

The right choice for ultimate yield!

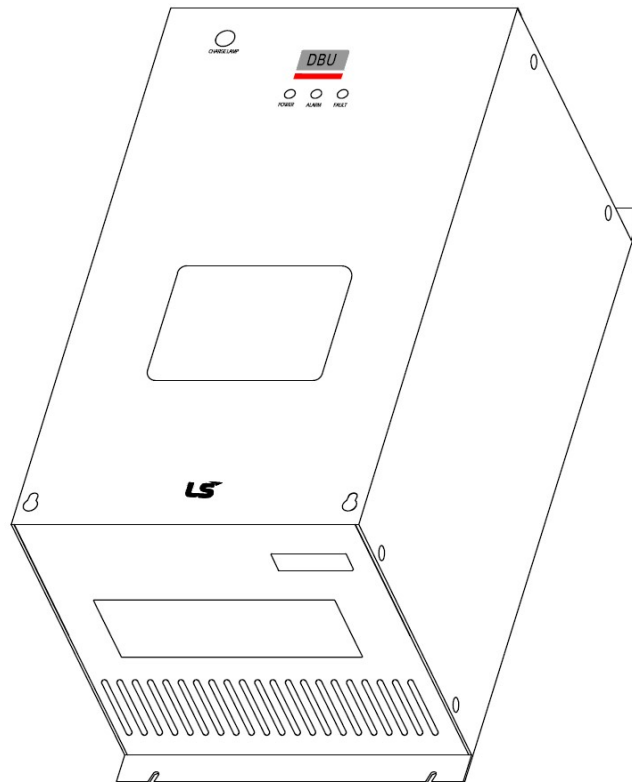
LS ELECTRIC strives to maximize your profits in gratitude for choosing us as your partner.

Braking Unit

LSLV-DBU Series

User's Manual

30~90kW[200V] 37~220kW[400V], 50% ED



Safety Instructions

- Read this manual carefully before installing, wiring, operation, servicing or inspecting this equipment.
- Keep this manual within easy reach for quick reference

LSELECTRIC

Thank you for your purchase of the LS ELECTRIC braking unit.

Safety Precautions

- Safety Instructions should always be observed in order to prevent accident or risk with the safe and proper use the product.
- Instructions are separated into “Warning” and “Caution”, and the meaning of the terms is as follows;



WARNING

This symbol indicates the possibility of serious injury or death if some applicable instruction is violated



CAUTION

This symbol indicates the possibility of slight injury or damage to products if some applicable instruction is violated

- The marks displayed on the product and in the user’s manual have the following meanings.



Be careful! Danger may be expected.



Be careful! Electric shock may occur.

- The user’s manual even after read shall be kept available and accessible to any user of the product.
- Before using the LSLV-DBU series braking unit, read this instruction manual carefully to ensure proper and safe operation.



WARNING

- **Do not open the cover while the power is on or the product is in operation.**

Otherwise, electric shock could occur.

- **Do not run the unit with the front cover removed.**

Otherwise, you may get an electric shock due to high voltage terminals or charged capacitor exposure.

- **Do not remove the cover except for periodic inspections or wiring, even if the input power is not applied.**

Otherwise, you may get an electric shock since the circuit inside the braking unit cannot be discharged immediately after the power is turned off.

- **Wiring and periodic inspections should be performed at least 10 minutes after disconnecting the input power and after checking the DC link voltage is discharged with a meter**

Otherwise, you may get an electric shock.

- **Operate the switches with dry hands.**

Otherwise, electric shock could occur.

- **Do not use the cable when its insulating tube is damaged.**

Otherwise, electric shock could occur.

- **Do not subject the cables to scratches, excessive stress, heavy loads or pinching.**

Otherwise, you may get an electric shock.

Safety Precautions



CAUTION

- **Install the inverter on a non-flammable surface. Do not place flammable material nearby.**
Otherwise, fire could occur.
- **Disconnect the input power if the inverter gets damaged.**
Otherwise, it could result in a secondary accident and fire.
- **Do not touch the braking unit while the input power is applied or for minutes after the power is cut out.**
Otherwise, you may get bodily injuries such as skin-burn or damage since it will remain hot for a couple of minutes.
- **Do not apply power to a damaged braking unit or to a unit with parts damaged even if the installation is complete.**
Otherwise, electric shock could occur.
- **Do not allow any other foreign materials such as screws, metal material, water and oil into the braking unit.**
Otherwise, fire could occur.

Precautions

(1) Transportation and Installation

- Please carry the product in the correct way, depending on the weight of the product.
- Do not stack the unit boxes higher than the number recommended.
- Install according to instructions specified in this manual.
- Do not open the cover while carrying the product.
- Do not place heavy objects on top of the product.
- Be sure to follow the installation directions exactly as written.
- Since the braking unit is precise device, do not drop it or subject it to physical shock.
- Connect the terminal to a grounding pole made by type D grounding for 200V series and to a grounding pole made by type C grounding for 400V series.
- When pulling out the PCB during installation or repair, place it immediately on an electric conductor. Otherwise, it may cause damage due to static electricity.

- Use the unit under the following environmental conditions.

Environment	Ambient temperature	-10°C to +40°C (non-freezing)
	Ambient humidity	90%RH or less (non-condensing)
	Storage temperature	-20°C to +65°C
	Ambience	free from corrosive gas, flammable gas, oil mist, dust and dirt
	Altitude, vibration	1000m above sea level or below, 5.9 m/s ² or less

(2) Wiring

- Do not fit capacitive equipment such as a power factor correction capacitor, radio noise filter or surge suppressor to the output of the braking unit.
- Incorrect terminal wiring could result in the equipment damage.
- Reversing the polarity (+/-) of the terminals could damage the braking unit.
- Have the wiring work conducted by a qualified electrician.
- Be sure to install the main body first before starting wiring.

(3) Trial run

- Check all parameters during operation. Parameter values might require adjustment depending on the load.
- Always apply voltage within the permissible range of each terminal as indicated in this manual. Otherwise, braking unit damage may result.

(4) Operation

- The Stop key on the keypad can only be used to stop the inverter when keypad control is enabled. Install a separate emergency stop switch if necessary.
- Do not modify the inside of the product.
- Do not start or stop of the braking unit with the electromagnetic contactor installed on the input power.
- A noise filter may be installed to reduce the effect of electromagnetic interference. It requires protection for the damage to the electronic devices used near the DB unit.
- If you initialize the parameters, set the parameters required before operating the unit again. Parameter initialization changes the parameter values to the default.
- In the event of failure has displayed by the overvoltage from the inverter or DC voltage is not a normal voltage corresponding to the input voltage. Since immediately operating the DB unit can generate fault output, please start operation after the DC voltage is stabilized.

Safety Precautions

- Depending on the applicable devices or operating environment, it may require the internal parameter changes via the keypad to secure the flexible operation. In this case, please contact our service center.

(5) Maintenance, inspection and parts replacement

- Do not megger (insulation resistance) test the control circuit of the braking unit.
- Refer to Chapter 4 for periodic inspection and (parts replacement details).

(6) Disposal

- Handle the unit as an industrial waste when disposing of it.

(7) General instructions

- Many of the diagrams and drawings in this manual show the unit without a cover.

Prior to operating the unit, be sure to restore covers and circuit protection according to specifications.

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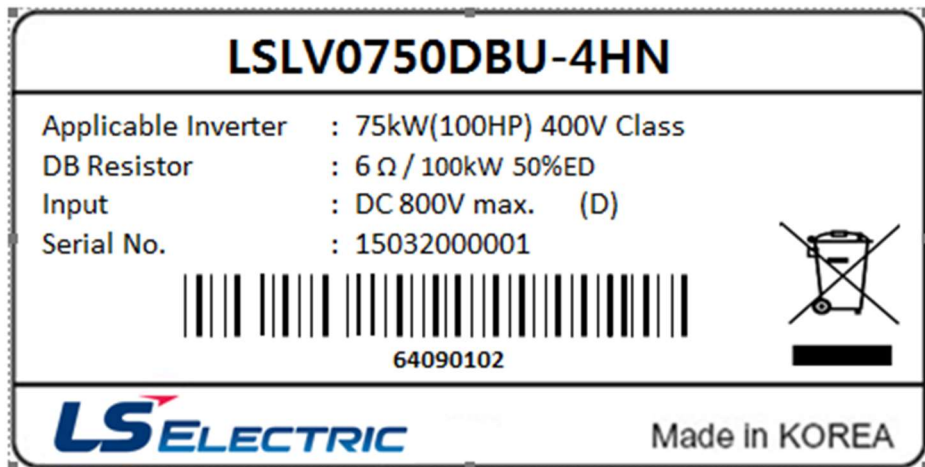
I. Basics

1.1 What You Need To Know Before Use

Misuse may lead to unusual operation or life expectancy of the unit will be reduced. In the worst case, the braking unit can be damaged or fatal or major injuries may occur if handling is mistaken. Be sure to read this manual thoroughly and understand the contents before using this unit.

1.2 Product Name Plate and Type Description

Take out the braking unit from the packing box and check whether the type of braking unit, rated output, etc. on the rating plate on the side of main body match the ordered product. Also, check if there's anything damaged during the transportation.



► Braking unit model name

EX) LSLV0750DBU-4HN

LSLV	: Model name (for LS low-voltage inverter)
0750	: Braking unit capacity (e.g.: 0750 ► 75kW)
DBU	: System name (Braking Unit)
4	: Input voltage (AC grid voltage 2: 220V, 4: 380 - 480V)
H	: %ED (Duty factor, H: 50%ED)
N	: Enclosure rating (N: Not rated enclosures)

► Manufacturer, date of manufacture, and production Lot are written in the S/N.

EX) 1503200001

150320	: Date of manufacture (E.g.: March 20th, 2015)
00001	Product Serial Number
Barcode	: Same as the serial number

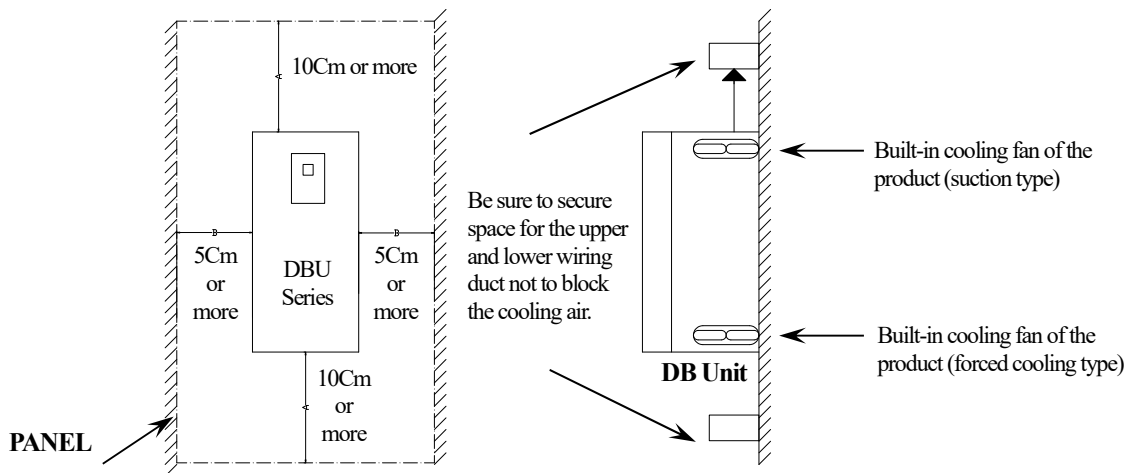
1.3 Installation location

- ▶ Do not install in the following locations:
 - Do not install in direct sunlight.
 - Do not install in a location subject to high temperature, or high humidity.
 - Do not install in a location with petrochemical mist, frequent dust.
 - Do not install in a location using fire extinguishing water sprinklers, oil, and powder form.

- ▶ When installing the DB unit in a panel box, as heat is generated during DB unit operation, consider sufficient ventilation to prevent ambient temperature of the DB unit from exceeding the specified value. Ensure that ventilation can certainly minimize the effect of heat from the DB unit and the inverter in the same panel box.

- ▶ Securely fasten the DB unit with bolts in an upright position on a designated place and the DB unit should face the front.

- ▶ After heat is generated from the DB unit, the heat remains in the panel space.



1.4 Standard specifications

220V series

Model Name (LSLV□□□□DBU-2HN)		0370	0750	0900	
The maximum DC input voltage		Maximum DC 400V for 220V series			
Applicable inverter capacity [kW]		37	75	90	
Damping Resistance	Rated Motor Capacity [kW]	37	75	90	
	Resistance capacity in accordance with duty factor (% ED is 90 seconds operation, based on the operating voltage DC 380V)	Duty factor	Resistance Capacity	Resistance Capacity	Resistance Capacity
		5%ED	5[kW]	10[kW]	13[kW]
		10%ED	10[kW]	20[kW]	26[kW]
		25%ED	25[kW]	50[kW]	65[kW]
50%ED	50[kW]	100[kW]	130[kW]		
Used minimum resistance		3[Ω]	1.5[Ω]	1.2[Ω]	
Braking operation voltages		DC 300V - DC 400V setting function (defaults DC 380V)			
Average Braking Torque		150% Braking Torque			

Installation and Connection

440V series

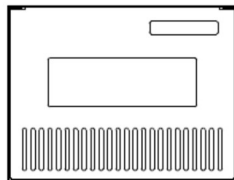
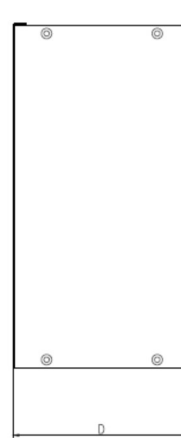
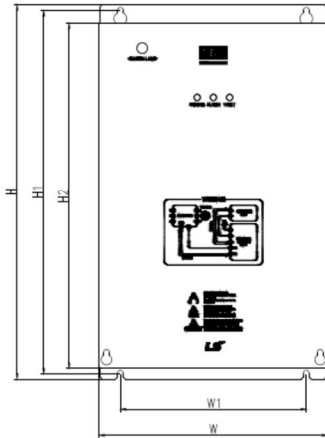
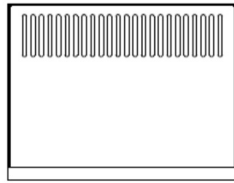
Model Name (LSLV□□□□DBU-4HN)		0370	0750	0900	1320	1600	2200	
The maximum DC input voltage		Maximum DC 800V for 440V series						
Applicable inverter capacity [kW]		37	75	90	132	160	220	
Rated Motor Capacity [kW]		37	75	90	132	160	220	
Damping Resistance	Resistance capacity in accordance with duty factor (% ED is 90 seconds operation, based on the operating voltage DC 760V)	Duty factor	Resistance Capacity	Resistance Capacity	Resistance Capacity	Resistance Capacity	Resistance Capacity	
		5%ED	5[kW]	10[kW]	13[kW]	20[kW]	24[kW]	30[kW]
		10%ED	10[kW]	20[kW]	26[kW]	40[kW]	48[kW]	60[kW]
		25%ED	25[kW]	50[kW]	65[kW]	100[kW]	120[kW]	150[kW]
	50%ED	50[kW]	100[kW]	130[kW]	200[kW]	240[kW]	300[kW]	
Used minimum resistance		12[Ω]	6[Ω]	5[Ω]	3.4[Ω]	2.8[Ω]	2[Ω]	
Braking operation voltages		DC 600V - DC 800V setting function (defaults DC 760V)						
Average Braking Torque		150% Braking Torque						

Note) If overvoltage alarm occurs due to deceleration time settings of the inverter, please consult with us since it may require change of resistance value.

1.5 Common Standard

Item		Specifications
Terminal	Input signal	RUN / RST / OHR input, parallel operation command master input signal
	Output signal	Parallel operation command slave output signal
	Alarm relay output signal	250VAC 1A or less, 30VDC 1A or less / N.O. / N.C. Output
	Power for PNP terminal operation	Output 24VDC 50mA or less
Protection	Overvoltage	Protects if it is DC 800V or more.
	Overheat	Protects by detecting overheat with a built-in thermistor.
	Internal system failure	Protects when internal system failure occurs.
	DC Undervoltage	Protects if it is DC 400V or below.
	Overload	Protects when the internal duty factor or continuous operation time exceeds the limit.
	External resistor overheating	Protects by detecting external resistor overheating with the contact signal.
	Thermistor failure	Protects when the built-in thermistor is not connected or has an error.
	FAN failure	Protects when the fan has an error.
Operating Environment	Overcurrent	Protects when the overcurrent occurs.
	Cooling system	Natural cooling
	Installation location	Indoor (without corrosive gas, flammable gas, oil mist, or dust)
	Ambient and Storage temperature	-10 - +40°C(Ambient temperature), -20 - +65°C(Storage temperature)
	Ambient humidity	Relative humidity 90% RH or below (no dew condensation)
	Altitude	1,000m or less
	5.9m/s ² (0.6G) or less	

1.6 Outline dimensions

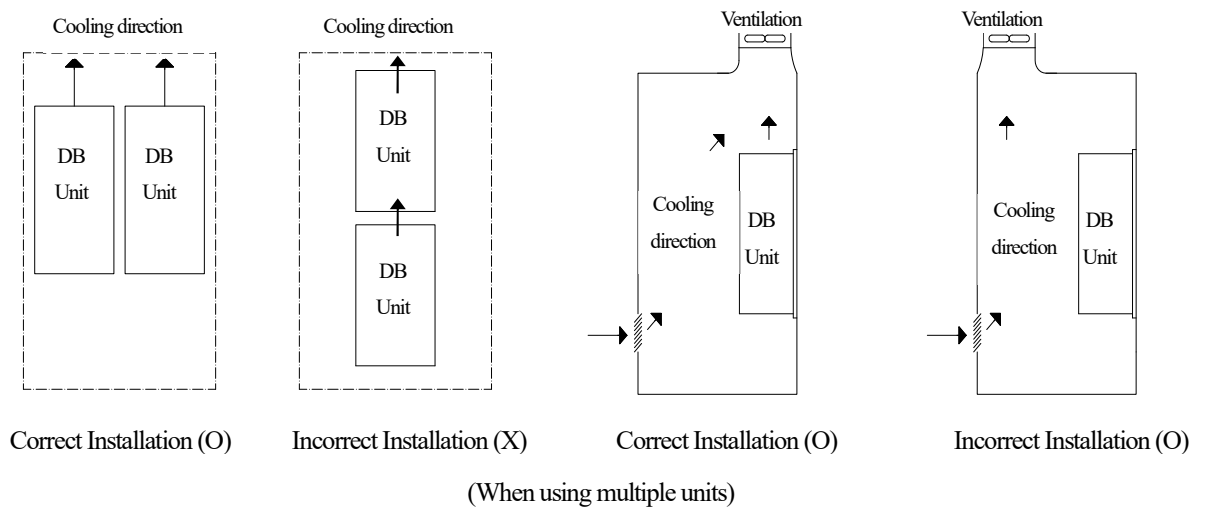
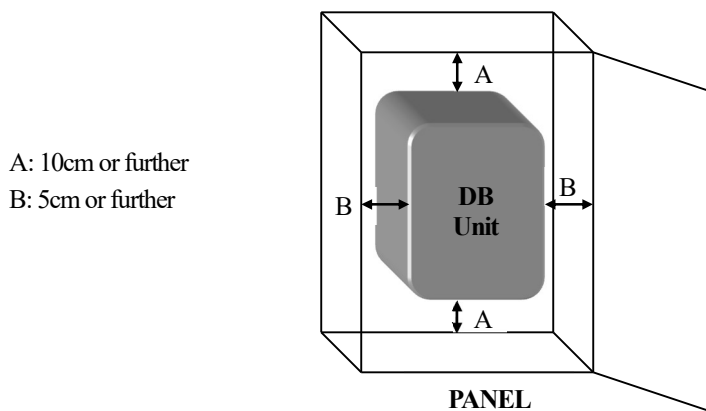


10	Used Voltage	Capacity	Duty factor (%ED)	Product Size (mm)				Attachment location (mm)		Cooling system	Weight (kg)	Bolt size (φ)
				W	H	H2	D	W1	H1			
A Frame	220 [V]	37 [kW]	50	200	219	190	165.2	160	208.5	Self-ventilation	3.77	M6
	440 [V]	37 [kW]	50								3.84	
		75 [kW]	50								3.98	
B Frame	220 [V]	75 [kW]	50	215	340	311		175	329.5	Self-ventilation	8.26	
		90 [kW]	50							fan forcibly cooled	8.48	
	440 [V]	90 [kW]	50							Self-ventilation	8.30	
		132 [kW]	50							fan forcibly cooled	8.40	
C Frame	440 [V]	160 [kW]	50	240	380	351		200	369.5	Self-ventilation	9.40	
		220 [kW]	50							fan forcibly cooled	9.70	

II. Installation and Connection

2.1 Installation Safety Precautions

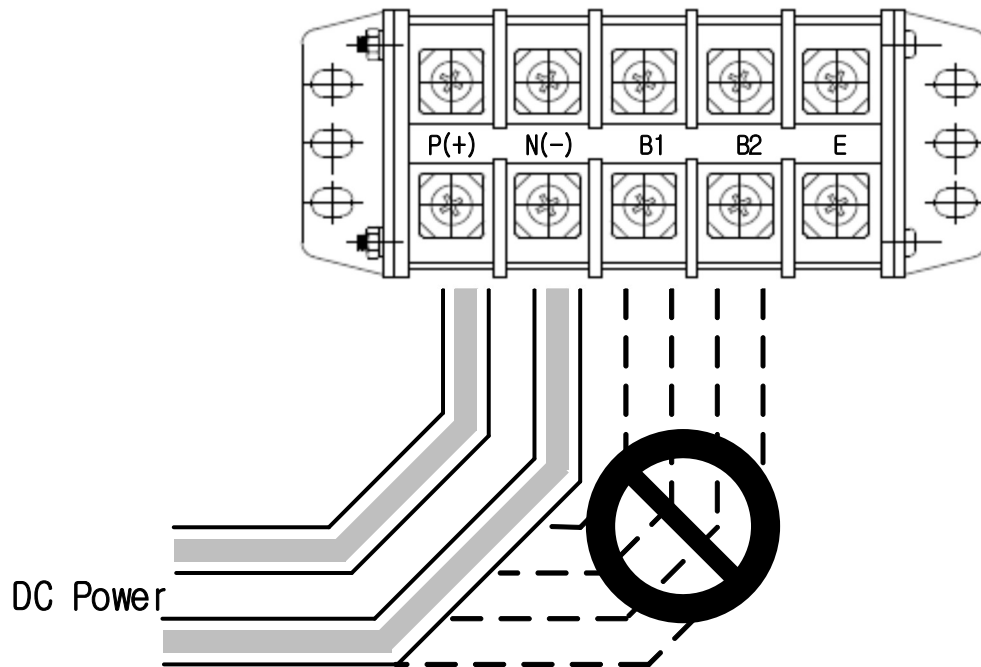
- ▶ Never remove the cover and touch the inside of the unit while the power is on or in operation. There are sections in the unit that are charged with high voltages. Always wait at least 10 minutes after turning the input power off before starting inspections.
- ▶ Make sure that the ambient humidity (90% RH or below) and the ambient temperature (-10°C to 40°C) are in the right range. High and low humidity may cause problems with the insulation and temperature exceeding 40°C can shorten the life expectancy of the electrolytic capacitor.
- ▶ Be sure to install the unit vertically to facilitate cooling. 5cm or wider spaces on the left and right side of the unit 10cm or wider spaces on the top and bottom of the unit has to be secured.



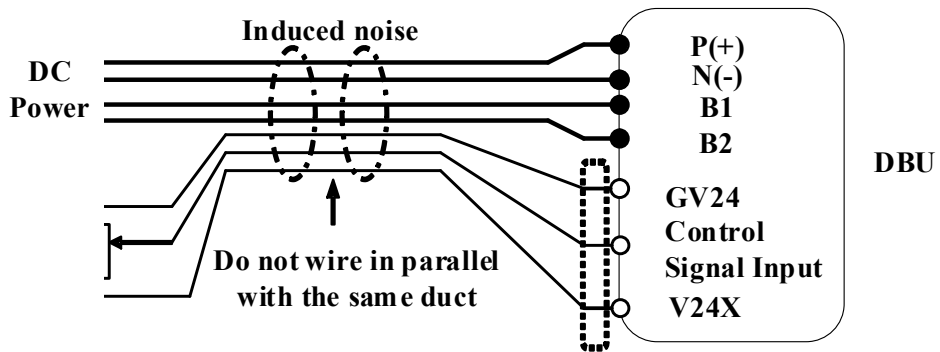
- ▶ Do not install the unit in a location where excessive vibration and subject to direct sunlight. Excessive vibration may cause loose screws and connect and it may cause malfunction.
- ▶ Install the unit in a location where free from dust and corrosive gas. Dust and corrosive gases can cause poor contact and result in malfunction.

2.2 Precautions for wiring

- ▶ Connect the DC link circuit terminals P (+) and N (-) of the inverter to the terminals P (+) and N (-) of the DB unit. Do not connect output terminals (B1, B2) of the braking unit to the input terminal P (+), N (-). Otherwise, braking unit failure may result.



- ▶ Be careful not to leave any foreign matter inside of the braking unit after wiring.
- ▶ Use the shield or twisted wire for the wires of the control circuit terminal and do not wire in the same duct as the wiring of the main circuit.



- ▶ Screws and wire size for main circuit terminal
When connecting input power (P (+), N (-)) and resistance (B1, B2), if it is not correctly wired to the high-voltage circuit, the DB unit could be damaged or the operator could be in danger. Be careful not to deviate from the accepted specification.

Installation and Connection

600V 75°C KIV Wire Standard 50%ED

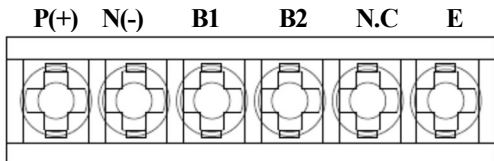
DB model name	Frame	Terminal screw	Tightening torque	Wire size	Pressure Terminal
LSLV0370DBU-2HN	A	M5	2.4 [N · M]	6 mm ² (8AWG)	6 mm ² , 5Φ Hole
LSLV0370DBU-4HN		M4	1.4 [N · M]		
LSLV0750DBU-4HN					
LSLV0900DBU-4HN	B	M6	3.0 [N · M]	10 mm ² (6AWG)	10 mm ² , 6Φ Hole
LSLV1320DBU-4HN				20 mm ² (4AWG)	20 mm ² , 8Φ Hole
LSLV0750DBU-2HN					
LSLV0900DBU-2HN					
LSLV1600DBU-4HN	C	M8	6.6 [N · M]	25 mm ² (3AWG)	25 mm ² , 8Φ Hole
LSLV2200DBU-4HN					

- Screws and wire size for control circuit terminal
If it is not wired correctly, malfunction or damage may result or operator could be in danger. Be careful not to deviate from the accepted specification.

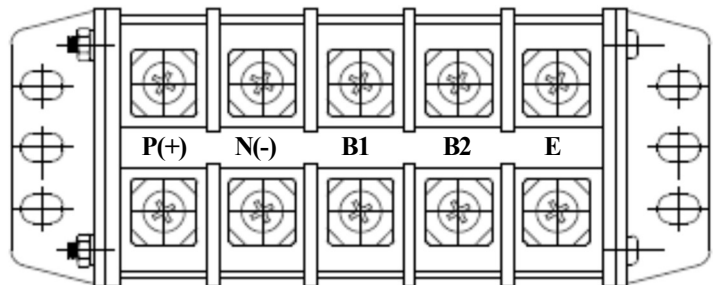
Regenerative braking unit Model	Terminal screw size	Tightening torque	Wire size	Pressure Terminal
LSLV0370DBU-2HN ~ LSLV0900DBU-2HN	M2.5	0.5 M	AWG 20 - 18	BLADE / BAR / PIN Type
LSLV037DBU-4HN ~ LSLV2200DBU-4HN				

2.3 Main circuit terminal block description

A Frame

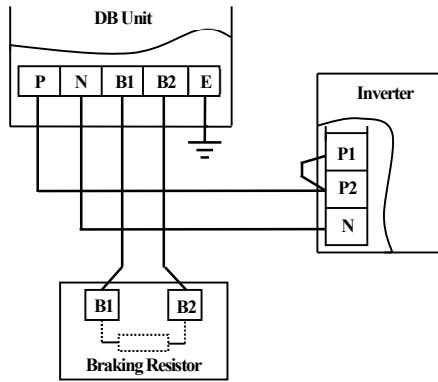


B Frame / C Frame

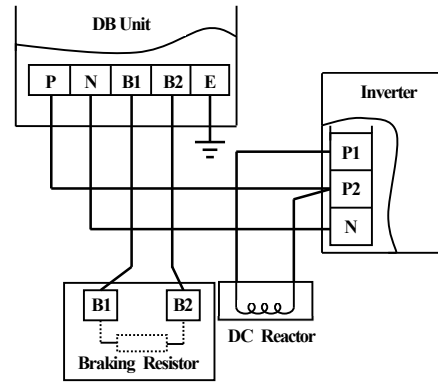


Terminal Symbols	Describes...	
P(+)	DC Bus Link	Connected with the DC Bus of the inverter
N(-)		
B1	External Resistor Link	Used to connect external resistors
B2		
E	Earth Ground Link	Used to connect external ground

2.4 Main circuit terminal block connection



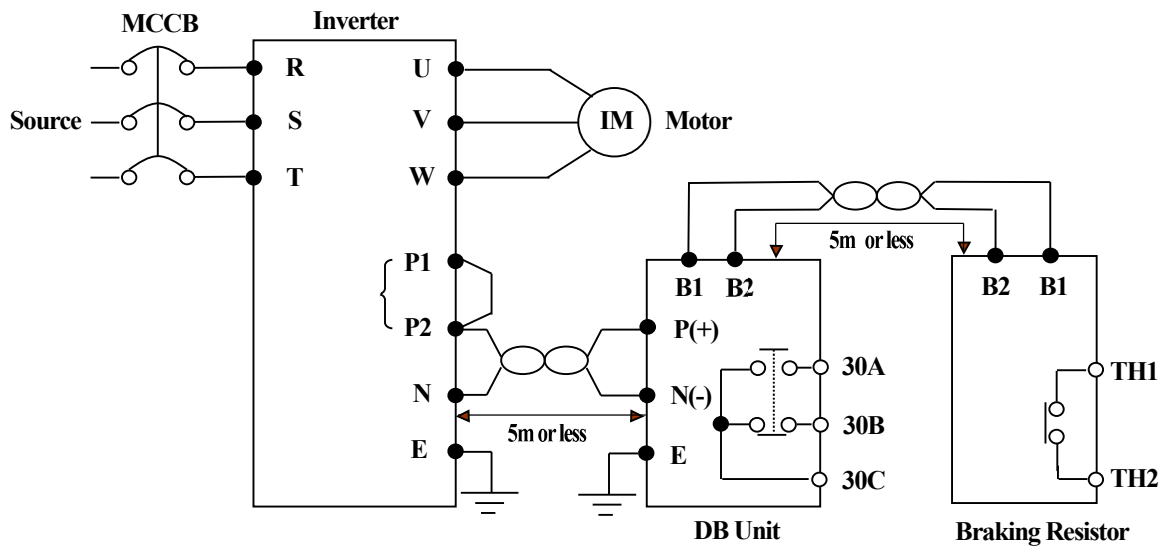
For connecting inverter, braking unit, and braking resistor.



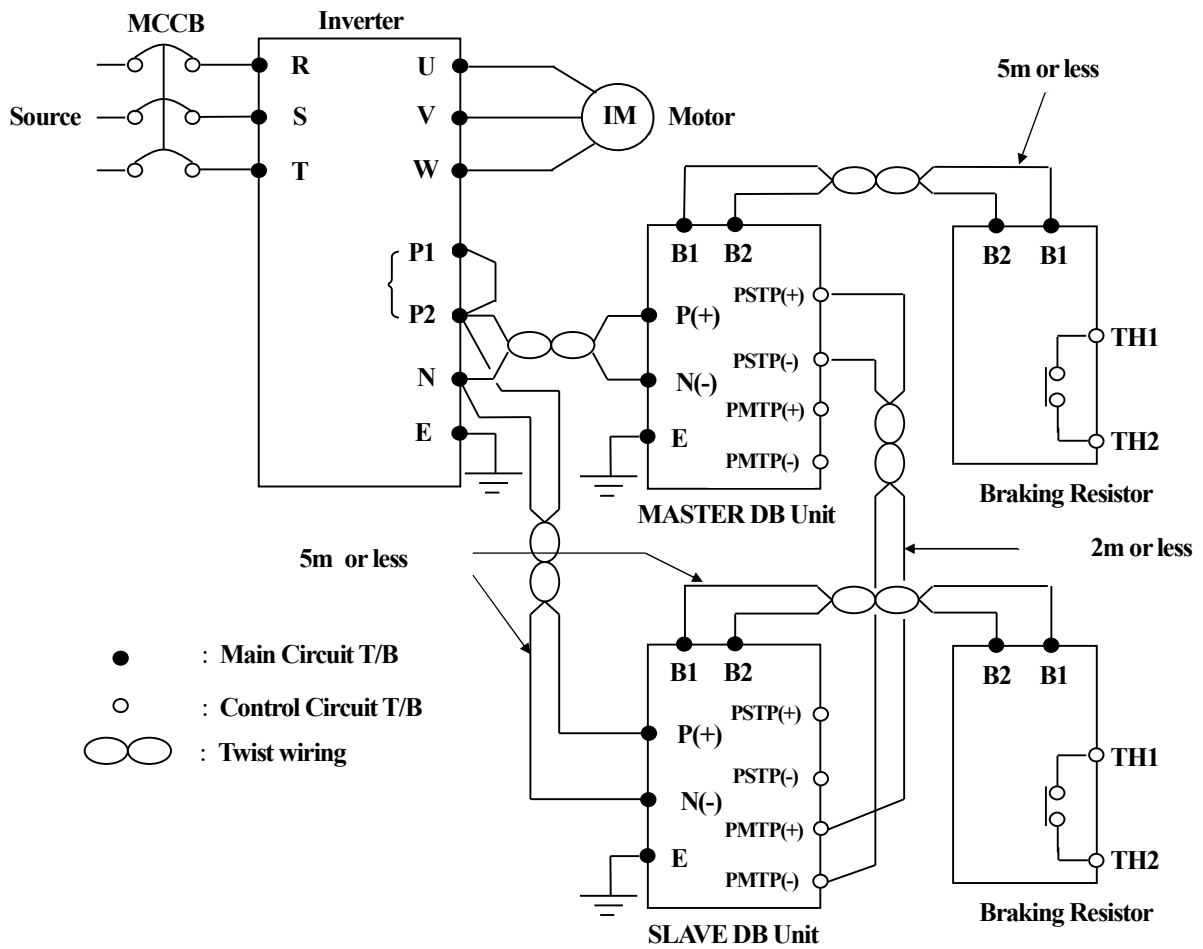
Wiring in combination with a DC reactor for power factor improvement

2.5 Basic Wiring

2.5.1 When using the braking unit alone (single operation)



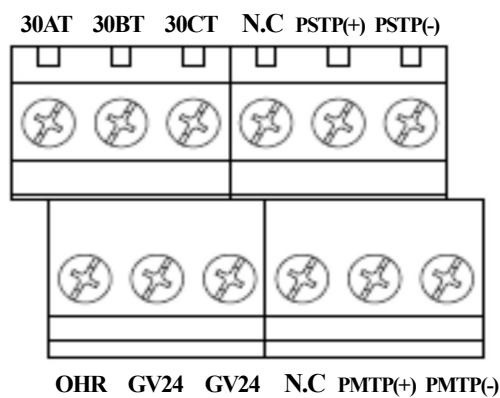
2.5.2 When using multiple braking units (parallel operation)



- ▶ Arrange the wires between the inverter and the DB unit, the DB unit and the braking resistor to be twisted.
- ▶ In case of using two DB units, arrange the wire rout so that the wire length is less than 2m and to be twisted.
- ▶ Arrange the wire length between the inverter and the DB unit, the DB unit and the braking resistor is less than 5m.
- ▶ Ensure that the terminal G for grounding DB unit and inverter is grounded.

2.6 Control Circuit

2.6.1 Control circuit terminal block



2.6.2 Control circuit terminal block description

Terminal Symbols		Functions	Specifications
PMTN(+)	Sequence Input	Parallel operation master operation command input signal Positive (+)	DC24V 10mA Photo-coupler insulation terminal
PMTN(-)		Parallel operation Master operation command input signal Negative(-)	
PSTP(+)		Parallel operation slave operation command output signal Positive (+)	
PSTP(-)		Parallel operation slave operation command output signal Negative(-)	
N.C		The signal terminals not in use.	
OHR		External resistor overheat contact signal input terminal (Level operation)	
GV24		Common terminal that connects to the internal ground	GND of DC24V
30AT	Relay Output	Alarm A contact output terminal	250VAC/1A 30VDC/1A
30BT		Alarm B contact output terminal	
30CT		Common terminal for A and B contact	

2.7 Wiring Control Circuit

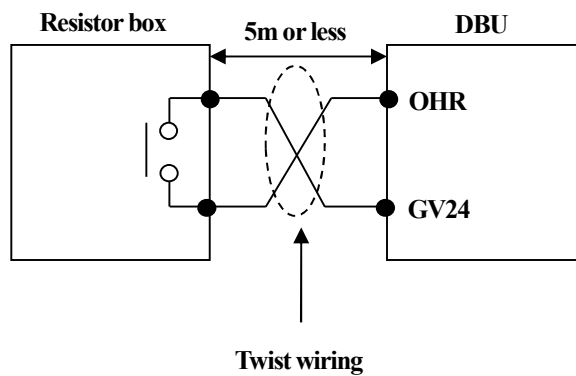
2.7.1 Precautions on Wiring

- ▶ Arrange the wires of control circuit terminal to be shielded or twisted and the wires should be separated from the main or high potential circuit (200V relay sequence circuit).
- ▶ Wires for selecting control circuit contact, open collector, or relay terminal block, use stranded wire between 26 AWG and 18 AWG.

2.7.2 Wiring description for OHR terminal

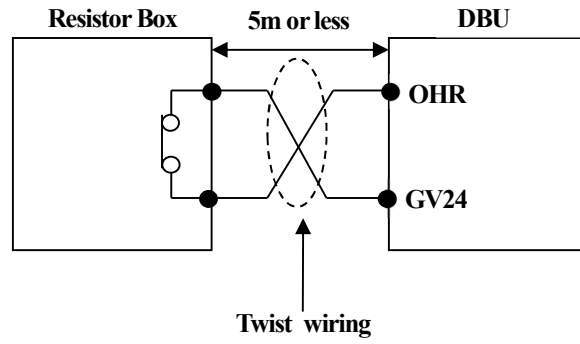
- Connect switch or transistor between the OHR input terminal and the GV24.

[When setting the 'F 3' as OHA from Option Keypad for DBU (Keypad purchase separately)] – Factory default



(There is no fault output from the resistance box in normal status)

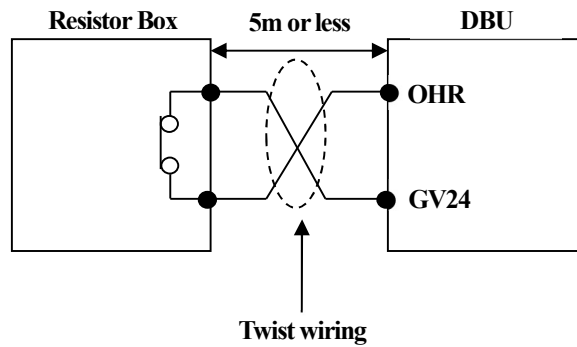
Installation and Connection



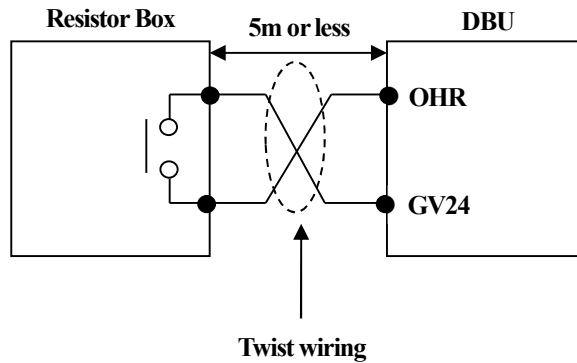
(There is fault output from the resistance box in abnormal status)

- ▶ F 3' is set as OHA. It is usually used when the output of the resistance box is A contact. If a fault occurs, a short-circuit occurs between the OHR and GV24 and informs the failure of the resistance box to the DBU.

[When setting the 'F 3' as OHB from option keypad for DBU (Keypad purchase separately)] – Factory default



(There is no fault output from the resistance box in normal status)



(There is fault output from the resistance box in abnormal status)

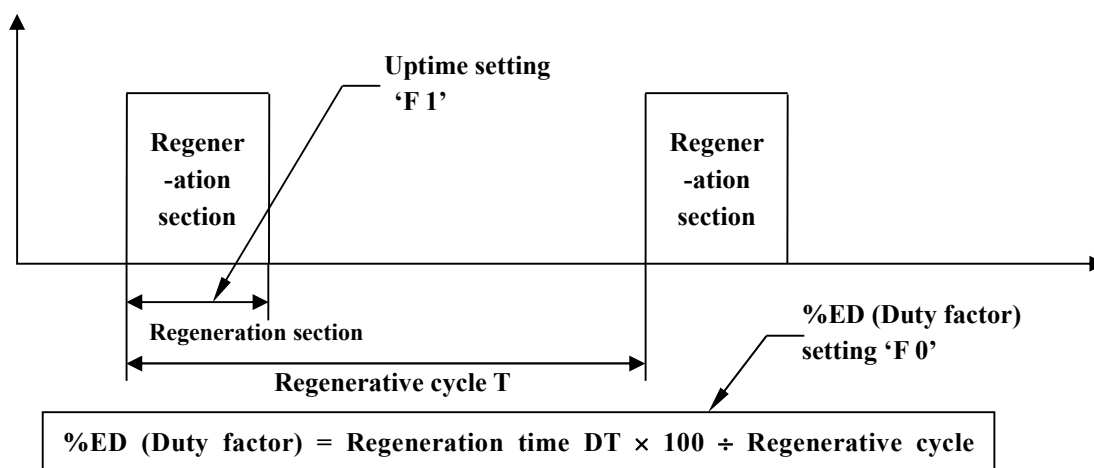
- ▶ F 3' is set as OHB. It is usually used when the output of the resistance box is B contact. If a fault occurs, a short-circuit has released between the OHR and GV24 and informs the failure of the resistance box to the DBU.

III. Operation

3.1 Operating command

- ▶ When power is established, it will operate automatically.

3.2 Duty Factor Description



- ▶ Duty factor displays percentage of actual braking operation for the cycle that operating the DB unit.
- ▶ Since the duty factor generates the overload fault when it exceeds the value set in the 'F 0' function, it should be set according to the application.
- ▶ The uptime is the time that an action can be performed continuously and it can be set in the 'F 1' function. Since exceeding the set time also generates overload fault, so it should be set carefully.
- ▶ The continuous using setting can be used by setting the 'F 0' function parameter to 100.

① When setting the duty factor, if the 'F 0' function parameter value is set to 50 or higher, 100% ED model that can be used continuously should be used. Otherwise, damage may result.

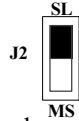
3.3 Parallel Operation

- ▶ When operating 2 or more braking units in parallel, one unit must be set to master and the rest units must be set to slave. (When the DB unit is used alone, it should be set to Master. The default setting is Master.)
- ▶ How to set the MASTER (switched from the PCB) is turn the switch J2 to the MS (to the downward).

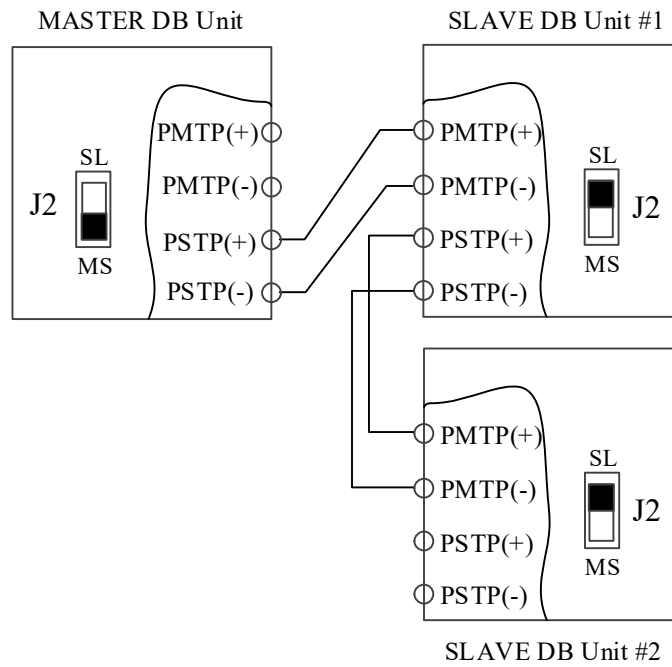


Operation

- ▶ How to set the SLAVE (switched from the PCB) is turn the switch J2 to the SL (to the upward).



- ▶ How to connect master and slave units is connecting PMTP (+) terminal of the I/O terminal from master unit and PMTP (+) terminal of the I/O terminal from slave unit with wire. Likewise, connect the PSTP (-) and PPMP (-) terminals.



- ⚠ Since the incorrect connection may result in overheat and damage of the unit, so connect carefully.

IV. Maintenance and Inspection

Braking unit is industrial electronics that adopted state-of-the-art semiconductor elements. Effects of the environment such as temperature, humidity, and vibration and the aging of components may cause a malfunction. To prevent malfunction and ensure long-term reliability, daily inspection is required.

4.1 Precautions on Maintenance

When checking the inside of the braking unit, since the smoothing condenser is maintained in high-voltage state after the power has been turned off, make sure to check that the DC voltage between the terminals P (+) and N (-) is 30V or less before starting the inspection.

4.2 Precautions on Inspection

4.2.1 Daily inspection

- Is there any abnormality in the installation location?
- Is there any abnormality in the cooling system?
- Is there vibration or abnormal sound?
- Is there any indication of overheating or discoloration?
- Is the output frequency outputted with the configured value?

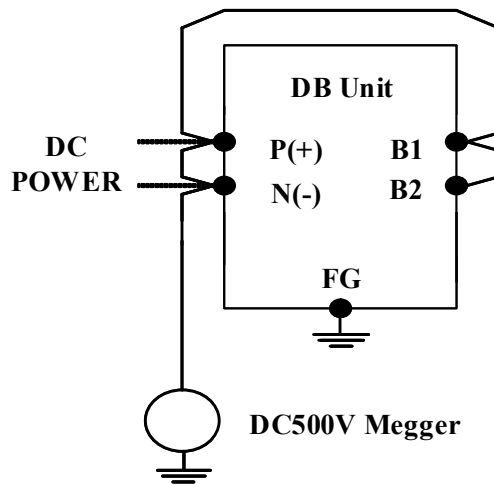
4.2.2 Periodical inspection

- Is there any abnormality in the cooling system? The cooling fan cleanliness.
- Are there any loose screws or connectors? In the severe vibration, screws and bolts might be loosened. Check them correctly and tighten or replace them.
- Is there any corrosion or damage to the conductors or insulators?
- Measuring the insulation resistance
- Check and replace a cooling fan, smoothing condenser, and relay.
- Is there foreign matter on the PCB of the braking unit?
- Is there any abnormality on contacts of the various connectors in the PCB?

☞ Cooling pan is only applicable to the continuous operation available braking unit.

4.2.3 Megger test

- When executing the megger test for the exterior circuit, remove all cables from the terminals to ensure the test voltage is not applied to inside of the DB unit.
- For conducting a continuity test on the control circuits use a tester (range for high resistance). (Do not use a megger or buzzer.)
- Execute the megger test only on the main circuit as shown in the figure below. A megger test must not be performed in the control circuit. (Use a 500V DC type megger)



4.3 Life Expectancy of the Main Parts and Maintenance

Part name	Standard period for replacement	Replacement method and others
Relay parts	-	Determined after checking
Fuse	10 years	Exchange for a new part
Control PCB	5 years	Exchange for a new part (determined after checking)
Electrolytic capacitor on the PCB	5 years	Exchange for a new part (determined after checking)

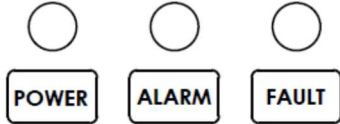
- ☞ Since the life expectancy of the main components was determined based on the case of continuous operation at the rated load, it may differ depending on the environment and using conditions.
- ☞ Cooling pan is only applicable to the fan forcibly cooled braking unit.

V. Fault Display and Countermeasures

If a problem occurs while using the product and the brake unit is not operable, deal with the problem after checking the cause by referring to the troubleshooting methods below. If problem occurs other than the cases listed below; a failure of the braking unit is found, components are broken. Please contact your dealer or sales representatives. (For the fault indication message and the failure countermeasure, using keypad options can check the problems in detail and take necessary measures.

5.1 Displays When Braking Unit Has Stopped Abnormally

5.1.1 LED indications on the front panel



5.1.2 LED indication examples

Indications	Description
	LED is on.
	LED is blinking rapidly, 0.3-second cycle
	LED is blinking slowly, 1.6-second cycle
	LED is off.

5.1.3 Operating status

POWER	ALARM	FAULT	Status	Description
			Power Ready	The power is applied to the BDU.
			RUN	DBU is operating and the output is being generated.

5.1.4 Warning Indications

POWER	ALARM	FAULT	Status	Description
			FAN Err	Failure has occurred in the FAN

Fault Display and Countermeasures

5.1.5 Failure Indications

POWER	ALARM	FAULT	Status	Description
●	●	⊙	BOC	DC input overcurrent has occurred.
			BOV	DC overcurrent has occurred.
			BLV	DC undervoltage has occurred.
			BOL	Overload condition has sustained over a certain period of time
			BOH	Internal overheating has occurred.
			HW Err	Internal system's failure has occurred.
			ROH	Resistance overheating caused by the OHR contact input has occurred.

5.2 DB Unit Failure Causes and Countermeasures

Protective Function	Main Cause	Countermeasures
DC Input Overcurrent	<ol style="list-style-type: none"> 1) The resistance connected to the braking unit is too small. 2) Output short circuit of the braking unit 	<ol style="list-style-type: none"> 1) Increase the using resistance of the braking unit. 2) Remove short circuit by checking the resistance connection.
DC Overvoltage	<ol style="list-style-type: none"> 1) Braking unit is not working. 2) Second failure has occurred due to other failure. 3) Regenerative load has generated excessively than the capacity of the braking unit. 4) Voltage of inverter and input power is too high. 	<ol style="list-style-type: none"> 1) Check if the braking unit is in RUN status. 2) Check if other failure has occurred. 3) Check the capacity of the braking unit. 4) Check the DC input voltage of the inverter.
PIN Overheating	<ol style="list-style-type: none"> 1) Cooling system has faults. 2) Ambient temperature high. 	<ol style="list-style-type: none"> 1) Check for alien substances in the heat sink. 2) Keep ambient temperature under 40 °C.
Device Fault	<ol style="list-style-type: none"> 1) Internal board has faults. 2) Electronic component has damages. 	<ol style="list-style-type: none"> 1) Shut down all the power. 2) Contact your dealer or service center.
DC Undervoltage	<ol style="list-style-type: none"> 1) Voltage of inverter and input power is low. 	<ol style="list-style-type: none"> 1) Check the DC input power.
Overload	<ol style="list-style-type: none"> 1) Load is larger than rating. 2) Incorrect braking unit capacity selected. 	<ol style="list-style-type: none"> 1) Check if the load is correctly selected according to the %ED. 2) Select correct braking unit capacity.
External resistor overheating	<ol style="list-style-type: none"> 1) Incorrect resistor capacity selected. 2) Duty factor of the braking unit is high. 3) Ambient temperature high. 	<ol style="list-style-type: none"> 1) Select correct resistor capacity. 2) Check if the duty factor is correct. 3) Keep ambient temperature under 40 °C.
Cooling fan warning	Cooling fan of the fan forcibly cooled type product has stopped or damaged.	Replace the cooling fans.

Warranty

Product Name	Braking Unit of the LS ELECTRIC	Installation Date	
Model Name	<i>LSLV-DBU</i>	Warranty Period	
Customer	Name		
	Address		
	Tel.		
Sales Office	Name		
	Address		
	Tel.		

This product has been manufactured under rigid inspection and quality management of LS ELECTRIC engineers.
 Warranty period is 12 months after installation or 18 months after manufactured when the installation date is unidentified. However, the guarantee term may vary on the sales term.

IN-WARRANTY service information

If the defective part has been identified under normal and proper use within the guarantee term, contact your local authorized LS distributor or LS Service center.

OUT-OF WARRANTY service information

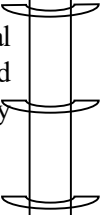
The guarantee will not apply in the following cases, even if the guarantee term has not expired.

- Damage was caused by misuse, negligence or accident.
- Damage was caused by abnormal voltage and peripheral devices' malfunction (failure).
- Damage was caused by an earthquake, fire, flooding, lightning, or other natural calamities.
- Damage was caused by improper repair or altering by other than LS authorized distributor or service center.
- When LS nameplate is not attached.
- When the warranty period has expired.

For a variety of useful information and services, please visit the LS ELECTRIC website (at <http://www.lselectric.co.kr>).

Revision History

No.	Date	Change Details	Version No.	Remarks
1	July, 2015	First Release	1.00	
2	May, 2020	Second Release	2.00	Changing a company name
3				
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<p>Environmental Management</p> <p>LS ELECTRIC considers the environmental preservation as the first management subject and every staff is committed to the pleasurable environmental preservation of the earth.</p>		<p>Guide for product disposal</p> <p>LS DB Unit is designed to protect the environment.</p> <p>When disposing of the product, it can be recycled by separating with iron, aluminum, copper, and synthetic resins.</p>
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www.lselectric.co.kr

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