss-application, abuse, improper installation or abnormal conditions (temperature, humidity, dirt or corrosive matter).
3. Failures due to operation, either intentional or otherwise, above rated capacities or in an otherwise improper manner.
4. Product which has in any way been tampered with or altered by anyone other than an authorized representative of Brother.
5. Expenses incurred by the Purchaser in an attempt to repair or rework an allegedly defective product.
6. Product damaged in shipment or otherwise without the fault of Brother.

■Returns
No product will be accepted for return unless authorized in writing with a returned merchandise authorization (RMA) number assigned. Any returned goods must be returned with transportation charges prepaid.

■Regulatory Laws and/or Standards
It is the Purchaser's obligation to install and operate all Brother gearmotor products in conformance with all applicable national or local laws and safety codes.

■Patents
Brother represents that its gearmotors are designed and manufactured such that they do not infringe on any United States Patent(s), and that Brother will, at its expense, defend any claim charging such infringement and will save Purchaser harmless from any adverse judgements resulting therefrom. Purchaser agrees to give Brother, prompt written notice of any claim of infringement and to turn over to Brother the complete control of any litigation involving such claims including the right to settle such claims. This indemnity does not apply to Products which are incorporated by the Purchaser into Products which are changed to infringe a Patent or to Product which is used by Purchaser in performance of a method or process which is charged to infringe a Patent.

■Law
These Standard terms and Conditions of Sale shall be interpreted in accordance with the Laws of the State of New Jersey.

■Severability
If any of the terms and Conditions shown here are determined to be invalid, illegal, or unenforceable the remainder of these Terms and Conditions shall remain in full force and effect.