

# Junction terminal block for servo motors with brakes

Model Name

DG2BK1TB-□

## User's Manual

### Before Using the Product

Thank you for purchasing the product.  
Before using the product, please read the following item.

#### SAFETY PRECAUTIONS

Please use details correctly after understanding the function and the performance of this product enough. You can download this document from our website.  
MEEFAN homepage URL <https://www.mee.co.jp/sales/fa/meefan/>

#### SAFETY PRECAUTIONS

(Always read these precautions prior to use.)

Do not attempt to install, operate, maintain, or inspect this product until you have carefully read through this instruction manual and relevant documents and can use the equipment correctly. Do not use this product until you have a full knowledge of the equipment, safety information, and instructions. In this manual, the safety instruction levels are classified into "WARNING" and "CAUTION."

**WARNING** Indicates that incorrect handling may cause hazardous conditions, resulting in death or severe injury.

**CAUTION** Indicates that incorrect handling may cause hazardous conditions, resulting in minor or moderate injury or property damage.

Under some circumstances, failure to observe the precautions given under "CAUTION" may lead to serious consequences. Observe the precautions of both levels because they are important for personal and system safety.

After reading this manual, keep the manual in a safe place for future reference.

### 1. Electric Shock Prevention

#### WARNING

- Make sure that all wiring work and inspections are performed by professional engineers.
- Do not damage, apply unreasonable stress to, place heavy objects on, or pinch the cables. Doing so results in the risk of electric shock.
- To avoid electric shock, insulate the connection area of the power supply terminal.
- Be sure to shut off all phases of the external power supply used by the system before performing work such as installation and wiring. Failure to do so results in the risk of electric shock and product damage.

### 2. Fire Prevention

#### CAUTION

- Be sure to install this product in a non-flammable object. Directly installing the product in a flammable object or installing the product near a flammable object results in the risk of fire.
- Do not allow any conductive foreign objects, such as a screw or metal fragments, or flammable foreign objects, such as oil, to enter the product interior.

### 3. Injury Prevention

#### CAUTION

- Be careful to connect terminals correctly. Failure to do so results in the risk of explosion, damage, and the like.
- Do not mistaken the polarity (positive and negative charges). Doing so results in the risk of explosion, damage, and the like.

### 4. General Precautions

Also note the following precautions. Incorrect handling may cause failure, injury, electric shock, and the like.

#### (1) Transport and Installation

#### CAUTION

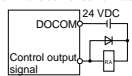
- This product is a precision instrument. During transport, avoid impacts larger than those specified in general specifications. Failure to do so results in the risk of failure.
- Do not stand or rest heavy objects on the product.
- Do not install or operate units that are damaged or have missing parts.
- This product is a precision instrument. Do not drop or apply strong impact to the product.
- Use this product in an environment that reflects the general specifications set forth in the User's Manual. Usage in an environment outside of the scope of the general specifications results in the risk of electric shock, fire, malfunction, product damage, and/or product deterioration.
- When handling the product, be careful of sharp areas such as product corners.
- Be sure to place this product inside a metal control panel.
- Reliably secure the module using a DIN rail or screws. If the module is not properly mounted, risk of malfunction, failure, and falling results. If using the product in an environment with high vibration, secure the product with screws.
- Tighten the screws within the specified torque range. Loose screws results in the risk of falling, a short circuit, and malfunction. Excessively tightened screws may damage the screws and product, resulting in the risk of falling, a short circuit, and malfunction.
- Fumigants that contain halogen materials such as fluorine, chlorine, bromine, and iodine used for disinfecting and protecting wooden packaging from insects will cause malfunction in Mitsubishi Electric Engineering products. Please take necessary precautions to ensure that residual fumigants do not enter the product, or treat packaging with methods other than fumigation (heat method, etc.). Additionally, disinfect and protect wood from insects before packing.

#### (2) Wiring

#### CAUTION

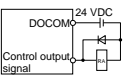
- The product is designed for the general-purpose AC servo amplifier manufactured by Mitsubishi Electric Corporation. Do not use them for any other products other than the servo amplifier or the servo motor with an electromagnetic brake. Refer to chapter 4 for the connection model.
- Be sure to wire the product correctly. Failure to do so results in the risk of unexpected servo motor operation.
- The connection drawings in this manual are based on a sink interface, unless otherwise specified.
- Be careful to properly set the orientation of the diodes for surge absorption, which are attached to the DC relay for servo amplifier control output signals. Incorrect orientation results in the risk of the servo amplifier failure, which can cause signal output failure and malfunction of protective circuits such as emergency stop.

Junction terminal block for servo motors with brakes



With sink output interface

Junction terminal block for servo motors with brakes



With source output interface

- Always verify that the wiring is properly secured to the terminal block. Failure to adequately secure the wiring results in the risk of poor contact, which can cause heat generation from the wiring and terminal block.
- Properly connect the wiring to the module after first verifying the module rated voltage and terminal layout. Inputting or connecting the power supply to voltage that differs from the rated voltage and miswiring result in the risk of fire and product failure.
- Securely install the connector to the module. Failure to do so results in the risk of malfunction.
- Be sure that foreign matter such as dust and wire shavings does not enter the module interior. Failure to do so results in the risk of fire, failure, and malfunction.
- Be sure to secure the power lines and cables connected to the module by placing them in a duct or clamping them. If not, dangling cables may swing, move, or inadvertently be pulled, resulting in damage to the module or cables, or malfunction due to poor cable connection.

#### CAUTION

- When disconnecting the cable connected to the module, do not pull the cable by the cable part. For cables with connectors, take hold of the connector connected to the module and then disconnect the connector. For cables connected to the terminal block, unlock the terminal board spring lock and then disconnect the connector. Pulling the connected cable may result in malfunction or damage to the module or cable.
- When connecting the servo amplifier, first verify that the product configuration is correct. Connecting the servo amplifier with a wrong configuration results in the risk of failure and malfunction.
- Securely mount the relay module to the module. Incorrect mounting results in the risk of damage, falling, and malfunction due to poor contact. Additionally, be sure to attach and detach the relay module following the correct procedure. Failure to do so results in the risk of damage, falling, and malfunction due to poor contact.

#### (3) Usage

#### CAUTION

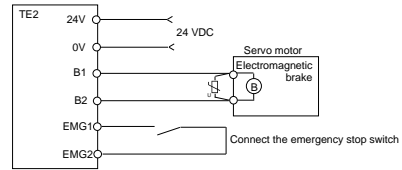
- Do not disassemble, repair, or modify the product.
- Never attempt to burn or disassemble the product. Doing so may cause generation of a poisonous gas.
- Be careful when changing the output device assignments in servo amplifier parameters. Changing the MBR (electromagnetic brake interlock) signal assignments, in particular, may cause unexpected operation of the servo motor, damage, falling, and malfunction.
- Make sure to set up external safety circuits outside the product to ensure safe system operation even during external power supply problems or servo amplifier or product failure. Otherwise, erroneous output or malfunction may cause serious accidents.
- Relay or other similar failure may cause output to remain ON or OFF. Be sure to provide a circuit outside the product that monitors output signals that may lead to serious accidents.
- When a load current exceeding the current rating or an overcurrent caused by a load short-circuit flows for a long time, it may cause smoke and fire. To prevent this, provide an external safety circuit.

#### (4) Emergency Handling

#### CAUTION

- Connect the emergency stop switch to the EMG1 terminal and EMG2 terminal to ensure that the electromagnetic brake activation output is linked to the external emergency stop switch.

Junction terminal block for servo motors with brakes



#### (5) Maintenance and Inspection.

#### CAUTION

- Before removing or installing the module, cut off all phases of the power supply externally. Failure to do so may cause module failure, malfunction, or damage.
- Connection/disconnection of the module and cables after the first use of the product shall be limited to 50 times.
- Before handling the module, touch a grounded metal object to discharge the static electricity from your body. Failure to release the static electricity may cause the module to fail or malfunction.

#### (6) Disposal

#### CAUTION

- When disposing of this product, treat it as industrial waste.

#### 1. Overview

This User's Manual describes the specifications of the junction terminal block for servo motors with brakes that is used in combination with the general-purpose AC servo amplifier manufactured by Mitsubishi Electric Corporation.

#### 2. GENERAL SPECIFICATIONS

Item	Environment Conditions
Ambient temperature	Operating: 0°C to 55°C (non-condensing) Storage: -20°C to 65°C (non-condensing)
Ambient humidity	Operating: 5%RH to 90%RH (non-condensing) Storage: 5%RH to 90%RH (non-condensing)
Environment	Indoors (not exposed to direct sunlight), free of corrosive gas, combustible gas, oil mist, and dust
Elevation	Within 1000m above sea level
Vibration resistance	5.9m/s <sup>2</sup> , 10Hz to 55Hz (X, Y, and Z directions)

#### 3. PERFORMANCE SPECIFICATIONS

Model name		DG2BK1TB	DG2BK1TB-D
Control logic		Sink logic / Source logic	
External signal relay terminal block	Terminal area	No. of terminals: 11P, 3.5-mm pitch, No. of line insertions: 1 per insertion port	
	Compatible wiring	Single wire, base wire: 0.2mm <sup>2</sup> to 1.5mm <sup>2</sup> , AWG24 to AWG16	
Brake output terminal block	Terminal area	No. of terminals: 6P, 3.81-mm pitch, No. of line insertions: 1 per insertion port	
	Compatible wiring	Single wire, base wire: 0.2mm <sup>2</sup> to 1.5mm <sup>2</sup> , AWG24 to AWG16	
External power supply	For servo amplifier interface	Voltage: 24 VDC -5%~10%, Maximum working current: 0.3A	
	For electromagnetic brake	Voltage: 24 VDC -10%~0%, Maximum working current: 1.43A	
MBR signal relay	Response time	OFF→ON	10ms or less
		ON→OFF	5ms or less
	Mechanical service life	50 million times or more (switch frequency: 180 times/minute)	
	Electrical service life	100,000 times or more (resistance load) *	
Operation display		LED illumination display at relay coil ON	
	Socket	Yes (relay module replaceable)	
Overseas compliant standards	UL standards	CE,UL/cUL	
Module installation		Screw/ DIN rail	DIN rail
	Screw size	M4 x 0.7mm x 10mm or greater	
Installation screws	Tightening torque	78 to 118N·cm	
	Compatible DIN rail	TH35-7.5Fe, TH35-7.5Al (IEC60715 compliant)	
Weight		Approx. 57g	Approx. 56g

\* The service life vary depending on operating methods and environment. If any fault is found in the parts, they must be replaced immediately regardless of their service life.

#### 4. PERFORMANCE SPECIFICATIONS

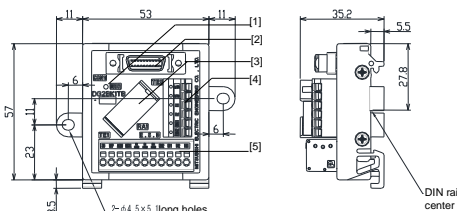
Connection model	Compatible servo motor capacity	Cable model
MR-J5-G (-RJ)	0.05kW to 22kW	DG4SV2CB05 (length: 0.5 m)
MR-J5-B (-RJ)		DG4SV2CB10 (length: 1.0 m)
MR-J4-GF (-RJ)		DG4SV2CB50 (length: 5.0 m)
MR-J4-B (-RJ)		
MR-J3-B		

※You can also use MR-J2HBUS\_M (0.5/1.0/5.0m) manufactured by Mitsubishi Electric Corporation.

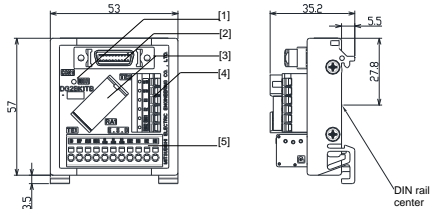
## 5. EXTERNAL DIMENSION DIAGRAM AND PART NAMES

### ● DG2BK1TB

[Unit: mm]



### ● DG2BK1TB-D

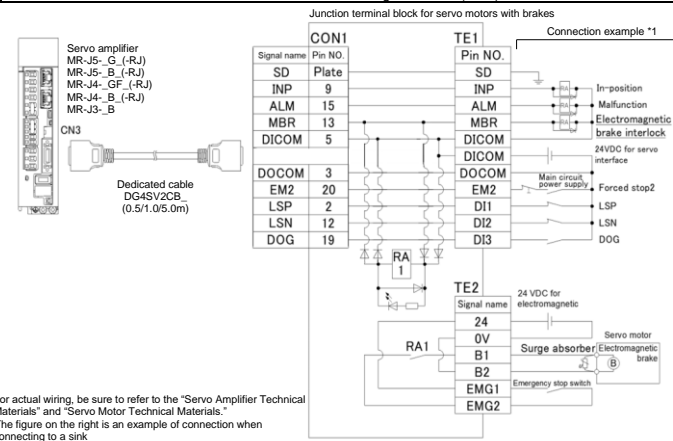


No.	Name and Application
[1]	MBR signal relay operation indicator LED Illuminates when the MBR signal relay coil turns ON.
[2]	Servo amplifier interface connector (CON1) Connects to the servo amplifier input/output connector (CN3).
[3]	MBR signal relay (RA1) The relay coil turns ON when the servo amplifier MBR signal output turns ON.
[4]	Brake output terminal block (TE2) Connects the brake power supply, brake output, and emergency stop switch of the servo motor with an electromagnetic brake.
[5]	External signal relay terminal block (TE1) Connects the servo amplifier input/output signal and the input/output signal power supply.

## 6. EXTERNAL CONNECTION DIAGRAM

### CAUTION

When connecting the MBR signal of "TE1" of this terminal block and a relay for Electromagnetic brake interlock\*, select an appropriate relay so that the current which flows into the servo amplifier meets the servo amplifier specifications, including the rated excitation current (12.5mA) that flows through the relay coil in the terminal block and the current that flows through the LED (3mA).

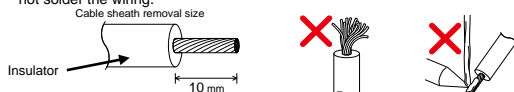


\*1 For actual wiring, be sure to refer to the "Servo Amplifier Technical Materials" and "Servo Motor Technical Materials." The figure on the right is an example of connection when connecting to a sink.

## 7. WIRING METHOD

When wiring the terminal blocks (TE1, TE2), use a rod-shaped terminal with the sheath removed. In the case of a single wire, you can use the wire as is with the sheath removed. Insert the rod-shaped terminal or single wire from the wiring opening and execute wiring.

(1) Remove the sheath in an amount equivalent to the dimensions below. If the amount of removed sheath is too long, a short circuit may occur with adjacent wires. If the amount of removed sheath is too short, the wiring may disengage. Be sure to process the wiring to ensure that it does not come apart. Do not solder the wiring.



(2) Insert the rod-shaped terminal into the wire and crimp the wire. Insert the terminal until the wire core section sticks out from the sleeve section by about 0 to 0.5mm. After crimping, check the outer appearance of the rod-shaped terminal. Do not use any rod-shaped terminal that is not properly crimped or is damaged on the side surface.

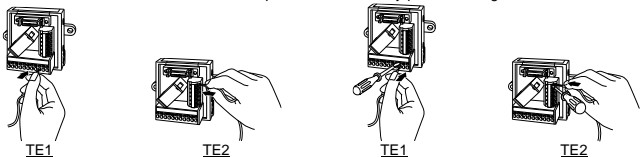


Wire Size (mm <sup>2</sup> )	Rod-Shaped Terminal Form		Manufacturer name	Crimping Tool Model Name
	With insulated sleeve	Without insulated sleeve		
0.3 to 0.5	A10.5 - 10WH	A0.75-10	PHOENIX CONTACT GmbH & Co. KG	CRIMPFOX6
0.75	A10.75 - 10GY	A0.75-10		
0.75 (for 2)	AI-TWIN2x0.75-GY	-		

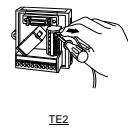
Wire Size (mm <sup>2</sup> )	Rod-Shaped Terminal Part Number	Cap Part Number	Manufacturer name	Crimping Tool Model Name
0.3 to 0.75	BT0.75-11	VC 0.75	Nichifu Co., Ltd.	NH69

(3) Insert the wire into the terminal.

If a rod-shaped terminal is not used with the base line, or if a single wire is used, insert the wire with the operation hole or open/close button fully pressed using a flathead screw driver.



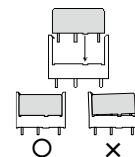
(4) Removing the wire  
Remove the wire by pulling the wire with the operation hole or open/close button fully pressed using a flathead screw driver.



## 8. ATTACHING AND REMOVING THE RELAY MODULE

(1) Attaching the Relay Module  
Align the relay and socket.

Fully insert both ends until the hooks catch on the relay ceiling.

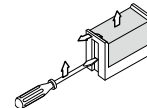


(2) Removing the Relay Module

Pull the relay module while applying pressure in the direction that releases the hooks from the ceiling.



If it is difficult to pinch the relay, remove the relay using a screwdriver as shown in the figure while applying pressure in the direction that releases the hooks from the ceiling.



Part Name	Model	Manufacturer Name
Power relay	DSP1a-DC24V	Panasonic Corporation

## [QUALITY WARRANTY]

1. Gratis Warranty Terms and Gratis Warranty Range  
If any fault or defect (hereinafter referred to as "Failure") attributable to Mitsubishi Electric Engineering should occur within the gratis warranty period, Mitsubishi Electric Engineering shall replace the product free of charge via the distributor from whom you made your purchase. Mitsubishi Electric Engineering shall not be held responsible for any on-site readjustment and/or trial run that may be required in association with replacement of a faulty unit.

### [Gratis Warranty Period]

The gratis warranty period of this product shall be twelve (12) months from the date of purchase or delivery to the designated place. Note that after shipment from Mitsubishi Electric Engineering, the maximum distribution period shall be six (6) months, and the gratis warranty period after manufacturing shall be limited to eighteen (18) months. The gratis warranty period of a repaired product shall not exceed the gratis warranty period prior to repair.

### [Gratis Warranty Range]

(1) The gratis warranty range shall be limited to normal use based on the usage conditions, methods, and environment, etc., defined by the product specifications, terms, and precautions, etc., given in the user's manual and the like.  
(2) In the following cases, a replacement fee shall be applied even if within the gratis warranty period.  
(i) Failure resulting from inappropriate storage or handling, carelessness, or negligence by the user, or Failure caused by the user's hardware or software design.  
(ii) Failure caused by unapproved modifications, etc., to the product by the user.  
(iii) Failure that could have been avoided if, when the Mitsubishi Electric Engineering product was assembled into the user's device, safeguards defined by legal regulations applicable to the user's device or functions or structures considered standard by the industry had been provided.  
(iv) Failure recognized as preventable if consumable products (relays and the like) were normally maintained and replaced.  
(v) Replacement of consumable products (relays and the like).  
(vi) Failure caused by external factors beyond anyone's control such as fires or abnormal voltage, and Failure caused by Force Majeure such as earthquakes, lightning, or wind and water damage.  
(vii) Failure caused by reasons unpredictable by scientific technology standards at the time of shipment from Mitsubishi Electric Engineering.  
(viii) Any other failure not attributable to Mitsubishi Electric Engineering or found by the user to not be attributable to Mitsubishi Electric Engineering.

2. Warranty period after discontinuation of production (fee applied)

(1) Mitsubishi Electric Engineering shall accept products for repair (fee applied) for a period of seven (7) years after production cancellation. Product cancellation shall be announced on the MEEFAN website. (URL: <https://www.mee.co.jp/sales/fa/meefan/>)  
(2) Product supply (including spare parts) is not possible after production has been discontinued.

3. Overseas services

Overseas services are out of scope.

4. Exclusion of opportunity loss and secondary loss from warranty liability

Regardless of the gratis warranty period, Mitsubishi Electric Engineering shall not be liable for compensation for damages arising from causes not attributable to Mitsubishi Electric Engineering, opportunity losses or lost profits incurred by the user due to Failures of Mitsubishi Electric Engineering products, damages or secondary damages arising from special circumstances, whether foreseen or unforeseen by Mitsubishi Electric Engineering, compensation for accidents, compensation for damages to products other than Mitsubishi Electric Engineering products, or compensation for replacement work, readjustment of onsite machinery and equipment, startup test runs, or other duties carried out by the user.

5. Changes in product specifications

The specifications given in the catalogs, manuals, technical documents, and the like are subject to change without notice.

6. Product application

(1) This product shall be used in applications that will not lead to a major accident even in the unlikely event any failure or defect should occur in the device, and shall be systematically provided with backup and fail-safe functions that operate in the event of any failure or defect.  
(2) This product has been designed and manufactured as a general-purpose product for general industry applications, etc. Thus, the product shall be excluded from use in applications in which the public could be greatly affected such as the applications of the nuclear and other power plants operated by the respective power companies, and applications in which a special quality assurance system is required, such as the applications of railway companies or government or other public offices. The product shall also be excluded from use in aircraft, medical applications, railways, incineration and fuel devices, manned transport devices, equipment for recreation and amusement, and safety devices, in which human life or assets could be greatly affected. Note that if the user consults with Mitsubishi Electric Engineering customer service in advance with regard to such an application and the user accepts that the application is to be limited and a special quality is not to be required, application shall be made possible upon exchange of required documents.

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