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AC Variable Speed Drive

LSLV-S300 Series

User's Manual

0.4~75 kW[200V] 0.4~220 kW[400V]

Safety Instructions

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

LS ELECTRIC

This operation manual is intended for users with basic knowledge of electricity and electric devices.

* S300 is the series name of the LSLV-S300.
* The software of this product may be revised for better functionality or performance. If you find any deviation from this user manual, check out the latest version on our website below.
  (https://www.ls-electric.com)

Safety Information

Read and follow all safety instructions in this manual precisely to avoid unsafe operating conditions, property damage, personal injury, or even death.

Safety symbols in this manual

⚠ Hazard

Indicates an imminently hazardous situation that, if not avoided, will result in severe injury or even death.

⚠ Warning

Indicates a potentially hazardous situation that, if not avoided, could result in injury or even death.

⚠ Caution

Indicates a potentially hazardous situation that, if not avoided, could result in minor injury or property damage.

Safety Information

⚠ Hazard

- Never remove the product cover or touch the internal printed circuit board (PCB) or any contact points when the power is on. Also, do not start the product when the cover is open. This may cause an electrical shock due to the exposure of high-voltage terminals or the charging area.
- Even if the power is off, do not open the cover unless it is absolutely necessary, like for the wiring operation or for a regular inspection. Opening the cover may still cause an electrical shock, even after the power is blocked, because the product has been charged for a long period of time.
- Before opening the cover to start working, wait at least 10 minutes after the power is disconnected and check that the DC voltage of the product has been discharged using a tester. Otherwise, it may cause an electrical shock and result in personal injury or even death.
- Supply earthing system: TT, TN, not suitable for corner-earthed systems

⚠ Warning

- Make sure to install a ground connection between the equipment and the motor for safe use. Otherwise, it may cause an electrical shock and result in personal injury or even death.
- Do not turn on the power if the product is damaged or faulty. If you find that the product is faulty, disconnect the power supply and have the product professionally repaired.
- The inverter becomes hot during operation. Avoid touching the inverter until it has cooled to avoid burns. Avoid touching the inverter until it has cooled to avoid burns.
- Do not allow foreign objects such as screws, metals, water, or oil to get inside the product. It can cause damage or a fire.
- Do not operate the switch with wet hands. Otherwise, it may cause an electrical shock and result in personal injury or even death.

ⓘ Caution

- Do not disassemble or change the inside of the product at your own discretion. This may result in failure or malfunction, causing worker injury or product damage. Also, products disassembled or changed at your own discretion will not be entitled to the product warranty.
- Do not use the inverter for single-phase motor operation, as it has been designed for three-phase motor operation. Using a single-phase motor may damage the motor.
- Do not place heavy objects on top of electric cables. Heavy objects may damage the cable and result in an electric shock.

Note

Maximum allowed prospective short-circuit current at the input power connection is defined in IEC 60439-1 as 100 kA. LSLV-S300 is suitable for use in a circuit capable of delivering not more than 100kA RMS at the drive's maximum rated voltage, depending on the selected MCCB. RMS symmetrical amperes for recommended MCCB are the following table.

Remarque

Le courant maximum de court-circuit présumé autorisé au connecteur d'alimentation électrique est défini dans la norme IEC 60439-1 comme égal à 100 kA. Selon le MCCB sélectionné, la série LSLV-S300 peut être utilisée sur des circuits pouvant fournir un courant RMS symétrique de 100 kA maximum en ampères à la tension nominale maximale du variateur. Le tableau suivant indique le MCCB recommandé selon le courant RMS symétrique en ampères.

Working Voltage	UTE100 (E/N)	UTS150 (N/H/L)	UTS250 (N/H/L)	UTS400 (N/H/L)
240V(50/60Hz)	50/65kA	65/100/150kA	65/100/150kA	65/100/150kA
480V(50/60Hz)	25/35kA	35/65/100kA	35/65/100kA	35/65/100kA

Working Voltage	UTS600 (N/H/L)	UTS800 (N/H/L)	UTS1200 (N/H/P/L)
240V(50/60Hz)	65/100/150kA	65/100/150kA	50/100/65/150kA
480V(50/60Hz)	35/65/100kA	35/65/100kA	35/65/50/100kA

Working Voltage	ABS33c	ABS53c	ABS63c	ABS103c	ABS203c	ABS403c
240V(50/60Hz)	30kA	35kA	35kA	85kA	85kA	75kA
480V(50/60Hz)	7.5kA	10kA	10kA	26kA	26kA	35kA

Quick Reference Table

The table below is a summary of situations that users encounter frequently while using the product. Refer to the following to search for information more easily and quickly:

Situation	Ref.
What are the recommended wiring lengths?	p.36
What are the factory default settings for multi-function terminals DI1 to DI8?	p.40
I want to install a frequency meter on the analog terminal.	p.43
I want to change the inverter's operation frequency using a potentiometer.	5.1.1.3
I want to operate the inverter using a multi-step speed configuration.	5.1.2.4
I want to configure the inverter to start operating as soon as the power source is applied.	5.2.3.2
I want to apply PID control to my system.	5.2.3.2
The motor is too noisy.	7.15
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The inverter is too hot.	9.2.3
I want to check the changed parameters only.	12.1.7
Can I check the current of the motor in Smart Operator?	12.2.1
I found something unusual in the product or motor.	p.138
The cooling fan does not work.	p.147
I want to know how to store the inverter when it is not in use.	p.153

* Refer to the corresponding chapter of the comprehensive user's manual for gray shaded areas.

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1 Preparing the Installation

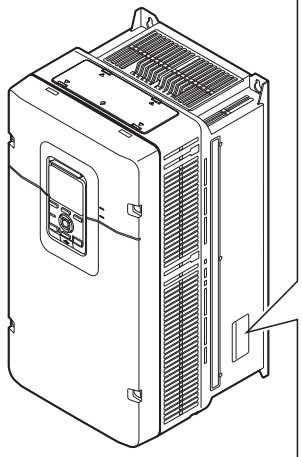
This chapter provides details on product identification, part names, correct installation, and cable specifications. To install the inverter correctly and safely, carefully read and follow the instructions.

1.1 Product Identification

The S300 inverter is manufactured in a range of product groups based on motor capacity and power source specifications. Product name and specifications are detailed on the rating plate. Check the product specification before installing the product and make sure that it is suitable for the intended use. For more detailed product specifications, refer to **16.2 Product Specification Details**.

Note

Open the packaging and check the product name and check the product for defects. If the product is found to be faulty, contact your supplier.



Model

LSLV0220S300-2COFD

INPUT	200-240	3Phase	50/60Hz
	HD:146.5A	ND:163A	
OUTPUT	0-Input V	3Phase	0.01 - 590Hz
	HD:152/124A	ND:169/156A	
	116 kVA(D)	IP20	

Input Power Specifications

Output Power Specifications

QR Code

Ser. No 550D130005F
Inspected by J.D. PARK

LS ELECTRIC MADE IN KOREA

LSLV□□□□ S300 - □□□□□

Maximum Applicable Motor Capacity (based on HD)

0004 - 0.4 kW
0008 - 0.75 kW
0015 - 1.5 kW
0022 - 2.2 kW
0040 - 4 kW
0055 - 5.5 kW
0075 - 7.5 kW
0110 - 11 kW
0150 - 15 kW
0185 - 18.5 kW
0220 - 22 kW
0300 - 30 kW
0370 - 37 kW
0450 - 45 kW
0550 - 55 kW
0750 - 75 kW
0900 - 90 kW
1100 - 110 kW
1320 - 132 kW
1600 - 160 kW
1850 - 185 kW
2200 - 220 kW

Series Name

S300 Series

Input Voltage

2 - 3 Phase 200 V - 240 V
4 - 3 Phase 380 V - 480 V

Operator

C - LCD Operator
N - No LCD Operator

UL Type

0 - UL Open Type
E - UL Type 1

EMC filter

F - Built-in EMC
N - No Built-in EMC

Reactor

D - Built-in DC Reactor

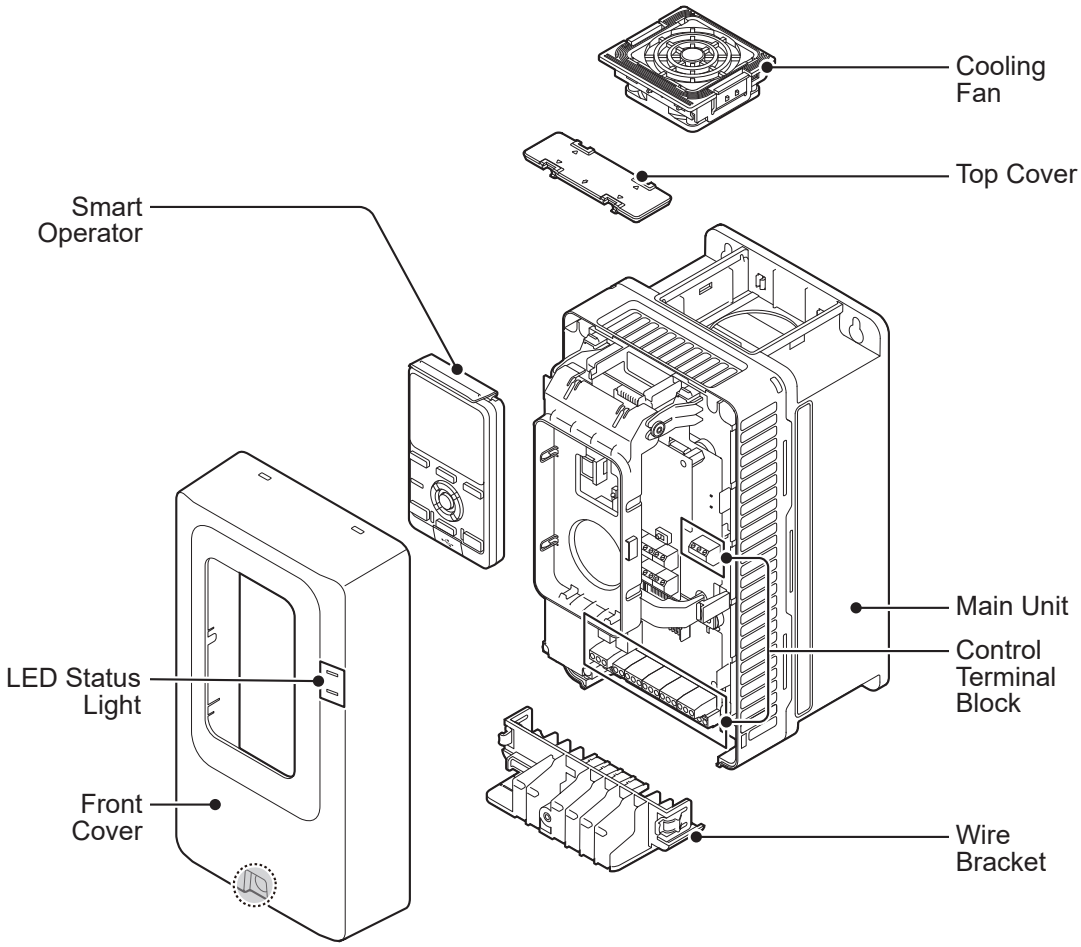
[Image 1. Product Rating Plate]

1.2 Check the Part Names

See the assembly diagram below for the part names. Refer to the following images, as detailed images may vary according to product groups. Refer to **4.1 Description of the Inverter Status Indicator LED** for instructions on the LED status light in the front of the inverter.

200 V Class 0.4-4 kW / 400 V Class 0.4-4 kW

LSLV0004S300-4 / LSLV0008S300-4 / LSLV0015S300-4 / LSLV0022S300-4 / LSLV0040S300-4
LSLV0004S300-2 / LSLV0008S300-2 / LSLV0015S300-2 / LSLV0022S300-2 / LSLV0040S300-2

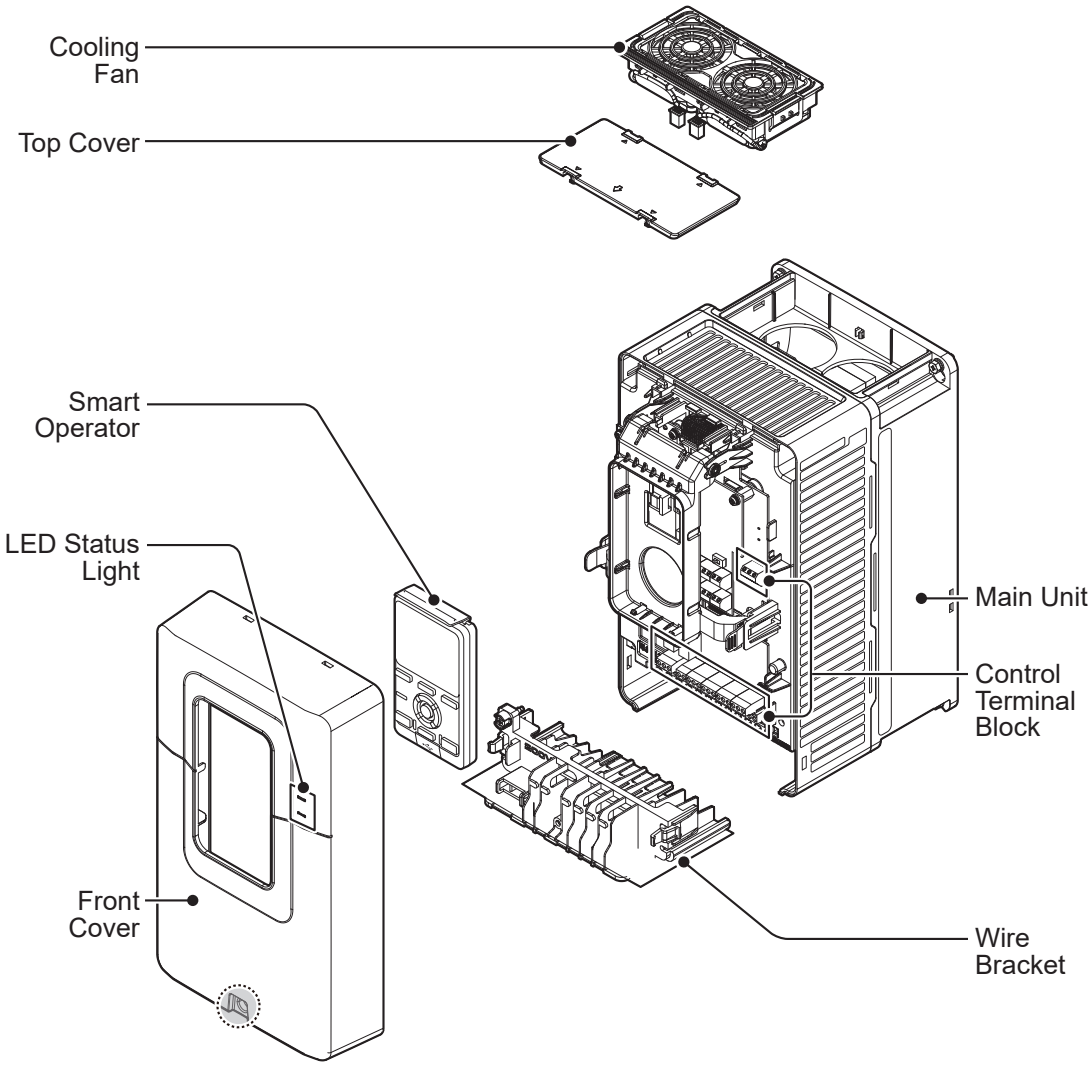


: Front Cover Bolted Joint

[Image 2. 200 V class 0.4-4 kW / 400 V class 0.4-4 kW Assembly Diagram]

200 V Class 5.5-7.5 kW / 400 V Class 5.5-7.5 kW

LSLV0055S300-2 / LSLV0075S300-2
LSLV0055S300-4 / LSLV0075S300-4

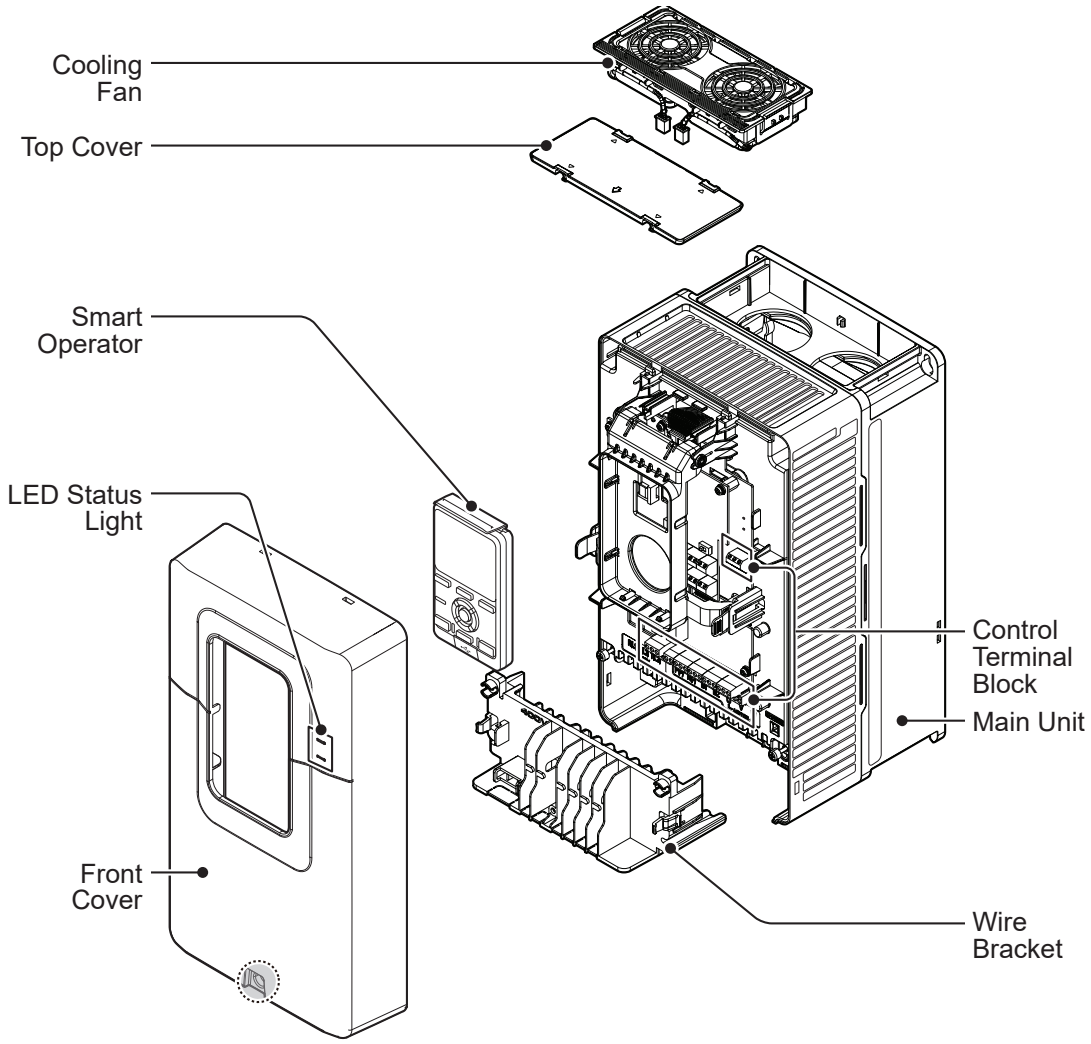


: Front Cover Bolted Joint

[Image 3. 200 V class 5.5-7.5 kW / 400 V class 5.5-7.5 kW Assembly Diagram]

200 V Class 11 kW / 400 V Class 11-15 kW

LSLV0110S300-2
LSLV0110S300-4 / LSLV0150S300-4

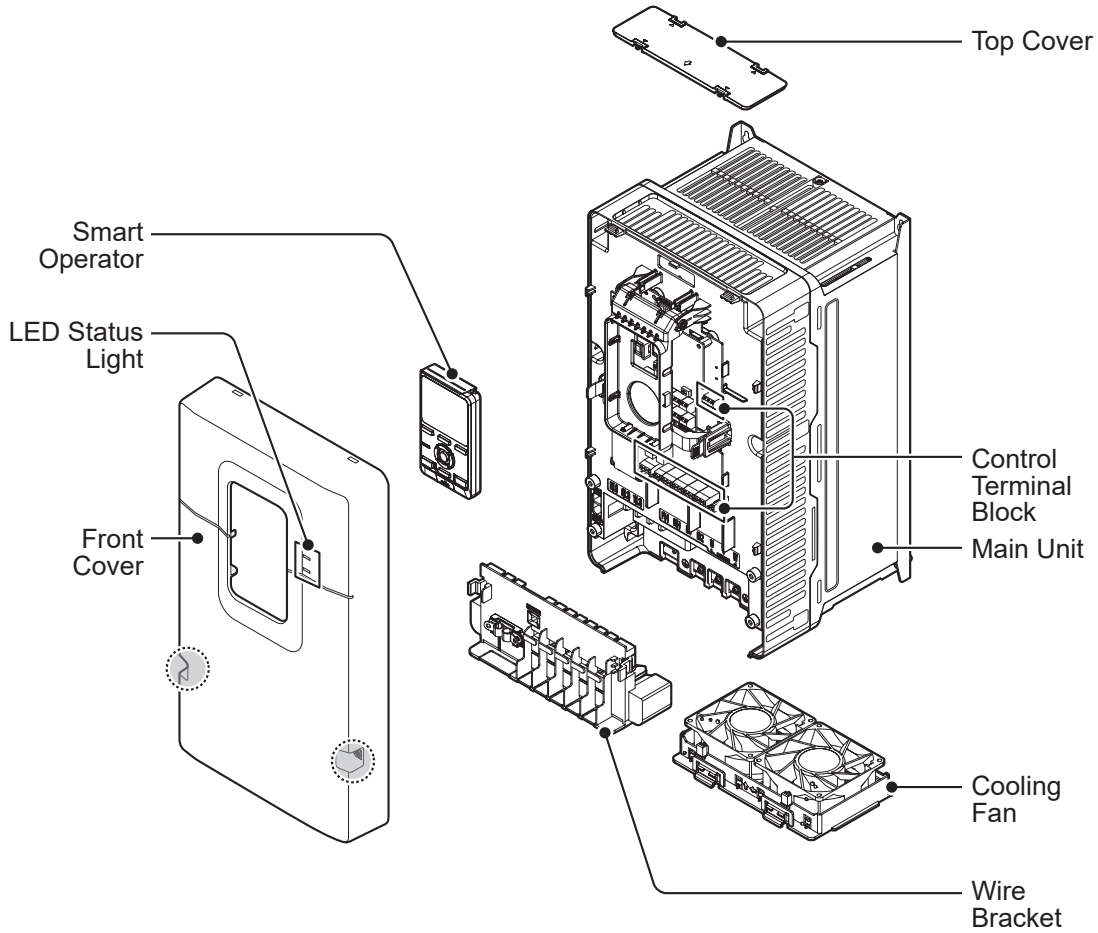


: Front Cover Bolted Joint

[Image 4. 200 V Class 11 kW / 400 V Class 11-15 kW Assembly Diagram]

200 V Class 15-18.5 kW / 400 V Class 18.5-22 kW

LSLV0150S300-2 / LSLV0185S300-2
LSLV0185S300-4 / LSLV0220S300-4

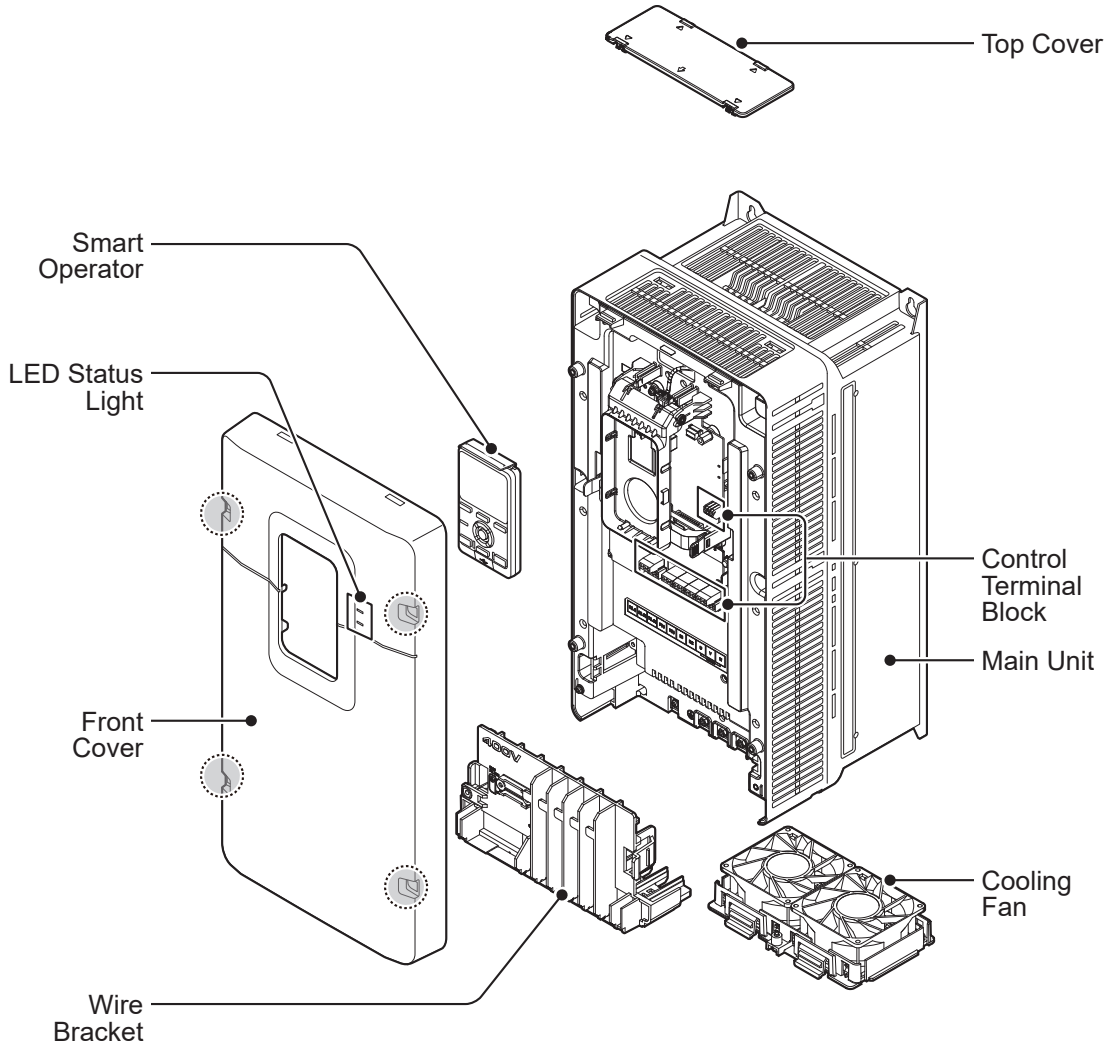


: Front Cover Bolted Joint

[Image 5. 200 V Class 15-18.5 kW / 400 V Class 18.5-22 kW Assembly Diagram]

200 V Class 22 kW / 400 V Class 30~37 kW

LSLV0220S300-2
LSLV0300S300-4 / LSLV0370S300-4

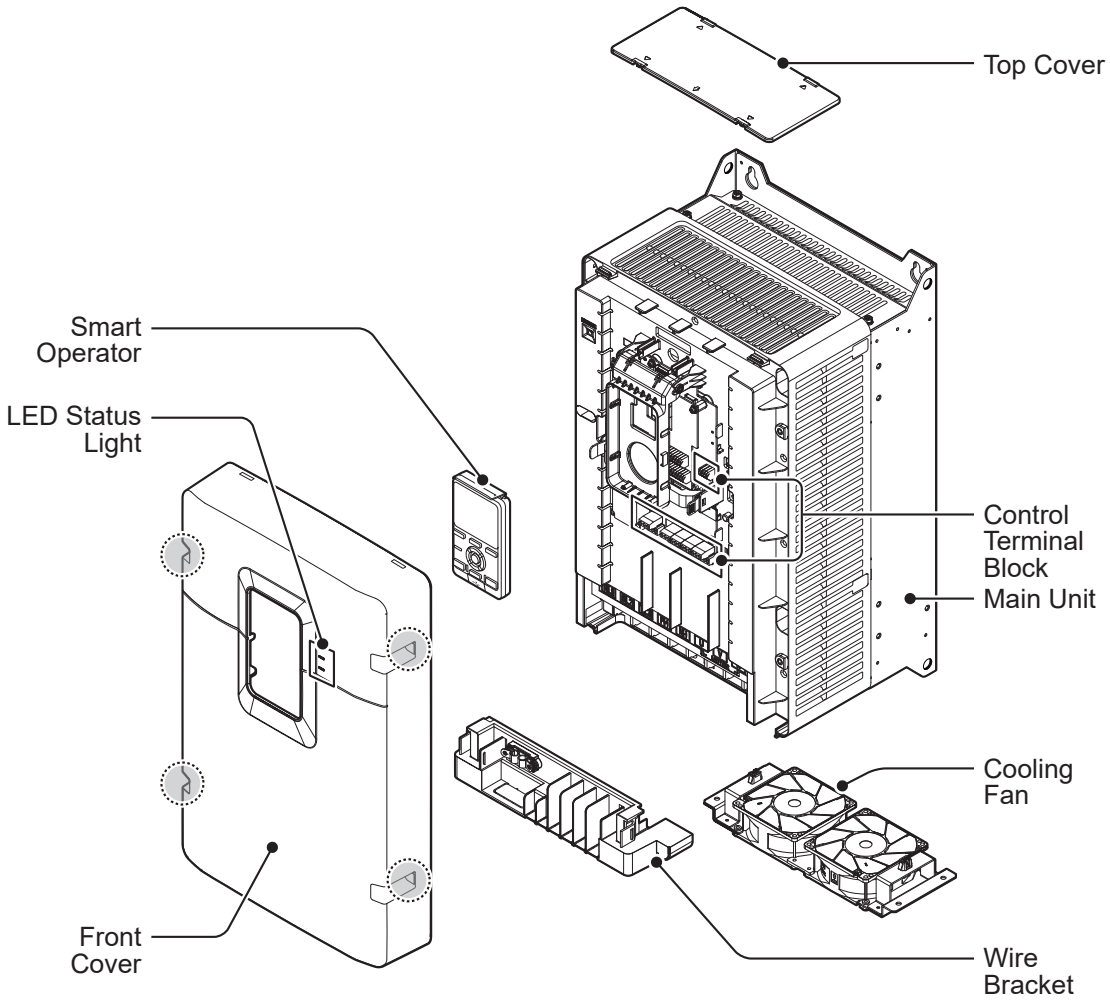


: Front Cover Bolted Joint

[Image 6. 200 V Class 22 kW / 400 V Class 30-37 kW Assembly Diagram]

200 V Class 30 kW / 400 V Class 45 kW

LSLV0300S300-2
LSLV0450S300-4

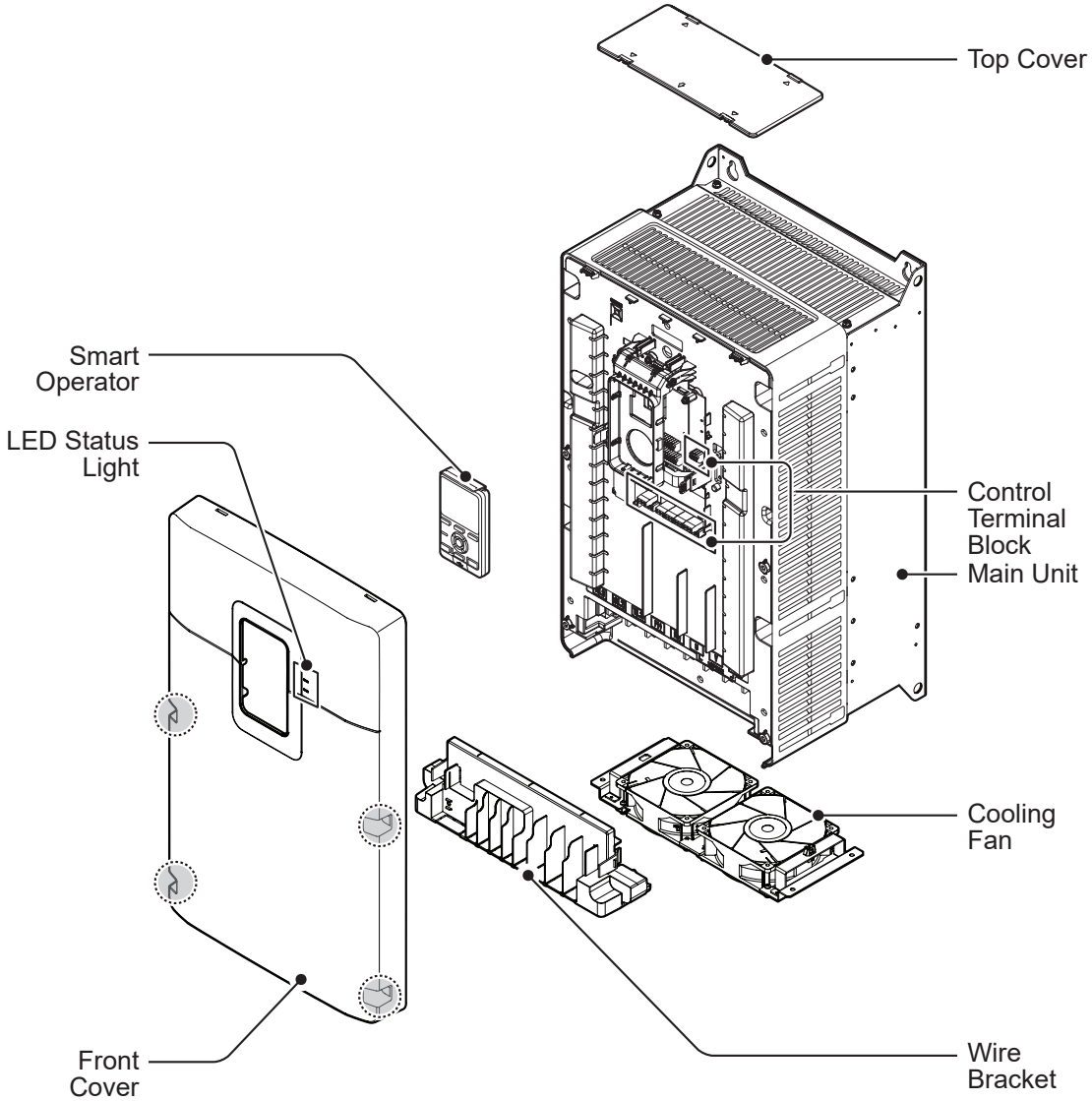


: Front Cover Bolted Joint

[Image 7. 200 V Class 30 kW / 400 V Class 45 kW Assembly Diagram]

200 V Class 37-45 kW / 400 V Class 55-75 kW

LSLV0370S300-2 / LSLV0450S300-2
LSLV0550S300-4 / LSLV0750S300-4

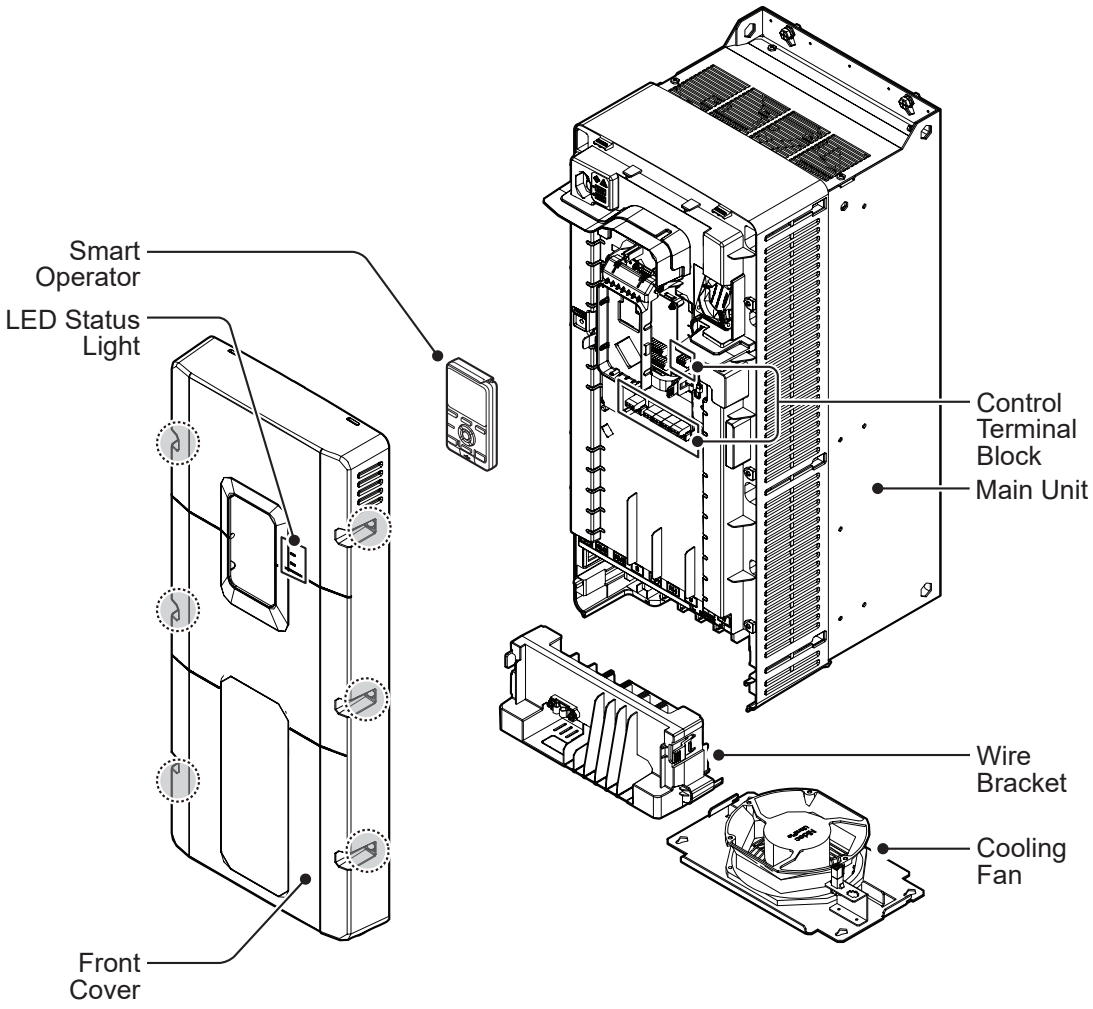


: Front Cover Bolted Joint

[Image 8. 200 V Class 37-45 kW / 400 V Class 55-75 kW Assembly Diagram]

400 V Class 90-110 kW

LSLV0900S300-4 / LSLV1100S300-4

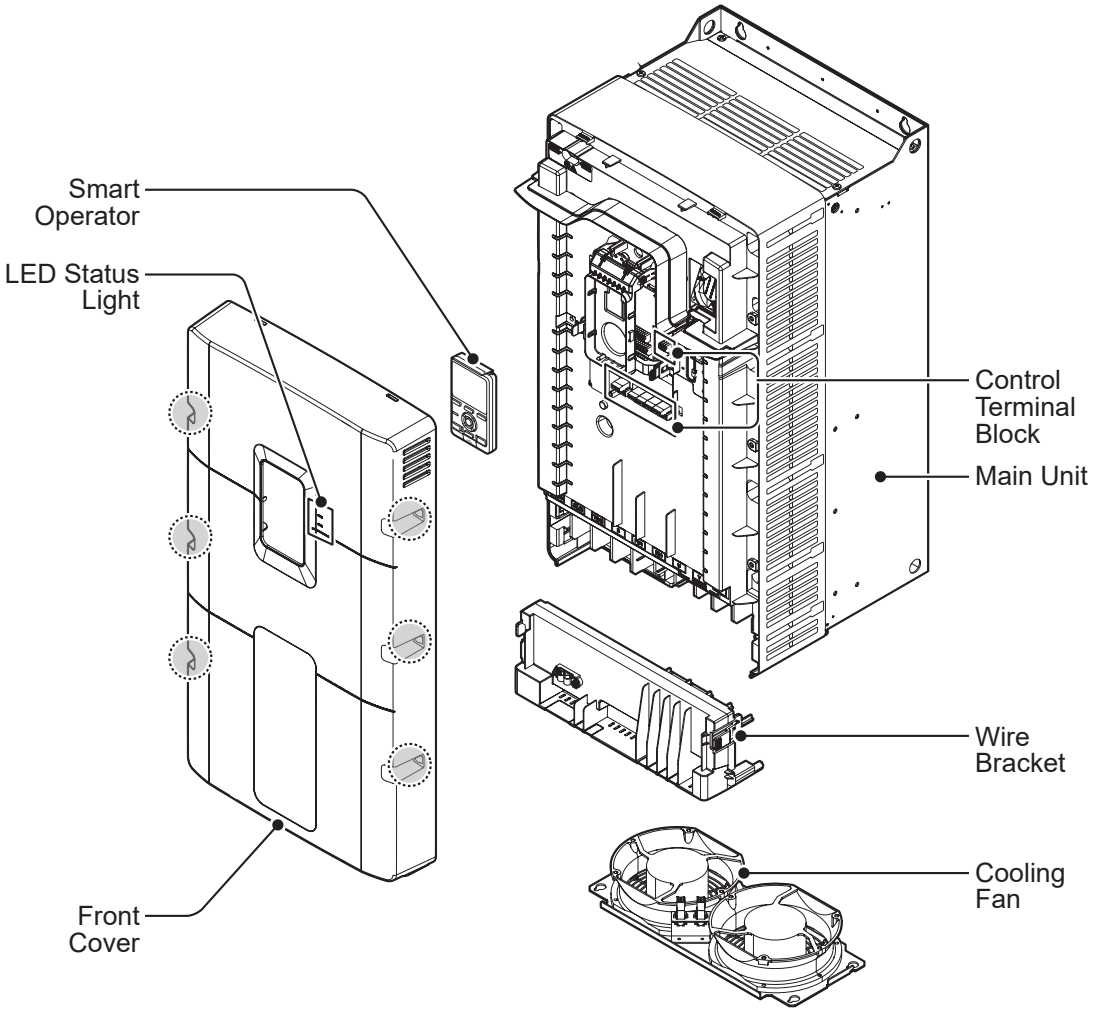


: Front Cover Bolted Joint

[Image 9. 400 V Class 90-110 kW Assembly diagram]

200 V Class 55-75 kW / 400 V Class 132-160 kW

LSLV0550S300-2 / LSLV0750S300-2
LSLV1320S300-4 / LSLV1600S300-4

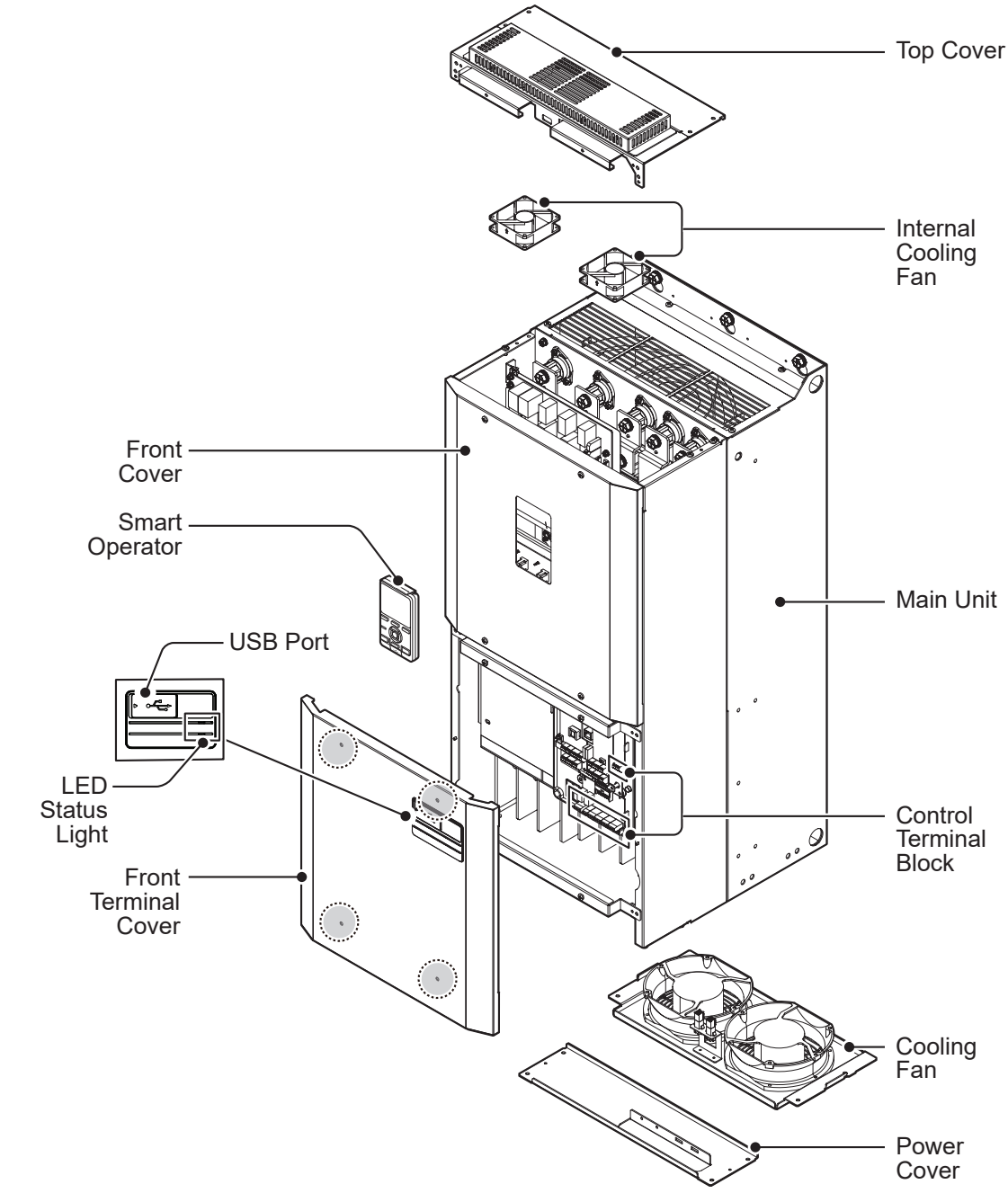


: Front Cover Bolted Joint

[Image 10. 200 V Class 55-75 kW / 400 V Class 132-160 kW Assembly Diagram]

400 V Class 185-220 kW

LSLV1850S300-4 / LSLV2200S300-4



[Image 11. 400 V Class 185-220 kW Assembly diagram]

1.3 Installation Considerations

Inverters are composed of various precise electronic parts, and therefore the installation environment can significantly impact the lifespan and reliability of the product. The table below details the ideal operation and installation conditions for the inverter.

Table 1. Inverter Installation Environment

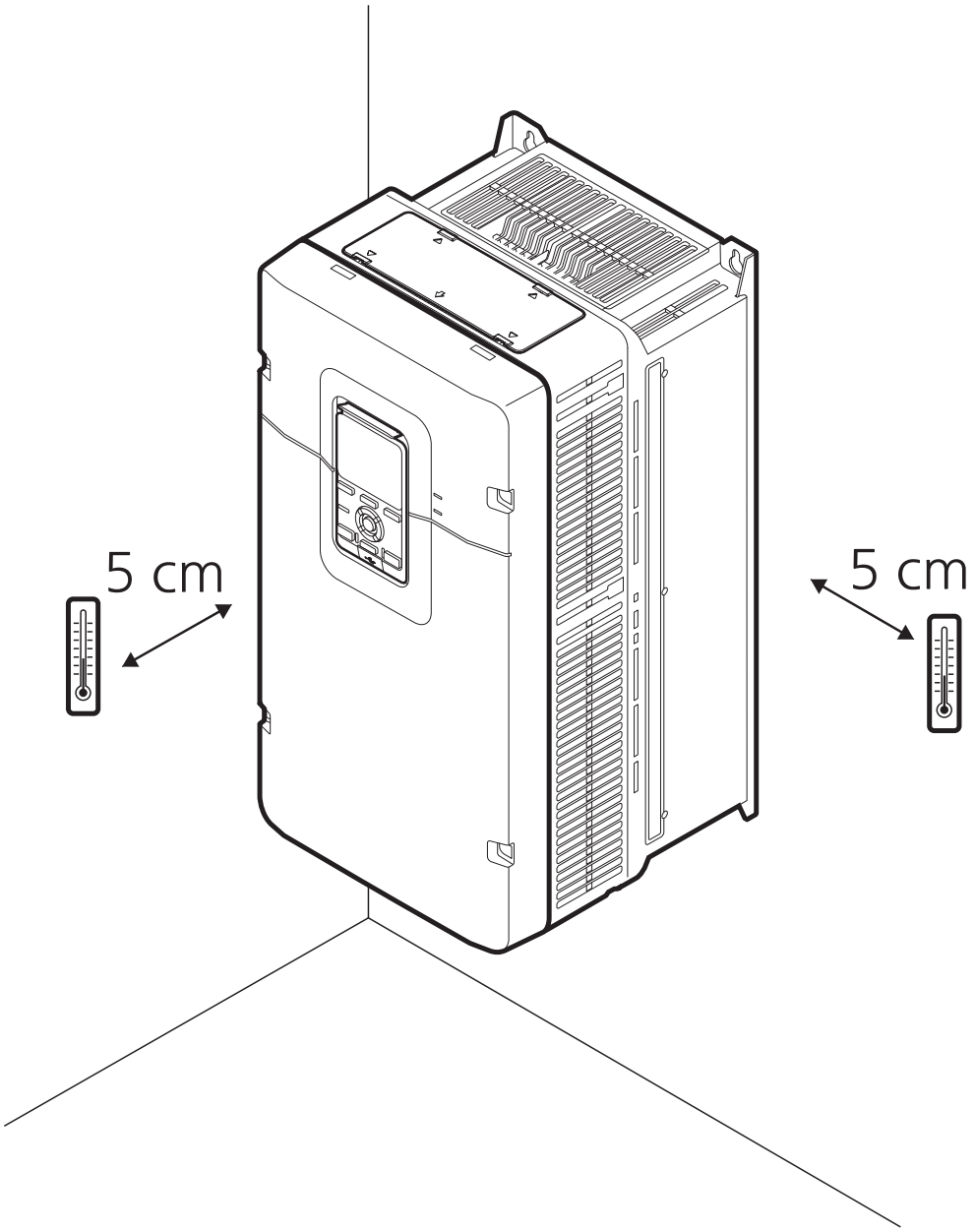
Items	Description
Ambient temperature*	Where there is no ice or frost, • -10~50℃ on heavy duty • -10~40℃ on normal duty The conduit option requires 1.5%/℃ current derating when it is over 30℃ on normal duty and when it is over 40℃ on heavy duty.
Ambient humidity	Less than 95% relative humidity (no condensation)
Storage temperature	-20~65℃
Environmental factors	Prevent contact with corrosive gases, inflammable gases, oil stains, dust, and other pollutants (Pollution Degree 2 Environment).
Altitude	Maximum of 1,000 m above sea level (1000-2000 m, 1%/100 m derating)
Vibration	Less than 9.8 m/sec² (1.0 G)
Air Pressure	70~106kPa
Installation Method	Wall-mount type or flange options
Turning on the Inverter	Overvoltage category III
Length of Output Wiring**	Within 100 m

* The ambient temperature is the temperature measured at a point 5 cm from the surface of the inverter.

** The maximum allowed carrier frequency per wiring length is as follows (contact the customer center if the wiring exceeds 100 m):

Table 2. Maximum Allowed Carrier Frequency per Wiring Length

Wiring Length Between Inverter and Motor	50 m or shorter	100 m or shorter	Longer than 100m
Allowed Carrier Frequency	15 kHz or lower	5 kHz or lower	3 kHz or lower



[Image 12. Measurement Criteria for Ambient Temperature for Installation]

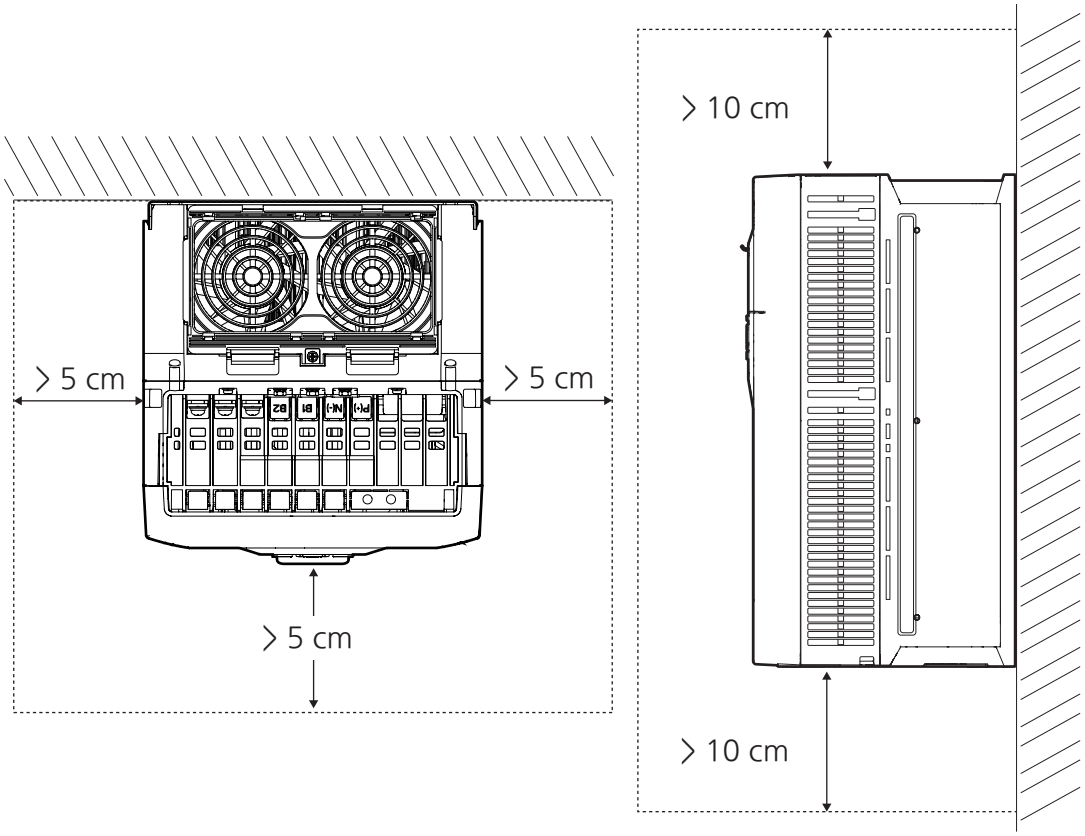
⚠ Caution

Do not allow the ambient temperature to exceed the allowable range while operating the inverter.

1.4 Selecting the Installation Location

When selecting an installation location, consider the following points:

- The location must be free from vibration, and the inverter must be installed on a wall that can support the inverter's weight.
- The inverter can become very hot during operation. Install the inverter on a surface that is fire-resistant or flame-retardant and with sufficient clearance around the inverter to allow air to circulate.



[Image 13. Selection Criteria for Installation Location]

- Make sure that sufficient air circulation is provided around the product. When installing the product inside the panel, carefully consider the position of the product's cooling fan and the ventilation louver. The product must be placed so that the cooling fan can discharge heat satisfactorily during the operation.

1.5 Wire Selection

Make sure to use wires that are appropriate for the use and specifications of each I/O and control circuit for safe and reliable operation of the product. Refer to the following information to assist you with cable selection:

⚠ Caution

- Select the thickest possible cable for I/O wiring to ensure that the percentage of voltage drop does not exceed 2%.
- Use copper cables rated for 600 V and 75 ℃ or above for I/O wiring.
- Use copper cables rated for 300 V and 75 ℃ for control terminal wiring.

1.5.1 Ground Wire Specifications

Table 3. Ground Wire Specifications per Model

Model LSLV□□□□	Ground			Model LSLV□□□□	Ground		
	mm²	AWG	Bolt		mm²	AWG	Bolt
0004S300-2	1.5	18	M4	0004S300-4	1.5	20	M4
0008S300-2	1.5	14	M4	0008S300-4	1.5	18	M4
0015S300-2	1.5	12	M4	0015S300-4	1.5	14	M4
0022S300-2	1.5	10	M4	0022S300-4	1.5	14	M4
0040S300-2	2.5	10	M4	0040S300-4	1.5	12	M4
0055S300-2	4	8	M4	0055S300-4	1.5	10	M4
0075S300-2	10	6	M4	0075S300-4	4	8	M4
0110S300-2	16	4	M4	0110S300-4	4	8	M4
0150S300-2	16	4	M4	0150S300-4	6	6	M4
0185S300-2	16	4	M4	0185S300-4	10	6	M4
0220S300-2	25	3	M5	0220S300-4	16	4	M4
0300S300-2	35	1	M8	0300S300-4	16	4	M5
0370S300-2	50	1/0	M8	0370S300-4	16	4	M5
0450S300-2	70	3/0	M8	0450S300-4	25	3	M8
0550S300-2	95	3/0	M12	0550S300-4	35	1	M8
0750S300-2	120	250	M12	0750S300-4	50	1/0	M8
				0900S300-4	70	2/0	M8
				1100S300-4	95	3/0	M8

Model LSLV□□□□	Ground			Model LSLV□□□□	Ground		
	mm²	AWG	Bolt		mm²	AWG	Bolt
				1320S300-4	120	4/0	M12
				1600S300-4	150	300	M12
				1850S300-4	185	350	M12
				2200S300-4	240	500	M12

1.5.2 Power I/O Cable Specifications

Table 4. I/O Wiring Specifications per Model

Model LSLV□□□□	Power Terminal Wiring									
	mm² (AWG)			AWG			Lug Specifications [1]		Bolt	
	R/S/T	P/N	U/V/W	R/S/T	P/N	U/V/W	R/S/T/U/V/W	P/N	R/S/T	P/N/U/V/W
0004S300-2	1.5	1.5	1.5	20.0	18.0	18.0	0102-xx04	0102-xx04	M3.5	M3.5
0008S300-2	1.5	1.5	1.5	16.0	14.0	14.0	0102-xx04	0102-xx04	M3.5	M3.5
0015S300-2	1.5	1.5	1.5	14.0	12.0	12.0	0102-xx04	0102-xx04	M3.5	M3.5
0022S300-2	1.5	2.5	2.5	12.0	10.0	10.0	0102-xx04	0102-xx04	M3.5	M3.5
0040S300-2	2.5	4.0	4.0	10.0	10.0	10.0	0102-xx04	0102-xx04	M3.5	M3.5
0055S300-2	4.0	6.0	6.0	8.0	8.0	8.0	0102-xx04	0102-xx04	M4	M4
0075S300-2	10.0	10.0	10.0	8.0	6.0	6.0	0103-xx04	0103-xx04	M4	M4
0110S300-2	16.0	16.0	16.0	6.0	4.0	4.0	0104-xx05	0104-xx05	M5	M5
0150S300-2	25.0	25.0	25.0	4.0	3.0	3.0	0105-xx05	0105-xx05	M5	M5
0185S300-2	25.0	35.0	35.0	3.0	2.0	2.0	0105-xx05	0105-xx05	M5	M5
0220S300-2	50.0	70.0	50.0	1.0	2/0	1/0	0108-xx06	0108-xx06	M6	M6
0300S300-2	70.0	95.0	70.0	2/0	3/0	2/0	0109-xx08	0109-xx08	M8	M8
0370S300-2	95.0	120.0	95.0	3/0	250.0	4/0	0112-xx08	0112-xx08	M8	M8
0450S300-2	120.0	185.0	150.0	250.0	350.0	300.0	0114-xx08	0114-xx08	M8	M8
0550S300-2	95x2	120x2	95x2	3/0x2	250x2	4/0x2	0112-xx08	0112-xx08	M12	M12

[1] American Wire Gauge (AWG) applicable lug (based on Dong-a Bestech)
PPNO□□□□-□□□□

Model LSLV□□□□	Power Terminal Wiring									
	mm² (AWG)			AWG			Lug Specifications [1]		Bolt	
	R/S/T	P/N	U/V/W	R/S/T	P/N	U/V/W	R/S/T/U/V/W	P/N	R/S/T	P/N/U/V/W
0750S300-2	120x2	180x2	120x2	250x2	350x2	250x2	0114-xx08	0114-xx08	M12	M12
0004S300-4	1.5	1.5	1.5	22.0	22.0	20.0	0102-xx04	0102-xx04	M3.5	M3.5
0008S300-4	1.5	1.5	1.5	20.0	18.0	18.0	0102-xx04	0102-xx04	M3.5	M3.5
0015S300-4	1.5	1.5	1.5	18.0	14.0	14.0	0102-xx04	0102-xx04	M3.5	M3.5
0022S300-4	1.5	1.5	1.5	16.0	14.0	14.0	0102-xx04	0102-xx04	M3.5	M3.5
0040S300-4	1.5	1.5	1.5	14.0	12.0	12.0	0102-xx04	0102-xx04	M3.5	M3.5
0055S300-4	2.5	2.5	2.5	12.0	10.0	10.0	0102-xx04	0102-xx04	M4	M4
0075S300-4	4.0	4.0	4.0	10.0	8.0	8.0	0102-xx04	0102-xx04	M4	M4
0110S300-4	6.0	6.0	6.0	8.0	8.0	8.0	0102-xx04	0102-xx04	M4	M4
0150S300-4	10.0	10.0	10.0	8.0	6.0	8.0	0103-xx04	0103-xx04	M4	M4
0185S300-4	10.0	16.0	10.0	6.0	6.0	6.0	0104-xx05	0104-xx05	M5	M5
0220S300-4	16.0	25.0	16.0	4.0	4.0	4.0	0104-xx05	0104-xx05	M5	M5
0300S300-4	25.0	35.0	25.0	3.0	2.0	3.0	0105-xx05	0107-xx05	M5	M6
0370S300-4	35.0	50.0	35.0	2.0	1.0	2.0	0105-xx05	0107-xx05	M5	M6
0450S300-4	50.0	70.0	50.0	1.0	2/0	1/0	0108-xx08	0108-xx08	M8	M8
0550S300-4	70.0	95.0	70.0	2/0	4/0	3/0	0111-xx08	0111-xx08	M8	M8
0750S300-4	95.0	120.0	95.0	4/0	250.0	4/0	0112-xx08	0112-xx08	M8	M8
0900S300-4	70x2	70x2	70x2	2/0x2	3/0x2	2/0x2	0109-xx08	0109-xx08	M8	M8
1100S300-4	95x2	95x2	95x2	3/0x2	4/0x2	3/0x2	0110-xx08	0110-xx08	M8	M8
1320S300-4	120x2	150x2	120x2	4/0x2	300x2	250x2	0113-xx12	0113-xx12	M12	M12
1600S300-4	150x2	185x2	150x2	300x2	500x2	300x2	0114-xx12	0114-xx12	M12	M12
1850S300-4	185x2	240x2	185x2	350x2	500x2	400x2	0117-xx12	0117-xx12	M12	M12
2200S300-4	185x2	240x2	185x2	350x2	500x2	400x2	0117-xx12	0117-xx12	M12	M12

1.5.3 Signal (Control) Cable Specifications

Table 5. Control Wiring Specifications by Terminal

Terminals	Wire gauge [2]	
	mm²	AWG
VR+, VR-, AI1, AI2, AI3, TI, TO, AO1, AO2, EPI, 5G	0.33~1.25	16~22
DI1~DI8, CM, DP, DG	0.33~2.0	14~22
DA1, DB1, DC1, DA2, DC2, DQ3, EG	0.33~2.0	14~22
SP, SA, SB	0.33~2.0	14~22
S+, S-, 5G	0.75	18

[2] Use shielded twisted pair cables (recommended).

2 Installing the Product

This chapter describes the physical and electrical installation methods, including mounting and wiring the product. Refer to the flowchart and basic configuration diagram provided below to understand the procedures and installation methods to be followed to install the product correctly.

Installation Flowchart

The flowchart lists the sequence to be followed during installation. Install the product following the flowchart and check the operation status. For more information on each step, refer to the pages below.

Product Identification (refer to **page 62**)

↓

Check the Installation Location (refer to **page 13**)

↓

Mounting the Inverter (refer to **page 22**)

↓

Wiring the Ground Connection (refer to **page 28**)

↓

Power and Signal Wiring (refer to **page 29**)

↓

Post-Installation Checks (refer to **page 50**)

↓

Turning on the Inverter

↓

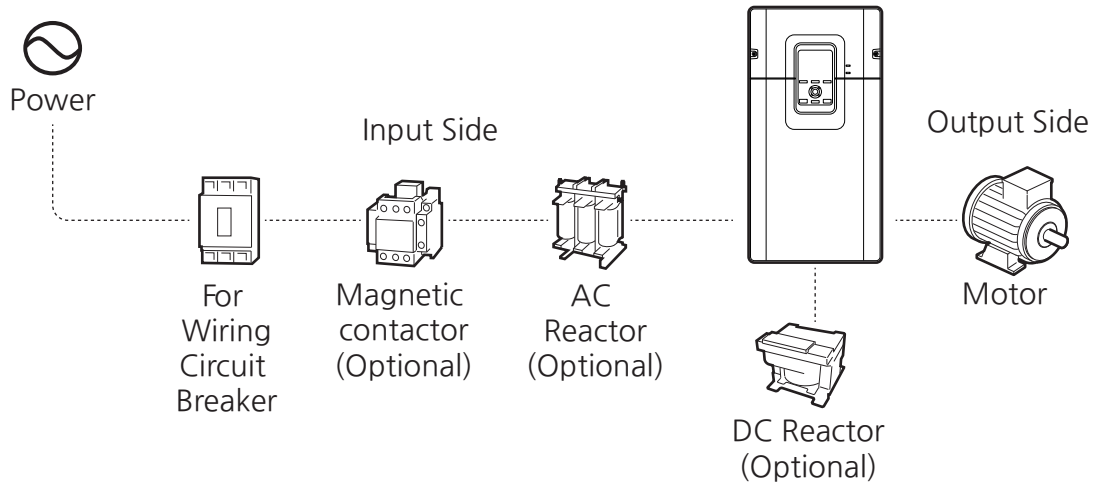
Parameter Configuration (refer to **page 53**)

↓

Testing (refer to **page 60**)

Basic configuration diagram

The following illustration shows the basic system configuration. Use the diagram as a reference when configuring the system by connecting the product with peripheral devices. Ensure that the product has a suitable rating for the configuration and that all the required peripherals and optional devices (brake units, reactors, noise filters, etc.) are available. For more details on the product's rated input and output specifications, refer to **16.1 Input and Output Specifications**. For more details on available peripheral devices, refer to **16.4 Peripheral Devices**.



[Image 1. System configuration]

ⓘ Caution

- Note that the illustration in this user manual may represent the product with the cover open or the circuit breaker removed for explanation. When operating the inverter, make sure to follow the instructions in the user manual after fully installing the necessary parts, such as the cover and circuit breaker.
- Do not start or stop the inverter with a magnetic contactor. This may cause damage to the inverter.
- Install additional safety devices, such as emergency brakes. In the event that control is difficult as a result of product failure, dangerous situations may occur.
- High levels of current draw while powering on can affect the system. Ensure that correctly rated circuit breakers are installed to operate safely when powering on.
- It is necessary to use a reactor if improvement to the power factor is required, if the wiring length is less than 10 meters, or if the input voltage capacity is large (600 kVA or more, and the power supply capacity is 10 times or more than the inverter capacity). Ensure that the reactor's capacity and rating are taken into consideration when selecting it (refer to **16.4.2 AC Input Fuse and Reactor Specifications**).

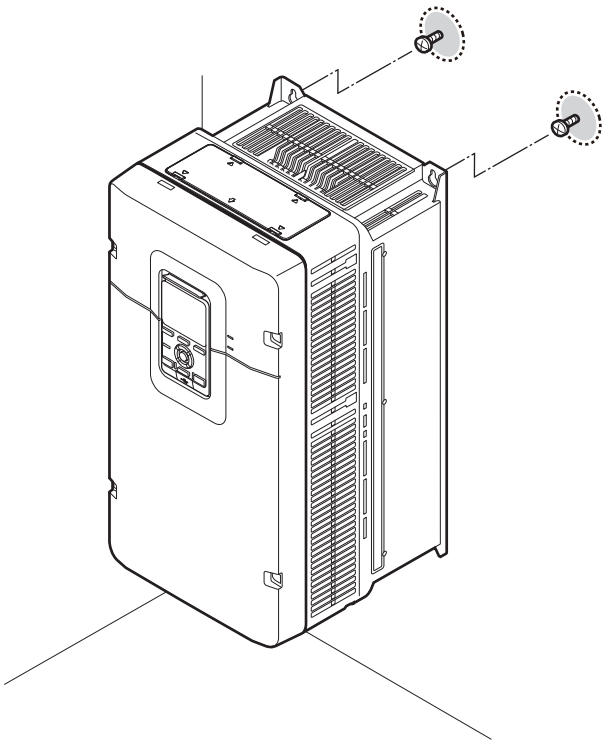
2.1 Mounting on the Wall or within the Panel

Mount the inverter on a wall or inside a panel following the procedures provided below. Before installation, ensure that there is sufficient space to meet the clearance specifications and that there are no obstacles impeding the cooling fan's air flow.

Select a wall or panel capable of supporting the installation, and check the inverter's mounting bracket dimensions (refer to **16.3.1 External Dimensions**).

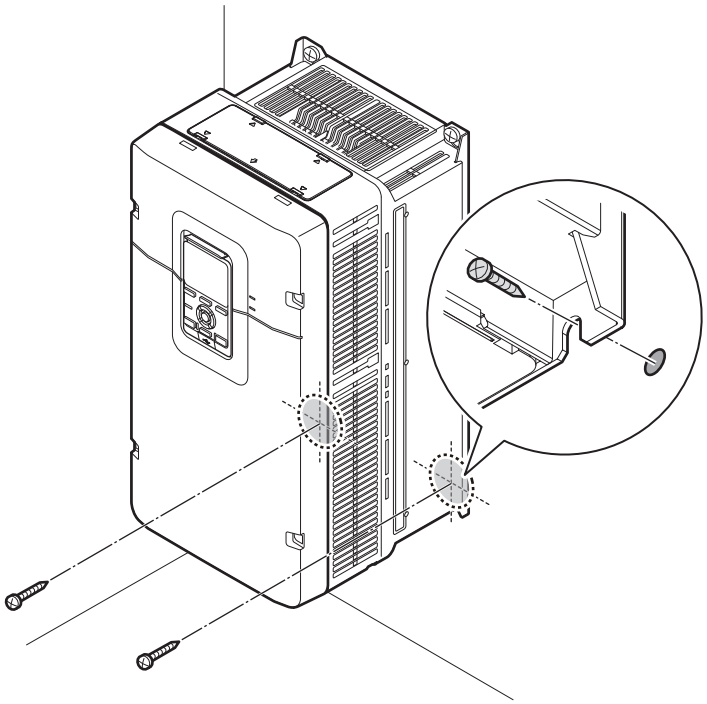
1 Draw a horizontal line using a level on the wall or inside the panel where you want to install the inverter, and accurately mark the locations of the mounting bolts on the horizontal line.

2 Use a drill to pierce two mounting holes at the installation location, and install the mounting bolts. Do not fully tighten the bolts at this time. Fully tighten the mounting bolts after the inverter has been mounted.



[Image 2. Fixing mounting bolts (top)]

3 Mount the inverter on a wall or inside a panel using two mounting bolts. Tighten the upper mounting bolts, then install two lower mounting bolts and tighten them to mount the inverter. Ensure that the inverter is placed flat on the mounting surface and that the installation surface can securely support the weight of the inverter.



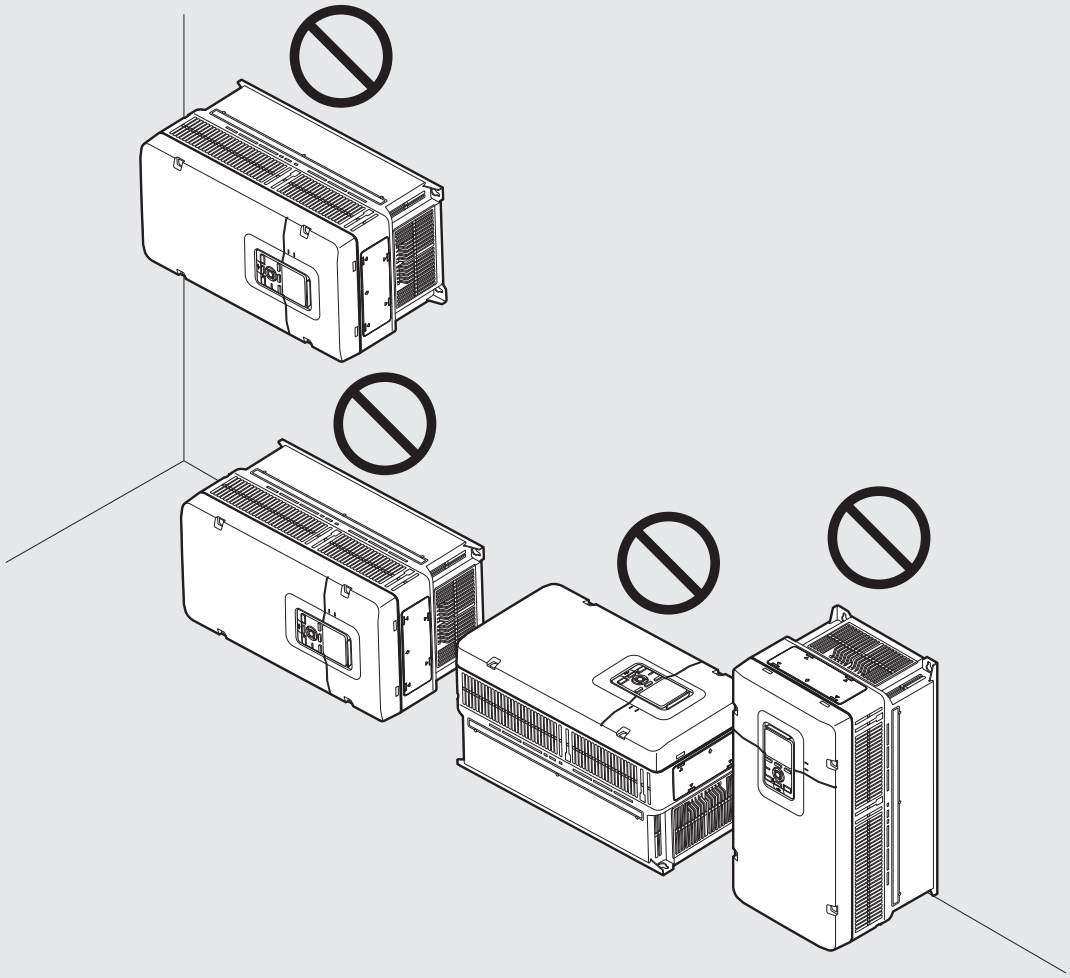
[Image 3. Fixing mounting bolts (bottom)]

Note

The quantity and dimensions of the mounting brackets vary based on the frame size. Refer to **16.3.1 External Dimensions** for detailed information about your model.

ⓘ Caution

- Always support the inverter by using the metal frames when moving it. Do not transport the inverter by lifting it with the inverter's covers or plastic surfaces. The inverter may tip over if the covers break, resulting in injury or damage to the product.
- Use a transport method that is suitable for the weight of the product. Some high-capacity inverters may be too heavy for one person to carry. Use an adequate number of people and transport tools to safely move the product.
- Do not install the inverter on the floor or mount it sideways against a wall. The inverter must be installed vertically, on a wall or inside a panel, with its rear flat on the mounting surface and at least 10 cm from the floor.



[Image 4. Example of incorrect mounting]

2.2 Wiring

Open the front cover, remove the wiring brackets and control terminal cover, and then install the ground connection as specified. Complete the cable connections by connecting an appropriately rated cable to the terminals on the power and control terminal blocks. Read the following information carefully before making wiring connections to the inverter: All warning instructions must be followed.

ⓘ Caution

- Install the inverter before carrying out wiring connections. Refer to **1.3 Installation Considerations** and **1.4 Selecting the Installation Location** for details.
- Ensure that no small metal debris, such as wire cut-offs or screws, remain inside the inverter. Metal debris and screws in the inverter may cause inverter failure.
- Tighten terminal screws to their specified torque. Loose terminal block screws may allow the cables to disconnect and cause a short circuit or inverter failure. Refer to **16.5 Terminal Screw Specifications** for torque specifications.
- Do not place heavy objects on top of electric cables. Heavy objects may damage the cable and result in an electric shock.
- Use cables with the largest cross-sectional area, appropriate for power terminal wiring, to ensure that any voltage drop does not exceed 2%.
- Use copper cables rated at 600 V, 75℃ for power terminal wiring.
- Use copper cables rated at 300 V, 75℃ for control terminal wiring.
- Be sure that the display screen of the Smart Operator as well as the charging indicator are turned off before changing the wiring due to a problem while operating. As soon as the power is turned off, be careful to avoid electric shock, as the capacitor in the inverter is charged with a high voltage.

2.2.1 Step 1 Front Cover Disassembly

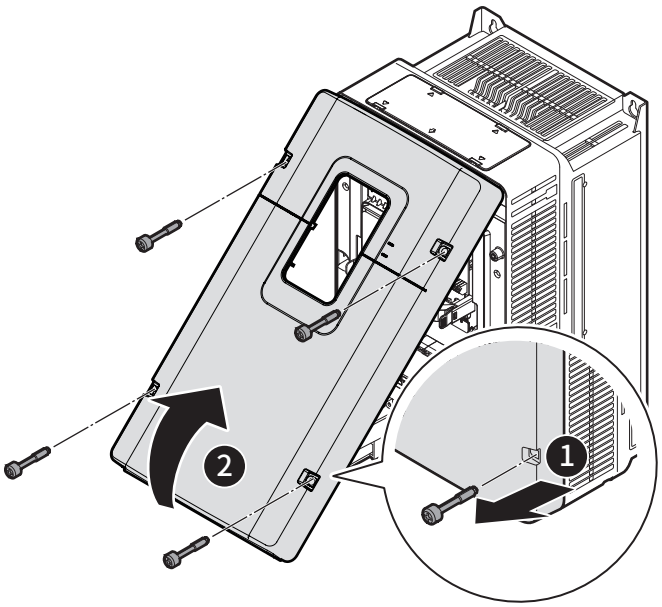
For power terminal and control terminal wiring, the front cover and the wiring bracket must be disassembled in order. Disassemble each front cover and wiring bracket in the following order.

Note

Depending on the product family, the number of bolts on the front cover and the location and shape of the wiring bracket may vary. Refer to **1.2 Check the Part Names** for details.

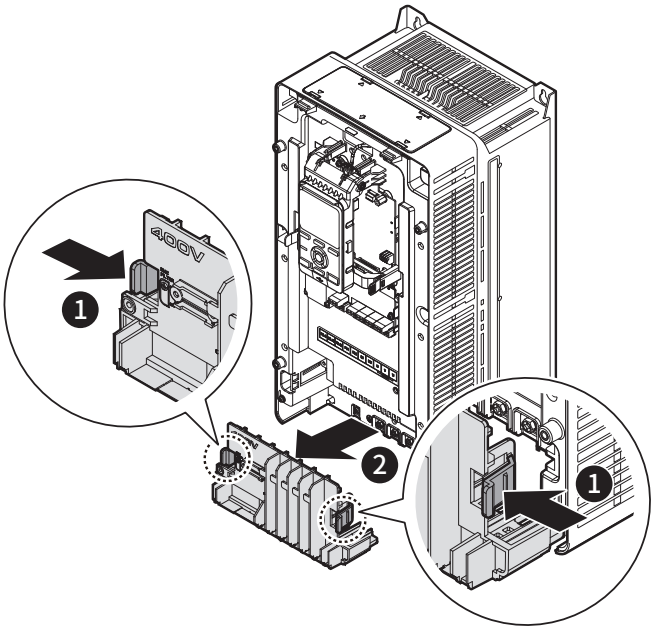
1 Unscrew the fixing bolts on the front cover and disassemble it.

- Disassemble the fixing bolts of the front terminal cover on 400 V products with a capacity of 185 - 220 kW.



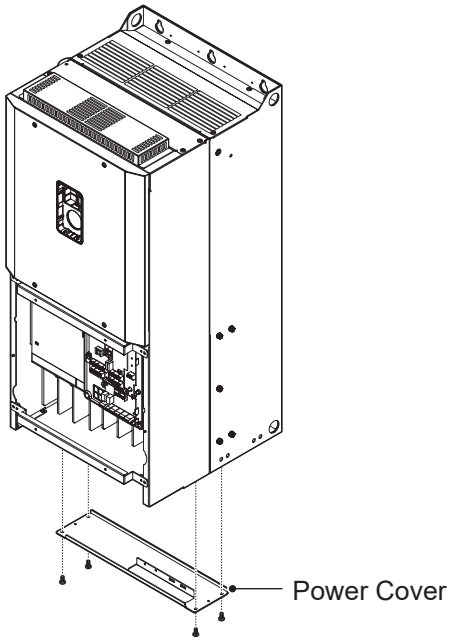
[Image 5. Front cover disassembly]

2 While holding both ends of the wiring bracket pressed inward, disassemble the wiring bracket.



[Image 6. Wiring bracket disassembly]

- Disassemble the bolts of the Power Cover on 400 V products with a capacity of 185 - 220 kW. The front terminal cover serves as a bracket on products in this capacity that do not have wiring brackets.



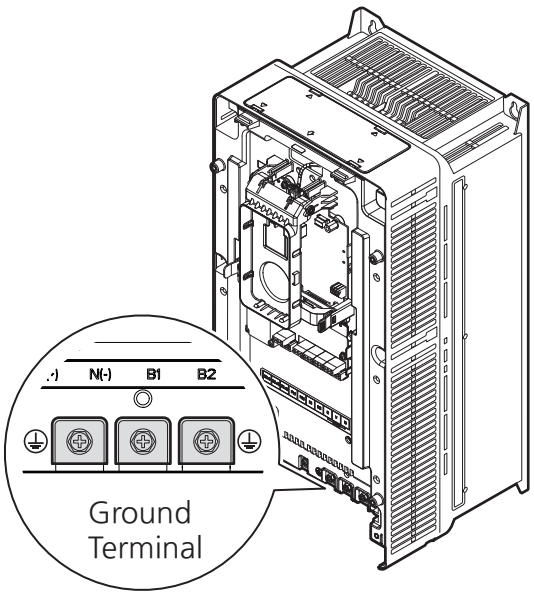
[Image 7. Power cover disassembly]

2.2.2 Step 2 Ground Connection

Disassemble the front cover(s) and the wiring bracket. Then, follow the instructions below to install the ground connection for the inverter.

1 Connect the prepared ground wire to the ground (⏚) terminal on the bottom of the inverter.

- Refer to **1.5 Wire Selection** to find the appropriate cable specification for your installation.



[Image 8. Ground terminal connection]

2 Connect the other ends of the ground cables to the supply earth (ground) terminal.

Note

- 200 V products require Class 3 grounding. Resistance to the ground must be less than 100 Ω.
- 400 V products require Special Class 3 grounding. Resistance to the ground must be less than 10 Ω.

⚠ Warning

Make sure to install a ground connection between the equipment and the motor for safe use. Otherwise, it may cause an electrical shock and result in personal injury or even death.

2.2.3 Step 3 Power Terminal Wiring

The following illustration shows the terminal layout and connection configuration on the power terminal block. Refer to the detailed descriptions to understand the function and location of each terminal before making wiring connections. Ensure that the selected cables meet or exceed the specifications in **1.5 Wire Selection** before installing them.

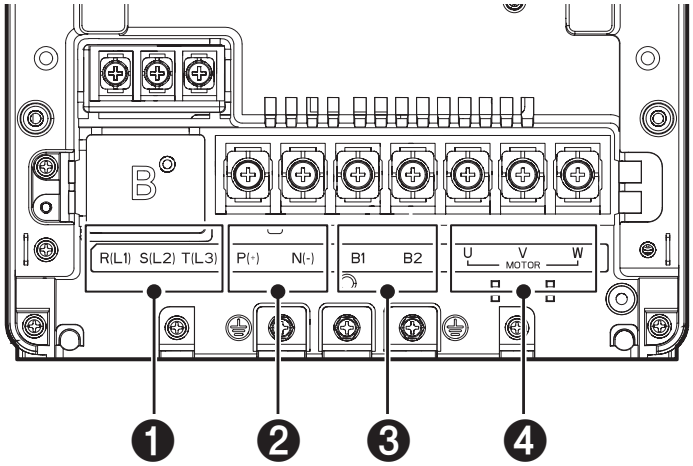
ⓘ Caution

- Apply rated torques to the terminal screws. Loose screws may cause short circuits and malfunctions. Tightening the screw too much may damage the terminals and cause short circuits and malfunctions.
- Use copper wires only with 600V, 75℃ rating for the power terminal wiring, and 300V, 75℃rating for the control terminal wiring.
- Power supply wirings must be connected to the R, S, and T terminals. Connecting them to the U, V, W terminals causes internal damages to the inverter. Motor should be connected to the U, V, and W Terminals. Arrangement of the phase sequence is not necessary.

ⓘ Attention

- Appliquer des couples de marche aux vis des bornes. Des vis desserrées peuvent provoquer des courts-circuits et des dysfonctionnements. Ne pas trop serrer la vis, car cela risque d'endommager les bornes et de provoquer des courts-circuits et des dysfonctionnements.
- Utiliser uniquement des fils de cuivre avec une valeur nominale de 600 V, 75 ℃ pour le câblage de la borne d'alimentation, et une valeur nominale de 300 V, 75 ℃ pour le câblage de la borne de commande.
- Les câblages de l'alimentation électrique doivent être connectés aux bornes R, S et T. Leur connexion aux bornes U, V et W provoque des dommages internes à l'onduleur. Le moteur doit être raccordé aux bornes U, V et W. L'arrangement de l'ordre de phase n'est pas nécessaire.

Power Terminal Labels and Descriptions



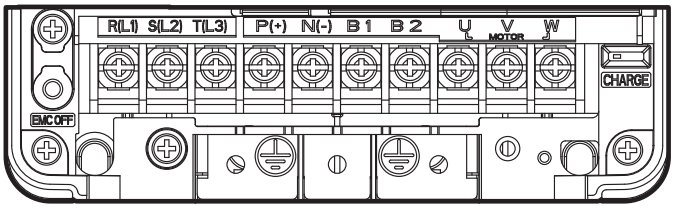
[Image 9. Power terminal]

Table 1. Power terminal configuration

No.	Terminal Labels	Name	Description
1	R(L1), S(L2), T(L3)	AC power input terminal	Mains supply AC power connections.
2	P(+)	+ DC link terminal	DC voltage (+) terminal. Connects DC (+) when using DC as inverter power.
	N(-)	- DC link terminal	DC voltage (-) terminal. Connects DC (-) when using DC as inverter power.
3	B1, B2	Brake resistor terminal	Connects the brake resistor.
4	U, V, W	Motor output terminal	Connects a 3-phase induction motor.

200 V Class 0.4-4kW / 400V Class 0.4-4kW

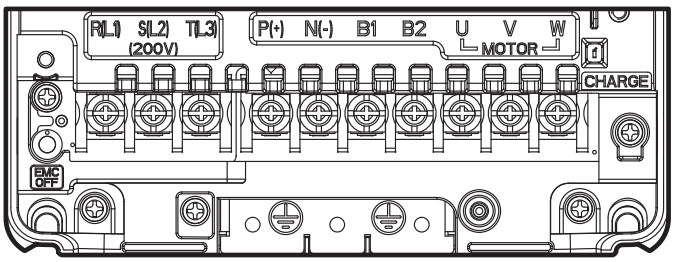
LSLV0004S300-4 / LSLV0008S300-4 / LSLV0015S300-4 / LSLV0022S300-4 / LSLV0040S300-4
LSLV0004S300-2 / LSLV0008S300-2 / LSLV0015S300-2 / LSLV0022S300-2 / LSLV0040S300-2



[Image 10. 200V Class 0.4-4kW / 400V Class 0.4-4kW Power Terminals]

200V Class 5.5-7.5kW

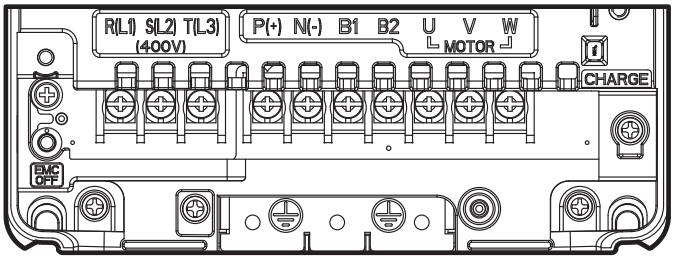
LSLV0055S300-2 / LSLV0075S300-2



[Image 11. 200V Class 5.5-7.5kW Power Terminals]

400V Class 5.5-7.5kW

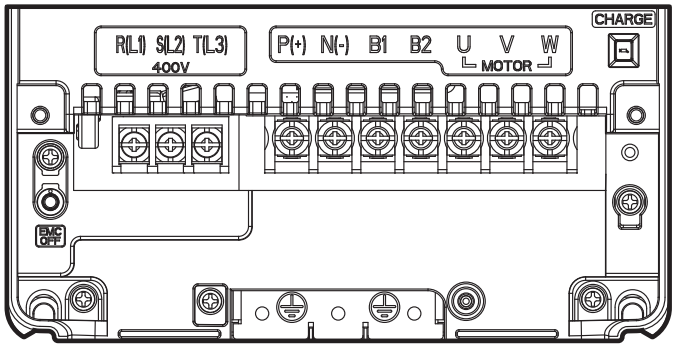
LSLV0055S300-4 / LSLV0075S300-4



[Image 12. 400V Class 5.5-7.5kW Power Terminals]

200V Class 11kW

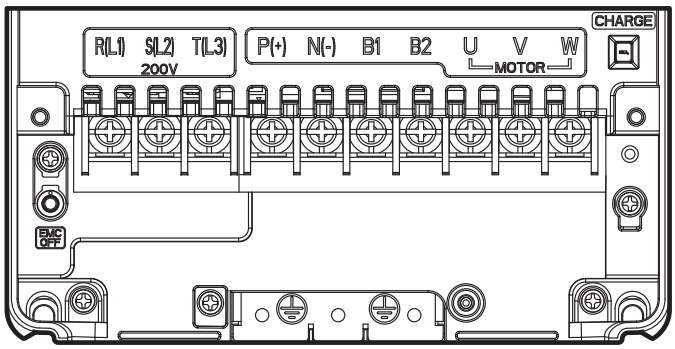
LSLV0110S300-2



[Image 13. 200V Class 11kW Power Terminals]

400V Class 11-15kW

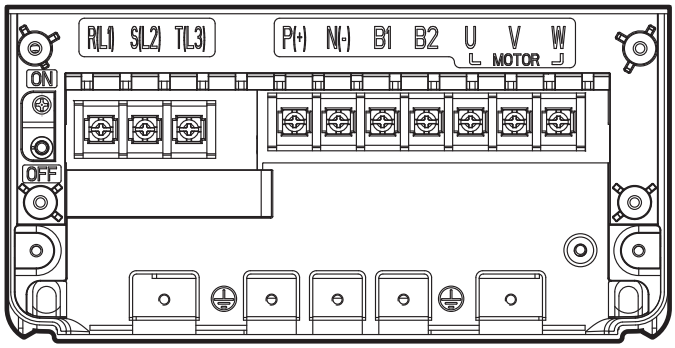
LSLV0110S300-4 / LSLV0150S300-4



[Image 14. 400V Class 11-15kW Power Terminals]

200V Class 15-18.5kW

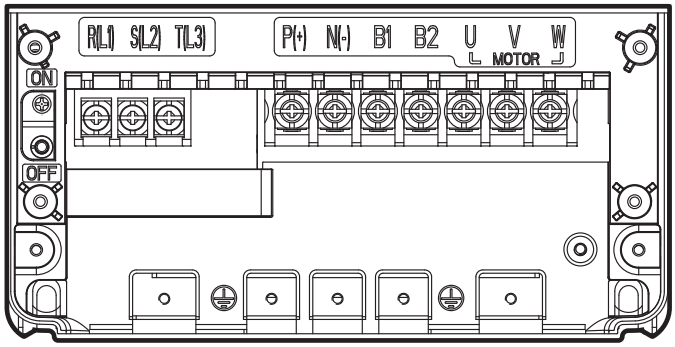
LSLV0150S300-2 / LSLV0185S300-2



[Image 15. 200V Class 15-18.5kW Power Terminals]

400V Class 18.5-22kW

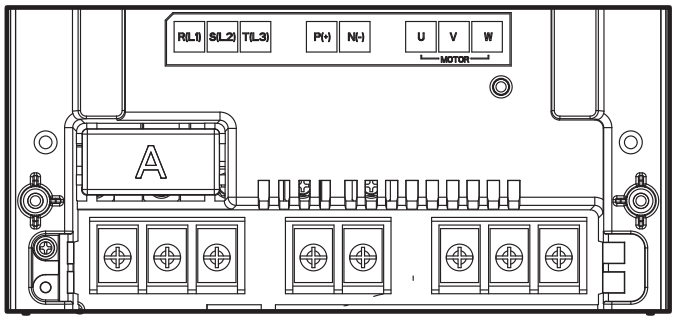
LSLV0185S300-4 / LSLV0220S300-4



[Image 16. 400V Class 18.5-22kW Power Terminals]

200V Class 22kW / 400V Class 30-37kW

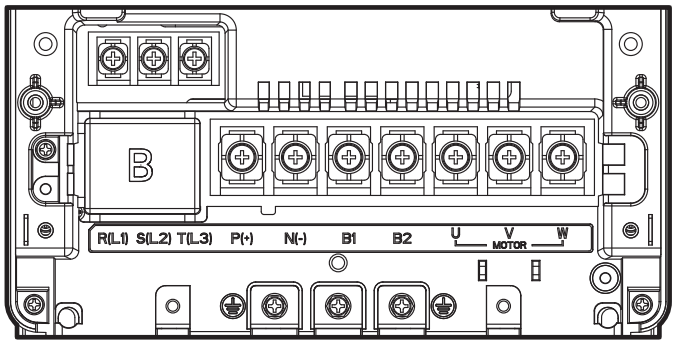
LSLV0220S300-2



[Image 17. 200V Class 22kW / 400V Class 30-37kW Power Terminals]

400V Class 30-37kW

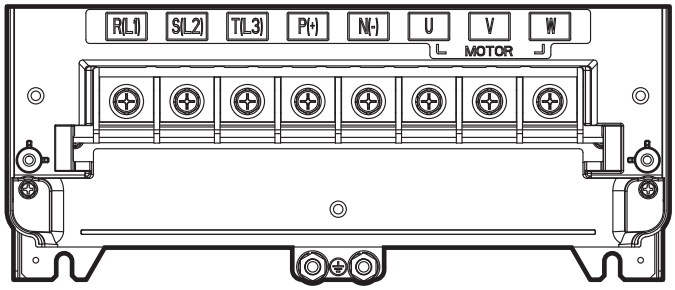
LSLV0300S300-4 / LSLV0370S300-4



[Image 18. 400V Class 30-37kW Power Terminals]

200V Class 30-45kW / 400V Class 45-75kW

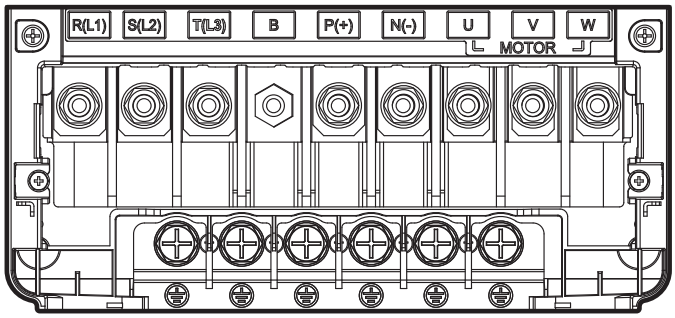
LSLV0300S300-2/LSLV0370S300-2/LSLV0450S300-2
LSLV0450S300-4/LSLV0550S300-4 / LSLV0750S300-4



[Image 19. 200V Class 30-45kW / 400V Class 45-75kW Power Terminals]

400V Class 90-110kW

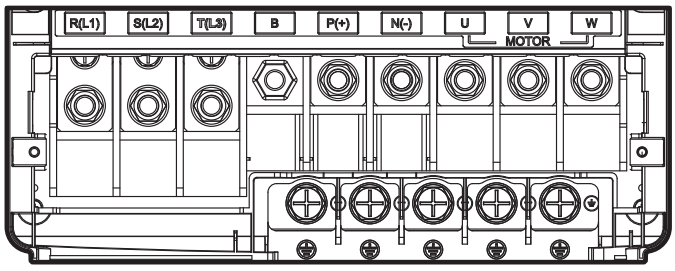
LSLV0900S300-4 / LSLV1100S300-4



[Image 20. 400V Class 90-110kW Power Terminals]

200V Class 55-75kW / 400V Class 132-160kW

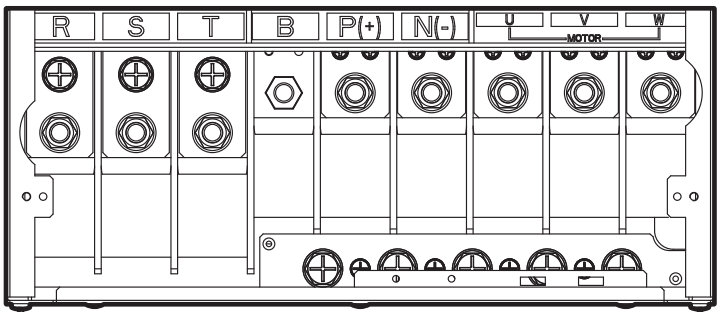
LSLV0550S300-2 / LSLV0750S300-2
LSLV1320S300-4 / LSLV1600S300-4



[Image 21. 200V Class 55-75kW / 400V Class 132-160kW Power Terminals]

400V Class 185-220kW

LSLV1850S300-4 / LSLV2200S300-4



[Image 22. 400V Class 185-220kW Power Terminals]

Note

The location of the power terminal labels may vary according to the product family.

⚠ Warning

Do not connect power to the inverter until the installation has been fully completed and the inverter is ready to be operated. Otherwise, it may cause an electrical shock and result in personal injury or even death.

ⓘ Caution

- Connect the input power wiring of the inverter to the R/S/T terminals and the output wiring to the motor to the U/V/W terminals. The product may be damaged if it is connected in reverse.
- To use DC input to operate the inverter, connect the DC input terminals to P (+) and N (-).
- Use insulated ring lugs when connecting cables to R/S/T and U/V/W terminals.
- The inverter's power terminal connections can cause harmonics that may interfere with other communication devices located near the inverter. To reduce interference the installation of noise filters or line filters may be required.
- Do not connect advanced-phase capacitors, surge killers, or radio noise filters to the output side of the product. There is a possibility that a trip may occur or the connected device may be damaged.
- Do not connect a magnetic contactor to the wiring on the output side of the product (motor side). There is a possibility that a trip may occur or the product may be damaged.

Note

- Do not use 3 core cables when connecting a remotely located motor with the inverter.
- Make sure that the total cable length does not exceed 100 m. For wire lengths greater than 100 m, please contact customer service.
- Long cable runs can cause reduced motor torque in low-frequency applications due to voltage drop. Long cable runs also increase a circuit's susceptibility to stray capacitance and may trigger over-current protection devices or result in a malfunction of equipment connected to the inverter. Voltage drop is calculated by using the following formula:

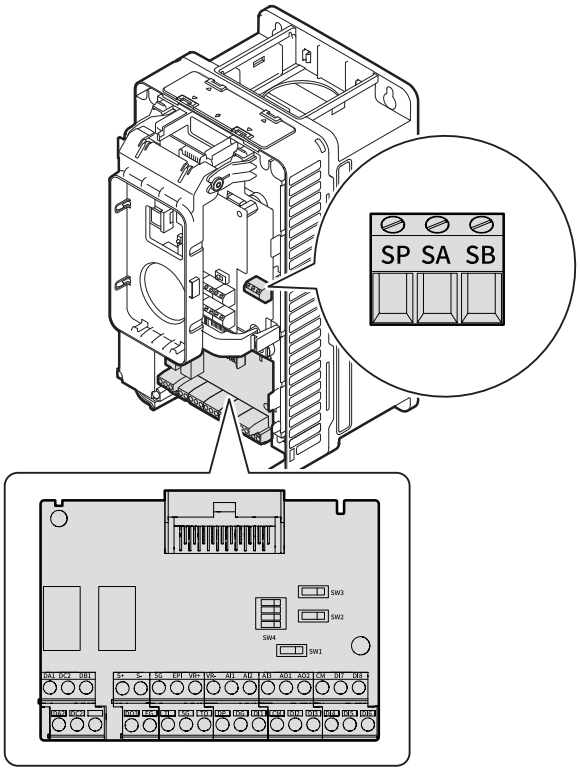
  Voltage Drop (V) = [$\sqrt{3}$ X cable resistance (MΩ/m) X cable length (m) X current (A)] / 1000

- Use cables with the largest possible cross-sectional area to ensure that voltage drop is minimized over long cable runs. Lowering the carrier frequency and installing a micro surge filter may also help to reduce voltage drop.

Wiring Length Between Inverter and Motor	50 m or shorter	100 m or shorter	Longer than 100m
Allowed Carrier Frequency	15 kHz or lower	5 kHz or lower	3 kHz or lower

2.2.4 Step 4 Control Terminal Wiring

Below is a diagram showing the layout and connection configuration of the control circuit. Refer to the detailed information and install the control circuit wiring. Ensure that the cables selected meet or exceed the specifications in **1.5 Wire Selection** before installing them.



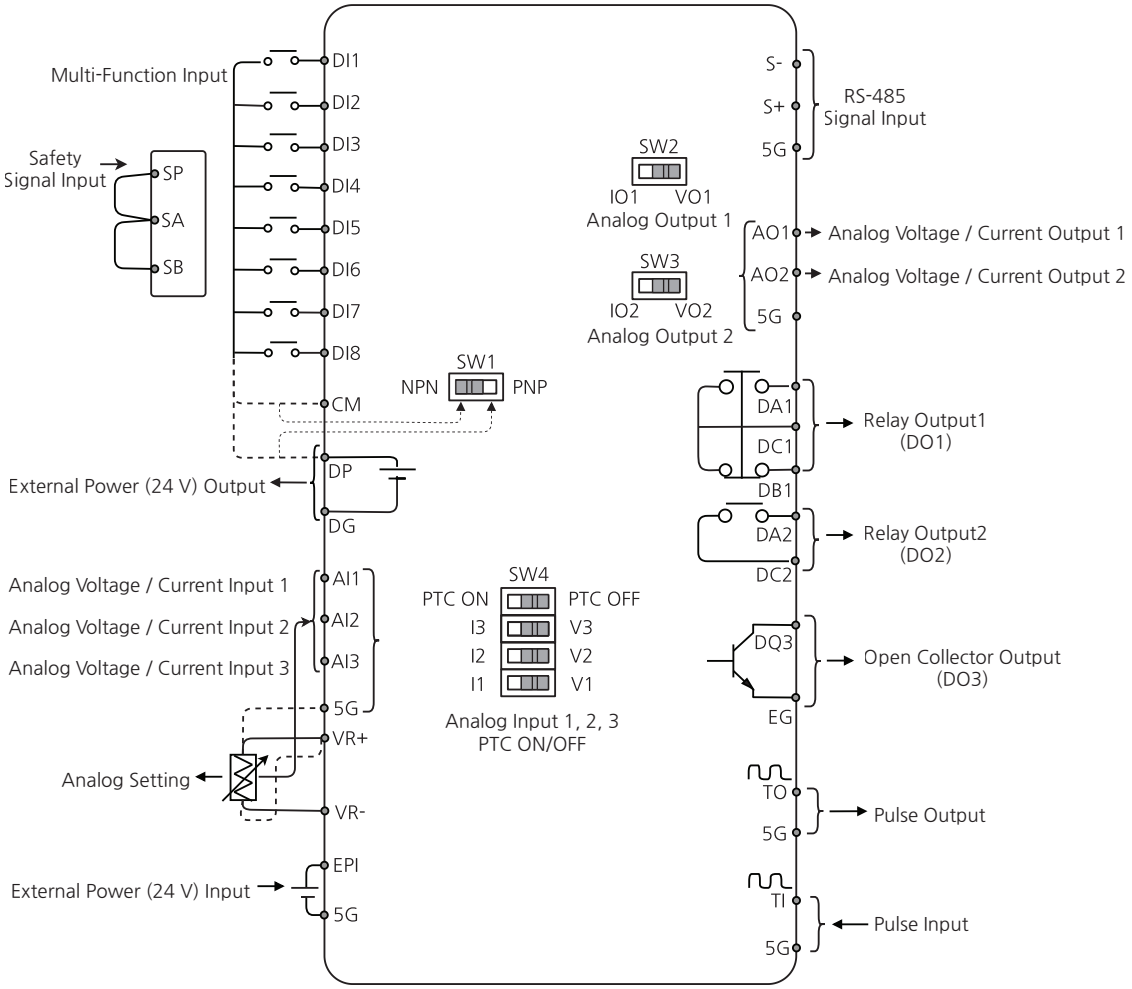
[Image 23. Control terminal]

Table 2. Safety terminal configuration

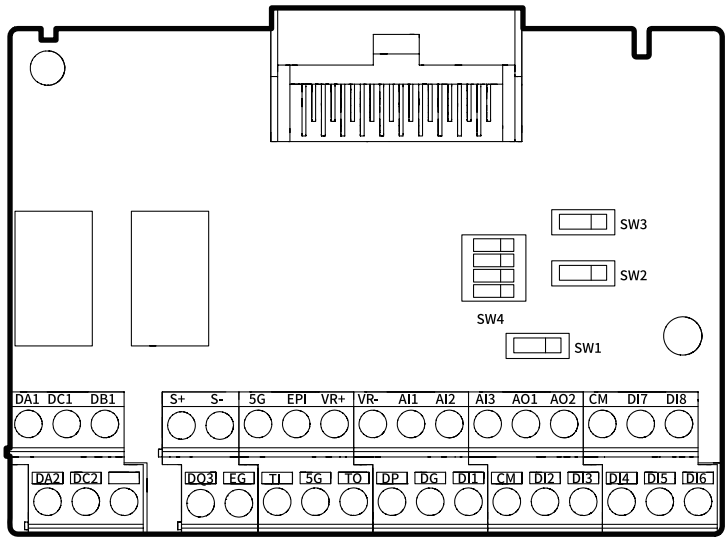
Category	Terminal Labels	Name	Description
Safety signal [1]	SP	Safety power output terminal	DC 24 V, 25 mA or less
	SA	Safety input A terminal	Based on the input signal from outside, it blocks the output.
	SB	Safety input B terminal	• If both SA and SB are connected to SP: Normal operation • If either SA or SB is disconnected from the SP: Block product output

[1] Three safety terminals are connected by short bars when shipped from the factory.

Input/Output control terminal wiring diagram



[Image 24. Input/Output control terminal wiring]



[Image 25. IO board switch]

Table 3. Dip switch configuration

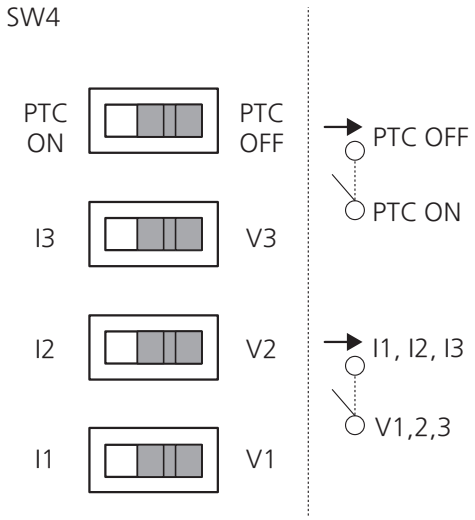
Switch labels	Description	Factory value (Default)
SW1	NPN/PNP setting switch (Left: NPN, Right: PNP)	Left: NPN
SW2	IO1/VO1 terminal setting switch (Left: IO1, Right: VO1)	Right: VO1
SW3	IO2/VO2 terminal setting switch (Left: IO2, Right: VO2)	Right: VO2
SW4	I1, I2, I3, PTC ON/V1, V2, V3 PTC OFF terminal selection switch (Left: I1, I2, I3, PTC ON, Right: V1, V2, V3, PTC OFF)	Right: V1, V2, V3, PTC OFF

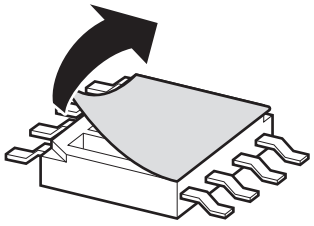
- DI1~DI8: Digital Input 1-8
- DP: Digital Power 24 V Output, Max 150 mA
- DG: Digital Ground
- CM: Digital Input Common
- DA1, DC1, DB1: Digital Relay1 Output
- DA2, DC2: Digital Relay2 Output
- DQ3, EG: Digital Open Collector Output
- EPI: Power Supply Input (for external power supply)
- 5G: Analog Ground
- AO1, AO2: Analog Output 1, 2
- AI1, AI2, AI3: Analog Input 1, 2, 3
- PTC: Positive Temperature Coefficient thermistor

- VR+, VR-: Analog ± Voltage Reference, output voltage ±10 V, Maximum current output 20 mA
- TO: Pulse Train Output
- TI: Pulse Train Input

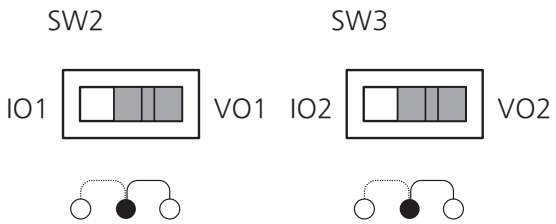
Table 4. Input/communication terminal configuration

Category	Terminal Labels	Name	Description
Terminal input selection	DI1~DI8	Digital input Terminals 1-8	Configurable for digital input terminals. The factory default is as follows: • DI1: FX • DI2: RX • DI3: BX • DI4: External Trip-1 • DI5: Speed-L • DI6: Speed-M • DI7: Speed-H • DI8: JOG
	CM	Common terminal	Common terminal for digital input terminals.
Analog input	VR+	Analog positive (+) voltage reference terminal	Power supply for analog reference. • Output Voltage: 10V • Maximum Current Output: 20mA • Potentiometer: 1~10kΩ
	VR-	Analog negative (-) voltage reference terminal	Power supply for analog reference. • Output Voltage: -10V • Maximum Current Output: 20mA • Potentiometer: 1~10kΩ

Category	Terminal Labels	Name	Description
Analog input	AI1~AI3	Analog voltage/ current input terminal (switch selection)	Depending on the setting of the switch (SW4), it can be used as either a voltage or current input. AI3 can be used as PTC sensor input. Factory default is V1, 2, and 3.  **[Image 26. Factory default setting for analog input terminal (SW4 switch)]** **[When voltage is selected]** Select the appropriate terminal block by setting the switch (SW4) to V1, 2, 3. Depending on the setting of the analog input mode, the following voltage ranges can be used. • Unipolar: 0.00 - 10 V • Bipolar: -10.00 - 10 V **[When current is selected]** Select the appropriate terminal block by setting the switch (SW4) to I1, 2, 3. If the analog input mode is set to "Current," the following current ranges can be used. • Input current: 4.00~20.00mA **[When inputting PTC]** Connect the PTC sensor to the AI3 input terminal and select the PTC ON switch (SW4).

Category	Terminal Labels	Name	Description
Analog input	AI1~AI3	Analog voltage/ current input terminal (switch selection)	**[Note]** **Remove SW4 dip switch seal tape** It is shipped with seal tape attached for SW4 dip switch protection (factory default: Analog voltage input). Remove the seal tape to change the switch settings, as shown in the following illustration. Using the cut-out corner of the switch mold, the seal tape can be easily removed.  **[Image 27. Remove SW4 switch seal tape]**
	TI	Pulse train input terminal	Set it to 0.00-32.00 kHz and enter it. • Low Level: 0~1.2V • High Level: 2.0~12V(Duty 30~70%)
	5G	Analog common terminal	Analog ground common terminal. (It differs from the CM common terminal.)
External power input	EPI	External power input terminal	By connecting external power to the EPI terminal and 5G ground, it can be utilized as backup power for the control unit. It is possible to use the Smart Operator, communication options, and some of the controller's features. • Precautions: Do not connect external power to DP/DG terminals. The DP/DG terminal is for internal power or service power. • Input power: 24V(21.6~26.4V), 0.5A
RS-485 communication	S+/S-	RS-485 signal input terminal	Used to send or receive RS-485 signals. Refer to **10 Using Built-in Communication Features** for more details. It is used with 5G ground.

Output Terminal Labels and Descriptions

Category	Terminal Labels	Name	Description
Analog output	AO1~AO2	Analog voltage/current Output terminal (switch selection)	Depending on the selection of the switch (SW2, SW3), it can be used as either a voltage or current output. Factory default is VO1, VO2.  **[Image 28. Factory default setting for analog output terminal (SW2, 3 switch)]** **[When voltage is selected]** Select the appropriate terminal block by selecting the switch (SW2, SW3) to VO1, VO2. Depending on the setting of the analog output mode, the following voltage ranges can be used. • Unipolar: 0.00 - 10 V • Bipolar: -10.00 - 10 V **[When current is selected]** Select the appropriate terminal block by selecting the switch (SW2, SW3) to IO1, IO2. If the analog output mode is set to "Current," the following current ranges can be used. • Output current: 4.00~20.00mA • External resistor connection: 249Ω
Analog output	TO	Pulse train output terminal	It outputs 0.00-32.00 kHz. (Duty around 50%) • Low Level: 1 V or less • High Level: 12V
	5G	Analog common terminal	Analog ground common terminal.

Category	Terminal Labels	Name	Description
Digital power	DP	Digital power output terminal	Digital service power. DC 24 V (21.6 - 26.4 V), 150 mA or less • Precautions: Do not connect with the CM (digital common terminal).
	DG	Digital ground terminal	External 24 V common terminal.
Terminal output	DA1, DC1, DB1	Digital multifunction output relay 1 terminal (A, B terminal) (parameter DO1)	It outputs a signal or multifunction signal in other situations, including when the product's protection function is activated. • N.O.: AC 250 V 2 A or less, DC 30 V 3 A or less • N.C.: AC 250 V 1 A or less, DC 30 V 1 A or less • Fault condition: A1 and C1 contacts are connected (B1 and C1 open connection) • Normal operation: B1 and C1 contacts are connected (A1 and C1 open connection)
	DA2, DC2	Digital multifunction output relay 2 terminal (A terminal) (parameter DO2)	• N.O.: AC 250 V 2 A or less, DC 30 V 3 A or less • N.C.: AC 250 V 1 A or less, DC 30 V 1 A or less • Fault condition: A1 and C1 contacts are connected (B1 and C1 open connection)
	DQ3, EG	Digital multifunction open collector output terminal (parameter DO3)	It selects and outputs one of the multifunction output signals.

Note

- Ensure that the total cable length does not exceed 50 m.
- Ensure that the length of any safety-related wiring does not exceed 30 m.
- Ensure that the wiring length when using Smart Operator does not exceed 3 m. There may be a signal error if the wiring length exceeds 3 m.
- Use ferrite material to block electromagnetic waves emitted from analog and digital signals.
- Be sure to apply the cable ties no closer than 15 cm from the inverter when using cables with cable ties. This provides sufficient access to fully close the front cover.

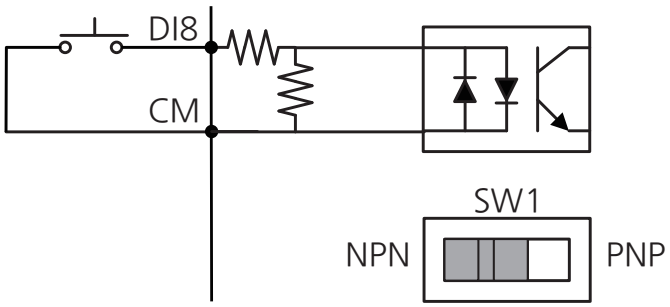
2.2.5 Step 5 PNP/ NPN Mode Selection

The product supports both NPN (Sink) and PNP (Source) modes for sequence inputs at the terminal. Select an appropriate mode to suit requirements using the NPN/PNP selection switch (SW1) on the control board. The NPN/PNP selection switch (SW1) is set to NPN mode when shipped from the factory. Refer to the following information for detailed applications.

NPN mode (Sink)

Select NPN using the PNP/NPN selection switch (SW1). The CM terminal is an input signal common terminal, and DP/DG is an internal power supply terminal.

If you are using an external 24 V source, connect the - terminal of the external power supply to the DI1-DI8 terminals, and connect the + terminal to the CM terminal.

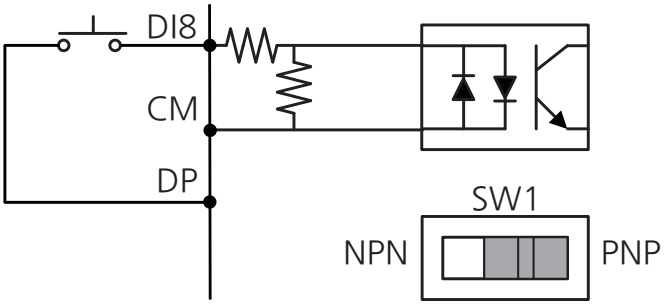


[Image 29. NPN mode]

PNP mode (Source)

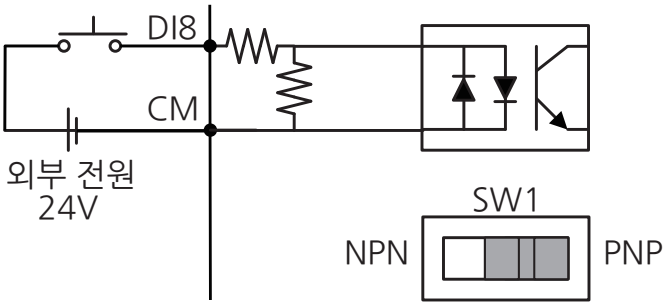
Select PNP using the PNP/NPN selection switch (SW1). The CM terminal is an input signal common terminal, and DP/DG is an internal power supply terminal.

If you are using the internal power supply in PNP mode, connect the external circuit to DI and DP.



[Image 30. PNP mode (internal power)]

If you are using the PNP mode with an external power supply, connect the external circuit to DI and CM, and connect the (-) terminal of the external power supply to CM.



[Image 31. PNP mode (external power)]

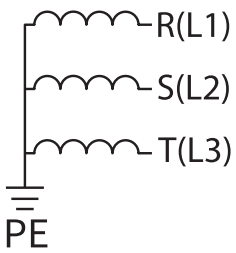
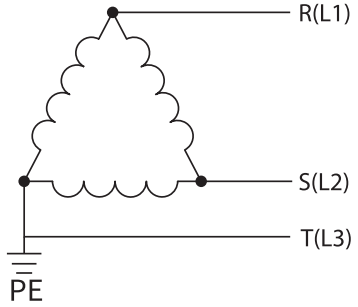
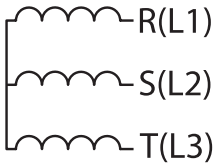
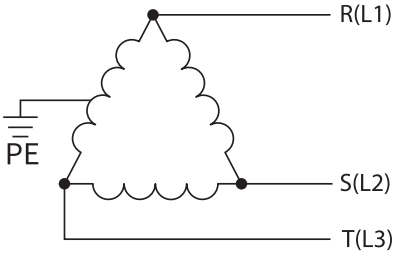
2.2.6 Step 6 Enabling and Disabling EMC filter and Varistor (VAR) Ground

The EMC filter and varistor (VAR) ground of the product can be enabled or disabled. EMC filter and VAR ground feature are set to On by factory default. The use of an EMC filter may increase leakage current at the expense of reducing airborne noise generated by the product. Use an EMC filter and VAR ground if a symmetrical ground scheme is used. Refer to the EMC filter and VAR ground conditions table below if you are using any other asymmetrical ground power, such as corner ground, midpoint ground, or non-ground power.

Table 5. EMC filters and VAR ground conditions

Model name LSLV□□□□	Symmetrical ground power	Corner ground power, midpoint ground power	Non-ground power
0004S300-2 ~0220S300-2	Enable EMC filter Enable VAR ground	Disable EMC filter Disable VAR ground	Disable EMC filter Disable VAR ground
0300S300-2 ~0750S300-2	Enable EMC filter Enable VAR ground	Disable EMC filter Enable VAR ground	Disable EMC filter Disable VAR ground
0004S300-4 ~0370S300-4	Enable EMC filter Enable VAR ground	Disable EMC filter Disable VAR ground	Disable EMC filter Disable VAR ground
0450S300-4 ~2200S300-4	Enable EMC filter Enable VAR ground	Disable EMC filter Enable VAR ground	Disable EMC filter Disable VAR ground

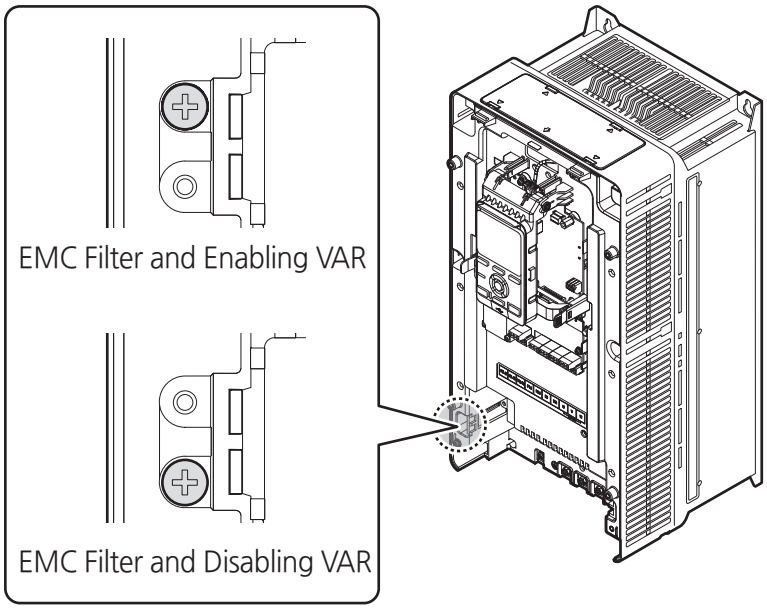
Table 6. Ground Power Structure

Ground power			
Symmetrical ground power		Corner ground power	
Non-ground power		Midpoint ground power	

Enabling and disabling the EMC filter and VAR ground varies depending on the inverter capacity. Refer to the following description of inverter capacity.

200 V level 0.4 - 22 kW / 400 V level 0.4 - 37 kW

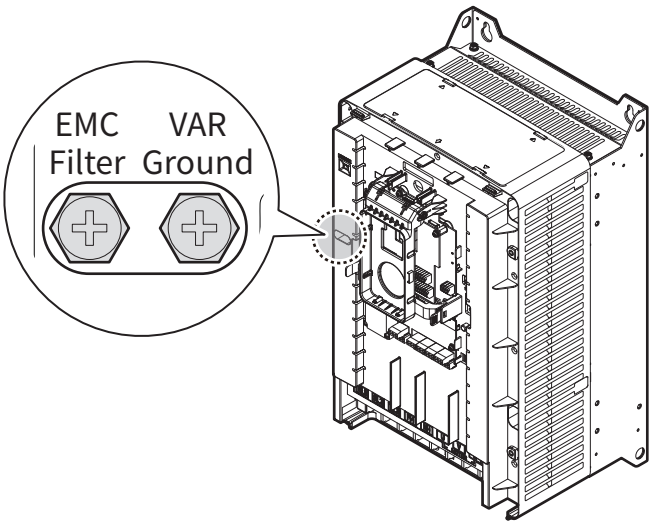
The EMC filter and VAR ground terminal are located on the terminal block in models with corresponding capacities. One screw is used to enable and disable the EMC filter and VAR ground. Therefore, the EMC filter and the VAR ground cannot be disabled separately. If you are enabling the EMC filter and VAR ground, install the screw in the upper hole, and if you are disabling the EMC filter and VAR ground, install the screw in the lower hole, as shown in the below illustration.



[Image 32. 200 V level 0.4 - 22 kW / 400 V level 0.4 - 37 kW model EMC filter, VAR ground]

200 V level 30 - 75 kW / 400 V level 45 - 220 kW

The EMC filter and VAR ground terminal are located on the upper-left side of the inverter, not on the terminal block in models with corresponding capacities. Each screw is used to enable and disable the EMC filter and VAR ground. Accordingly, the EMC filter and VAR ground may be fixed with screws or removed, as shown in the following illustration. When the EMC filter or VAR grounding screw is tightened, the EMC filter or VAR grounding is enabled, and when the screw is removed, the EMC filter or VAR ground will be disabled.



[Image 33. 200 V level 30 - 75 kW / 400 V level 45 - 220 kW model EMC filter, VAR ground]

2.2.7 Step 7 Reassembling the Wiring Bracket and the Front Cover

After completing the wiring and basic configurations, reassemble the wiring bracket and the front cover. Note that the assembly procedure may vary according to the product group or frame size of the product.

2.3 Post-Installation Checklist

After completing the installation, check the items in the following table to make sure that the inverter has been safely and correctly installed.

Table 7. Installation check

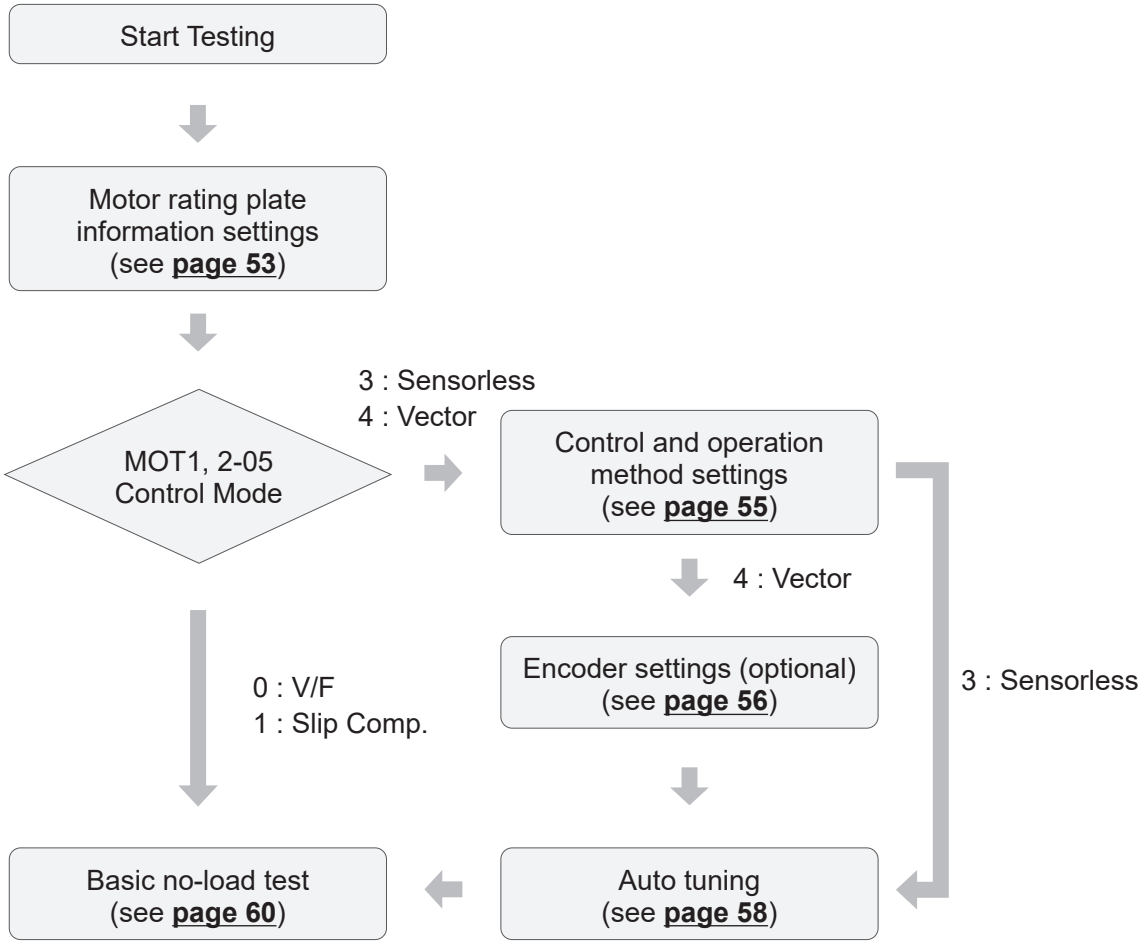
Situation	Details	Ref.	Check
Installation location/I/O voltage	Is the installation location appropriate?	p.13	
	Is the inverter's rated output sufficient to supply the equipment? (Derating is applied in specific conditions.)	p.154	
Power Terminal Wiring	Is a circuit breaker installed on the input side of the inverter?	p.21	
	Is the circuit breaker correctly rated?	p.175	
	Are the power source cables correctly connected to the input terminals of the inverter? (Caution: connecting the power source to the U/V/W terminals may damage the inverter.)	p.29	
	Are the motor output cables connected in the correct phase order? (Caution: Motors will rotate in the reverse direction if the phase cables are not wired in the correct order.)	p.29	
	Are the cables used in the power terminal connections correctly rated?	p.16	
	Is the inverter grounded correctly?	p.28	
	Are the power terminal screws and the ground terminal screws tightened to their specified torques?	p.29	
	Are the overload protection circuits installed correctly on the motors (if multiple motors are being run using one inverter)?	-	
	Is the inverter separated from the power source by a magnetic contactor (if a braking resistor is in use)?	p.21	
	Are advanced-phase capacitors, surge protection, and electromagnetic interference filters installed correctly? (These devices MUST not be installed on the output side of the inverter.)	p.36	

Situation	Details	Ref.	Check
Control Terminal Wiring	Are shielded twisted pair (STP) cables used for control terminal wiring?	-	
	Is the shielding of the STP wiring properly grounded?	-	
	If 3-wire operation is required, are the multifunction input terminals defined prior to the installation of the control wiring connections?	**p.37**	
	Is the shielding of the STP wiring properly grounded?	-	
	Are the control cables properly wired?	**p.37**	
	Are the control terminal screws tightened to their specified torques?	-	
	Is the total cable length of all control wiring less than 50 m?	**p.44**	
	Is the total length of safety wiring less than 30 m?	**p.44**	
	Are there any debris or screws left inside the inverter?	**p.25**	
	Are any cables contacting adjacent terminals, creating a potential short circuit risk?	-	
	Are the control terminal connections separated from the power terminal connections?	-	
	Have the capacitors been replaced if they have been in use for more than 2 years?	**9.3.3**	
	Has a fuse been installed for the power source?	**p.175**	
	Are the connections to the motor separated from other connections?	-	

* Refer to the corresponding chapter of the comprehensive user's manual for gray shaded areas.

3 Operation Sequence and Testing

In order to maximize motor performance and operate the normal protection function, various motor information must be set. Set in the following sequence based on the motor control mode you want to use:



3.1 Setting Up Motor Rating Plate Information

Enter the information displayed on the motor rating plate. Motor rating plate information is used for motor control, protective operation, and others. Enter the motor type in MOT1 and MOT2-04 (Motor Type) and the motor capacity in MOT1 and MOT2-21 (Motor Capacity). If there is no capacity setting option for the motor, select the closest higher capacity to the motor's actual capacity. After that, enter the remaining rating plate information. For items that are not entered, apply default values based on motor capacity.

Example of motor rating plate information settings

Group	Code	LCD Display	Set Value		Setting Range	Initial value	Unit
MOT1, MOT2	04	Motor Type	0	Induction Motor	0~1	0	-
	21	Motor Capacity	2	0.75kW	0~27	3	-
	23	Base Frequency	60.00		30.00~590.00	60.00	Hz
	24	Rated Speed	1710		900~24000	1750	rpm
	25	Number of Poles	4		2~100	4	-
	26	Rated Current	3.4		1.0~1000	6.4	A
	27	Rated Voltage	0		0 or 180-480	0	V
	28	Efficiency	74		70~100	80	%
	35	No-load Current	1.7		0.5~1000.0	2.6	A

Details of motor rating plate information settings

<table>
<tr><th>Code and Functions</th><th>Description</th></tr>
<tr><td>MOT1, MOT2-04
Motor Type</td><td>Set the type of the motor connected to the inverter. The following motors can be selected:
<table>
<tr><th colspan="2">Item</th><th>Functionality</th></tr>
<tr><td>0</td><td>Induction Motor</td><td>Induction motor</td></tr>
<tr><td>1</td><td>Perm Magnet Motor</td><td>Permanent magnet motor</td></tr>
</table></td></tr>
<tr><td>MOT1, MOT2-21
Motor Capacity</td><td>Set the capacity of the motor connected to the inverter. According to the motor capacity, the default value of the related parameter changes if the value is changed.</td></tr>
<tr><td>MOT1, MOT2-23
Base Frequency</td><td>Enter the base frequency of the motor rating plate. A base frequency is the inverter’s output frequency when running at its rated voltage. Refer to the motor’s rating plate to set this parameter value.</td></tr>
<tr><td>MOT1, MOT2-24
Rated Speed</td><td>Enter the rated speed of the motor rating plate.</td></tr>
<tr><td>MOT1, MOT2-25
Number of Poles</td><td>Enter the number of poles on the motor rating plate.</td></tr>
<tr><td>MOT1, MOT2-26
Rated Current</td><td>Enter the rated current of the motor rating plate.</td></tr>
<tr><td>MOT1, MOT2-27
Rated Voltage</td><td>Enter the rated voltage of the motor rating plate. Set the motor voltage if the input power and the motor voltage specifications differ.
• The output voltage can be maintained at the set value if the set voltage is lower than the input power supply voltage above the base frequency.
• A voltage smaller than the input power supply voltage is output if the set voltage is higher than the input power supply voltage above the base frequency.
• The output voltage size is determined by the input power voltage during V/F operation if the set voltage is set to 0 above the base frequency.</td></tr>
<tr><td>MOT1, MOT2-28
Efficiency</td><td>Enter the efficiency of the motor rating plate.</td></tr>
<tr><td>MOT1, MOT2-35
No-load Current</td><td>Enter the no-load current of the motor rating plate. Only induction motors are affected by this, and if it is not specified on the rating plate, use the default value that changes when the motor capacity is set or enter the value displayed on the Smart Operator’s initial screen when operating at the base frequency with no load.</td></tr>
</table>

3.2 Setting Control and Operation Method

Select the appropriate operating mode for your system.

Example of setting control and operation method

Group	Code	LCD Display	Set Value		Setting Range	Initial value	Unit
MOT1, MOT2	05	Control Mode	0	V/F	0~4	0	-
	08	Torque Control En	0	No	0~1	0	-

Details of setting the control and operation method

<table>
<tr><th>Code and Functions</th><th colspan="3">Description</th></tr>
<tr><td rowspan="6">MOT1, MOT2-05 Control Mode</td><td colspan="3">Set the motor control method.</td></tr>
<tr><td colspan="2">Item</td><td>Functionality</td></tr>
<tr><td>0</td><td>V/F</td><td>Operates in a V/F control mode (open loop control where voltage size is determined by operating frequency).
Refer to <u>6.1 Induction Motor V/F Control</u> in the comprehensive user’s manual for details.</td></tr>
<tr><td>1</td><td>Slip Comp.</td><td>It is a control mode that compensates for slip during induction motor V/F control operation without position/speed sensors. It can only be set when the induction motor type is selected. Refer to <u>3.4 Auto Tuning</u> and perform tuning in advance.
Refer to <u>6.1.4 Slip Compensation Operation</u> in the comprehensive user’s manual for details.</td></tr>
<tr><td>2</td><td>V/F PG</td><td>This is a control mode that compensates for slip during induction motor V/F control operation with position/speed sensors. It can only be set when the induction motor type is selected.</td></tr>
<tr><td>3</td><td>Sensorless</td><td>Operates in vector control mode without position/speed sensors. Refer to <u>3.4 Auto Tuning</u> and perform tuning in advance.
As there is no position/speed sensor, the control may be unstable at low speeds (less than 1/120 of the base frequency for induction motors and 1/20 of the base frequency for synchronous motors).</td></tr>
<tr><td>4</td><td>Vector</td><td>Operates in vector control mode with position/speed sensors. Refer to <u>3.4 Auto Tuning</u> and perform tuning in advance.</td></tr>
</table>

<table>
<tr><th>Code and Functions</th><th colspan="3">Description</th></tr>
<tr><td>MOT1, MOT2-08 Torque Control En</td><td colspan="3">Set the operation method when operating in vector control mode (Sensorless, Vector). It is disabled when V/F control mode (V/F, Slip Comp., V/F PG) is selected.
<table>
<tr><th colspan="2">Item</th><th>Functionality</th></tr>
<tr><td>0</td><td>No</td><td>Set to speed control mode. The speed control function controls the motor to maintain the set speed.</td></tr>
<tr><td>1</td><td>Yes</td><td>Perform torque control. The torque control function controls the motor to maintain the torque value set. When the load torque is balanced with the output torque, the rotational speed of the motor remains constant. Therefore, during torque control, the rotational speed of the motor is determined by the magnitude and direction of the output torque, as well as the load torque.
The torque control can only be selected in the sensorless or vector control modes for induction motors.</td></tr>
</table></td></tr>
</table>

3.3 Setting the Encoder

It is a method used to control the rotor by measuring the position/speed of the rotor with a position/speed sensor. Once the encoder has been wired according to the manual for the encoder option card, set the encoder parameters.

How to set encoders

Group	Code	LCD Display	Set Value		Setting Range	Initial value	Unit
ENC	02	Enc Monitor[Hz]	-		-	-	Hz
	03	Enc Monitor[rpm]	-		-	-	rpm
	10	Auto Flying Start	0	No	0~1	1	-
			1	Yes			
	11	Enc Output Phase	0	(A+B)	0~1	0	-
	12	Resolution/Pulse	1024		10~4096	1024	-
	13	Enc LPF Gain	3		0~10000	3	msec
	16	Wire Check Trip En	1	Yes	0~1	0	-
	17	Wire Check Time	10		1~100	10	sec
	18	Enc Pulse Chk Time	1000		500~5000	1000	msec

Details of encoder settings

<table>
<tr><th>Code and Functions</th><th>Description</th></tr>
<tr><td>ENC-2 Enc Monitor[Hz], ENC-3 Enc Monitor[rpm]</td><td>The encoder output is converted into motor rotation speed and displayed in Hz or rpm.</td></tr>
<tr><td>ENC-10 Auto Flying Start</td><td>If set to 1 (Yes), the motor will start from the current motor speed without going through the starting sequence (dwell, brake, Start Mode, etc.) if the motor is rotating when the operation starts, and it will accelerate or decelerate to the target frequency.
If set to 0 (No), the motor will start from zero speed and follow the starting sequence.</td></tr>
<tr><td>ENC-11 Enc Output Phase</td><td>Set the direction of the encoder output pulse.
<table>
<tr><th colspan="2">Item</th><th>Functionality</th></tr>
<tr><td>0</td><td>(A + B)</td><td>Forward Operation</td></tr>
<tr><td>1</td><td>-(A + B)</td><td>Reverse Operation</td></tr>
</table></td></tr>
<tr><td>ENC-12 Resolution/Pulse</td><td>Enter the number of output pulses per revolution of the encoder.</td></tr>
<tr><td>ENC-13 Enc LPF Gain</td><td>Set the time constant of the encoder pulse low-pass filter. Refer to AIN-04, 19, 34 (AI1-3 LPF Gain) in <u>8.2.4 Filter</u> in the comprehensive user’s manual for details.</td></tr>
<tr><td>ENC-16 Wire Check Trip En
ENC-17 Wire Check Time</td><td>Check the wiring of the line-drive type encoder.
If you are using a line-drive encoder, set ENC-16 to 1 (yes).</td></tr>
<tr><td>ENC-18 Enc Pulse Chk Time</td><td>It is the minimum pulse period that determines the encoder speed as 0 Hz. When there is no pulse signal for more than this time period, it is regarded as 0 Hz.</td></tr>
</table>

3.4 Auto Tuning

You can measure motor parameters automatically. Additionally, you can test the operation of the encoder if the encoder option card is connected to the inverter's main body. Measured motor parameters are used for auto torque boost, sensorless vector control, and vector control, among others. The parameters required for control mode are tuned if 1 (Auto Tuning) is selected in BAS-20 (Auto Tuning). After applying power to the inverter, the first auto tuning performs inverter tuning, which is a longer process (up to about 20 minutes). Refer to **3.1 Setting Up Motor Rating Plate Information** and check the item before performing this function.

Example of auto tuning settings

Group	Code	LCD Display	Set Value		Setting Range	Initial value	Unit
BAS	20	Auto Tuning	0	None	0~1	0	-
			1	Auto Tuning			

Caution

- Ensure that auto tuning is performed after the motor has stopped.
- Before you run auto tuning, check the motor rating pole number, rated slip, rated current, rated voltage, and efficiency on the motor's rating plate and enter the data. Default values will be used for items not entered.

Auto tuning results – Induction motor

Group	Code	LCD Display	Result value
MOT1, MOT2	35	No-load Current	The auto tuning result value is displayed.
	36	Stator Resistance	
	37	Leakage Inductance	
	38	Stator Inductance	
	39	Rotor TimeConstance	

Auto tuning results – Synchronous motor

Group	Code	LCD Display	Result value
MOT1, MOT2	36	Stator Resistance	The auto tuning result value is displayed.
	40	q-axis Inductance	
	41	d-axis Inductance	
	42	PM Rotor Flux	

Auto Tuning Parameter Setting Details

<table>
<tr><th>Code and Functions</th><th>Description</th></tr>
<tr><td>BAS-20
Auto Tuning</td><td>If you press the ENTER key after selecting the necessary item from the BAS-20 menu, auto tuning will be executed immediately.
<table>
<tr><th colspan="2">Item</th><th>Functionality</th></tr>
<tr><td>0</td><td>None</td><td>Auto tuning is not enabled. If auto tuning is enabled, this will indicate that auto tuning is complete.</td></tr>
<tr><td>1</td><td>Auto Tuning</td><td>Start auto tuning to measure all required parameters.
As the motor is not rotating while the parameters are measured, the parameters are not affected when the load is connected to the motor spindle. However, when measuring parameters, do not rotate the motor spindle on the load side.</td></tr>
</table>
</td></tr>
</table>

3.5 Basic No-Load Test

After installing the product and checking the checklist, follow the instructions below to test the inverter.

Refer to **4.3 How to Use the Smart Operator** and **5 Learning Basic Functions** in the comprehensive user's manual for basic information regarding parameter changes, such as setting the operation command source, setting the target frequency, and setting the acceleration/deceleration time.

1 Activate the power supply for the inverter. Check if the LED status indicator is illuminated.

2 Select the command source. For command source settings, see **5.2 Operation Command Settings** in the comprehensive user's manual.

- The command source can be easily set with the Easy Start On function when using the Smart Operator. For the Easy Start On function, see **12.1.2 Parameter Easy Start (Easy Start On)** in the comprehensive user's manual.

3 Set a frequency reference, and then check the following:

- Whether the frequency value changes if the voltage input value is changed when the frequency is set to one of AI1/2/3 and when the analog voltage/current input terminal setting switch is selected as voltage
- Whether the frequency value changes if the current input value is changed when the frequency is set to one of AI1/2/3 and when the analog voltage/current input terminal setting switch is selected as current

4 Set the acceleration (DRV-05 Acc Time) and deceleration (DRV-06 Dec Time) times.

5 Start the motor and check the following:

- Ensure that the motor rotates in the correct direction. If the motor is rotating in the reverse direction, refer to the following details:
- Ensure that the motor accelerates and decelerates according to the set times and that the motor speed reaches the frequency reference.

Note

If the forward command (Fx) is on, the motor should rotate counterclockwise when viewed from the load side of the motor. If the motor rotates in the reverse direction, switch the cables at the U and V terminals.

Remarque

Si la commande avant (Fx) est activée, le moteur doit tourner dans le sens anti-horaire si on le regarde côté charge du moteur. Si le moteur tourne dans le sens inverse, inverser les câbles aux bornes U et V.

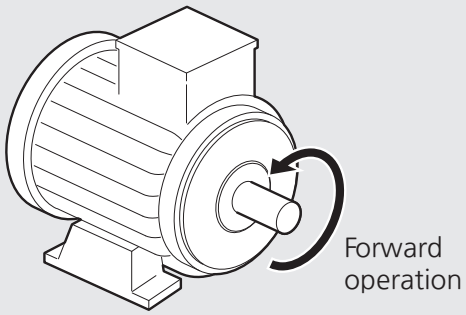
Check the motor's rotational direction

1 Set DRV-10 (1st Command Source) of the drive group (DRV) to 0 (Keypad) with the Smart Operator.

2 Set DRV-01 (Command Frequency) of the drive group (DRV) to an arbitrary target frequency with the Smart Operator.

3 Press the FWD key of the Smart Operator. The forward operation will start.

4 Observe that the motor's axis rotates counterclockwise (forward direction), as shown in the following illustration.



[Image 1. Check motor's rotational direction]

ⓘ Caution

- Check the parameter settings before running the inverter. Parameter settings may have to be adjusted depending on the load.
- Do not supply the inverter with an input voltage that exceeds the rated voltage of the equipment. This may cause damage to the inverter.
- Make sure that the motor does not exceed its rated operating range. Inverters can easily increase the rotation speed of motors, so you should check the motor's rated operating range before maximizing the rotation speed.

4 Learning to Perform Basic Operations

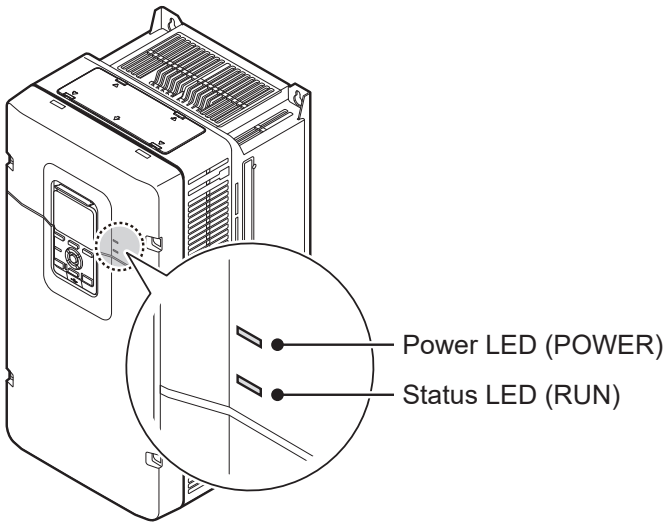
This chapter describes the Smart Operator's composition and operation method, as well as the function groups used for inverter operation and the basic operation method using the Smart Operator. Before proceeding with actual use, familiarize yourself with the various functions of the inverter, such as setting, changing frequency or input voltage, and issuing operating instructions, in order to learn the correct basic operating method.

4.1 Description of the Inverter Status Indicator LED

Refer to the following table for a detailed description of the functions of the inverter's status indicator LED. For a description of the Smart Operator's status LEDs, refer to **4.2.2 Description of the Status Indicator LED**.

Note

The location of the inverter status LEDs may vary according to the product family. Refer to **1.2 Check the Part Names** for details.



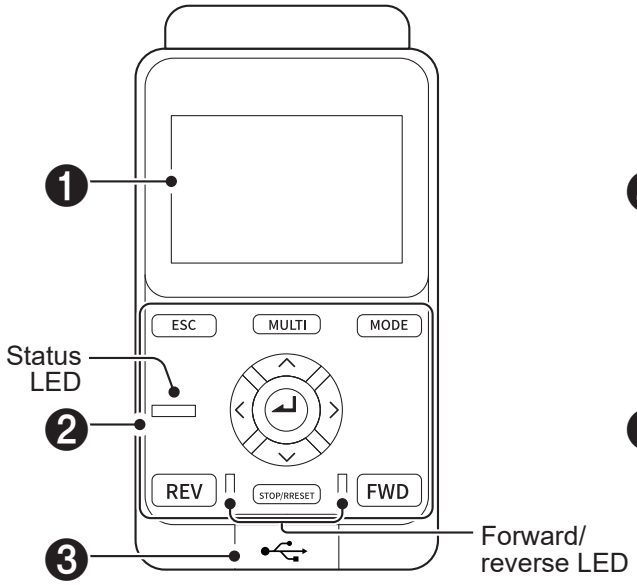
[Image 1. Inverter status LED]

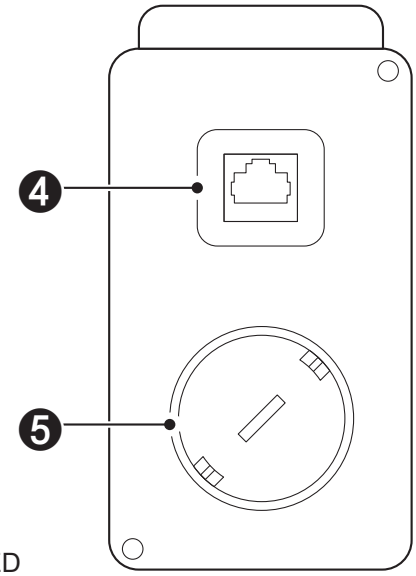
Table 1. Inverter body LED

Classification	Name	Inverter status	Color	Display method
Power display	POWER	Turning on the Inverter	Green	Always on
Operation status display	RUN	Normal	Green	1.4-second interval flashing
		Trip	Red	0.2-second interval flashing

4.2 Description of the Smart Operator's Composition and Functions

Refer to the following illustration and table to identify the part names and functions of the Smart Operator.





[Image 2. Front part of the Smart Operator] [Image 3. Rear part of the Smart Operator]

Table 2. Composition of the Smart Operator's parts

No.	Name	Description
❶	LCD screen	You can check the function settings and operation status. Refer to **4.2.3 LCD Screen Composition** for details.
❷	Control panel (input key) and status display lamp	You can set various inverter functions, give operation commands by changing the frequency or input voltage, and determine the current situation through the status display lamp. Refer to **4.2.1 Description of Operation Key Functions** and **4.2.3 LCD Screen Composition** for details.
❸	USB Port	You can use the Smart Operator as a USB memory device by connecting it to a computer.
❹	RJ45 communication port	The Smart Operator is connected to the main body of the inverter through this port.
❺	Battery cover	This is the Smart Operator's battery cover. • Battery type: CR2032 • One battery is provided with your purchase. For details on installing (replacing) the battery, refer to **Installing (replacing) the Smart Operator battery**.

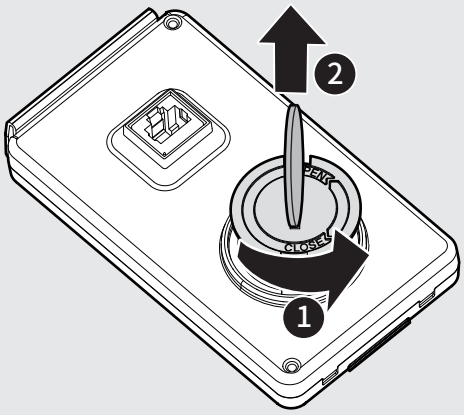
Note

Installing (replacing) the Smart Operator battery

When the Smart Operator is shipped, the battery (CR2032) is already installed.
Please follow the steps below when installing (replacing) the battery for the first time or when the battery is low and needs to be replaced.

1 Use the snap hook to separate the Smart Operator from the product. Be careful not to pull too hard since there is a communication line connecting the Smart Operator to the product.

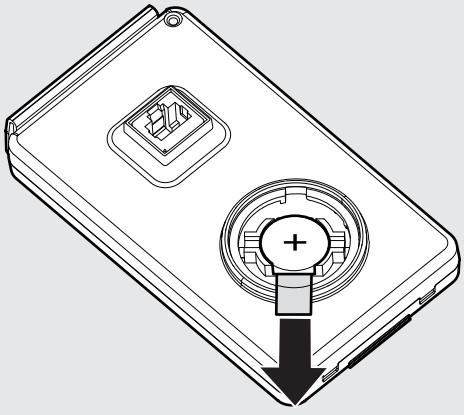
2 Using a flathead (-) screwdriver or coin, remove the battery cover by turning it in the opening direction.



[Image 4. Battery cover removal]

3 When using the battery for the first time or using the RTC option, remove the insulation strip attached to the battery.

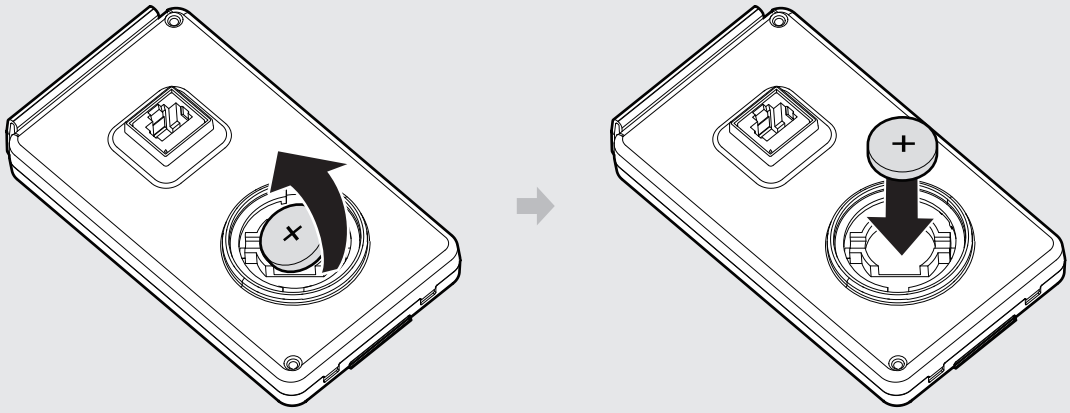
- If the battery insulation strip is not removed and power is supplied to the inverter, the **Date Time Reset** message will be displayed.



[Image 5. Battery insulation strip removal]

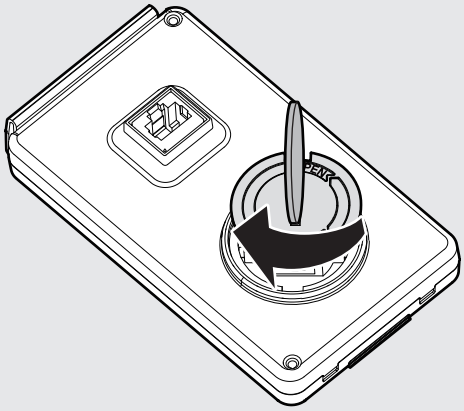
Note

4 Remove the old battery and install the new one in the correct orientation when replacing an old battery.



[Image 6. Battery replacement]

5 Using a flathead (-) screwdriver or coin, close the battery cover by turning it in the closing direction.



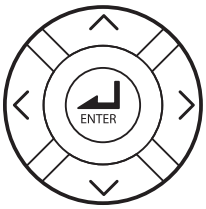
[Image 7. Battery cover combination]

6 In order to install the Smart Operator, raise it to the installation position and press the snap hook until it clicks into place.

4.2.1 Description of Operation Key Functions

Refer to the following table for descriptions of the functions for each key.

Table 3. Smart Operator operation key

Classification	Display	Function name	Functionality
Key	ESC	Cancel (ESC) key	In editing mode, if you press the Cancel ESC key before pressing the Program ENTER key, the previously saved data will be retained. Press to navigate to the first code of a group when moving codes within a group.
	MULTI	Multifunction (MULTI) key	Local/Remote, Keypad Jog, and Favorite codes can be registered depending on the settings. Refer to **12.1.1 Settings Mode Parameters** in the comprehensive user's manual for detailed setting method.
	MODE	MODE key	Displays the Menu screen.
		Program (ENTER) key	By pressing once in the parameter code that can be set, the parameter code enters an editing state, and by pressing again after editing, the modified data will be saved.
		Up arrow key/ Down arrow key	Used when moving codes or editing data values.
		Left arrow key/ Right arrow key	Navigates between groups. Moves the cursor in editing mode.
	REV	Reverse operation (REV) key	Operates in the reverse direction.
	STOP/RESET	STOP key	Stops the inverter or resets the trip.
	FWD	Forward operation (FWD) key	Operates in the forward direction.

4.2.2 Description of the Status Indicator LED

Refer to the following table for a detailed description of the Smart Operator's status indicator LED. For a description of the status indicator LED located on the front of the inverter body, refer to **4.1 Description of the Inverter Status Indicator LED**.

Table 4. Smart Operator LED

Classification	Name	Inverter status	Color	Display method
Inverter status display	Status LED	Trip	Red	0.5-second interval flashing
		Warning	Yellow	0.5-second interval flashing
		In operation	Green	Always on
		Tuning	White	0.5-second interval flashing
Operation direction status display	Forward/ reverse LED	Accelerating	Green	0.5-second interval flashing
		Decelerating	Green	0.5-second interval flashing
		At constant speed	Green	Always on
		Operation stopped.	-	Off

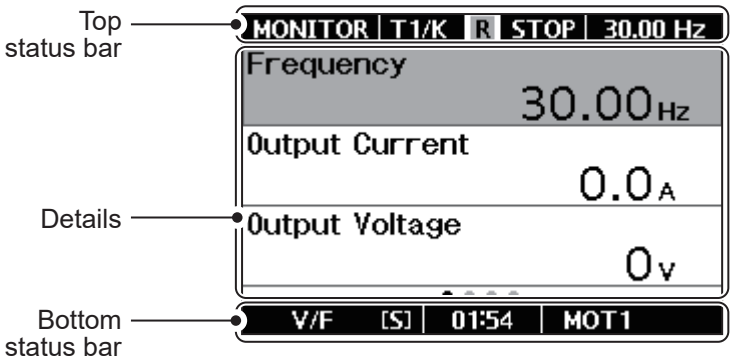
4.2.3 LCD Screen Composition

The following illustration shows the composition of the Smart Operator screen. The Smart Operator displays Monitor mode as the initial screen when it is turned on.

The screen consists of upper/lower status bars and detailed items between them. Depending on the mode (menu), the composition of the screen may differ. Refer to **4.2.4 Menu (mode) and Screen** for details.

Note

The Smart Operator displays Monitor mode as the initial screen when it is turned on. Depending on the mode (menu), the composition of the screen may differ. Refer to **4.2.4 Menu (mode) and Screen** for details about the screen in Monitor mode.



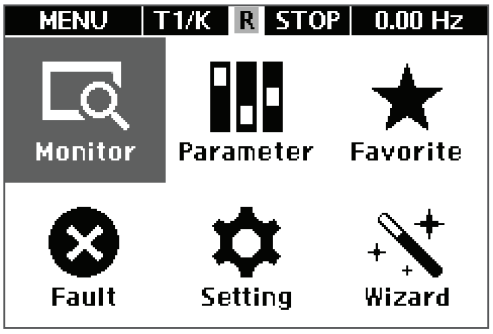
[Image 8. LCD Screen Composition]

4.2.4 Menu (mode) and Screen

The S300 series inverter consists of six modes, as follows: Each mode has function items appropriate for its characteristics, and in the case of parameter mode, functions necessary for the operation of the inverter are displayed as group units.

- Monitor: Monitor mode
- Parameter: Parameter configuration mode
- Favorite: Favorite mode
- Fault: Trip mode
- Setting: Configuration mode
- Wizard: Wizard mode (Easy Start)

Enter the main menu screen by pressing the MODE key, select the desired mode using the direction keys (▲/▼/◀/▶), and press the ENTER key to navigate to the corresponding screen.



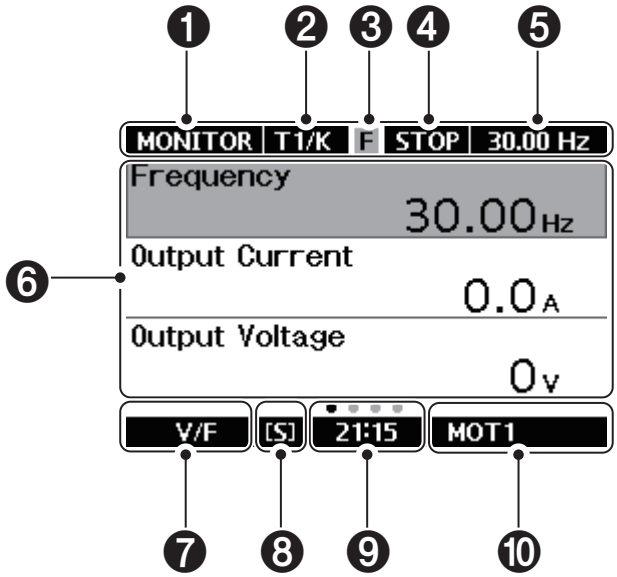
[Image 9. Menu screen]

4.2.4.1 Monitor mode

In Monitor mode, information about the inverter's operation is displayed. You can set the frequency, display the operating frequency, monitor the output current and voltage, etc.

Enter the main menu screen by pressing the MODE key, select the **Monitor** mode using the direction keys (▲/▼/◀/▶), and press the ENTER key to navigate to the Monitor mode screen.

The Monitor mode is composed of the following:



[Image 10. Monitor mode screen]

Table 5. Monitor mode screen composition

No.	Screen name	Display	Description
❶	Mode display	**MONITOR**	Monitor mode
		PARAM	Parameter mode
		PARAM E	Parameter editing mode
		FAVORITE	Favorite mode
		FAVOR.E	Favorite editing mode
		ALERT	Alert mode
		HISTORY	Alert history mode
		SETTING	Configuration mode
		WIZARD	Wizard mode

No.	Screen name	Display	Description
❷	Operation command source	**K**	Smart Operator
		T1	Fx/Rx-1
		T2	Fx/Rx-2
		3W	3-Wire
		R	RS-485 built-in communication
		O	Option
		U	USB
		KJ	Smart Operator jog
		TJ	Terminal jog
		US	User Sequence
	Frequency command source	**K**	Smart Operator
		A1, A2 , A3	Analog A1, A2, A3
		P	Pulse
		UD	Up/Down
		R	485 built-in communication
		U	USB
		O	Option
		US	User Sequence
		X1, X2, X3	Extension option analog
		PS	Position Control
		J	Jog
		PI	PID
		1~15	Multistep speed 1-15
❸	Multifunction key setting	**R**	Remote Mode
		L	Local Mode
		J	Smart Operator jog
		F	Favorite Register/Delete

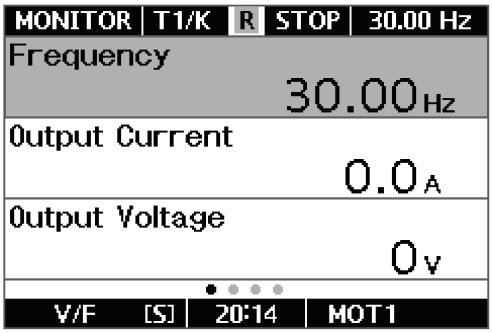
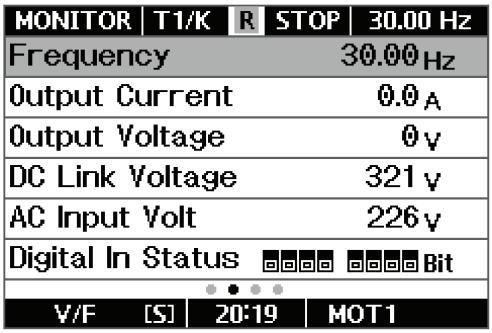
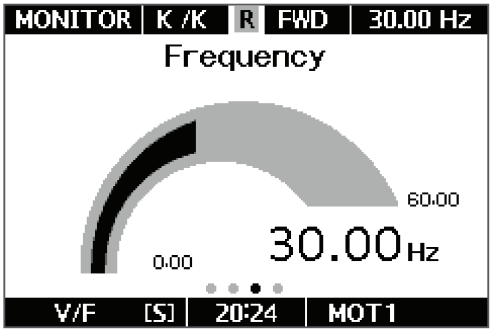
No.	Screen name	Display	Description
❹	Inverter operation state	**STOP**	Stopped
		FWD	Forward operation
		REV	Reverse operation
		TRIP	Trip
		WARN	Warning
		STL	Stall
		SPS	Speed search
		OSS	S/W overcurrent suppression
		OSH	H/W overcurrent suppression
		TUNE	Tuning
		FIRE	Fire Mode
		SLP	PID Operation Sleep Mode
		DC	DC Braking
		KEB	KEB operation
❺	Continuous monitoring display items	**Frequency** (default)	Refer to **12.2.2 Monitoring Item Settings for Top Status Bar** in the comprehensive user's manual.
❻	Display items	**MONITOR1** (default)	Monitor 1, monitor 2, monitor gauge, monitor graph display (press ⟨/⟩ key in Monitor mode to change monitor screen type)
❼	Control mode display	**V/F**	V/F control mode
		Slip Comp.	Slip Compensation control mode
		V/F PG	V/F PG control mode
		Sensorless	Sensorless Vector control mode
		Vector	Sensored Vector control mode
❽	Operation mode display	**[S]**	Speed control mode
		[T]	Torque control mode
		[P]	Position control mode
❾	Current time display	**Hour:minute**	Current time
❿	Control motor display	**MOT1**	First motor selection
		MOT2	Second motor selection

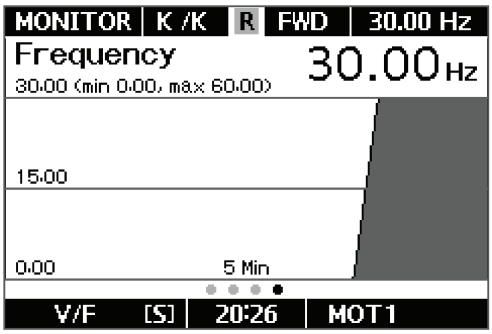
4.2.4.2 Monitor mode type

You can change the monitor screen type by pressing the ⟨/⟩ key in Monitor mode.

In Setting mode, you can select the items to be displayed on each monitor. In Monitor mode, you can navigate directly to Setting mode by pressing the ENT key. Refer to **12.2.1 Item Change in Monitor Display Mode** in the comprehensive user's manual for details.

Table 6. Monitor mode type

Monitor screen type	Description
Monitor 1	This monitor mode displays three items. 
Monitor 2	This monitor mode displays six items. 
Monitor gauge	This monitor mode is displayed as a gauge. 

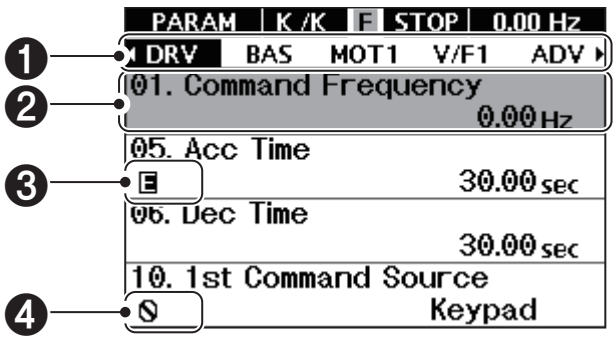
Monitor screen type	Description
Monitor graph	This monitor mode is displayed as a graph. You can set the graph display time in Setting mode as well as using the ▲/▼ key on the Smart Operator. 

4.2.4.3 Parameter mode

You can set the functions necessary for operation.

Enter the main menu screen by pressing the MODE key, select the **Parameter** mode using the direction key (▲/▼/◀/▶), and press the ENTER key to navigate to the Parameter mode screen.

Parameter mode is composed of the following:



[Image 11. Parameter mode screen]

Table 7. Parameter mode screen composition

No.	Classification	Description
❶	Parameter group information	Displays the parameter group name (refer to **Description of the Parameter configuration mode**)
❷	Parameter group details	Displays selected parameter sub-details (code number + code name + parameter value)
❸	Parameter property (changed value)	Displayed when default settings are changed to other values (refer to **4.4 Parameter Setting**)
❹	Parameter property (read only)	Displayed when the item is a read-only property

Description of the Parameter configuration mode

The Parameter configuration mode is composed of the following function groups:

Table 8. Parameter function group

Group name	Display	Description
Drive Group	DRV	Configures basic parameters for inverter operation, such as target frequency and acceleration/ deceleration time. You can check information regarding jog operation settings, inverter temperature, and cooling fan information.
Basic function group	BAS	Configures the parameters related to DC braking, acceleration/deceleration pattern, multistep speed frequency, etc.
First motor group	MOT1	Configures the basic functions related to the first motor.
First motor V/F control group	VF1	Configures functions related to the first motor V/F control.
First motor vector control group	VEC1	Configures functions related to the first motor vector control.
Second motor group	MOT2	Configures the basic functions related to the second motor. Refer to **7.16 Second Motor Operation** in the comprehensive user's manual for details.
Second motor V/F control group	VF2	Configures the second motor V/F control function. Refer to **7.16 Second Motor Operation** in the comprehensive user's manual for details.
Second motor vector control group	VEC2	Configures the second motor vector control function. Refer to **7.16 Second Motor Operation** in the comprehensive user's manual for details.

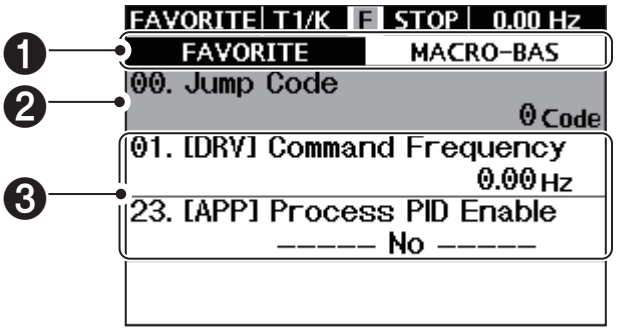
Group name	Display	Description
Advanced function group	ADV	Configures functions related to dwell operation, frequency jump, and up/down operation.
Application function group	APP	Configures functions related to application function activations, speed search, and kinetic energy buffering motion (KEB).
Input terminal function group	DIN	Configures the function of the multifunction digital input terminal.
Analog input terminal group	AIN	Configures the functions of the analog input terminal.
Output terminal group	OUT	Configures output terminal-related functions, including digital multifunctional outputs and analog outputs.
Process PID group	PPID	Configures functions related to PID control.
Protection function group	PRT	Configures motor and inverter protection functions.
Diagnostic function group	DIAG	Configures functions related to inverter diagnosis.
Built-in communication group	INTC	Configures functions related to built-in slave communication.
Built-in master communication group	INTM	Configures functions related to built-in master communication. (Required when using the user sequence function.)
USB communication group	USBC	Configures functions related to USB communication.
Virtual multifunction input group	VIRT	Configures functions related to the virtual multifunction input group.
Encoder group	ENC	Configures functions related to the encoder. (Visible when the encoder option is installed.)
External PID group	EPI1 EPI2	Configures functions related to external PID control.
Position control group	POS1 POS2	Configures functions related to position control.
User Sequence group	US USL USV USP USM	Configures functions related to user sequence.

4.2.4.4 Favorite mode

A user may group frequently used parameters and edit the parameter values of selected macro functions. Refer to **4.5 Favorites Settings** for details.

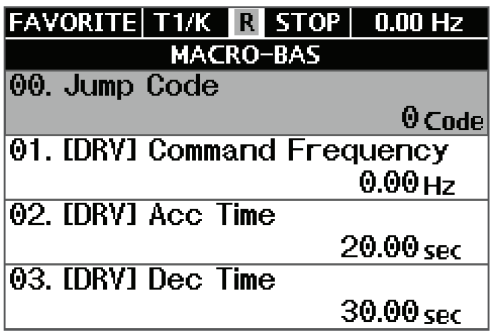
Enter the main menu screen by pressing the MODE key, select the **Favorite** mode using the direction key (▲/▼/◀/▶), and press the ENTER key to navigate to the Favorite mode screen.

The Favorite mode is composed of the following:



[Image 12. Favorite mode screen]

Table 9. Favorite mode screen composition

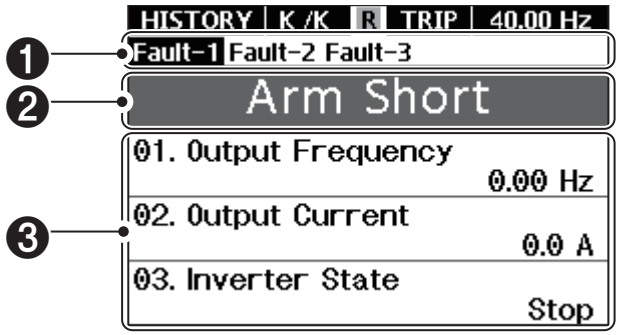
No.	Classification	Description
❶	Tab information	Favorite tab information When there are no parameters registered in **Favorite**, only the MACRO-BAS tab appears on the initial screen. 
❷	Jump Code	Enter the code number to go directly to the desired item (refer to **4.3.3 Navigating Directly to Different Codes (Jump Codes)**)
❸	Registration information	Parameter items registered in favorites • Code number + [group name] code name + parameter value • In Favorites mode, a parameter value may be modified without having to navigate to the corresponding parameter location (refer to **4.5 Favorites Settings**)

4.2.4.5 Trip mode

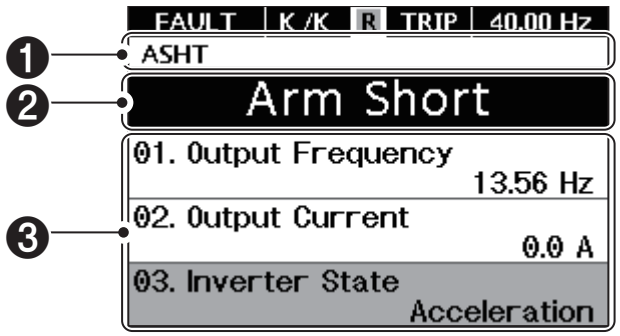
When a trip occurs during operation, the type of trip, frequency of operation, current, and voltage at the time of the trip will be displayed. It is also possible to monitor the types of trips that have occurred in the past. The trip data will not be displayed if no trip has been made and there is no past trip history. Refer to **12.3 Trip Status Monitoring** in the comprehensive user's manual and **14.1 Trip and Warning** for details.

Enter the main menu screen by pressing the MODE key, select the **Trip** mode using the direction key (▲/▼/◀/▶), and press the ENTER key to navigate to the Trip mode screen.

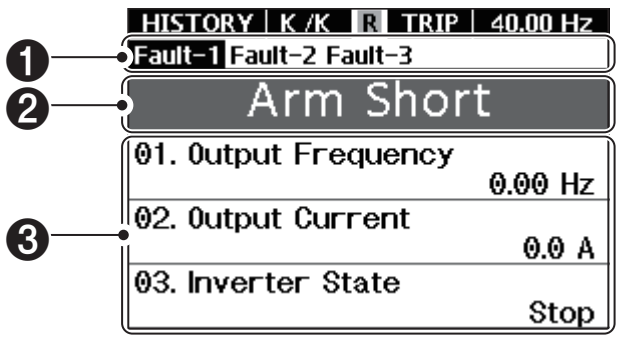
Trip mode is composed of the following:



[Image 13. Screen when there is a previously occurred trip]



[Image 14. Screen when one trip occurred]



[Image 15. Screen when two or more trips occurred]

Table 10. Trip mode screen composition

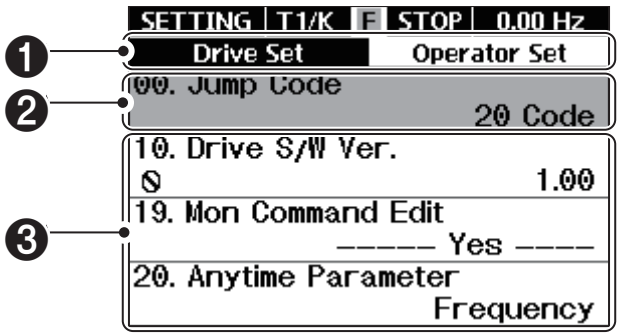
No.	Classification	Description
❶	Trip type/history information tab	The information is displayed according to the type of trip or by the history tab, depending on the situation (Fault-1: last occurred trip)
❷	Fault trip information	Displays the currently occurring trip type
❸	Trip details	Displays information on output frequency, current, operation status, etc. at the time the trip occurred

4.2.4.6 Configuration mode

You can configure the usage environment for the inverter itself, which is not related to operation functions, including setting the Smart Operator language, selecting the monitor mode environment, displaying the type of option card installed on the inverter, initializing parameters, and copying functions. Refer to **12 Inverter Setting Mode** in the comprehensive user's manual for details.

Enter the main menu screen by pressing the MODE key, select the **Setting** mode using the direction key (▲/▼/◀/▶), and press the ENTER key to navigate to the Setting mode screen.

The Setting mode is composed of the following:



[Image 16. Setting mode screen]

Table 11. Setting mode screen composition

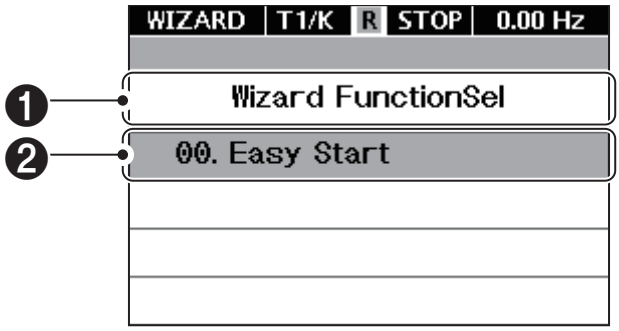
No.	Classification	Description
❶	Tab information	Separates setting items into settings related to operation or Smart Operator operation and displays them in tabs
❷	Jump Code	Enter the code number to go directly to the desired item (refer to **4.3.3 Navigating Directly to Different Codes (Jump Codes)**)
❸	Sub-details	Displays setting tab sub-details

4.2.4.7 Wizard mode

This mode simplifies the complex, multistep setup process for users who are not familiar with it. It is the same mode as the Easy Start On function. Refer to **12.1.2 Parameter Easy Start (Easy Start On)** in the comprehensive user's manual for details.

Enter the main menu screen by pressing the MODE key, select the **Wizard** mode using the direction keys (▲/▼/◀/▶), and press the ENTER key to navigate to the Wizard mode screen.

The Wizard mode is composed as follows:



[Image 17. Wizard mode screen]

Table 12. Wizard mode screen composition

No.	Classification	Description
❶	Title	Displays the Wizard mode title
❷	Run item	Runs Wizard (refer to **12.1.2 Parameter Easy Start (Easy Start On)** in the comprehensive user's manual)

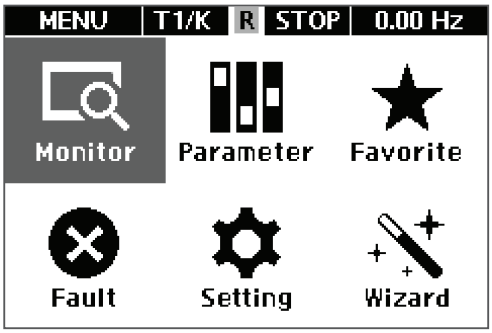
4.3 How to Use the Smart Operator

To use the product's functions, it is necessary to select the group and code to which the function belongs with the Smart Operator and set the parameter value for each function. Refer to **13 Table of Functions** to find the functions you need. Check the group and code to which the function belongs and the set value (parameter) range for the function. Select the group and code using the Smart Operator, and set the parameter value according to the description below.

4.3.1 Navigating to the Main Menu (Mode) Screen

Pressing the MODE key will navigate to the main menu screen, regardless of where the screen is currently located.

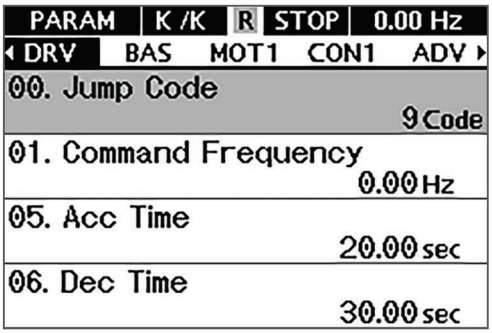
Press the direction key (▲/▼/◀/▶) of the Smart Operator to navigate to and select the desired mode. Enter the corresponding mode by pressing the ENTER key.



[Image 18. Menu screen]

4.3.2 Navigating to Code (Function Item)

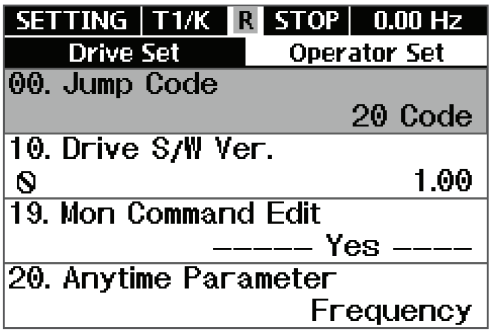
On the menu screen, press the direction key () to navigate to the desired mode, and press the  key to enter it.



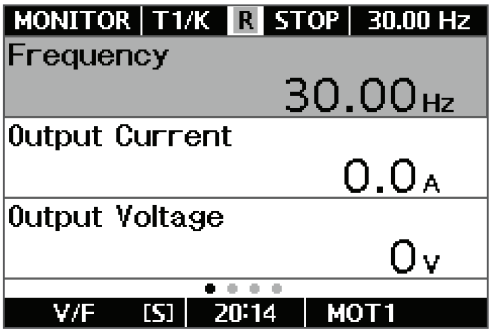
[Image 19. Parameter configuration group screen]

[Select a parameter group or information tab]

You can select the desired parameter group or information tab by pressing the  key.



[Image 20. Drive Set tab screen in Setting mode]



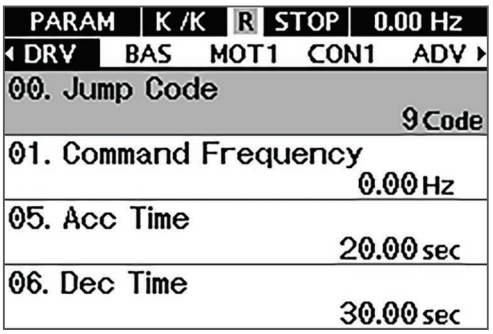
[Image 21. Monitor mode screen]

Navigating to function items]

- You can navigate to the desired function item by pressing the  key.
- You can navigate to the first code (jump code) by pressing the ESC key.

4.3.3 Navigating Directly to Different Codes (Jump Codes)

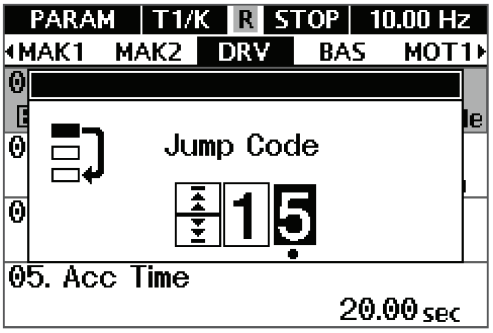
There is a jump code input item that can be used to navigate to the code of each group in the Parameter mode and Setting mode groups. You can navigate (jump) directly to the desired code by using the Jump Code, which is the first code of a specific group in parameter mode. It allows you to move faster than pressing the ▲/▼ key when the code number is large. An example of navigating to code number 15 of the drive group (DRV) is shown in the following illustration.



[Image 22. Jump Code selection screen]

[Group Selection]

- When in parameter configuration mode, press the ◀/▶ key to navigate to the drive group (DRV) and select code number 00 (pressing the ESC key on a specific item navigates to code number 00).
- Press the ENTER key.



[Image 23. Jump Code No. input screen]

[Example of entering code number 15]

- Enter the first digit (5): Press the ▲/▼ key to enter 5.
- Enter the second digit (1): Press the ◀/▶ key from the first digit to navigate to the second digit input position, then press the ▲/▼ key to enter 1.
- Press the ENTER key.

[Note]

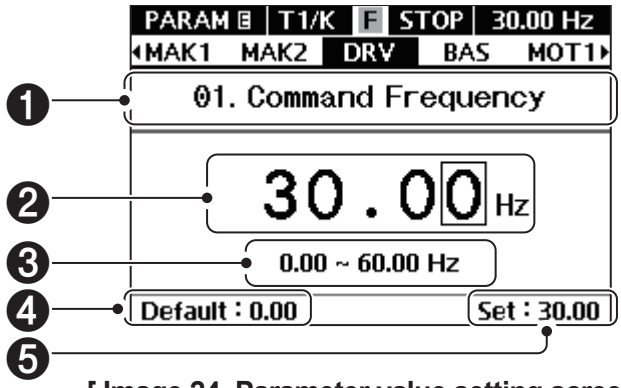
- Current input position: A round dot symbol appears below the number.
- ▲▼ : By pressing the ◀/▶ key, you can navigate to this button position. Then, press the ▲ key to input the code number 99 and press the ▼ key to input the code number 00.

4.4 Parameter Setting

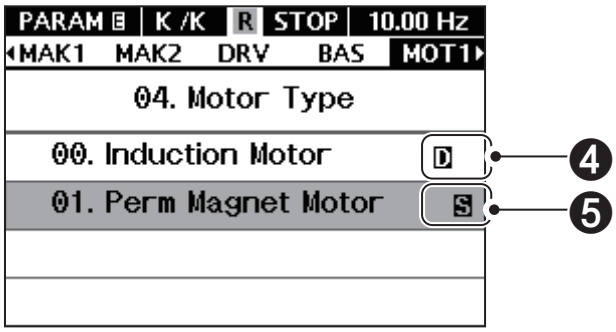
You can directly change the parameters required for operation.

On the Parameter configuration mode screen, select the parameter group and items to be set, then press the ENTER key to change the items. However, items marked as ⃠ in the list are read-only and cannot be edited.

The Parameter configuration change screen is composed of the following.



[Image 24. Parameter value setting screen]

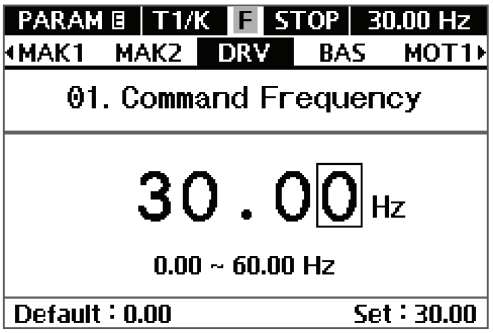


[Image 25. Parameter item selection screen]

Table 13. Parameter mode screen composition

No.	Description
❶	Code number and code name
❷	Displays the new parameter values. Press the ⟨/⟩ key to move to the position
❸	Settable range
❹	Initial value at product shipment
❺	Current setting values

An example of changing the command frequency setting value of code number 01 in the drive group (DRV) is shown in the following illustration.



[Image 26. Parameter value input screen]

- By pressing the ◁/▷ key, navigate to the desired position to enter a value. Then, press the △/▽ key to enter the desired setting value.
- Press the ENTER key.
- Once set, you can navigate to the list of the corresponding group, and if a value other than the default value is entered, **E** will be displayed on the corresponding item in the list.

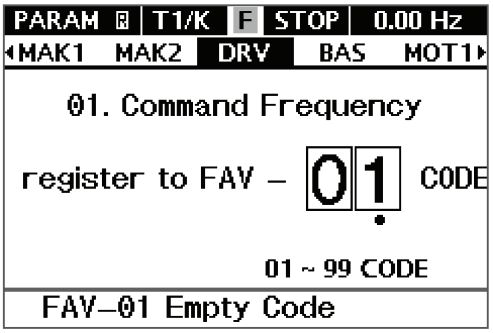
4.5 Favorites Settings

4.5.1 Register/delete favorite parameters

Among the function items in each parameter mode group, this function allows you to register or delete frequently used parameters in the Favorite group. The MULTI key must be set to a function that allows you to register or delete favorites in order to use this function. You can enable the favorites register/delete function of MULTI by following the example in the below table.

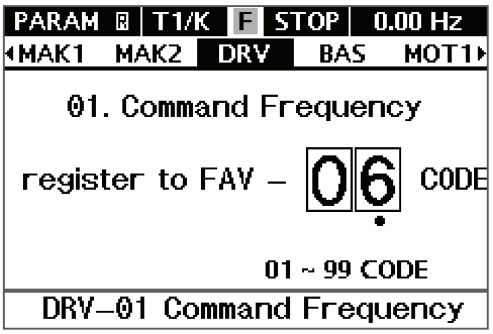
Mode	Group	Code	LCD Display	Set Value		Setting Range	Initial value	Unit
Setting	Operator Set	15	Multi Key Select	2	Favorite Add/ Del	-	0	

Favorite Registration



[Image 27. Favorite registration screen]
(if there is no parameter registered in the selected code)

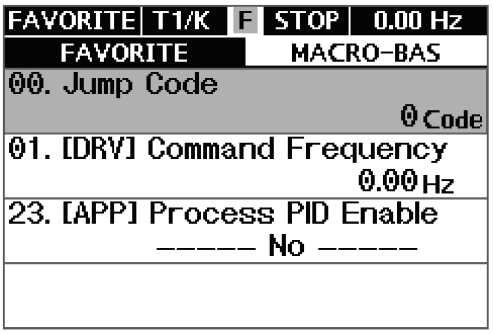
- Navigate to the parameter you want to register as a favorite in the Parameter mode and press the MULTI key. Navigate to the Favorite registration screen.
- By pressing the ◁/▷ key, navigate to the position to enter a value. Then, by pressing the △/▽ key, enter the code number of the favorites group to register the parameter.
- Press the ENTER key. The parameter is registered as a favorite in the selected code.



[Image 28. Favorite registration screen]
(If there is a parameter registered in the selected code)

[Note]
The parameters will be overwritten if there are already registered parameters for the selected code number.

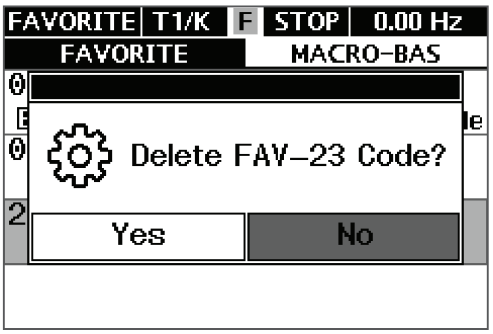
Favorite deletion



[Image 29. Favorite list screen]

- In Favorite mode, navigate to the parameter you want to delete and press the ENTER key. (It is not possible to unregister the 00-Jump Code.)

[Note]
The favorite items on the MACRO-BAS tab, which are registered by default, can only be edited and cannot be deleted.

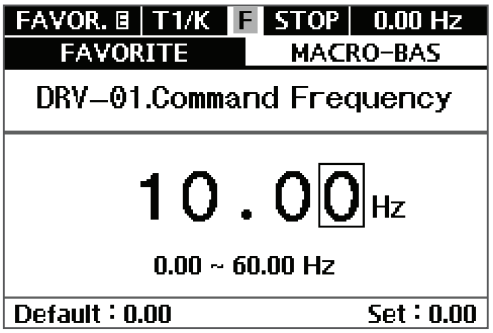


[Image 30. Confirmation screen for deleting favorites]

- In the pop-up window asking for deletion, select YES and press the ENTER key. The parameter will be deleted from the favorites list.

4.5.2 Editing the Favorite Parameters

The parameter values registered in the favorite group can be directly edited in Favorite mode.



[Image 31. Editing screen of the favorites registration parameter value]

- Navigate to the parameter you want to delete in Favorite mode and press the ENTER key. Navigate to the parameter change screen.
- By pressing the ◁/▷ key, navigate to the desired position to enter a value. Then, press the △/▽ key to enter the desired setting value.
- Press the ENTER key.
- Once set, you can navigate to the list of the corresponding group, and if a value other than the default value is entered, E will be displayed on the corresponding item in the list.

4.6 Macro settings

4.6.1 Selecting macro

Similar to Favorites settings, this function allows you to easily use basic functions in each Parameter mode group by pre-registering them into a group.

Mode	Group	Code	LCD Display	Set Value		Setting Range	Initial Value	Unit
Setting	Drive Set	47	Macro Select	0	Basic	0-2	0	-
				1	3-Wire			
				2	Up Down Drive			

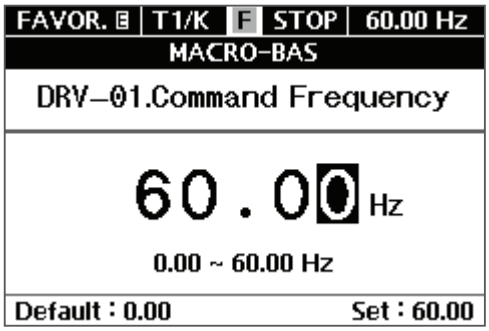
The parameters and initial values for each macro are as follows:

Macro settings value	Group	Code	LCD Display	Initial Value
BASIC	DRV	02	Command Frequency	60.00Hz
		05	Acc Time	20.00sec
		06	Dec Time	30.00sec
		10	1st Command Src	Fx/Rx-1
		11	1st Freq Ref Src	Keypad
	DIN	01	DI1 Define	Fx
		03	DI2 Define	Rx
		09	DI5 Define	Speed-L
		11	DI6 Define	Speed-M
		13	DI7 Define	Speed-H
		15	DI8 Define	JOG

Macro settings value	Group	Code	LCD Display	Initial Value
3WIRE	DRV	02	Command Frequency	60.00Hz
		05	Acc Time	20.00sec
		06	Dec Time	30.00sec
		10	1st Command Src	Fx/Rx-1
		11	1st Freq Ref Src	Keypad
	DIN	01	DI1 Define	Fx
		03	DI2 Define	Rx
		05	DI3 Define	3-Wire
UPDOWN	DRV	05	Acc Time	20.00sec
		06	Dec Time	30.00sec
		10	1st Command Src	Fx/Rx-1
		11	1st Freq Ref Src	Up Down Drive
	ADV	75	Up/Down Mode	U/D Normal
	DIN	01	DI1 Define	Fx
		03	DI2 Define	Rx
		07	DI4 Define	Up
		09	DI5 Define	Down
		11	DI6 Define	Up/Down Clear
		13	DI7 Define	Up/Down Save

4.6.2 Edit macro Parameters

The parameter values registered in the favorite group can be directly edited in Macro mode.



[Image 32. Editing screen of the macro parameter value]

- Navigate to the parameter you want to delete in Macro mode and press the ENTER key. Navigate to the parameter change screen.
- By pressing the ◁/▷ key, you can navigate to the position to enter a value. Then, press the △/▽ key to enter the desired setting value.
- Press the ENTER key.
- Once set, you can navigate to the list of the corresponding group, and if a value other than the default value is entered, E will be displayed on the corresponding item in the list.

5 Learning Basic Functions

For more information about the basic functions of the inverter, refer to the comprehensive user's manual on the website (https://www.ls-electric.com).

5.1 Frequency Settings

5.2 Operation Command Settings

5.3 Acc/Dec Settings

6 Using the Advanced Functions of the Motor

For more information about the advanced functions of the motor, refer to the comprehensive user's manual on the website (https://www.ls-electric.com).

6.1 Induction Motor V/F Control

6.2 Vector Control for Induction Motors

6.3 Torque Control for Induction Motors

6.4 V/F Control for Synchronous Motors

6.5 Vector Control for Synchronous Motors

6.6 Common Functions of Vector Control

7 Learning Advanced Features

For more information about the advanced features of the inverter, refer to the comprehensive user's manual on the website (https://www.ls-electric.com).

7.1 Auxiliary Frequency Operation

7.2 Jog operation

7.3 3-Wire Operation

7.4 Safe Operation Mode

7.5 Dwell Operation

7.6 Torque Boost

7.7 PID Control

7.8 External PID (EPID)

7.9 Kinetic Energy Buffering Operation

7.10 Current Hunting Prevention (Anti-Hunting Regulator)

7.11 Fire Mode

7.12 Energy Saving Operation

7.13 Speed Search Operation

7.14 Auto Restart Setting

7.15 Operational Noise Settings (Change of Carrier Frequency Settings)

7.16 Second Motor Operation

7.17 Switching Operation to Commercial Power

7.18 Input Power Frequency Settings and Voltage Monitoring

7.19 Second Operation Mode Settings

7.20 Regeneration Avoidance

7.21 Load Speed

7.22 Output Power Display

7.23 Motor Pre-Heating

7.24 DC Injection by Terminal Block

7.25 Brake Control

7.26 Position Control

7.27 Using User Sequence

7.28 Operating Winder/Unwinder

7.29 System Stop (Quick Stop)

7.30 No Restart after a Free-Run Stop

7.31 Timer Settings

7.32 Droop Control

8 Functions of Terminal Block

For more information about the functions of terminal block, refer to the comprehensive user's manual on the website (https://www.ls-electric.com).

8.1 Multifunction Digital Inputs

8.2 Analog Input

8.3 Multifunction Digital Output

8.4 Pulse Input

8.5 Analog Output

8.6 Pulse Output

9 Learning Protection Functions

For more information about the protection functions of the inverter, refer to the comprehensive user's manual on the website (https://www.ls-electric.com).

9.1 Motor Protection

9.2 Inverter and Sequence Protection

9.3 Diagnostic Functions

9.4 Operation Settings related to Trip Occurrence

9.5 Trip/Warning List

10 Using Built-in Communication Features

For more information about the built-in communication features of the inverter, refer to the comprehensive user's manual on the website (https://www.ls-electric.com).

10.1 Communication Standards

10.2 Communication System Configuration

10.3 Communication Parameter Address Operation

10.4 Built-in Communication Protocol

11 Using USB Communication Functions

For more information about the USB communication functions of the inverter, refer to the comprehensive user's manual on the website (https://www.ls-electric.com).

11.1 Parameter Settings for USB Communication

11.2 Parameter Group for Data Transmission

12 Inverter Setting Mode

For more information about the inverter setting mode, refer to the comprehensive user's manual on the website (https://www.ls-electric.com).

12.1 Parameter Management

12.2 Monitoring Settings

12.3 Trip Status Monitoring

13 Table of Functions

This chapter lists all the function settings for S300 series inverter. Set the parameters required for operation according to the table of functions.

The parameter address when accessing the inverter parameter with communication is calculated as follows:

16-bit parameter address = 16 bit group code + code number
32-bit parameter address = 32 bit group code + code number *2

If you want to get the process PID output via communication, its parameter is PPID-02 (Output Value) and the parameter address when accessing with 16-bit parameter is as follows:

2000h + 2 = 2002h

The parameter address when accessing with a 32-bit parameter is as follows:

A000h + 2 * 2 = A004h (read two consecutively)

By default, when accessing 32-bit parameters, the parameter addresses must be even numbers. If accessed with an odd number, the inverter will respond with an address that is 1 less. For example, the 32-bit parameter address of PPID-02 (Output Value) is A004h. However, if accessed with A005h, the inverter will recognize it as A004h and respond accordingly.

The group codes for each parameter are as follows:

Group	16-Bit	32-Bit	Group	16-Bit	32-Bit
DRV	1200h	9200h	INTC	2700h	A700h
BAS	1300h	9300h	INTM	2800h	A800h
MOT1	1400h	9400h	USBC	2900h	A900h
VF1	1500h	9500h	VIRT	2C00h	AC00h
VEC1	1600h	9600h	ENC	2D00	AD00
MOT2	1700h	9700h	EPI1	2E00	AE00
VF2	1800h	9800h	EPI2	2F00	AF00
VEC2	1900h	9900h	POS1	3000	B000
ADV	1A00h	9A00h	POS2	3100	B100
APP	1B00h	9B00h	WEB1	3200	B200
DIN	1B00h	9B00h	WEB2	3300	B300

Group	16-Bit	32-Bit	Group	16-Bit	32-Bit
AIN	1C00h	9C00h	US	3900	B900
OUT	1D00h	9D00h	USL	3A00	BA00
PPID	2200h	A200h	USV	3B00	BB00
PRT	2400h	A400h	USP	3C00	BC00
DIAG	2500h	A500h	USM	3D00	BD00

13.1 Drive Group (DRV)

The codes in the gray shaded area are hidden when shipped from the factory and shown only when setting the parameter (refer to the footnote).

Max Frequency and Maximum Speed refer to the setting values at DRV-20 (Max Frequency) and DRV-21 (Maximum Speed) respectively.

Code	LCD Display	Setting Range	Initial Value	Unit	Property[1]	Ref.	Communication address/scale	
							16-Bit	32-Bit
00	Jump Code	1-99	25	-	O	4.3.3	1200h	9200h
01	Command Frequency	0.00-Max Frequency	0.00	Hz	O	5.1.1.2	1201h	9202h
							0.01	0.01
02 [2]	Command Speed	0-Maximum Speed	0 [3]	rpm	O	5.1.1.2	1202h	9204h
							1	1
03	Command Torque	-180.0-180.0	0.0	%	O		1203h	9206h
							0.1	0.1
05	Acc Time	0.00-6000.00	20.00 [4]	sec	O	5.3.1	1205h	920Ah
			60.00 [5]				0.1	0.01

1 O: Writable during operation, △: Writable when stopped, X: Not writable
2 Activated when the DRV-32 (Hz/rpm Select) value is 1 (rpm Display).
3 The rpm value varies according to the motor rating pole number (MOT1, 2-25).
4 For an inverter capacity of 75 kW or less (Refer to **16.8 Parameter Default Values Based on the Motor Capacity**)
5 For an inverter capacity 90 kW or more (Refer to **16.8 Parameter Default Values Based on the Motor Capacity**)

Code	LCD Display	Setting Range		Initial Value	Unit	Property[1]	Ref.	Communication address/scale	
								16-Bit	32-Bit
06	Dec Time	0.00-6000.00		30.00	sec	O	5.3.1	1206h	920Ch
								0.1	0.01
10	1st Command Source	0	Keypad	1	-	△	5.2.1	120ah	9214h
		1	Fx/Rx-1						
		2	Fx/Rx-2						
		3	3-Wire						
		4	Internal Comm						
		5	USB Comm.						
		6	Option Comm.						
		7	UserSequence						
11	1st Freq Ref Src	0	Keypad	0	-	△	5.1.1.1	120bh	9216h
		1	Analog Input 1						
		2	Analog Input 2						
		3	Analog Input 3						
		4	Pulse Input						
		5	Up Down Drive						
		6	Internal Comm.						
		7	USB Comm.						
		8	Option Comm.						
		9	UserSequence						
		10	X-Analog Input 1						
		11	X-Analog Input 2						
		12	X-Analog Input 3						

Code	LCD Display	Setting Range		Initial Value	Unit	Property[1]	Ref.	Communication address/scale	
								16-Bit	32-Bit
12 [6]	1st Torque Ref Src	0	Keypad	0	-	△		120ch	9218h
		1	Analog Input 1						
		2	Analog Input 2						
		3	Analog Input 3						
		4	Pulse Input						
		5	Internal Comm.						
		6	USB Comm.						
		7	Option Comm.						
		8	UserSequence						
		9	X-Analog Input 1						
		10	X-Analog Input 2						
		11	X-Analog Input 3						
15	Jog Frequency	0.00-Max Frequency		10.00	Hz	O	7.2.1	120fh	921Eh
								0.01	0.01
16 [2]	Jog Speed	0-Maximum Speed		300 [3]	rpm	O	7.2.1	1210h	9220h
								1	1
17	Jog Acc Time	0.00-6000.00		20.00	sec	O	7.2.1	1211h	9222h
								0.1	0.01
18	Jog Dec Time	0.00-6000.00		30.00	sec	O	7.2.1	1212h	9224h
								0.1	0.01
20	Max Frequency	40.00-590.00		60.00	Hz	△	5.1.2.5	1214h	9228h
								0.01	0.01
21 [2]	Maximum Speed	1200-17700		1800 [3]	rpm	△	5.1.2.5	1215h	922Ah
								1	1
22	Frequency at 100%	0.00-Max Frequency		60.00	Hz	O	5.1.1.3	1216h	922Ch
								0.01	0.01
23 [2]	Speed at 100%	0-Maximum Speed		1800 [3]	rpm	O	5.1.1.3	1217h	922Eh
								1	1
24 [6]	Torque at 100%	0.0-200.0		100.0	%	O		1218h	9230h
								0.1	0.1

[6] Activated when the MOT1-8 (Torque Control En) value is 1 (Yes).

Code	LCD Display	Setting Range		Initial Value	Unit	Property[1]	Ref.	Communication address/scale	
								16-Bit	32-Bit
25	Load Duty Select	0	Normal Duty	1	-	△	9.1.3	1219h	9232h
		1	Heavy Duty				9.1.2		
26	PWM Mode	0	Normal PWM	1	-	△		121ah	9234h
		1	Low Leakage PWM						
27	Carrier Frequency	1-15		2	kHz	O		121bh	9236h
								1	1
28	OVM Mode Enable	0	No	1	-	O	-	121Ch	9238h
		1	Yes						
30	Ref AC Input Volt	**200 V class**	200-240V	-	V	X	7.18	121eh	923Ch
								1	1
		400 V class	380-480V	-			7.18	121fh	923Eh
								1	1
31	60/50 Hz Select	0	60Hz	0	-	△	7.18	1220h	9240h
		1	50Hz						
32	Hz/rpm Select	0	Hz Display	0	-	△	5.1.2.3	1223h	9246h
		1	rpm Display						
35	Auxiliary Ref Src	0	None	0	-	△		1224h	9248h
		1	Analog Input 1						
		2	Analog Input 2						
		3	Analog Input 3						
		4	Pulse Input						

Code	LCD Display	Setting Range		Initial Value	Unit	Property[1]	Ref.	Communication address/scale	
								16-Bit	32-Bit
36 [7]	Auxiliary Cal Type	0	M + (G * A)	0	-	△		1225h	924Ah
		1	M * (G * A)						
		2	M / (G * A)						
		3	M+(M*(G*A))						
		4	M+G*2*(A-50)						
		5	M*(G*2*(A-50))						
		6	M/(G*2*(A-50))						
		7	M+M*G*2*(A-50)						
		8	(M-A)^2						
		9	M^2 + A^2						
		10	MAX(M,A)						
		11	MIN(M,A)						
		12	(M+A)/2						
37 [7]	Auxiliary Ref Gain	-200.0-200.0		100.0	%	O		1228h	9250h
								0.1	0.1
40 [8]	2nd Command Src	0	Keypad	1	-	△	7.18	1229h	9252h
		1	Fx/Rx-1						
		2	Fx/Rx-2						
		3	3-Wire						
		4	Internal Comm.						
		5	USB Comm.						
		6	Option Comm.						
		7	UserSequence						

[7] Activated when the DRV-35 (Auxiliary Ref Src) value is not 0 (None).
[8] Activated when one of the DIN-01, 03, 05, 07, 09, 11, 13, and 15 (DI1-DI8 Define) values is 20 (2nd Source).

Code	LCD Display	Setting Range		Initial Value	Unit	Property[1]	Ref.	Communication address/scale	
								16-Bit	32-Bit
41 [8]	2nd Freq Ref Src	0	Keypad	0	-	O	7.18	122ah	9254h
		1	Analog Input 1						
		2	Analog Input 2						
		3	Analog Input 3						
		4	Pulse Input						
		5	Up Down Drive						
		6	Internal Comm.						
		7	USB Comm.						
		8	Option Comm.						
		9	UserSequence						
		10	X-Analog Input 1						
		11	X-Analog Input 2						
		12	X-Analog Input 3						
42 [8]	2nd Torque Src	0	Keypad	0	-	O	7.18	122ah	9254h
		1	Analog Input01						
		2	Analog Input02						
		3	Analog Input03						
		4	Pulse Input						
		5	Internal Comm.						
		6	USB Comm.						
		7	Option Comm.						
		8	UserSequence						
		9	X-Analog Input 1						
		10	X-Analog Input 2						
		11	X-Analog Input 3						
45	Trim Power %	70-130		100	%	O	7.22	122dh	925Ah
								1	1

Code	LCD Display	Setting Range		Initial Value	Unit	Property[1]	Ref.	Communication address/scale	
								16-Bit	32-Bit
50	Fan Control	0	During Run	0	-	O	9.2.10	1232h	9264h
		1	Always Run						
		2	Temp. Control						
85	Temperature	-		-	℃	X	-	1255h	92AAh
								0.1	0.1
86	Sync Frequency	-		-	Hz	X	-	1256h	92ACh
								0.01	0.01

13.2 Basic Function Group (BAS)

The codes in the gray shaded area are hidden when shipped from the factory and shown only when setting the parameter (refer to the footnote).

Max Frequency and Maximum Speed refer to the setting values at DRV-20 (Max Frequency) and DRV-21 (Maximum Speed) respectively.

Code	LCD Display	Setting Range		Initial Value	Unit	Property[9]	Ref.	Communication address/scale	
								16-Bit	32-Bit
00	Jump Code	1-99		20	-	O	4.3.3	1300h	9300h
01	Start Mode	0	Acceleration	0	-	△	5.2.4	1301h	9302h
		1	DC Start						
		2	Speed Search						
02	Stop Mode	0	Deceleration	0	-	△	5.2.5	1302h	9304h
		1	Dc Brake						
		2	CoastStop (FreeRun)						
		3	Reserved						
		4	Power Braking						
03 [10]	DC Start Time	0.01-60.00		1.00	sec	△	5.2.4.2	1303h	9306h
								0.01	0.01
04 [10]	DC Start Level	1-200		50	%	△	5.2.4.2	1304h	9308h
								1	1
05 [11]	DC Brake Block Time	0.00-60.00		0.10	sec	△	5.2.5.2	1305h	930ah
								0.01	0.01
06 [11]	DC Brake Time	0.01-60.00		1.00	sec	△	5.2.5.2	1306h	930ch
								0.01	0.01
07 [11]	DC Brake Level	1-200		50	%	△	5.2.5.2	1307h	930eh
								1	1
08 [11]	DC Brake Frequency	0.00-60.00		5.00	Hz	△	5.2.5.2	1308h	9310h
								0.01	0.01

[9] O: Writable during operation, △: Writable when stopped, X: Not writable
[10] Activated when the BAS-1 (Start Mode) value is 1 (DC Start).
[11] Activated when the BAS-02(Stop Mode) value is 1 (DC Brake).

Code	LCD Display	Setting Range		Initial Value	Unit	Property[9]	Ref.	Communication address/scale	
								16-Bit	32-Bit
09 [12]	DC Brake Speed	0-1800		150 [13]	rpm	△	5.2.5.2	1309h	9312h
								1	1
10 [14]	DC Injection Level	1-200		50	%	△		130ah	9314h
								1	1
11 [15]	PwrBrk BandWidth	0-500		100	%	△	5.2.5.4	130bh	9316h
								1	1
12 [15]	PwrBrk FluxBrkGain	0-200		100	%	△	5.2.5.4	130ch	9318h
								1	1
16	Torque Limit Src	0	Keypad	0	-	△		130bh	9316h
		1	Analog Input 1						
		2	Analog Input 2						
		3	Analog Input 3						
		4	Pulse Input						
		5	Up Down Drive						
		6	Internal Comm.						
		7	USB Comm.						
		8	Option Comm						
17 [16]	TrqMode SpdLmt Src	0	Keypad	0	-	△		130ch	9318h
		1	Analog Input 1						
		2	Analog Input 2						
		3	Analog Input 3						
		4	Pulse Input						
		5	Up Down Drive						
		6	Internal Comm.						
		7	USB Comm.						
		8	Option Comm						

[12] Activated when the BAS-2 (Stop Mode) value is 1 (DC Brake) and the DRV-32 (Hz/rpm Select) value is 1 (rpm Display).
[13] The rpm value varies according to the motor rating pole number (MOT1, 2-25).
[14] Activated when one of the DIN-01, 03, 05, 07, 09, 11, 13, and 15 (DI1-DI8 Define) values is 28 (DC Injection).
[15] Activated when the BAS-2 (Stop Mode) value is 4 (Power Braking).
[16] Activated when the MOT1-8 (Torque Control En) value is 1 (Yes).

Code	LCD Display	Setting Range	Initial Value	Unit	Property[9]	Ref.	Communication address/scale	
							16-Bit	32-Bit
20	Auto Tuning	0 None 1 Auto Tuning	0	-	△	3.4	130fh	931eh
22	Ldq Tune Freq Perc	80-150	150	%	△	-	1318h 1	9330h 1
23	Ldq Tune Curr Perc	20-50	35	%	△	-	1319h 1	9332h 1
31	Step Frequency-01	0.00-Max Frequency	10.00	Hz	O	5.1.2.4	131fh 0.01	933eh 0.01
32	Step Frequency-02	0.00-Max Frequency	20.00	Hz	O	5.1.2.4	1320h 0.01	9340h 0.01
33	Step Frequency-03	0.00-Max Frequency	30.00	Hz	O	5.1.2.4	1321h 0.01	9342h 0.01
34	Step Frequency-04	0.00-Max Frequency	40.00	Hz	O	5.1.2.4	1322h 0.01	9344h 0.01
35	Step Frequency-05	0.00-Max Frequency	50.00	Hz	O	5.1.2.4	1323h 0.01	9346h 0.01
36	Step Frequency-06	0.00-Max Frequency	60.00	Hz	O	5.1.2.4	1324h 0.01	9348h 0.01
37	Step Frequency-07	0.00-Max Frequency	60.00	Hz	O	5.1.2.4	1325h 0.01	934ah 0.01
38	Step Frequency-08	0.00-Max Frequency	55.00	Hz	O	5.1.2.4	1326h 0.01	934ch 0.01
39	Step Frequency-09	0.00-Max Frequency	50.00	Hz	O	5.1.2.4	1327h 0.01	934eh 0.01
40	Step Frequency-10	0.00-Max Frequency	45.00	Hz	O	5.1.2.4	1328h 0.01	9350h 0.01
41	Step Frequency-11	0.00-Max Frequency	40.00	Hz	O	5.1.2.4	1329h 0.01	9352h 0.01
42	Step Frequency-12	0.00-Max Frequency	35.00	Hz	O	5.1.2.4	132ah 0.01	9354h 0.01
43	Step Frequency-13	0.00-Max Frequency	25.00	Hz	O	5.1.2.4	132bh 0.01	9356h 0.01

Code	LCD Display	Setting Range	Initial Value	Unit	Property[9]	Ref.	Communication address/scale	
							16-Bit	32-Bit
44	Step Frequency-14	0.00-Max Frequency	15.00	Hz	O	5.1.2.4	132ch	9358h
							0.01	0.01
45	Step Frequency-15	0.00-Max Frequency	5.00	Hz	O	5.1.2.4	132dh	935ah
							0.01	0.01
46 [12]	Step Speed-01	0-Maximum Speed	300 [13]	rpm	O	5.1.2.4	132eh	935ch
							1	1
47 [12]	Step Speed-02	0-Maximum Speed	600 [13]	rpm	O	5.1.2.4	132fh	935eh
							1	1
48 [12]	Step Speed-03	0-Maximum Speed	900 [13]	rpm	O	5.1.2.4	1330h	9360h
							1	1
49 [12]	Step Speed-04	0-Maximum Speed	1200 [13]	rpm	O	5.1.2.4	1331h	9362h
							1	1
50 [12]	Step Speed-05	0-Maximum Speed	1500 [13]	rpm	O	5.1.2.4	1332h	9364h
							1	1
51 [12]	Step Speed-06	0-Maximum Speed	1800 [13]	rpm	O	5.1.2.4	1333h	9366h
							1	1
52 [12]	Step Speed-07	0-Maximum Speed	1800 [13]	rpm	O	5.1.2.4	1334h	9368h
							1	1
53 [12]	Step Speed-08	0-Maximum Speed	1650 [13]	rpm	O	5.1.2.4	1335h	936ah
							1	1
54 [12]	Step Speed-09	0-Maximum Speed	1500 [13]	rpm	O	5.1.2.4	1336h	936ch
							1	1
55 [12]	Step Speed-10	0-Maximum Speed	1350 [13]	rpm	O	5.1.2.4	1337h	936eh
							1	1
56 [12]	Step Speed-11	0-Maximum Speed	1200 [13]	rpm	O	5.1.2.4	1338h	9370h
							1	1
57 [12]	Step Speed-12	0-Maximum Speed	1050 [13]	rpm	O	5.1.2.4	1339h	9372h
							1	1
58 [12]	Step Speed-13	0-Maximum Speed	750 [13]	rpm	O	5.1.2.4	133ah	9374h
							1	1

Code	LCD Display	Setting Range		Initial Value	Unit	Property[9]	Ref.	Communication address/scale	
								16-Bit	32-Bit
59 [12]	Step Speed-14	0-Maximum Speed		450 [13]	rpm	O	5.1.2.4	133bh	9376h
								1	1
60 [12]	Step Speed-15	0-Maximum Speed		150 [13]	rpm	O	5.1.2.4	133ch	9378h
								1	1
66	Acc Pattern	0	Linear	0	-	△	5.3.2.1	1342h	9384h
		1	S-Curve						
67 [17]	Acc S-Curve Start	1-100		40	%	△	5.3.2.1	1343h	9386h
								1	1
68 [17]	Acc S-Curve End	1-100		40	%	△	5.3.2.1	1344h	9388h
								1	1
69	Dec Pattern	0	Linear	0	-	△	5.3.2.1	1345h	938ah
		1	S-Curve						
70 [18]	Dec S-Curve Start	1-100		40	%	△	5.3.2.1	1346h	938ch
								1	1
71 [18]	Dec S-Curve End	1-100		40	%	△	5.3.2.1	1347h	938eh
								1	1
76	Ramp Time Mode	0	Max Frequency	0	-	△	5.3.2.1	134ch	9398h
		1	Delta Frequency						
77	Pattern UpdateBand	0.0-1.0		0.3	Hz	△	5.3.2.1	134dh	939ah
								0.1	0.1
78 [19]	Acc Time-1	0.00-6000.00		20.00	sec	O	5.3.1.3	134eh	939ch
								0.1	0.01
79 [19]	Dec Time-1	0.00-6000.00		20.00	sec	O	5.3.1.3	134fh	939eh
								0.1	0.01
80 [19]	Acc Time-2	0.00-6000.00		30.00	sec	O	5.3.1.3	1350h	93a0h
								0.1	0.01

[17] Activated when the BAS-66 (Acc Pattern) value is 1 (S-Curve).
[18] Activated when the BAS-69 (Dec Pattern) value is 1 (S-Curve).
[19] Activated when one of the DIN-01, 03, 05, 07, 09, 11, 13, and 15 (DI1-DI8 Define) values is 14, 15, and 16 (XCEL_L, XCEL_M, XCEL_H).

Code	LCD Display	Setting Range		Initial Value	Unit	Property[9]	Ref.	Communication address/scale	
								16-Bit	32-Bit
81 [19]	Dec Time-2	0.00-6000.00		30.00	sec	O	5.3.1.3	1351h	93a2h
								0.1	0.01
82 [19]	Acc Time-3	0.00-6000.00		40.00	sec	O	5.3.1.3	1352h	93a4h
								0.1	0.01
83 [19]	Dec Time-3	0.00-6000.00		40.00	sec	O	5.3.1.3	1353h	93a6h
								0.1	0.01
84 [19]	Acc Time-4	0.00-6000.00		50.00	sec	O	5.3.1.3	1354h	93a8h
								0.1	0.01
85 [19]	Dec Time-4	0.00-6000.00		50.00	sec	O	5.3.1.3	1355h	93aah
								0.1	0.01
86 [19]	Acc Time-5	0.00-6000.00		60.00	sec	O	5.3.1.3	1356h	93ach
								0.1	0.01
87 [19]	Dec Time-5	0.00-6000.00		60.00	sec	O	5.3.1.3	1357h	93aeh
								0.1	0.01
88 [19]	Acc Time-6	0.00-6000.00		70.00	sec	O	5.3.1.3	1358h	93b0h
								0.1	0.01
89 [19]	Dec Time-6	0.00-6000.00		70.00	sec	O	5.3.1.3	1359h	93b2h
								0.1	0.01
90 [19]	Acc Time-7	0.00-6000.00		80.00	sec	O	5.3.1.3	135ah	93b4h
								0.1	0.01
91 [19]	Dec Time-7	0.00-6000.00		80.00	sec	O	5.3.1.3	135bh	93b6h
								0.1	0.01
95	Flux Brake Enable	0	No	0	-	O	9.1.5	135fh	93beh
		1	Yes						

13.3 First Motor Group (MOT1)

The codes in the gray shaded area are hidden when shipped from the factory and shown only when setting the parameter (refer to the footnote).

Code	LCD Display	Setting Range		Initial Value	Unit	Property[20]	Ref.	Communication address/scale	
								16-Bit	32-Bit
00	Jump Code	1-99		35	-	O	4.3.3	1400h	9400h
04	Motor Type	0	Induction Motor	0	-	△	3.1	1404h	9408h
		1	Perm Magnet Motor						
05	Control Mode	0	V/F	0	-	△	3.1	1405h	940ah
		1	Slip Comp.						
		2	V/F PG						
		3	Sensorless						
		4	Vector						
08 [21]	Torque Control En	0	No	0	-	△	3.2	1408h	9410h
		1	Yes						
15	Start Frequency	0.00-10.00		0.50	Hz	△	5.1.2.5	140fh	941eh
								0.01	0.01
16 [22]	Start Speed	0-300		15 [23]	rpm	△	5.1.2.5	1410h	9420h
								1	1
17	Stop Frequency	0.00-10.00		0.00	Hz	△	5.2.5.1	1411h	9422h
								0.01	0.01
18 [22]	Stop Speed	0-300		0 [23]	rpm	△	5.2.5.1	1412h	9424h
								1	1

[20] O: Writable during operation, △: Writable when stopped, X: Not writable
[21] Activated when the MOT1-05 (Control Mode) value is 3 (Sensorless) or 4 (Vector).
[22] Activated when the DRV-32 (Hz/rpm Select) value is 1 (rpm Display).
[23] The rpm value varies according to the motor rating pole number (MOT1, 2-25).

Code	LCD Display	Setting Range		Initial Value	Unit	Property[20]	Ref.	Communication address/scale	
								16-Bit	32-Bit
21	Motor Capacity	0	0.2 kW	-	-	△	3.1	1415h	942ah
		1	0.4 kW						
		2	0.75 kW						
		3	1.5 kW						
		4	2.2 kW						
		5	4 kW						
		6	5.5 kW						
		7	7.5 kW						
		8	11 kW						
		9	15 kW						
		10	18.5 kW						
		11	22 kW						
		12	30 kW						
		13	37 kW						
		14	45 kW						
		15	55 kW						
		16	75 kW						
		17	90 kW						
		18	110 kW						
		19	132 kW						
		20	160 kW						
		21	185 kW						
		22	200 kW						
		23	220 kW						
		24	280 kW						
		25	315 kW						
		26	375 kW						
		27	450 kW						
23	Base Frequency	30.00-590.00		60.00	Hz	△	3.1	1417h	942eh
								0.01	0.01

Code	LCD Display	Setting Range	Initial Value	Unit	Property[20]	Ref.	Communication address/scale	
							16-Bit	32-Bit
24 [22]	Rated Speed	900-24000	16.8 Note	rpm	△	3.1	1418h	9430h
							1	1
25	Number of Poles	2-100	4	Pole	△	3.1	1419h	9432h
							1	1
26	Rated Current	1.0-1000.0	16.8 Note	A	△	3.1	141ah	9434h
							0.1	0.1
27	Rated Voltage	0, 180-480	0	V	△	3.1	141bh	9436h
							1	1
28	Efficiency	70-100	16.8 Note	%	△	3.1	141ch	9438h
							1	1
35	No-load Current	0.5-1000.0	16.8 Note	A	△	3.1	1423h	9446h
							0.1	0.1
36	Stator Resistance	0.0000-99.9999	16.8 Note	Ω	△	3.4	1424h	9448h
							0.0001[24]	0.0001
37	Leakage Inductance	0.000-99.999	16.8 Note	mH	△	3.4	1425h	944ah
							0.001[24]	0.001
38	Stator Inductance	0.000-999.999	16.8 Note	mH	△	3.4	1426h	944ch
							0.001[24]	0.001
39	Rotor TimeConstant	25-5000	16.8 Note	msec	△	3.4	1427h	944eh
							1	1
40 [25]	q-axis Inductance	0.000-99.999	10.000	mH	△	3.4	1428h	9450h
							0.01	0.001
41 [25]	d-axis Inductance	0.000-99.999	10.000	mH	△	3.4	1429h	9452h
							0.01	0.001
42 [25]	PM Rotor Flux	0.000-65.000	0.100	-	△	3.4	142ah	9454h
							0.001	0.001
51	ACR Bandwidth	50-400	100	%	O		1433h	9466h
							1	1

[24] For products with 200 V 15 kW or more or 400 V 18.5 kW or more. For other capacities, refer to **Table 1**.

[25] Activated when the MOT1-04 (Motor Type) value is 1 (Perm Magnet Motor).

Code	LCD Display	Setting Range		Initial Value	Unit	Property[20]	Ref.	Communication address/scale	
								16-Bit	32-Bit
52	Active Resistance	0-1000		0	%	O		1434h	9468h
								1	1
54	ASR Adjust Gain	1-10		4	-	O		1436h	946ch
								1	1
61 [25]	IPPE Enable	0	No	1	-	O		143dh	947ah
		1	Yes						
62 [25]	IPPE Volt Ref Perc	10-100		50	%	O		143eh	947ch
								1	1
63 [25]	IPPE Curr Peak Per	10-150		120	%	O		143fh	947eh
								1	1
75	ETH Enable	0	None	0	-	O	9.1.1	144bh	9496h
		1	CoastStop (FreeRun)						
		2	Dec						
76	Motor Cooling	0	Self-Cool	0	-	O	9.1.1	144ch	9498h
		1	Forced-Cool						
77	ETH Cont Current	50-150		120	%	O	9.1.1	144dh	949ah
								1	1
78	ETH 1min Current	120-200		150	%	O	9.1.1	144eh	949ch
								1	1
96	Load Speed Gain	0.1-6000.0		100.0	%	O	7.21	1460h	94c0h
								0.1	0.1
97	Load Speed Scale	0	x 1	0	-	O	7.21	1461h	94c2h
		1	x 0.1						
		2	x 0.01						
		3	x 0.001						
		4	x 0.0001						
98	Load Speed Unit	0	rpm	0	-	O	7.21	1462h	94c4h
		1	mpm						

Note

Table 1. Parameter with different scales depending on the motor capacity when accessing with a 16-bit parameter data

Voltage category	Motor capacity	MOT1,2-36 (Stator Resistance)	MOT1,2-37 (Leakage Inductance)	MOT1,2-38 (Stator Inductance)
200 V	Below 0.4 kW	0.01	0.1	0.1
	0.75-11 kW	0.001	0.01	0.01
	Above 15 kW	0.0001	0.001	0.001
400 V	Below 1.5 kW	0.01	0.1	0.1
	2.2-15 kW	0.001	0.01	0.01
	18.5 kW or more	0.0001	0.001	0.001

13.4 The First Motor V/F Group (VF1)

This group is activated when the MOT1-05 (Control Mode) value is 0 (V/F) or 1 (Slip Comp.).

The codes in the gray shaded area are hidden when shipped from the factory and shown only when setting the parameter (refer to the footnote).

Max Frequency and Maximum Speed refer to the setting values at DRV-20 (Max Frequency) and DRV-21 (Maximum Speed) respectively.

Code	LCD Display	Setting Range		Initial Value	Unit	Property[26]	Ref.	Communication address/scale	
								16-Bit	32-Bit
00	Jump Code	1-99		31	-	O	4.3.3	1500h	9500h
01	V/F Pattern	0	Linear	0	-	△		1501h	9502h
		1	Square						
		2	User V/F						
		3	Square 2						
02	User Frequency-1	0.00-User Frequency-2		15.00	Hz	△		1502h	9504h
								0.01	0.01
03 [27]	User Speed-1	0 - User Speed-2		450 [28]	rpm	△		1503h	9506h
								1	1
04	User Voltage-1	0-100		25	%	△		1504h	9508h
								1	1
05	User Frequency-2	User Frequency-1-User Frequency-3		30.00	Hz	△		1505h	950ah
								0.01	0.01
06 [27]	User Speed-2	User Speed-1-User Speed-3		900 [28]	rpm	△		1506h	950ch
								1	1
07	User Voltage-2	0-100		50	%	△		1507h	950eh
								1	1
08	User Frequency-3	User Frequency-2-User Frequency-4		45.00	Hz	△		1508h	9510h
								0.01	0.01
09 [27]	User Speed-3	User Speed-2-User Speed-4		1350 [28]	rpm	△		1509h	9512h
								1	1

[26] O: Writable during operation, △: Writable when stopped, X: Not writable
[27] Activated when the DRV-32 (Hz/rpm Select) value is 1 (rpm Display).
[28] The rpm value varies according to the motor rating pole number (MOT1, 2-25).

Code	LCD Display	Setting Range		Initial Value	Unit	Property[26]	Ref.	Communication address/scale	
								16-Bit	32-Bit
10	User Voltage-3	0-100		75	%	△		150ah	9514h
								1	1
11	User Frequency-4	User Frequency-3-Max Frequency		60.00	Hz	△		150bh	9516h
								0.01	0.01
12 [27]	User Speed-4	User Speed-3-Maximum Speed		1800 [28]	rpm	△		150ch	9518h
								1	1
13	User Voltage-4	0-100		100	%	△		150dh	951ah
								1	1
21	Slip Comp Mode	0	Basic Comp.	0	-	△		1515h	952ah
		1	Advanced Comp.						
22	SlipGain Mot-Low	0-300		100	%	O		1516h	952ch
								1	1
23	SlipGain Mot-High	0-300		100	%	O		1517h	952eh
								1	1
24	SlipGain Gen-Low	0-300		100	%	O		1518h	9530h
								1	1
25	SlipGain Gen-High	0-300		100	%	O		1519h	9532h
								1	1
26	SlipComp LPF Gain	1-10000		300	msec	O		151ah	9534h
								1	1
27	SlipGain SwOv Freq	0.00-20.00		9.00	Hz	O		151bh	9536h
								0.01	0.01
28 [27]	SlipGain SwOv Spd	0-600		270 [28]	rpm	O		151ch	9538h
								1	1
31	Torque Boost Mode	0	Manual	0	-	△	7.6	151fh	953eh
		1	Auto						
32	Forward Boost	0-15.0		2.0 [29]	%	△	7.6	1520h	9540h
				1.0 [30]				0.1	0.1

[29] For an inverter capacity of 75 kW or less (Refer to **16.8 Parameter Default Values Based on the Motor Capacity**)

[30] For an inverter capacity 90 kW or more (Refer to **16.8 Parameter Default Values Based on the Motor Capacity**)

Code	LCD Display	Setting Range	Initial Value	Unit	Property[26]	Ref.	Communication address/scale	
							16-Bit	32-Bit
33	Reverse Boost	0-15.0	2.0 [29]	%	△	7.6	1521h	9542h
			1.0 [30]				0.1	0.1
34	ATB Mot-Gain	0.0-300.0	100.0	%	O	7.6.2	1522h	9544h
							0.1	0.1
35	ATB Gen-Gain	0.0-300.0	100.0	%	O	7.6.2	1523h	9546h
							0.1	0.1
36	ATB LPF Gain	1-10000	3	msec	△	7.6.2	1524h	9548h
							1	1
54 [31]	PM V/F HPF Gain	0-1.0	0.7	-	O	-	1536h	956ch
							0.1	0.1
55 [31]	PM V/F HPF Wcut	0.0-3	1	Hz	O	-	1537h	956eh
							1	1
56 [31]	PM V/F CurrLmtGain	0-200	150	%	O	-	1538h	9570h
							1	1
57 [31]	PM VF DC Inj Perc	0-150	100	%	O	-	1539h	9572h
							1	1
58 [31]	PM VF Idse Limit	0-150	70	%	O	-	153ah	9574h
							1	1
71	AHR Enable	0 No	1	-	O	7.10	1547h	958eh
		1 Yes						
72	AHR P-Gain	0-1000	50	%	O	7.10	1548h	9590h
							1	1
73	AHR Limit	0-100	2	%	O	7.10	1549h	9592h
							1	1
76	Stall Prevent Acc	0 No	0	-	△	9.1.4	154ch	9598h
		1 Yes						
77	Stall Prevent Dec	0 No	0	-	△	9.1.4	154dh	959ah
		1 Yes						
78	Stall Prevent Std	0 No	0	-	△	9.1.4	154eh	959ch
		1 Yes						

[31] Activated when the MOT1-04 (Motor Type) value is 1 (Perm Magnet Motor).

Code	LCD Display	Setting Range	Initial Value	Unit	Property[26]	Ref.	Communication address/scale	
							16-Bit	32-Bit
79	Stall Frequency-1	0.00- Stall Frequency-2	15.00	Hz	O	9.1.4	154fh	959eh
							0.01	0.01
80 [27]	Stall Speed-1	0-Stall Speed-2	450 [28]	rpm	O	9.1.4	1550h	95a0h
							1	1
81	Stall Level-1	30-250	180	%	O	9.1.4	1551h	95a2h
							1	1
82	Stall Frequency-2	Stall Frequency-1 - Stall Frequency-3	30.00	Hz	O	9.1.4	1552h	95a4h
							0.01	0.01
83 [27]	Stall Speed-2	Stall Speed-1-Stall Speed-3	900 [28]	rpm	O	9.1.4	1553h	95a6h
							1	1
84	Stall Level-2	30-250	180	%	O	9.1.4	1554h	95a8h
							1	1
85	Stall Frequency-3	Stall Frequency-2- Stall Frequency-4	45.00	Hz	O	9.1.4	1555h	95aah
							0.01	0.01
86 [27]	Stall Speed-3	Stall Speed-2-Stall Speed-4	1350 [28]	rpm	O	9.1.4	1556h	95ach
							1	1
87	Stall Level-3	30-250	180	%	O	9.1.4	1557h	95aeh
							1	1
88	Stall Frequency-4	Stall Frequency-3- Max Frequency	60.00	Hz	O	9.1.4	1558h	95b0h
							0.01	0.01
89 [27]	Stall Speed-4	Stall Speed-3- Maximum Speed	1800 [28]	rpm	O	9.1.4	1559h	95b2h
							1	1
90	Stall Level-4	30-250	180	%	O	9.1.4	155ah	95b4h
							1	1

13.5 First Motor Control Group (VEC1)

For more information about the first motor control group (VEC1) and other function groups, refer to the comprehensive user's manual on the website (https://www.ls-electric.com).

13.6 Second Motor Group (MOT2)

13.7 Second Motor V/F Group (VF2)

13.8 Second Motor Control Group (VEC2)

13.9 Advanced Function Group (ADV)

13.10 Application Function Group (APP)

13.11 Digital Input Terminal Block Group (DIN)

13.12 Analog Input Terminal Block Group (AIN)

13.13 Output Terminal Block Group (OUT)

13.14 Process PID Group (PPID)

13.15 Protection Function Group (PRT)

13.16 Diagnosis Function Group (DIAG)

13.17 Internal Communication Group (INTC)

13.18 Modbus Master Group (INTM)

13.19 USB Communication Group (USBC)

13.20 Virtual Terminal Block Group (VIRT)

13.21 Encoder Group (ENC)

13.22 External PID 1 Group (EPI1)

13.23 External PID 2 Group (EPI2)

13.24 Position Control Group 1 (POS1)

13.25 Position Control Group 2 (POS2)

13.26 WEB1 Group (WEB1)

13.27 WEB2 Group (WEB2)

13.28 User Sequence Group (US)

13.29 User Sequence Logical Operation Group (USL)

13.30 User Sequence Arithmetic Operation Group (USV)

13.31 User Sequence Parameter Operation Group (USP)

13.32 User Sequence Special Function Group (USM)

14 Troubleshooting

14.1 Trip and Warning

When the inverter detects an abnormal condition, it will stop (trip) the operation or display a warning to protect the internal circuit. When a trip or warning occurs, detailed trip information and warning information will be displayed on the Smart Operator. When two or more trips occur, the trip information with the highest priority will be displayed first in the Smart Operator,
and the information for the next trip can be accessed by pressing the  key.
Refer to **12.3 Trip Status Monitoring** in the comprehensive user's manual for details about the trip screen.

The trip conditions can be categorized as follows:

- Level: When the trip is corrected, the trip or warning signal will automatically disappear. The trip will not be saved in the trip history.
- Latch: When the trip is corrected and a reset input signal is provided, the trip or warning signal will disappear. In the event that the trip continues, contact the retailer or our customer service center.

14.1.1 Fault Trips

14.1.1.1 Protection Functions for Output Current and Input Voltage

Table 1. Current/voltage-related trip

LCD Display	Trip condition	Details
Over Load	Latch	Displayed when the motor load is greater than the set overload warning level (PRT-36 OL Warn Level) after selecting the motor overload trip. Operates when the PRT-38 (OL Trip Select) code is set to a value other than 0.
Under Load	Latch	Displayed when the motor load is less than the set under load level after selecting the motor underload protection function. Operates when the PRT-47 (UL Trip Select) code is set to a value other than 0.
Over Current	Latch	Displayed when the inverter output current exceeds 240% of the rated current.

LCD Display	Trip condition	Details
Over Voltage	Latch	Displayed when the internal DC circuit voltage is greater than the specified value.
Low Voltage	Latch/ Level	Displayed when internal DC circuit voltage is less than the specified value during operation. It is possible to set the trip type (Latch/Level) in the PRT-02 (LV Trip Mode) code.
Ground Fault Trip	Latch	Displayed when a ground fault trip occurs on the output side of the inverter and causes the current to exceed the specified value. The specified value varies depending on inverter capacity.
E-Thermal	Latch	Occurs according to the inverse time characteristic in order to prevent overheating caused by overloads during motor operation. Operates when the MOT1, MOT2-75 (ETH Enable) code is set to a value other than 0.
OutputPhase U Open OutputPhase V Open OutputPhase W Open	Latch	Displayed when a 3-phase inverter output has one or more phases in an open circuit condition. Operates when PRT-12 (Out Phase Open Chk) code is set to 1 (Yes).
No Motor Trip	Latch	Displayed when a 3-phase inverter output has two or more phases in an open circuit condition.
Input Phase Open	Latch	Displayed when a 3-phase inverter input has one or more phases in an open circuit condition while operating with a load of 50% or more of the inverter's rated current. Operates when PRT-10 (In Phase Open Chk) code is set to 1 (Yes).
Drive Over Load	Latch	This is an inverse time characteristic protection function that protects an inverter from overloading. Displayed when a current of 150% or more of the inverter’s rated current flows for 1 minute.
Over Speed	Latch	Displayed when the motor speed exceeds the maximum speed.
Speed Deviation	Latch	Displayed when the difference between the motor speed and the current command speed exceeds the set value of PRT-67 (Speed Dev BandFreq) or PRT-68 (Speed Dev BandSpd) and is maintained above the set value of PRT-69 (Speed Dev Time).
Line To Line Short	Latch	Displayed when the inverter output terminal short-circuits.
HW OCS Fail	Latch	Displayed when there is an error with H/W overcurrent suppression.

14.1.1.2 Protection Functions Using Abnormal Internal Circuit Conditions and External Signals

Table 2. Trip related to internal circuit/external signal

LCD Display	Trip condition	Details
Data Storage Error	Fatal	Displayed when there is an error in reading/writing parameters due to damage to the inverter's internal storage device.
Main System Error Watch Dog	Fatal	Displayed when there is an error with S/W operation.
Drive Over Heat	Latch	Displayed when the temperature of the inverter heat sink exceeds the specified value.
Arm Short	Latch	Displayed when the DC circuit in the inverter detects the size of the short-circuited current.
ParameterReset Err	Latch	Displayed when all parameters stored inside the inverter are incorrectly initialized.
Fuse Open	Latch	Displayed when there is an error in the fuse in the power unit of the inverter.
ADC OffSet	Latch	Displayed when there is an error in the current sensing circuit (U/V/W terminal, current sensor, etc.).
NTC Open	Latch	Displayed when a temperature sensor error has been detected in the Insulated Gate Bipolar Transistor (IGBT) or when there is a problem with the internal sensor connection connector.
NTC Short	Latch	Displayed when an error is detected in the temperature sensor of the Insulated Gate Bipolar Transistor (IGBT).
IO Board Trip	Latch	Displayed when the I/O board or external communication card is not connected to the inverter or there is a bad connection.
Main Fan Fault	Latch	Displayed when an error is detected in the cooling fan. Operates when the PRT-75 (MainFan Trip mode) code is set to 0 (Trip).
AuxiliaryFan Fault	Latch	Displayed when an error is detected in the auxiliary cooling fan.
Control Fan Fault	Latch	Displayed when an error is detected in the internal circulation fan.
MC Fault	Latch	Displayed when there is an error in the magnetic contactor (MC) or relay used in the pre-charge circuit.

LCD Display	Trip condition	Details
Gate Power Loss	Latch	Displayed when there is an error in the power circuit of the power unit in the inverter.
Power Index Error	Level	Displayed when there is an error in the capacity recognition circuit of the power unit in the inverter.
STO P24 Fault	Latch	Displayed when there is an error in the safety circuit (24V power).
STO P05 Fault	Latch	Displayed when there is an error in the safety circuit (5V power).
Option Trip-1, 2, 3	Latch	Displayed when an option installed in the inverter is not recognized.
CAN Bus Error	Latch	Displayed when there is an error with the communication interface with the option installed on the inverter.

14.1.1.3 External Interface Fault

Table 3. Trip related to external interface

LCD Display	Trip condition	Details
External Trip-1, 2, 3, 4	Latch/ Level	Displayed when an external trip signal is provided by the multifunction terminal. Operates when DIN-01, 03, 05, 07, 09, 11, 13, 15 (DI1-DI8 Define) codes are set to 5-8 (External Trip-1 to External Trip-4).
BX	Level	Displayed when the inverter output is blocked according to the function setting of the multifunction terminal. Operates when DIN-01, 03, 05, 07, 09, 11, 13, 15(DI1-DI8 Define) codes are set to 4 (BX).
Lost Analog-1, 2, 3	Level	Displayed if a trip signal is provided when the analog input is not connected. Operates when PRT-25, 28, 31 (Lost AI1-AI3 Mode) codes are set to a value other than 0.
Lost Keypad	Level	Displayed if a trip signal is provided when the Smart Operator is not connected. Operates when PRT-16 (Lost Keypad Mode) is set to a value other than 0.
Lost Internal Comm	Level	Displayed if a trip signal is provided when communication is not performed through internal communication. Operates when PRT-17 (Lost IntComm Mode) is set to a value other than 0.

LCD Display	Trip condition	Details
Lost USB	Level	Displayed if a trip signal is provided when communication is not performed through the USB connector. Operates when PRT-19 (Lost USB Mode) is set to a value other than 0.
Lost Ext Ana In-1, 2, 3, 4	Level	Displayed if a trip signal is provided when the analog input in the extended IO is not connected.
Lost Option Comm	Level	Displayed if a trip signal is provided when there is an error in the communication of the option card.
STO Feedback A/B	Latch/ Level	Displayed when SA or SB input is not in the STO terminal block. Depending on the settings of PRT-82 (Safety Trip Mode), latch/level operation is determined.
Motor Over Heat	Latch	Displayed if the motor overheats when the motor temperature is detected through the PTC.
Encoder Error	Latch	Displayed when the polarity of each signal of line drive type encoder is incorrectly connected.
Lost External 24V	Level	Displayed if there is no external 24V power input when the PRT-89 (Ext 24V Pwr Lost) setting value is 1 (Yes). If PRT-89 (Ext 24V Pwr Lost) is set to 0 (No), 24V power input is not checked.
Encoder Error	Latch	Displayed when the encoder wiring is incorrect. Operates only on line drive-type encoders.
Encoder No Connect	Latch	Displayed if there is no encoder when using a function that requires an encoder.
Encoder Tuning Err	Latch	Displayed when the Z pulse does not come in abnormally when tuning the encoder.
Pole Pos Detect F	Latch	Displayed when there is an error in the PM motor stimulus estimation.

14.1.1.4 Advanced Functions

Table 4. Trip related to application functions

LCD Display	Trip condition	Details
Mechanical Brake	Latch	Displayed when there is an error with the mechanical brake sequence.
Reset Restart Fail	Latch	Displayed when the restart function is activated after more than the set number of resets has been performed.
Pre-PID Fail	Latch	Displayed when Pre-PID fails.
KEB Safety Stop	Latch	Displayed when there is an error with KEB operation.
Br Release Invalid	Latch	Displayed when the brake is not released because the load required to release the brake is not reached for a certain period of time.
Br Releasing Fail	Latch	Displayed when a request to release the brake is issued and the actual brake is not released after a certain period of time. Operates when the DIN-01, 03, 05, 07, 09, 11, 13, 15 (DI1-DI8 Define) codes are set to 55 (Brake Monitor Sel).
Br Engaging Fail	Latch	Displayed when a request to fix the brake is issued and the actual brake is not fixed after a certain period of time. Operates when the DIN-01, 03, 05, 07, 09, 11, 13, 15 (DI1-DI8 Define) codes are set to 55 (Brake Monitor Sel).
POS Max Track Err	Latch	Occurs when the difference between the reference pulse and position feedback pulse is bigger than the setting value of POS1-36 (Max Track Pulse).
Pos Tar Bound Err	Latch	Displayed when the difference between the target position and the actual position after conducting position control is greater than the set value of POS1-37 (Tar Bound Pulse).
Pos SW Limit High	Latch	Displayed if the current position (POS1-4 Cur Position) is greater than the set value of SW Hight Limit (POS1-33 Pos SW Limit High) when POS1-30 (SW Limit Prot Mode) is set to 1 (Trip) and POS1-31 (SW Limit Hi Enable) is set to 1 (Yes) in position control mode.
Pos SW Limit Low	Latch	Displayed if the current position (POS1-4 Cur Position) exceeds the set value of SW Low Limit (POS1-34 Pos SW Limit Low) when POS1-30 (SW Limit Prot Mode) is set to 1 (Trip) and POS1-32 (SW Limit Lo Enable) is set to 1 (Yes) in position control mode.

LCD Display	Trip condition	Details
Pos HW Limit High	Latch	Displayed when an input signal is input into the multifunction terminal whose DI1-DI8 Define code is set to 59 (POS HW Lmt H).
Pos HW Limit Low	Latch	Displayed when an input signal is input into the multifunction terminal whose DI1-DI8 Define code is set to 58 (POS HW Lmt L).
Pos Multi Sync F	Latch	Displayed when there is an error with the multiposition sync.
Cur Pos Overf Err	Latch	Displayed when there is an error in the firmware internal operation during position control.

14.1.1.5 Diagnostic Functions

Table 5. Trip related to diagnostic functions

LCD Display	Trip condition	Details
Main Cap Diag Fail	Latch	Displayed when the current input voltage falls below the applicable voltage during the main capacitor diagnostic function, or when the power is not turned off for longer than 10 seconds.

14.1.1.6 Miscellaneous

Table 6. Miscellaneous trip

LCD Display	Trip condition	Details
ParaWrite Trip	Latch	Displayed when communication is not achieved while writing parameters due to a wire error or poor contact in the Smart Operator. Displayed when using the Smart Operator.
System Error-1	Latch	Displayed when there is an error inside the firmware.
Lost Power MCU	Latch	Displayed when there is an error in the power unit inside the inverter.
Option Trip-1, 2, 3	Latch	Displayed when an option installed in the inverter is not recognized.

14.1.2 Warning Messages

14.1.2.1 Fault status

Table 7. Fault status warning

LCD Display	Details
Over Load Warn	Displayed when the motor becomes overloaded. Operates when PRT-35 (OL Warn Select) code is set to 1 (Yes). To receive a warning output signal, set the OUT-50, 52, 54 (DO1-DO3 Status) codes to 5 (Over Load Warn).
Under Load Warn	Displayed when the motor becomes underloaded. Operates when PRT-45 (UL Warn Select) code is set to 1 (Yes). To receive a warning output signal, set OUT-50, 52, 54 (DO1-DO3 Status) codes to 7 (Under Load Warn).
Drv Over Load Warn	Displayed when a time equivalent to 60% of the operating time of the inverter overload protection (IOLT) function is accumulated. To receive a warning output signal, set OUT-50, 52, 54 (DO1-DO3 Status) codes to 6 (Drv Over Load Warn).
Lost Keypad Warn	Displayed when the Smart Operator (Keypad) connection is lost. Operates when PRT-16 (Lost Keypad Mode) is set to 3 (Warning). To receive a warning output signal, set the OUT-50, 52, 54 (DO1-DO3 Status) codes to 25 (lost Keypad Warn).
Lost Int Comm Warn	Displayed when internal communication is lost. Operates when PRT-17 (Lost IntComm Mode) is set to 3 (Warning). To receive a warning output signal, set the OUT-50, 52, 54 (DO1-DO3 Status) codes to 13 (Lost Int Comm Warn).
Lost USB Warn	Displayed when the USB connection on the main body is lost. Operates when PRT-19 (Lost USB Mode) is set to 3 (Warning). To receive a warning output signal, set the OUT-50, 52, 54 (DO1-DO3 Status) codes to 34 (Lost USB Warn).
Lost Analog Inl-1~3	Displayed when analog input terminal connection is lost. To receive a warning output signal, set OUT-50, 52, 54 (DO1-DO3 Status) codes to 36, 37, 38 (Lost AI-1 - 3 Warn).
Main Fan Warning	Displayed when an error is detected in the cooling fan. Operates when PRT-75 (MainFan Trip Mode) code is set to 1 (Warn). To receive a warning output signal, set the OUT-50, 52, 54 (DO1-DO3 Status) codes to 8 (MainFan Warn).

LCD Display	Details
DB Warn %ED	Displayed when the DB resistor warning level is greater than the APP-37 (DB Warn %ED) set value. Operates when the APP-36 (DB Warn %ED Enable) code is set to 1 (Yes). To receive a warning output signal, set the OUT-50, 52, 54 (DO1-DO3 Status) codes to 26 (DB Warn %ED).
PreChargerRepWarn	Displayed when the number of pre-charger operations (DIAG-42 PreCharger Used Lv) is greater than the pre-charger replacement level (DIAG-41 PreCharger Repl Lv). Operates when the DIAG-40 (PreCharger Warn Sel) code is set to 1 (Yes).
Main Cap Repl Warn	Displayed when the cumulative usage time of the main capacitor is greater than DIAG-12 (MainCap Repl Level). To receive a warning output signal, set the OUT-50, 52, 54 (DO1-DO3 Status) codes to 40 (Main Cap Repl Warn).
Low Capacity Warn	Displayed when the capacitor capacity is low after performing main capacitor diagnostics.
MainCap Diag Alarm	It is a function that alerts with a warning so that periodic testing of the main capacitor can be performed. To receive a warning output signal, set the OUT-50, 52, 54 (DO1-DO3 Status) codes to 43 (Main Cap Diag Alarm).
Pos SW Limit High	Displayed when the current position (POS1-04 Cur Position) is greater than the set value of SW Hight Limit (POS1-33 Pos SW Limit High) in position control mode. Operates when POS1-30 (SW Limit Prot Mode) is set to 1 (Warning) and POS1-31 (SW Limit Hi Enable) is set to 1 (Yes) in position control mode.
Pos SW Limit Low	Displayed when the current position (POS1-4 Cur Position) is greater than the set value of SW Low Limit (POS1-34 Pos SW Limit Low) in position control mode. Operates when POS1-30 (SW Limit Prot Mode) is set to 1 (Warning) and POS1-32 (SW Limit Lo Enable) is set to 1 (Yes) in position control mode.
Pos HW Limit High	Occurs when there is an input signal at the multifunction terminal to which 59 (POS HW Lmt H) is set for the Define code of DI1-DI8 of the terminal input group (DIN).
Pos HW Limit Low	Occurs when there is an input signal at the multifunction terminal where 58 (POS HW Lmt L) is set for the Define item of DI1-DI8 of the terminal input group (DIN).
Motor Over Heat	Displayed when electronic thermal of the motor is detected by the temperature sensor attached to the motor.
AC Input Over Volt	Displayed when the input voltage of the inverter is greater than the allowable range during a stop.
AC Input Low Volt	Displayed when the input voltage of the inverter is less than the allowable range during a stop.

14.1.2.2 Status display according to advanced tasks

Table 8. Status display warning according to advanced tasks

LCD Display	Details
Torque->Speed	Displayed when converting to speed control mode during a torque control mode operation in torque control mode.
Speed->Torque	Displayed when converting to torque control mode during a speed control mode operation in torque control mode.
Running Auto Tune	Displayed to indicate that autotuning is currently in progress.
Fire Mode	Displayed to indicate that a fire mode operation is currently in progress.

14.1.2.3 Miscellaneous

Table 9. Miscellaneous warnings

LCD Display	Details
Power Off Please	Displayed if power off is required according to the sequence when performing the main capacitor diagnostic function.

14.2 Troubleshooting Fault Trips

When a fault trip or warning occurs due to a protection function, refer to the following table for possible causes and remedies.

Table 10. Troubleshooting Fault Trips

Items	Cause	Remedy
Over Load	The load is greater than the rated motor capacity.	Replace the motor and inverter with models that have a larger capacity.
	The set value for the overload trip level (PRT-39 OL Trip Level) is too low.	Increase the set value for the overload trip level.
Under Load	There is a motor-load connection problem.	Replace the motor and inverter with models that have smaller capacities.
	The set value for underload level is greater than the system's minimum load.	Lower the set value of the underload level (PRT-49 UL LF Level, PRT-50 UL BF Level).
Over Current	The acceleration/deceleration time is too short for the load inertia (GD2).	Set the acceleration/ deceleration time (DRV-05 Acc Time, DRV-06 Dec Time) to a longer value.
	The inverter load is greater than the rated capacity.	Replace the inverter with a model that has increased capacity.
	Inverter output was applied during a motor free run.	Operate the inverter after the motor has stopped or use the speed search function (APP-05 SpeedSearch Mode).
	The mechanical brake of the motor is operating too fast.	Check the mechanical brake.

Items	Cause	Remedy
Over Voltage	Deceleration time is too short for the load inertia (GD2).	Set the deceleration time (PRT-01 Trip Dec Time) to a longer value.
	A generative load occurs at the inverter output.	Use the braking unit. Refer to **16.6 Braking Unit and Braking Resistor Specifications** for more information on the types and specifications of brake units that can be used.
	The input voltage is too high.	Determine if the input voltage is above the specified value.
Low Voltage	The input voltage during operation is low.	Determine if the input voltage is below the specified value.
	A load greater than the power capacity is connected to the system (e.g., a welder, direct motor connection, etc.).	Increase the power capacity.
	The magnetic contactor (MC) connected to the power source has a faulty connection.	Replace the magnetic contactor.
	An input open-phase has occurred when input voltage is low.	Check the input wiring.
Ground Trip	A ground fault has occurred in the inverter output wiring.	Check the output wiring.
	The motor insulation is damaged.	Replace the motor.
E-Thermal	The motor is overheated.	Reduce the load or operation frequency.
	The inverter load is greater than the rated capacity.	Replace the inverter with a model that has increased capacity.
	The set value for electronic thermal protection (ETH) is too low.	Set the electronic thermal protection level (MOT1, MOT2-77 ETH Cont Current, MOT1, MOT2-78 ETH 1min Current) appropriately.
	The inverter has been operated at low speed for an extended duration.	Replace the motor with a model that supplies extra power to the motor cooling fan.

Items	Cause	Remedy
Out Phase Open	The magnetic contactor (MC) on the output side has a connection fault.	Check the magnetic contactor on the output side.
	The output wiring is faulty.	Check the output wiring.
In Phase Open	The magnetic contactor (MC) on the input side has a connection fault.	Check the magnetic contactor on the input side.
	The input wiring is faulty.	Check the input wiring.
	The DC link capacitor needs to be replaced.	Replace the DC link capacitor. Contact the retailer or our customer service center.
Inverter OLT	The load is greater than the rated motor capacity.	Replace the motor and inverter with models that have a larger capacity.
	The torque boost level is too high.	Reduce the torque boost level.
Over Heat	There is a problem with the cooling system.	Determine if a foreign object is obstructing the air inlet, outlet, or vent.
	The inverter cooling fan has been operated for an extended period.	Replace the cooling fan.
	The ambient temperature is too high.	Keep the ambient temperature below 50℃.
Arm Short	Output wiring is short-circuited.	Check the output wiring.
	There is a fault with the electronic semiconductor (IGBT).	Do not operate the inverter. Contact the retailer or our customer service center.
NTC Open	The ambient temperature is too low.	Keep the ambient temperature above -10℃.
	There is a fault with the internal temperature sensor.	Contact the retailer or our customer service center.
Main Fan Fault	A foreign object is obstructing the fan's air vent.	Remove the foreign object from the air inlet or outlet.
	The cooling fan needs to be replaced.	Replace the cooling fan.

14.3 Actions on Other Faults

When a fault other than those identified as fault trips or warnings occurs, refer to the following table for possible causes and remedies.

Table 11. Actions on Other Faults

Items	Cause	Remedy
Parameters cannot be set.	The inverter is in operation (driving mode).	Stop the inverter to change to program mode and set the parameter. Refer to **13 Table of Functions** for a list of parameters that cannot be changed during operation.
	The parameter access is incorrect.	Check the correct parameter access level and set the parameter.
	The password is incorrect.	Check the password, disable the parameter lock and set the parameter.
	Low voltage is detected.	Check the power input to resolve the low voltage and set the parameter.
The motor does not rotate.	The frequency command source is set incorrectly.	Check the frequency command source setting. Refer to **5.1 Frequency Settings** in the comprehensive user's manual for details.
	The operation command source is set incorrectly.	Check the operation command source setting. Refer to **5.2 Operation Command Settings** in the comprehensive user's manual for details.
	Power is not supplied to the terminal R/S/T.	Check the terminal connections R/S/T and U/V/W. Refer to **2.2.3 Step 3 Power Terminal Wiring** for information about terminal wiring.
	The charge indicator is off.	Turn on the inverter.
	The operation command is off.	Turn on the operation command as directed in DRV-10 (1st Command Source).
	The motor is locked.	Unlock the motor or lower the load level.

Items	Cause	Remedy
The motor does not rotate.	The load is too high.	Operate the motor independently.
	An emergency stop signal is input.	Reset the emergency stop signal.
	The wiring for the control circuit terminal is incorrect.	Check the wiring for the control circuit terminal.
	The input voltage or current for the frequency command is incorrect.	Check the input voltage or current for the frequency command. Refer to **5.1.1.3 Setting Frequency via Terminal Analog Voltage Input (AI1-AI3)** in the comprehensive user's manual for details.
	The PNP/NPN mode is selected incorrectly.	Check the PNP/NPN mode setting. Refer to **2.2.5 Step 5 PNP/ NPN Mode Selection** for details.
	The frequency command value is too low.	Check the frequency command and input a value above the minimum frequency. Refer to **5.1.1.2 Setting Operating Frequency in the Smart Operator-Direct Input** in the comprehensive user's manual for details.
	The motor torque is too low.	Manually increase the amount of torque boost to operate. Refer to **7.6.1 Manual Torque Boost** in the comprehensive user's manual for details. If the fault remains, replace the inverter with a model with increased capacity.
The motor rotates in the opposite direction to the command.	The wiring for the motor output cable is incorrect.	Make sure that the output wiring is properly connected to the motor's phase (U/V/W). Refer to **2.2.3 Step 3 Power Terminal Wiring** for information about terminal wiring.
	The signal connection between the control circuit terminal (forward/reverse rotation) of the inverter and the forward/reverse rotation signal on the control panel side is incorrect.	Check the forward/reverse rotation wiring.

Items	Cause	Remedy
The motor only rotates in one direction.	Reverse rotation prevention is selected.	Remove the reverse rotation prevention.
	The reverse rotation signal is not provided, even when a 3-wire sequence is selected.	Check the input signal associated with the 3-wire operation and adjust as necessary. Refer to **7.3 3-Wire Operation** in the comprehensive user's manual for details.
The motor is overheating.	The load is too high.	Reduce the load. Set the acceleration/deceleration time (DRV-05 Acc Time, DRV-06 Dec Time) to a longer value.
		Check the motor-related parameters (MOT1, MOT2) and set the correct values.
		Replace the motor and the inverter with models with appropriate capacities for the load.
	The ambient temperature of the motor is too high.	Lower the ambient temperature of the motor.
	The motor's phase-to-phase voltage is insufficient.	Use a motor that can withstand phase-to-phase voltage surges greater than the maximum surge voltage.
		Only use motors suitable for applications with inverters.
		Connect the AC reactor to the output side. Refer to **16.4.2 AC Input Fuse and Reactor Specifications** for more information on the types and specifications of AC reactors that can be used.
	The motor fan has stopped or the fan is obstructed with debris.	Check the motor fan and remove any foreign objects.

Items	Cause	Remedy
The motor stops when accelerating.	The load is too high.	Reduce the load.
		Manually increase the amount of torque boost to operate. Refer to **7.6.1 Manual Torque Boost** in the comprehensive user's manual for details.
		Replace the motor and the inverter with models with appropriate capacities for the load.
	The current is too high.	Manually reduce the amount of torque boost to operate if the load is light but the current is high. Refer to **7.6.1 Manual Torque Boost** in the comprehensive user's manual for details.
The motor stops when the load is connected.	The load is too high.	Reduce the load.
		Replace the motor and the inverter with models with appropriate capacities for the load.
The motor does not accelerate. /The acceleration time of the motor is long.	The frequency command value is low.	Check the frequency command and enter the value in the DRV-01 (Command Frequency) code or DRV-02 (Command Speed) code.
	The load is too high.	Reduce the load or increase the acceleration time (DRV-05 Acc Time). Or check the mechanical brake status.
	The acceleration time is too long.	Check the acceleration time (DRV-05 Acc Time) and change it.
	The combined values of the motor properties and the inverter parameter are incorrect.	Check the motor-related parameter group (MOT1, MOT2) and change the code value.
	The stall prevention level during acceleration is low.	Check the stall prevention level (VF1, VF2-81, 84, 87, 90 Stall Level-1 to Stall level-4) and change it.
	The stall prevention level during operation is low.	Check the stall prevention level (VF1, VF2-81, 84, 87, 90 Stall Level-1 to Stall level-4) and change it.

Items	Cause	Remedy
Motor revolutions per minute varies during operation.	There is a high variance in load.	Replace the motor and inverter with models that have a larger capacity.
	The input voltage varies.	Stabilize the power supply voltage.
	Motor speed variations occur at a specific frequency.	Adjust the output frequency (DRV-01 Command Frequency) to avoid a resonance area.
The motor rotation is different from the setting.	The V/F pattern is set incorrectly.	Set the V/F pattern (VF1, VF2-01) in accordance with the motor specifications.
The motor deceleration time is too long even with Dynamic Braking (DB) resistor connected.	The deceleration time is set too long.	Check the deceleration time (DRV-06 Dec Time) and change the setting.
	Motor torque is insufficient.	Replace it with a motor of larger capacity if the motor-related parameters (MOT1, MOT2) are normal.
	There is a load applied to the inverter that exceeds its current limit.	Replace the inverter with a model that has increased capacity.
While the inverter is in operation, a control unit malfunctions or noise occurs.	Noise occurs due to switching inside the inverter.	Change the carrier frequency (DRV-27 Carrier Frequency) to the minimum value.
		Install a micro surge filter in the inverter output.
When the inverter is operating, the earth leakage breaker is activated.	An earth leakage breaker will interrupt the supply if current flows to ground during inverter operation.	Connect the inverter to a ground terminal.
		Check that the ground resistance is less than 100 Ω for 200 V inverters and less than 10 Ω for 400 V inverters.
		Check the capacity of the earth leakage breaker and make the appropriate connection, based on the rated current of the inverter.
		Set the carrier frequency (DRV-27 Carrier Frequency) to a low value.
		Make the cable length between the inverter and the motor as short as possible.

Items	Cause	Remedy
The motor vibrates severely and does not rotate normally.	The voltage between phases is badly balanced.	Check the input voltage and balance the voltage.
		Check and test the motor's insulation.
The motors makes humming, or loud noises.	Resonance occurs between the motor's natural frequency and the carrier frequency.	Increase or decrease the carrier frequency (DRV-27 Carrier Frequency) slightly.
	Resonance occurs between the motor's natural frequency and the inverter's output frequency.	Increase or decrease the operation frequency (DRV-01 Command Frequency) slightly.
		Use the frequency jump function to avoid the frequency band where resonance occurs. Refer to **5.1.2.5 Frequency Limit** in the comprehensive user's manual for details.
The motor vibrates/ hunts.	The frequency input command is an external, analog command.	In situations of noise inflow on the analog input side that results in frequency command interference, change the set value of the input filter time constant (AIN-04, 19, 34 AI1, 2, 3 LPF Gain).
	The wiring length between the inverter and the motor is too long.	The total wiring length for the inverter and motor should not exceed 100m.
	There is a deviation in the rotor time constant value when operating in induction motor vector control mode using the position/speed sensor.	Increase the current controller bandwidth (MOT1, MOT2-51 ACR Bandwidth) or adjust the torque compensation value (VEC1, VEC2-34 IMSD Trq Comp).
The motor will not come to a complete stop when the inverter output stops.	It is difficult to decelerate sufficiently, because DC braking is not operating normally.	Adjust the DC braking parameter. Refer to **5.2.5.2 Stop after DC Braking** in the comprehensive user's manual for details.
		Adjust the set value of DC braking current (BAS-07 DC Brake Level) to a larger value.
		Adjust the set value of DC braking time (BAS-06 DC Brake Timer) to a larger value.

Items	Cause	Remedy
The output frequency does not increase to the frequency reference.	The frequency reference is within the jump frequency range.	Set the frequency reference higher than the jump frequency range.
	The frequency reference is exceeding the upper limit of the frequency command.	Set the upper limit of the frequency command higher than the frequency reference.
	Because the load is too heavy, the stall prevention function is working.	Replace the inverter with a model that has increased capacity.
The cooling fan does not rotate.	The control parameter for the cooling fan is set incorrectly.	Check the set value of the cooling fan control parameter (DRV-50 Fan Control).

15 Maintenance

15.1 Regular Inspection Lists

15.1.1 Daily Inspections

Table 1. Regular Inspection List

Inspection Area	Inspection Item	Inspection Details	Inspection Method	Judgment Standard	Inspection Equipment
All	Environmental Factors	Is the ambient temperature and humidity within the design range, and is there any dust or foreign objects present?	Refer to **2.1 Mounting on the Wall or within the Panel**.	There must be no danger of freezing with ambient temperature of -10~50˚C and must be no condensation with ambient humidity of less than 90%.	Thermometer, hygrometer, recorder
	Inverter	Is there any abnormal vibration or noise?	Visual inspection	No abnormality	-
	Power voltage	Are the input and output voltages normal?	Measure voltages between R/S/T-phases in. the inverter terminal block.	Refer to **16.1 Input and Output Specifications**.	Digital multimeter/ tester
Input/ Output circuit	Smoothing capacitor	Is there any leakage from the inside? Is the capacitor swollen?	Visual inspection	No abnormality	-

Inspection Area	Inspection Item	Inspection Details	Inspection Method	Judgment Standard	Inspection Equipment
Cooling system	Cooling Fan	Is there any abnormal vibration or noise?	Turn off the system and check operation by rotating the fan manually.	Fan rotates smoothly	-
Display	Measuring device	Is the display value normal?	Check the reading of displayed device on the panel.	Check and manage specified values.	Voltmeter, ammeter, etc.
Motor	All	Is there any abnormal vibration or noise?	Visual inspection	No abnormality	-
		Is there any abnormal smell?	Check for overheating or damage.		

15.1.2 annual Inspections

Table 2. Regular (Yearly) Inspection List

Inspection Area	Inspection Item	Inspection Details	Inspection Method	Judgment Standard	Inspection Equipment
Input/ Output circuit	All	Megger test (between input/output terminals and earth terminal)	Remove wiring from the inverter and short R/S/T/U/V/W terminals, and then measure from each terminal to the earth terminal using a megger (insulation-resistance tester).	Must be above 5 MΩ	DC 500 V class megger (insulation-resistance tester)
		Is there anything loose in the device?	Tighten up all screws.	No abnormality	
		Is there any evidence of parts overheating?	Visual inspection		
	Connecting conductor / wire	Are there any corroded cables?	Visual inspection	No abnormality	-
		Is there any damage to cable insulation?			
	Terminal block	Is there any damage?	Visual inspection	No abnormality	-
	Smoothing capacitor	Measure electrostatic capacity.	Measure with capacity meter.	Rated capacity over 85%	Capacity meter

Inspection Area	Inspection Item	Inspection Details	Inspection Method	Judgment Standard	Inspection Equipment
Input/ Output circuit	Relay	Is there any chattering noise during operation?	Visual inspection	No abnormality	-
		Is there any damage to the contacts?	Visual inspection		
	Braking resistor	Is there any damage from resistance?	Visual inspection	No abnormality	Digital multimeter / analog tester
		Check for disconnection.	Disconnect one side and measure with a tester.	Must be within ±10% of the rated value of the resistor.	
Control Circuit and Safety Circuit	Operation check	Check for output voltage imbalance while the inverter is in operation.	Measure voltage among the inverter output terminals, U/V/W.	Balance the voltage between phases: Within 4 V for 200 V class and within 8 V for 400 V class.	Digital multimeter or DC voltmeter
		Is there an error in the display circuit after the sequence protection test?	Test the inverter output protection in both short and open circuit conditions.	The circuit must work according to the sequence.	
Cooling system	Cooling Fan	Are any of the fan parts loose?	Check the connecting part of the connector and tighten up the screws.	No abnormality	-
Display	Display device	Is the display value normal?	Check the command value on the display device.	Specified and managed values must match.	Voltmeter, ammeter, etc.

15.1.3 bi-annual Inspections

Table 3. Regular (Biennial) Inspection List

Inspection Area	Inspection Item	Inspection Details	Inspection Method	Judgment Standard	Inspection Equipment
Motor	Insulation resistance	Megger test (between the output and earth terminals).	Remove the wires from terminals U/V/W before testing the wiring.	Must be above 5 MΩ	DC 500 V class megger (insulation-resistance tester)

⚠ Caution

Do not run a megger (insulation-resistance test) test on the control circuit. This may cause damage to the inverter.

15.2 Storage and Disposal

15.2.1 Proper Product Storage

If you are not using the product for an extended period, store it in the following way:

- Store the product in the environmental suitable for operation (refer to **1.3 Installation Considerations**).
- When storing the product for a period longer than 3 months, store it between -10 ˚C and 30 ˚C, to prevent depletion of the electrolytic capacitor.
- Do not expose the inverter to snow, rain, fog, or dust.
- Package the inverter in a way that prevents contact with moisture. Keep the relative humidity below 70% in the package by including a desiccant, such as a silica gel packet.
- Do not leave the inverter in a humid or dusty environment (e.g. Used as a device or control panel at a construction site). Disassemble the product and store in a place that is suitable for operation.

15.2.2 Correct Disposal

When disposing of the product, categorize it as general industrial waste. The product contains materials that can be recycled. Please consider the environment, energy, and resources and recycle unused products. The packing materials and all metal parts can be recycled. Although plastic can also be recycled, it can be incinerated under controlled conditions in some regions.

⚠ Caution

If the product is left in a prolonged state without a flow of current, the condenser will deteriorate due to its characteristics. To prevent the deterioration of the electrolytic condenser, turn on the power of the inverter at least once a year for the current to flow for 30–60 minutes. Run the device under no-load conditions.

16 Technical Specifications

16.1 Input and Output Specifications

16.1.1 200 V Class 0.4-18.5 kW (LSLV0004 - 0185S300-2)

Table 1. Input/Output Specifications (200 V Class 0.4-18.5 kW)

Model: LSLV□□□□S300-2			0004	0008	0015	0022	0040	0055	0075	0110	0150	0185
Applied Motor [1]	Heavy Duty (HD)	[HP]	0.5	1	2	3	5	7.5	10	15	20	25
		[kW]	0.4	0.75	1.5	2.2	4	5.5	7.5	11	15	18.5
	Normal Duty (ND)	[HP]	1	2	3	5	7.5	10	15	20	25	30
		[kW]	0.75	1.5	2.2	4	5.5	7.5	11	15	18.5	22
Output Rating	Rated capacity	HD [kVA]	1.2	1.9	3.0	4.2	6.7	9.5	12.6	17.9	22.9	28.6
		ND [kVA]	1.9	3.0	4.6	6.1	8.4	11.4	16.0	21.3	26.7	31.2
	Rated current [2]	HD [A]	3.2	5	8	11	17.5	25	33	47	60	75
		ND [A]	5	8	12	16	22	30	42	56	70	82
	Output frequency	[Hz]	V/F, V/F-SC [3]: 0.01~590									
			V/F-PG [4]: 0~400									
			SLVC-IM [5], SLVC-PM [6], SVC-IM [7], SVC-PM [8]: 0~400									
	Output voltage	[V]	3-phase 200-240									

1 The motor capacity is based on a standard 4-pole motor.
2 The rated output current is limited based on the carrier frequency (DRV-27 Carrier Frequency) settings.
3 V/F slip compensation control mode
4 V/F sensored (encoder) control (Only available when the induction motor type is selected.)
5 Sensorless vector-induction motor control
6 Sensorless vector-permanent magnet motor control
7 Sensored vector-induction motor control
8 Sensored vector-permanent magnet motor control

Model: LSLV□□□□S300-2			0004	0008	0015	0022	0040	0055	0075	0110	0150	0185
Input Rating	Input Voltage	[V]	3-phase 200-240, -15% - +10%									
	Input frequency	[Hz]	50/60 ±5%									
	Rated Current	HD [A]	2.5	4.0	6.8	9.6	15.5	22.1	29.6	42.6	54.8	68.4
		ND [A]	4.0	6.8	10.5	14.1	19.5	26.9	38.1	51.1	63.9	75.8
Weight (lb /kg)			3.2	3.3	3.5	3.7	3.8	5.5	5.6	7.2	12.9	13.2

16.1.2 200 V Class 22-75 kW (LSLV0220 - 0750S300-2)

Table 2. Input/Output Specifications (200 V Class 22-75 kW)

Model: LSLV□□□□S300-2			0220	0300	0370	0450	0550	0750
Applied Motor [9]	Heavy Duty (HD)	[HP]	30	40	50	60	75	100
		[kW]	22	30	37	45	55	75
	Normal Duty (ND)	[HP]	40	50	60	75	100	125
		[kW]	30	37	45	55	75	90
Output Rating	Rated capacity	HD [kVA]	33.5	43.8	55.3	68.6	83.8	109.7
		ND [kVA]	41.9	52.6	64.4	80.4	109.7	131.5
	Rated current [10]	HD [A]	88	115	145	180	220	288
		ND [A]	110	138	169	211	288	345

[9] The motor capacity is based on a standard 4-pole motor.
[10] The rated output current is limited based on the carrier frequency (DRV-27 Carrier Frequency) settings.

Model: LSLV□□□□S300-2			0220	0300	0370	0450	0550	0750
Output Rating	Output frequency	[Hz]	V/F, V/F-SC [11]			0.01~590		
			V/F-PG [12]			0~400		
			SLVC-IM [13], SLVC-PM [14], SVC-IM [15], SVC-PM [16]			0~400		
	Output voltage	[V]	3-phase 200-240					
Input Rating	Input Voltage	[V]	3-phase 200-240, -15% - +10%					
	Input frequency	[Hz]	50/60 ±5%					
	Rated Current	HD [A]	81.3	106.9	135.6	168.4	212.0	277.5
		ND [A]	102.3	129.1	158.1	198.5	277.5	332.5
Weight (lb /kg)			19.1	26.7	38.8	39.1	54	73

16.1.3 400 V Class 0.4-22 kW (LSLV0004 - 0220S300-4)

Table 3. Input/Output Specifications (400 V Class 0.4-22 kW)

Model: LSLV□□□□S300-4			0004	0008	0015	0022	0040	0055	0075	0110	0150	0185	0220
Applied Motor [17]	Heavy Duty (HD)	[HP]	0.5	1	2	3	5	7.5	10	15	20	25	30
		[kW]	0.4	0.75	1.5	2.2	4	5.5	7.5	11	15	18.5	22
	Normal Duty (ND)	[HP]	1	2	3	5	7.5	10	15	20	25	30	40
		[kW]	0.75	1.5	2.2	4	5.5	7.5	11	15	18.5	22	30

[11] V/F slip compensation control mode
[12] V/F sensored (encoder) control (Only available when the induction motor type is selected.)
[13] Sensorless vector-induction motor control
[14] Sensorless vector-permanent magnet motor control
[15] Sensored vector-induction motor control
[16] Sensored vector-permanent magnet motor control
[17] The motor capacity is based on a standard 4-pole motor.

Model: LSLV□□□□S300-4			0004	0008	0015	0022	0040	0055	0075	0110	0150	0185	0220
Output Rating	Rated capacity	HD [kVA]	1.4	2.6	3.7	4.2	7.0	11.3	12.6	18.3	23.6	29.7	34.3
		ND [kVA]	1.9	3.1	4.6	6.1	9.2	13.3	18.3	23.6	29.0	34.3	46.5
	Rated Current [18] (380 - 460 V)	HD [A]	1.8	3.4	4.8	5.5	9.2	14.8	16.5	24	31	39	45
		ND [A]	2.5	4.1	6	8	12.1	17.5	24	31	38	45	61
	Rated Current [18] (460-480 V)	HD [A]	1.7	3.1	4.4	5	8.3	13.4	14.9	21.6	27.9	35.1	40.5
		ND [A]	2.3	3.7	5.4	7.6	11	15.8	21.6	27.9	34.2	40.5	54.9
	Output frequency	[Hz]	V/F, V/F-SC [19]						0.01~590				
			V/F-PG [20]						0~400				
			SLVC-IM [21], SLVC-PM [22], SVC-IM [23], SVC-PM [24]						0~400				
	Output voltage	[V]	3-phase 380-480										
Input Rating	Input Voltage	[V]	3-phase 380-480, -15% - +10%										
	Input frequency	[Hz]	50/60 ±5%										
	Rated current	HD [A]	1.4	2.7	4.1	4.8	8.1	13.1	14.8	21.8	28.3	35.6	41.6
		ND [A]	2.0	3.5	5.2	7.1	10.7	15.7	21.8	28.3	34.7	41.6	56.7
Weight (lb /kg)			3.3	3.5	3.5	3.6	3.7	5.3	5.6	7.6	7.7	13.6	14

[18] The rated output current is limited based on the carrier frequency (DRV-27 Carrier Frequency) settings.
[19] V/F slip compensation control mode
[20] V/F sensored (encoder) control (Only available when the induction motor type is selected.)
[21] Sensorless vector-induction motor control
[22] Sensorless vector-permanent magenet motor control
[23] Sensored vector-induction motor control
[24] Sensored vector-permanent magnet motor control

16.1.4 400 V Class 30-75 kW (LSLV0300 - 0750S300-4)

Table 4. Input/Output Specifications (400 V Class 30-75 kW)

Model: LSLV□□□□S300-4			0300	0370	0450	0550	0750
Applied Motor [25]	Heavy Duty (HD)	[HP]	40	50	60	75	100
		[kW]	30	37	45	55	75
	Normal Duty (ND)	[HP]	50	60	75	100	125
		[kW]	37	45	55	75	90
Output Rating	Rated capacity	HD [kVA]	46.5	57.2	69.4	83.8	115.8
		ND [kVA]	57.2	69.4	81.5	108.2	128.8
	Rated Current [26] (380 - 460 V)	HD [A]	61	75	91	110	152
		ND [A]	75	91	107	142	169
	Rated Current [26] (460-480 V)	HD [A]	54.9	67.5	81.9	99	136.8
		ND [A]	67.5	81.9	96.3	127.8	156
	Output frequency	[Hz]	V/F, V/F-SC [27]			0.01~590	
			V/F-PG [28]			0~400	
			SLVC-IM [29], SLVC-PM [30], SVC-IM [31], SVC-PM [32]			0~400	
	Output voltage	[V]	3-phase 380-480				

[25] The motor capacity is based on a standard 4-pole motor.
[26] The rated output current is limited based on the carrier frequency set at DRV-27 (Carrier Frequency).
[27] V/F slip compensation control mode
[28] V/F sensored (encoder) control (Only available when the induction motor type is selected.)
[29] Sensorless vector-induction motor control
[30] Sensorless vector-permanent magnet motor control
[31] Sensored vector-induction motor control
[32] Sensored vector-permanent magnet motor control

Model: LSLV□□□□S300-4			0300	0370	0450	0550	0750
Input Rating	Input Voltage	[V]	3-phase 380-480, -15% - +10%				
	Input frequency	[Hz]	50/60 ±5%				
	Rated current	HD [A]	56.7	70.1	85.1	103.5	146.5
		ND [A]	70.1	85.1	100.7	136.8	162.9
Weight (lb /kg)			18.6	18.7	28.3	41.2	41.9

16.1.5 400 V Class 90-220 kW (LSLV0900 - 2200S300-4)

Table 5. Input/Output Specifications (400 V Class 90-220 kW)

Model: LSLV□□□□S300-4			0900	1100	1320	1600	1850	2200
Applied Motor [33]	Heavy Duty (HD)	[HP]	125	150	200	250	300	350
		[kW]	90	110	132	160	185	220
	Normal Duty (ND)	[HP]	150	200	250	300	350	400
		[kW]	110	132	160	185	220	250

[33] The motor capacity is based on a standard 4-pole motor.

Model: LSLV□□□□S300-4			0900	1100	1320	1600	1850	2200
Output Rating	Rated capacity	HD [kVA]	139	170	201	248	282	324
		ND [kVA]	170	201	248	282	329	367
	Rated Current [34] (380 - 460 V)	HD [A]	183	223	264	325	370	425
		ND [A]	223	264	325	370	432	481
	Rated Current [34] (460-480 V)	HD [A]	164.7	200.7	237.6	292.5	333	382.5
		ND [A]	200.7	237.6	292.5	333	388.8	432.9
	Output frequency	[Hz]	V/F, V/F-SC [35]				0.01~590	
			V/F-PG [36]				0~400	
			SLVC-IM [37], SLVC-PM [38], SVC-IM [39], SVC-PM [40]				0~400	
	Output voltage	[V]	3-phase 380-480					
Input Rating	Input Voltage	[V]	3-phase 380-480, -15% - +10%					
	Input frequency	[Hz]	50/60 ±5%					
	Rated current	HD [A]	178.4	217.4	258.9	318.7	367.0	428.8
		ND [A]	217.4	257.4	318.7	362.8	428.5	485.3
Weight (lb /kg)			58	58	77	78	120.5	121.5

[34] The rated output current is limited based on the carrier frequency set at DRV-27 (Carrier Frequency).
[35] V/F slip compensation control mode
[36] V/F sensored (encoder) control (Only available when the induction motor type is selected.)
[37] Sensorless vector-induction motor control
[38] Sensorless vector-permanent magnet motor control
[39] Sensored vector-induction motor control
[40] Sensored vector-permanent magnet motor control

16.2 Product Specification Details

16.2.1 Product Specification Details

Table 6. Product Specifications

Items			Description	
Control	Control method		V/F control, slip compensation, V/F PG [41], sensorless vector, sensored vector	
	Frequency settings power resolution		Digital command	0.01Hz
			Analog command	0.06 Hz(60 Hz standard)
	Frequency accuracy		1% of maximum output frequency	
	V/F pattern		Linear, square reduction, user V/F	
	Overload capacity		Normal duty (ND): based on VT rated current [42]	
			Heavy duty (HD): 150%/minute compared to CT rated current	
	Torque Boost		Manual torque boost, automatic torque boost	
Run	Operation type		Select among Smart Operator, terminal block, and communication operation	
	Frequency Settings		Analog type: -10-10 V, 0-10 V, 0-20 mA Digital type: Smart Operator, pulse train input	
	Operation function		PID Control, Up-down operation, 3-Wire Operation, DC braking, Frequency (speed) limit, Frequency Jump, Second function, Slip compensation, Anti-forward and reverse direction rotation, Automatic restart, Commercial transition, Kinetic energy buffering operation, Speed search, Flux Braking, Power braking, Energy Saving Operation, Leakage reduction operation	
	Input	Multifunction Terminal (8ea) DI1-DI8	Select between PNP (Source) and NPN (Sink) modes Functions can be set according to parameter settings at DIN-01, 03, 05, 07, 09, 11, 13, and 15 as follows:	

[41] V/F sensored (encoder) control (Only available when the induction motor type is selected.)

[42] 200V: 45 kW or less 120%, 1 minute / 55 kW or more 110%, 1 minute
400V: 75 kW or less 120%, 1 minute / 90 kW or more 110%, 1 minute

Items			Description		
Run	Input	Multifunction Terminal (8ea) DI1-DI8	Forward operation, reverse operation		
			Reset		
			Emergency stop		
			External trip 1, 2, 3, 4		
			Jog operation		
			Multi-stage frequency: L/M/H/X		
			Multi-stage acceleration and deceleration: high/medium/low		
			Acceleration or deceleration stop		
			Safe operation (Run Enable)		
			3-wire		
			Second operation (2nd Source)		
			Switching to commercial power (Exchange)		
			Increase/reduce/delete/save up-down operation frequency		
			Fix command frequency		
			Second motor selection		
			DC braking during stop		
			Timer settings (Timer Input)		
			Deactivate auxiliary speed		
			FWD jog		
			REV jog		
			PID Enable, Open Loop		
			PID Ref, Gain Change		
			PID I-Term Clear		
			PID Output Hold		
			PID Sleep On/Change		
			PID Step Ref L/M/H		
		Pulse Train	0~32kHz	Low Level	0~0.8V
				High Level	3.5~12V

<table>
<tr><th colspan="3">Items</th><th colspan="3">Description</th></tr>
<tr><td rowspan="7">Run</td><td rowspan="7">Output</td><td>Multifunction Open Collector Terminal</td><td rowspan="5">Trip output and inverter operation status output</td><td colspan="2">Less than DC 26V, 50mA</td></tr>
<tr><td rowspan="2">Trip Relay Terminal</td><td>N.O.</td><td>Less than AC 250 V, 2 A,
less than DC 30 V, 3 A</td></tr>
<tr><td>N.C.</td><td>Less than AC 250 V, 1 A,
less than DC 30 V, 1 A</td></tr>
<tr><td rowspan="2">Multi function relay terminal</td><td colspan="2">Less than AC 250 V, 5 A</td></tr>
<tr><td colspan="2">Less than DC 30 V, 5A</td></tr>
<tr><td>Analog Output</td><td colspan="3">0 - 10 Vdc (0-20 mA): Frequency, output current, output voltage, DC voltage, and more are selectable</td></tr>
<tr><td>Pulse Train</td><td colspan="3">Maximum of 32 kHz, 0-10 V</td></tr>
<tr><td rowspan="3">Protection Functions</td><td colspan="2">Trip</td><td colspan="3">Overcurrent trip, Overvoltage trip, External signal trip,
Temperature sensor trip, ARM short current fault trip,
Inverter overheat trip, Over heat trip,
Out phase open trip, In phase open trip,
Inverter overload trip, Ground trip, Fan trip,
Motor overheat trip, Low voltage trip during operation,
I/O board link trip, Low voltage trip,
Parameter writing trip, Analog input error trip,
Emergency stop trip, Motor overload trip,
Command loss trip, Smart Operator command loss trip,
External memory error, Level detection trip,
CPU watchdog trip, Motor normal duty trip</td></tr>
<tr><td colspan="2">Alarm</td><td colspan="3">Warnings for command loss, overload, normal duty, inverter overload, fan operation, braking rate of braking resistance, and LDT</td></tr>
<tr><td colspan="2">Instantaneous power interruption</td><td colspan="3">Use KEB operation [43]</td></tr>
</table>

[43] Operates when 1 (KEB Ride-Through) is selected in APP-15 (KEB Mode).

16.2.2 Structure and Usage Environment

Table 7. Product Structure/Usage Environment

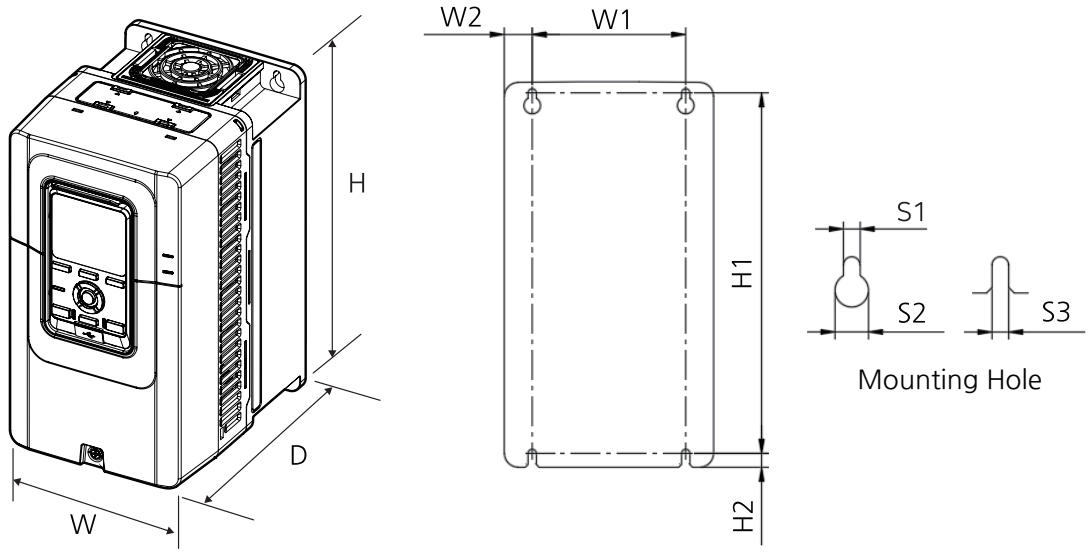
Items		Description
Structure/ Usage Environment	Cooling type	Forced fan cooling structure
	Protection structure	IP 20 (default), UL Open & Enclosed Type 1 (optional) Installing Conduit option fulfills UL Enclosed Type 1
	Ambient temperature	Where there is no ice or frost, • -10~50℃ on heavy duty • -10~40℃ on normal duty The conduit option requires 1.5%/℃ current derating when it is over 30℃ on normal duty and when it is over 40℃ on heavy duty.
	Ambient humidity	Relative humidity less than 95% RH (to avoid condensation forming)
	Storage temperature	-20~65°C
	Environmental Factors	No corrosive gas, inflammable gas, oil stains, dust, and other pollutants inside (Pollution Degree 2 Environment [44])
	Operation altitude/ oscillation	No higher than 3280 ft (1,000 m), less than 9.8 m^2/sec (1.0 G).
	Air Pressure	70~106kPa

[44] Pollution level of temporary conductivity from dew, though nonconductive pollution occurs.

16.3 External Dimensions (IP20 Type)

16.3.1 External Dimensions

200 V Class 0.4-4 kW / 400 V Class 0.4-4 kW



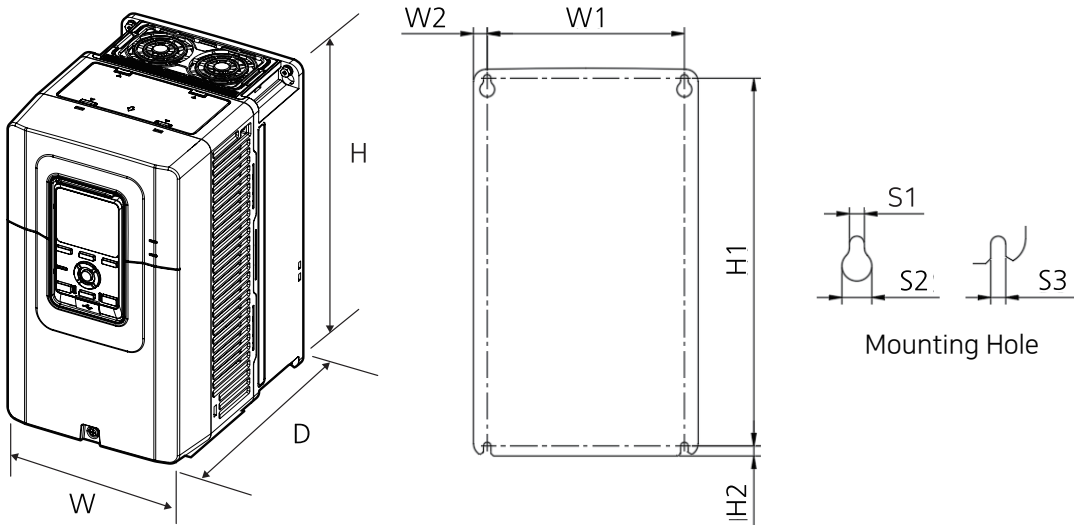
[Image 1. 200 V class 0.4-4 kW/400 V class 0.4-4 kW Exterior Diagram]

Table 8. External Dimensions (200 V Class 0.4-4 kW/400 V Class 0.4-4 kW)

모델명	W	H	D	W1	W2	H1	H2	S1	S2	S3
LSLV0004S300-4 LSLV0008S300-4 LSLV0015S300-4 LSLV0022S300-4 LSLV0040S300-4 LSLV0004S300-2 LSLV0008S300-2 LSLV0015S300-2 LSLV0022S300-2 LSLV0040S300-2	150.0 (5.91)	276.0 (10.87)	192.0 (7.56)	110.0 (4.33)	20.0 (0.79)	258.0 (10.16)	10.0 (0.39)	6.0 (0.24)	12.0 (0.47)	6.0 (0.24)

Units: mm(in)

200 V Class 5.5-7.5 kW / 400 V Class 5.5-7.5 kW



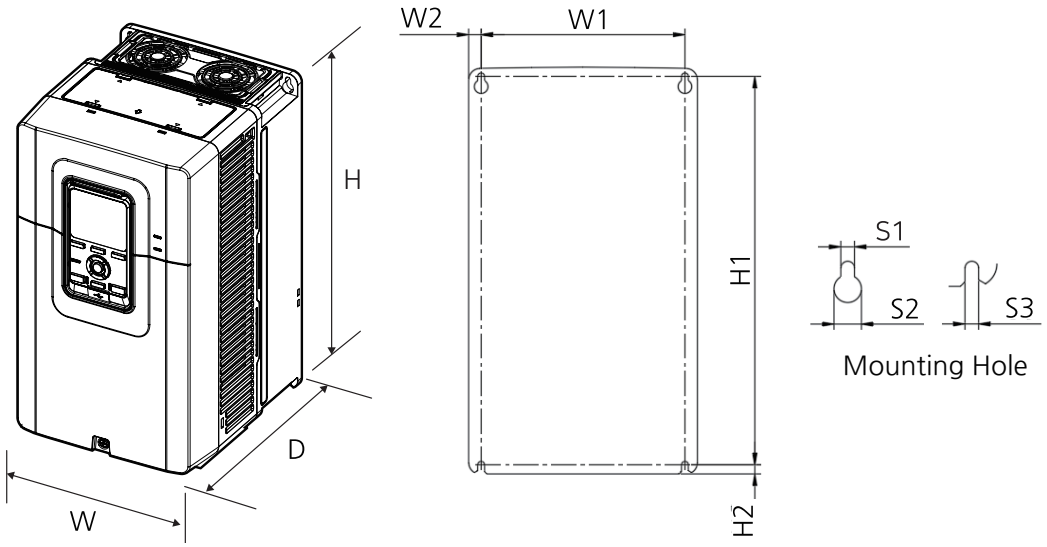
[Image 2. 200 V class 5.5-7.5 kW/400 V class 5.5-7.5 kW Exterior Diagram]

Table 9. External Dimensions (200 V Class 5.5-7.5 kW/400 V Class 5.5-7.5 kW)

모델명	W	H	D	W1	W2	H1	H2	S1	S2	S3
LSLV0055S300-4 LSLV0075S300-4 LSLV0055S300-2 LSLV0075S300-2	180.0 (7.09)	310.0 (12.20)	225.0 (8.86)	158.0 (6.22)	11.0 (0.43)	294.0 (11.57)	8.0 (0.31)	6.0 (0.24)	12.0 (0.47)	6.0 (0.24)

Units: mm(in)

200 V Class 11 kW / 400 V Class 11-15 kW



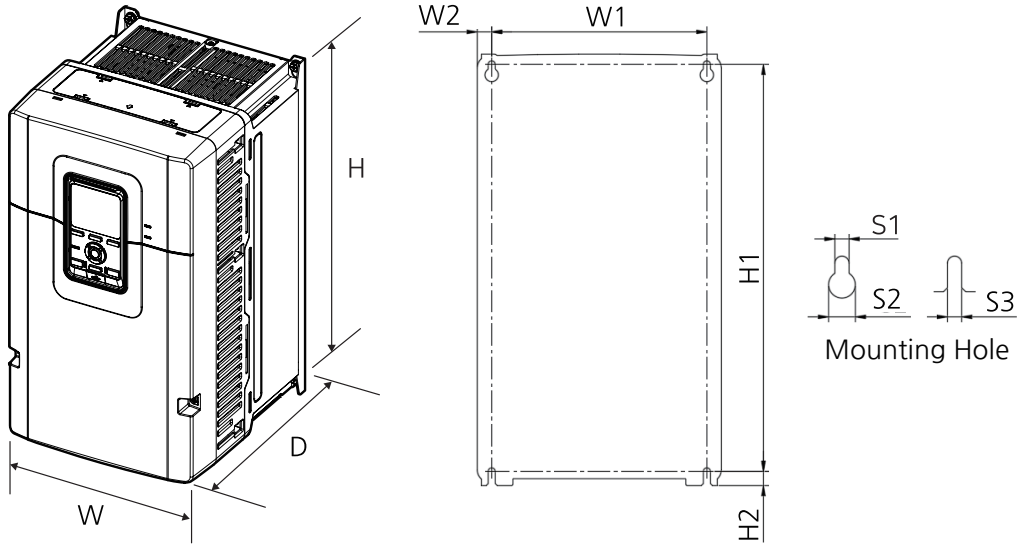
[Image 3. 200 V Class 11 kW/400 V Class 11-15 kW Exterior Diagram]

Table 10. External Dimensions (200 V Class 11 kW/400 V Class 11-15 kW)

모델명	W	H	D	W1	W2	H1	H2	S1	S2	S3
LSLV0110S300-4 LSLV0150S300-4 LSLV0110S300-2	200.0 (7.87)	355.0 (13.98)	225.0 (8.86)	178.0 (7.01)	11.0 (0.43)	339.0 (13.35)	8.0 (0.31)	6.0 (0.24)	12.0 (0.47)	6.0 (0.24)

Units: mm(in)

200 V Class 15-18.5 kW / 400 V Class 18.5-22 kW



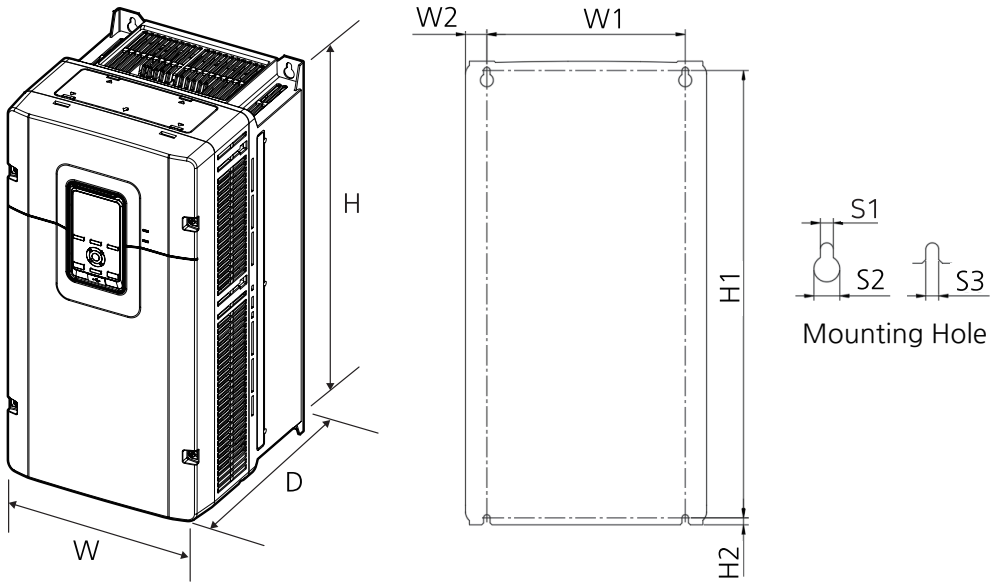
[Image 4. 200 V class 15-18 kW/400 V class 18.5-22 kW Exterior Diagram]

Table 11. External Dimensions (200 V Class 15-18.5 kW/400 V Class 18.5-22 kW)

모델명	W	H	D	W1	W2	H1	H2	S1	S2	S3
LSLV0185S300-4 LSLV0220S300-4 LSLV0150S300-2 LSLV0185S300-2	240.0 (9.45)	424.0 (16.69)	265.0 (10.43)	211.6 (8.33)	14.2 (0.56)	400.0 (15.75)	14.0 (0.55)	7.0 (0.28)	13.2 (0.52)	7.0 (0.28)

Units: mm(in)

200 V Class 22 kW / 400 V Class 30-37 kW



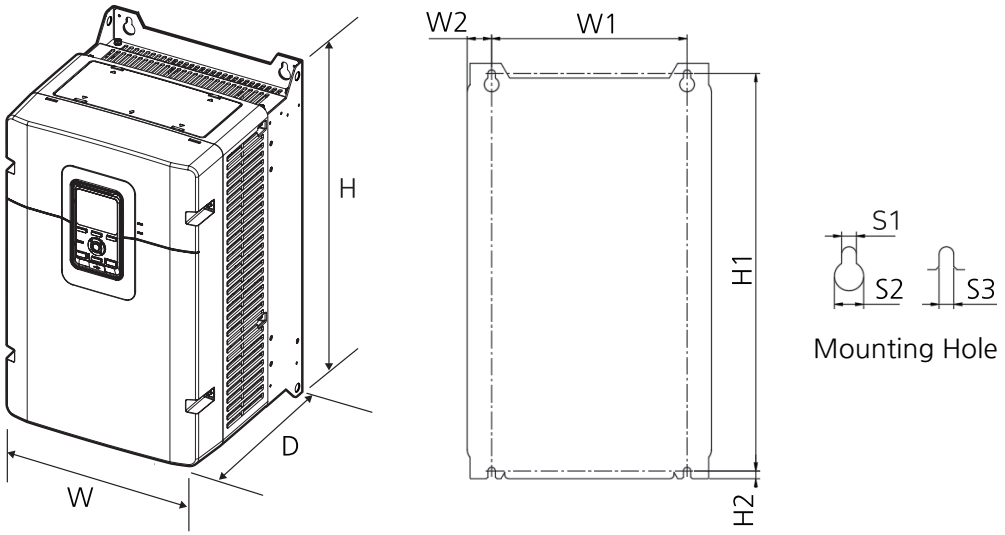
[Image 5. 200 V Class 22 kW/400 V Class 30-37 kW Exterior Diagram]

Table 12. External Dimensions (200 V Class 22 kW/400 V Class 30-37 kW)

모델명	W	H	D	W1	W2	H1	H2	S1	S2	S3
LSLV0300S300-4 LSLV0370S300-4 LSLV0220S300-2	260.0 (10.24)	500.0 (19.69)	271.0 (10.67)	214.0 (8.43)	23.0 (0.91)	482.5 (19.00)	7.5 (0.30)	7.0 (0.28)	14.0 (0.55)	7.0 (0.28)

Units: mm(in)

200 V Class 30 kW / 400 V Class 45 kW



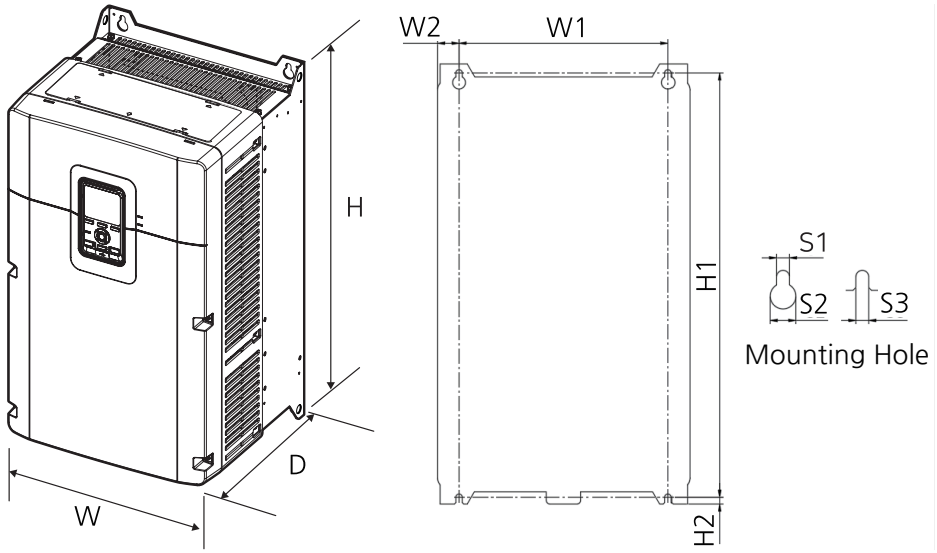
[Image 6. 200 V Class 30 kW/400 V Class 45 kW Exterior Diagram]

Table 13. External Dimensions (200 V Class 30 kW/400 V Class 45 kW)

모델명	W	H	D	W1	W2	H1	H2	S1	S2	S3
LSLV0450S300-4 LSLV0300S300-2	300.0 (11.81)	510.0 (20.08)	298.2 (11.74)	240.0 (9.45)	30.0 (1.18)	488.0 (19.21)	9.5 (0.37)	9.0 (0.35)	18.0 (0.71)	9.0 (0.35)

Units: mm(in)

200 V Class 37-45 kW / 400 V Class 55-75 kW



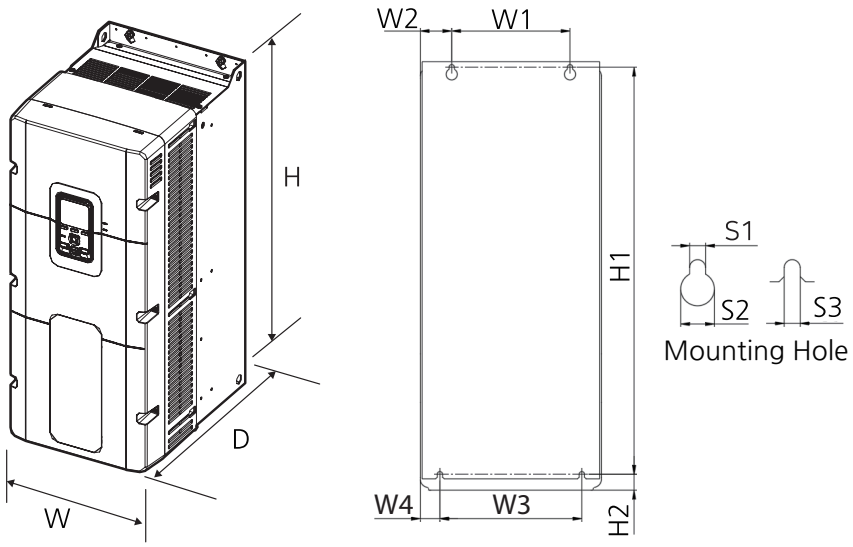
[Image 7. 200 V class 37-45 kW/400 V class 55-75 kW Exterior Diagram]

Table 14. External Dimensions (200 V Class 37-45 kW/400 V Class 55-75 kW)

모델명	W	H	D	W1	W2	H1	H2	S1	S2	S3
LSLV0550S300-4 LSLV0750S300-4 LSLV0370S300-2 LSLV0450S300-2	350.0 (13.78)	615.0 (24.21)	318.3 (12.53)	290.0 (11.42)	30.0 (1.18)	593.0 (23.35)	9.5 (0.37)	9.0 (0.35)	18.0 (0.71)	9.0 (0.35)

Units: mm(in)

400 V Class 90-110 kW



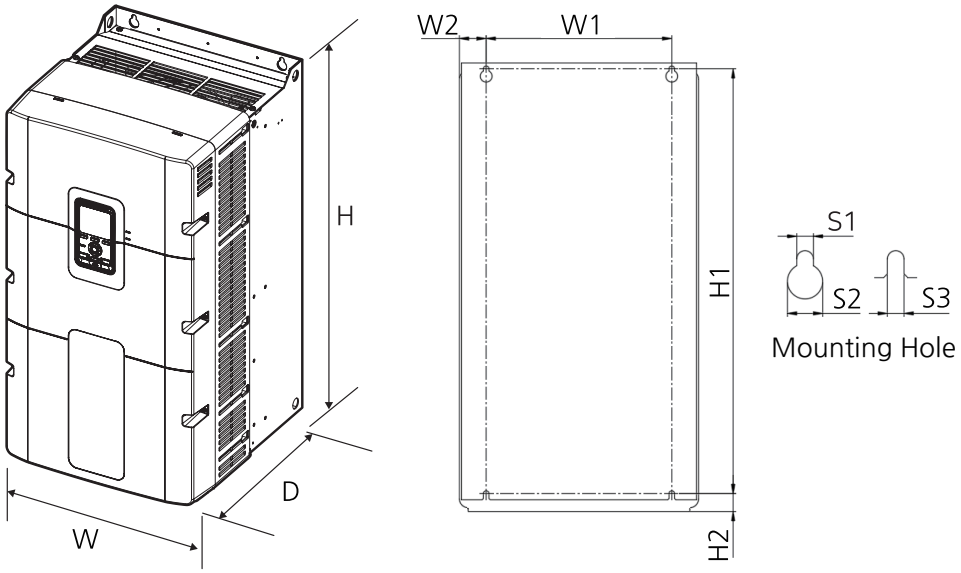
[Image 8. 400 V Class 90-110 kW Exterior diagram]

Table 15. External Dimensions (400 V Class 90-110 kW)

모델명	W	H	D	W1	W2	W3	W4	H1	H2	S1	S2	S3
LSLV0900S300-4 LSLV1100S300-4	306.4 (12.06)	725.0 (28.54)	391.0 (15.39)	200.0 (7.87)	53.2 (2.09)	240.0 (9.45)	33.2 (1.31)	688.5 (27.11)	27.0 (1.06)	9.0 (0.35)	19.0 (0.75)	9.0 (0.35)

Units: mm(in)

200 V Class 55-75 kW / 400 V Class 132-160 kW



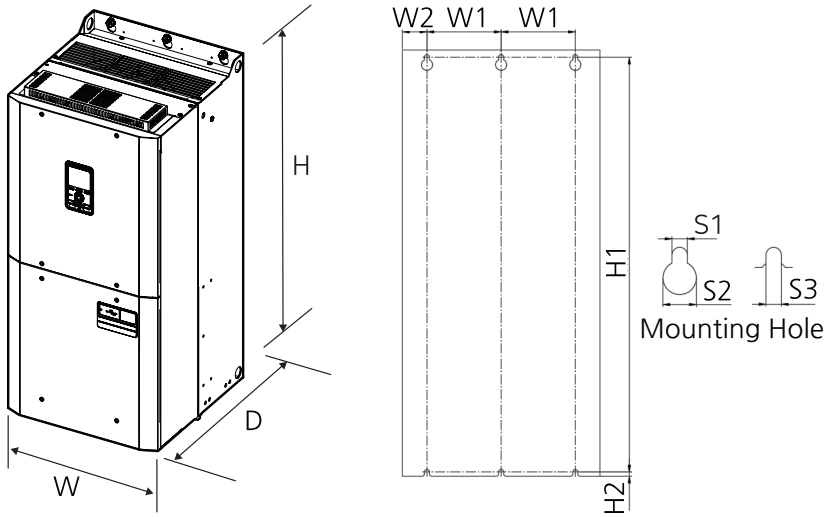
[Image 9. 200 V class 55-75 kW/400 V class 132-160 kW Exterior Diagram]

Table 16. External Dimensions (200 V Class 55-75 kW/400 V Class 132-160 kW)

모델명	W	H	D	W1	W2	H1	H2	S1	S2	S3
LSLV1320S300-4 LSLV1600S300-4 LSLV0550S300-2 LSLV0750S300-2	386.4 (15.21)	724.0 (28.50)	401.0 (15.79)	300.0 (11.81)	43.2 (1.70)	685.5 (26.99)	29.0 (1.14)	9.0 (0.35)	19.0 (0.75)	9.0 (0.35)

Units: mm(in)

400 V Class 185-220 kW



[Image 10. 400 V Class 185-220 kW Exterior diagram]

Table 17. External Dimensions (400 V Class 185-220 kW)

모델명	W	H	D	W1	W2	H1	H2	S1	S2	S3
LSLV1850S300-4 LSLV2200S300-4	426.0 (16.77)	920.0 (36.22)	440.9 (17.36)	160.0 (6.30)	53.0 (2.09)	895.5 (35.26)	9.0 (0.35)	11.0 (0.43)	24.0 (0.94)	11.0 (0.43)

Units: mm(in)

16.4 Peripheral Devices

16.4.1 Standards of Molded Case Circuit Breaker (MCCB), Earth Leakage Circuit Breaker (ELCB), and Magnetic Contactor (MC)

You may use molded case circuit breakers (MCCB), earth leakage circuit breakers (ELCB), and magnetic contactors (MC) in the following table:

Table 18. Compatible Molded Case Circuit Breaker, Earth Leakage Circuit Breaker, and Magnetic Contactor Standards

Model LSLV□□□□	Molded Case Circuit Breaker (MCCB)		Earth Leakage Circuit Breaker (ELCB)	Magnetic Contactor (MC)		
	Model	Rating [A]	Model	Rating [A]	Model	Rating [A]
0004S300-2	UTE100·H·FTU·15·3P·UL	15	EBS33c	10	MC-6a	9
0008S300-2	UTE100·H·FTU·15·3P·UL	15	EBS33c	10	MC-9a	11
0015S300-2	UTE100·H·FTU·15·3P·UL	15	EBS33c	15	MC-12a	13
0022S300-2	UTE100·H·FTU·20·3P·UL	20	EBS33c	20	MC-18a	18
0040S300-2	UTE100·H·FTU·30·3P·UL	30	EBS33c	30	MC-32a	32
0055S300-2	UTS150·H·FTU·40·3P·UL	40	EBS53c	40	MC-40a	40
0075S300-2	UTS150·H·FTU·60·3P·UL	60	EBS63c	60	MC-55a	55
0110S300-2	UTS150·H·FTU·80·3P·UL	80	EBS103c	75	MC-75a	75
0150S300-2	UTS150·H·FTU·100·3P·UL	100	EBS103c	100	MC-100a	100
0185S300-2	UTS150·H·FTU·125·3P·UL	125	EBS103c	125	MC-130a	130
0220S300-2	UTS150·H·FTU·150·3P·UL	150	EBS203c	150	MC-150a	150
0300S300-2	UTS250·H·FTU·200·3P·UL	200	EBS203c	175	MC-185a	185
0370S300-2	UTS250·H·FTU·225·3P·UL	225	EBS403c	225	MC-225a	225
0450S300-2	UTS400·H·FTU·300·3P·UL	300	EBS403c	300	MC-265a	265
0550S300-2	UTS400·H·FTU·400·3P·UL	400	EBS403c	400	MC-400a	400
0750S300-2	UTS600·H·FTU·500·3P·UL	500	EBS603c	500	MC-500a	500
0004S300-4	UTS150·L·MCP·3.2·3P·UL	3.2	EBS33c	5	MC-6a	7
0008S300-4	UTS150·L·MCP·6.3·3P·UL	6.3	EBS33c	5	MC-6a	7
0015S300-4	UTS150·L·MCP·12·3P·UL	12	EBS33c	10	MC-9a	9

Model LSLV□□□□	Molded Case Circuit Breaker (MCCB)		Earth Leakage Circuit Breaker (ELCB)	Magnetic Contactor (MC)		
	Model	Rating [A]	Model	Rating [A]	Model	Rating [A]
0022S300-4	UTS150·L·MCP·12·3P·UL	12	EBS33c	10	MC-12a	12
0040S300-4	UTS150·L·MCP·20·3P·UL	20	EBS33c	15	MC-18a	18
0055S300-4	UTS150·L·MCP·32·3P·UL	32	EBS33c	25	MC-32a	32
0075S300-4	UTS150·L·MCP·32·3P·UL	32	EBS33c	30	MC-32a	32
0110S300-4	UTS150·L·FTU·40·3P·UL	40	EBS53c	50	MC-50a	43
0150S300-4	UTS150·L·FTU·50·3P·UL	50	EBS53c	50	MC-65a	65
0185S300-4	UTS150·L·FTU·60·3P·UL	60	EBS63c	60	MC-65a	65
0220S300-4	UTS150·L·FTU·80·3P·UL	80	EBS103c	100	MC-100a	100
0300S300-4	UTS150·L·FTU·100·3P·UL	100	EBS103c	100	MC-100a	100
0370S300-4	UTS150·L·FTU·125·3P·UL	125	EBS103c	125	MC-130a	130
0450S300-4	UTS150·L·FTU·150·3P·UL	150	EBS203c	150	MC-150a	150
0550S300-4	UTS250·L·FTU·175·3P·UL	175	EBS203c	200	MC-185a	185
0750S300-4	UTS250·L·FTU·225·3P·UL	225	EBS203c	225	MC-225a	225
0900S300-4	UTS400·LT·FTU·300·3P·UL	300	EBS403c	300	MC-330a	330
1100S300-4	UTS400·LT·FTU·400·3P·UL	400	EBS403c	350	MC-400a	400
1320S300-4	UTS600·LT·FTU·500·3P·UL	500	EBS603c	500	MC-500a	500
1600S300-4	UTS600·LT·FTU·600·3P·UL	600	EBS603c	500	MC-500a	500
1850S300-4	UTS600·LT·FTU·600·3P·UL	600	EBS603c	600	MC-630a	630
2200S300-4	UTS800·LT·NGO·800·3P·UL	800	EBS803c	800	MC-800a	800

16.4.2 AC Input Fuse and Reactor Specifications

This product has a built-in DC reactor. To additionally install an AC reactor, contact our customer service center.

Table 19. Input Fuse and Reactor Specifications

Model LSLV□□□□	AC Input Fuse		AC Reactor*	
	Voltage [V]	Current [A]	Inductance [mH]	Current [A]
0004S300-2	600	10	2.02	5
0008S300-2	600	15	1.12	9
0015S300-2	600	15	0.92	11
0022S300-2	600	25	0.59	17
0040S300-2	600	35	0.42	24
0055S300-2	600	50	0.30	34
0075S300-2	600	70	0.22	46
0110S300-2	600	80	0.16	64
0150S300-2	600	100	0.12	83
0185S300-2	600	125	0.10	103
0220S300-2	600	150	0.08	123
0300S300-2	600	200	0.06	161
0370S300-2	600	250	0.05	204
0450S300-2	600	300	0.04	253
0550S300-2	600	400	0.03	334
0750S300-2	600	500	0.02	417
0004S300-4	600	6	6.74	3
0008S300-4	600	6	4.04	5
0015S300-4	600	10	2.89	7
0022S300-4	600	15	2.25	9
0040S300-4	600	20	1.56	13
0055S300-4	600	25	1.01	20
0075S300-4	600	35	0.75	27

Model LSLV□□□□	AC Input Fuse		AC Reactor*	
	Voltage [V]	Current [A]	Inductance [mH]	Current [A]
0110S300-4	600	50	0.59	34
0150S300-4	600	60	0.47	43
0185S300-4	600	80	0.37	54
0220S300-4	600	100	0.29	69
0300S300-4	600	100	0.24	86
0370S300-4	600	125	0.19	106
0450S300-4	600	150	0.16	128
0550S300-4	600	200	0.12	165
0750S300-4	600	250	0.09	220
0900S300-4	600	400	0.08	261
1100S300-4	600	400	0.07	309
1320S300-4	600	500	0.05	383
1600S300-4	600	600	0.05	446
1850S300-4	600	600	0.04	515
2200S300-4	600	800	0.03	583

ⓘ Caution

Use Class CC, G, J, L, R or T UL Listed Input Fuse and UL Listed Breaker Only. See the table above For the Voltage and Current rating of the fuse and the breaker.

ⓘ Attention

Utiliser UNIQUEMENT des fusibles d'entrée homologués de Classe CC, G, J, L, R ou T UL et des disjoncteurs UL. Se reporter au tableau ci-dessus pour la tension et le courant nominal des fusibless et des disjoncteurs.

16.5 Terminal Screw Specifications

16.5.1 Input/output Terminal Screw Specification

Table 20. Input/output Terminal Screw Specification

Model LSLV□□□□	Terminal Block Screw Size	Screw Torque [Kgf·cm (N·m)]
0004S300-2	M4	12.2~14.3(1.2~1.4)
0008S300-2	M4	12.2~14.3(1.2~1.4)
0015S300-2	M4	12.2~14.3(1.2~1.4)
0022S300-2	M4	12.2~14.3(1.2~1.4)
0040S300-2	M4	12.2~14.3(1.2~1.4)
0055S300-2	M4	12.2~14.3(1.2~1.4)
0075S300-2	M4	12.2~14.3(1.2~1.4)
0110S300-2	M5	20.4~24.5(2.0~2.4)
0150S300-2	M5	20.4~24.5(2.0~2.4)
0185S300-2	M5	20.4~24.5(2.0~2.4)
0220S300-2	M6	30.6~38.2(3~3.74)
0300S300-2	M8	61.2~91.8(6~9)
0370S300-2	M8	61.2~91.8(6~9)
0450S300-2	M8	61.2~91.8(6~9)
0550S300-2	M12	182.4~215.0(18~21.2)
0750S300-2	M12	182.4~215.0(18~21.2)
0004S300-4	M4	12.2~14.3(1.2~1.4)
0008S300-4	M4	12.2~14.3(1.2~1.4)
0015S300-4	M4	12.2~14.3(1.2~1.4)
0022S300-4	M4	12.2~14.3(1.2~1.4)
0040S300-4	M4	12.2~14.3(1.2~1.4)
0055S300-4	M4	12.2~14.3(1.2~1.4)
0075S300-4	M4	12.2~14.3(1.2~1.4)

Model LSLV□□□□	Terminal Block Screw Size	Screw Torque [Kgf·cm (N·m)]
0110S300-4	M5	12.2~14.3(1.2~1.4)
0150S300-4	M5	12.2~14.3(1.2~1.4)
0185S300-4	M5	20.4~24.5(2.0~2.4)
0220S300-4	M5	20.4~24.5(2.0~2.4)
0300S300-4	M5 / M6	24.5~31.8(2.4~3.1)/30.6~38.2(3~3.74)
0370S300-4	M5 / M6	24.5~31.8(2.4~3.1)/30.6~38.2(3~3.74)
0450S300-4	M8	61.2~91.8(6~9)
0550S300-4	M8	61.2~91.8(6~9)
0750S300-4	M8	61.2~91.8(6~9)
0900S300-4	M8	61.2~91.8(6~9)
1100S300-4	M8	61.2~91.8(6~9)
1320S300-4	M12	182.4~215.0(18~21.2)
1600S300-4	M12	182.4~215.0(18~21.2)
1850S300-4	M12	182.4~215.0(18~21.2)
2200S300-4	M12	182.4~215.0(18~21.2)

16.5.2 Control Circuit Terminal Screw Specifications

Table 21. Control Circuit Terminal Screw Specifications

Terminals	Terminal Block Screw Size	Screw Torque [Kgf·cm (N·m)]
VR+, VR-, AI1, AI2, AI3, TI, TO, AO1, AO2, EPI, S+, S-, 5G, DI1~DI8, CM, DP, DG, A1/B1/C1, A2/C2, Q3, EG	M2.5	24.0 (0.4)

ⓘ Caution

Apply rated torques to the terminal screws. Loose screws may cause short circuits and malfunctions. Tightening the screw too much may damage the terminals and cause short circuits and malfunctions. Use copper wires only with 600V, 90℃ rating for the power terminal wiring, and 300V, 75℃ rating for the control terminal wiring.

ⓘ Attention

Appliquer des couples de marche aux vis des bornes. Des vis desserrées peuvent provoquer des courts-circuits et des dysfonctionnements. Ne pas trop serrer la vis, car cela risque d'endommager les bornes et de provoquer des courts-circuits et des dysfonctionnements. Utiliser uniquement des fils de cuivre avec une valeur nominale de 600 V, 90 ℃ pour le câblage de la borne d'alimentation, et une valeur nominale de 300 V, 75 ℃ pour le câblage de la borne de commande.

16.6 Braking Unit and Braking Resistor Specifications

16.6.1 Type of Braking Units

Table 22. Type of Braking Units

UL Type	Type	Voltage	Product Capacity	Brake unit	Exterior and Terminal Arrangement
UL type	Type A (Refer to the table **16.6.5 Braking Resistor Specifications** for resistance values of the braking resistor.)	200 V class	22kW	SV220DBU-2U	Refer to **Group 1**
			37kW	SV370DBU-2U	
			55kW	SV550DBU-2U	
		400 V class	55kW	SV550DBU-4U	
			75kW	SV750DBU-4U	
Non-UL Type	Type B (Refer to the user manual of each braking unit for resistance values of the braking resistor.)	400 V class	75kW	SV750DB-4	Refer to **Group 2**
			220kW	SV2200DB-4	Refer to **Group 3**
	Type C (Refer to the user manual of each braking unit for resistance values of the braking resistor.)	200 V class	22kW	LSLV0220DBU-2LN	Refer to **Group 4**
			37kW	LSLV0370DBU-2LN	
				LSLV0370DBU-2HN	Refer to **Group 5**
			75kW	LSLV0750DBU-2LN	Refer to **Group 4**
				LSLV0750DBU-2HN	Refer to **Group 5**
		400 V class	75kW	LSLV0750DBU-4LN	Refer to **Group 4**
				LSLV0750DBU-4HN	Refer to **Group 5**

Note

- Make sure to check the changes in the user manual of the relevant braking unit before use.
- Refer to **16.6.5 Braking Resistor Specifications**, or check the user manual of each braking unit for the resistance values of Type A.
- Check the user manual of each braking unit for resistance values of Type B and C.

16.6.2 Terminal Arrangement in the Braking Unit

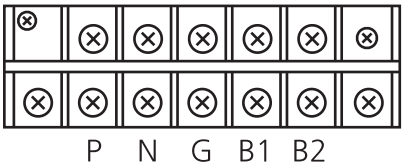
The following table describes the terminals in the braking unit.

Table 23. Terminal Arrangement in the Braking Unit

Terminal Name	Functionality
P	Terminal that connects to inverter terminal P
P(+)	
N	Terminal that connects to inverter terminal N
N(-)	
G	Ground Terminal
E	
B1	Terminal that connects to B1 in the braking resistor
B2	Terminal that connects to B2 in the braking resistor
N.C	Terminal not used
P/B1	Terminal that connects to inverter terminal P2 or P/ terminal that connects to B1 in the braking resistor

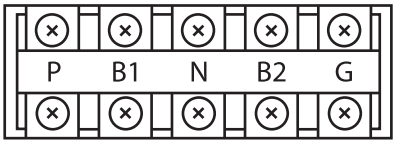
The terminal arrangement of the braking unit is as the following groups:

Group 1



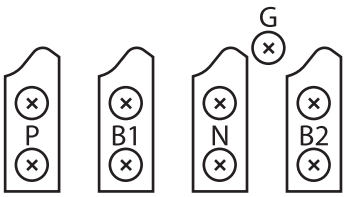
[Image 11. Terminal Arrangement in the Braking Unit - Group 1]

Group 2



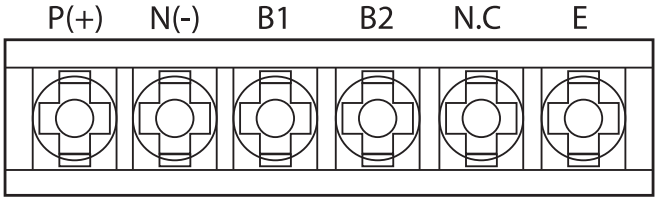
[Image 12. Terminal Arrangement in the Braking Unit - Group 2]

Group 3



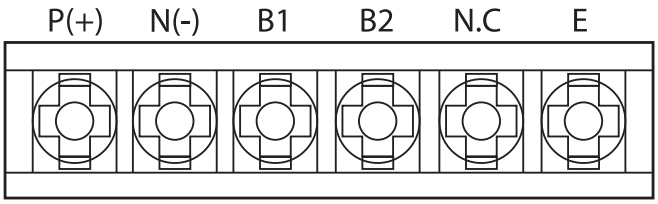
[Image 13. Terminal Arrangement in the Braking Unit - Group 3]

Group 4

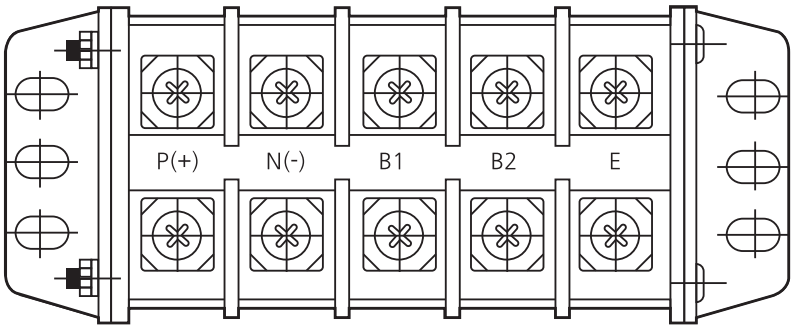


[Image 14. Terminal Arrangement in the Braking Unit - Group 4]

Group 5



[Image 15. Terminal Arrangement in the Braking Unit - Group 5: A Frame (200 V Class 37 kW, 400 V Class 37 kW/75 kW)



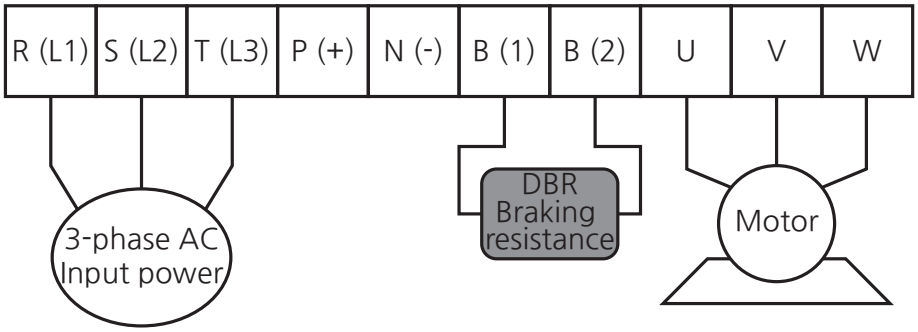
[Image 16. Terminal Arrangement in the Braking Unit - Group 5: B/C Frame (200 V Class 75 kW)]

16.6.3 Braking unit and braking resistor wiring diagram by capacity

200 V class 0.4-22 kW / 400 V class 0.4-37 kW

When using the built-in braking unit

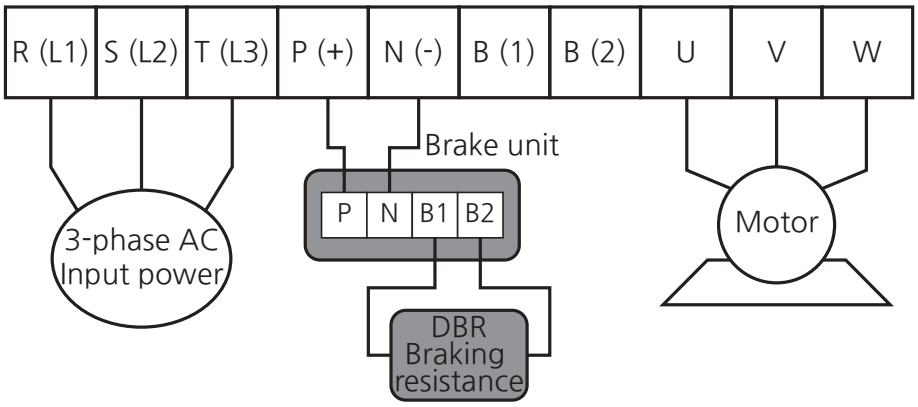
Connect the braking resistor to B (1) and B (2) terminals when using the built-in braking unit.



[Image 17. Braking resistor wiring – built-in braking unit (200 V class 0.4-18.5 kW, 400 V class 0.4-37 kW)]

When using the separate braking unit

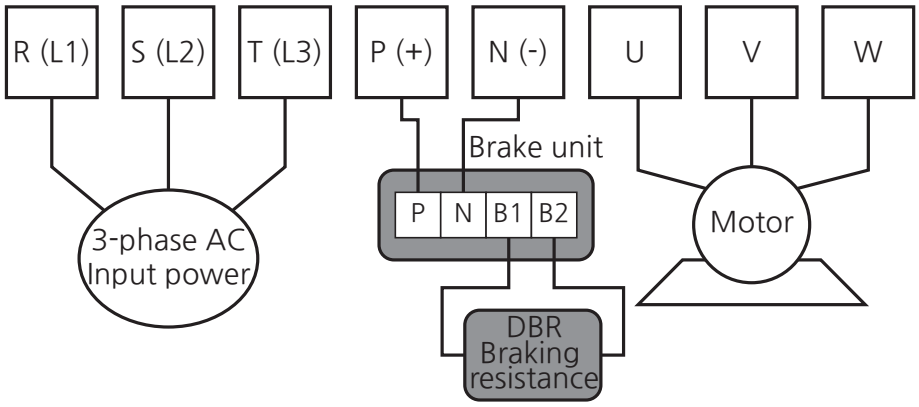
Connect the braking unit to P (+) and N (-) terminals when using the separate braking unit.



[Image 18. Braking resistor wiring – separate braking unit (200 V class 0.4-22 kW, 400 V class 0.4-37 kW)]

200 V class 30-45 kW / 400 V class 45-75kW

Connect the braking unit to P (+) and N (-) terminals when using the separate braking unit.

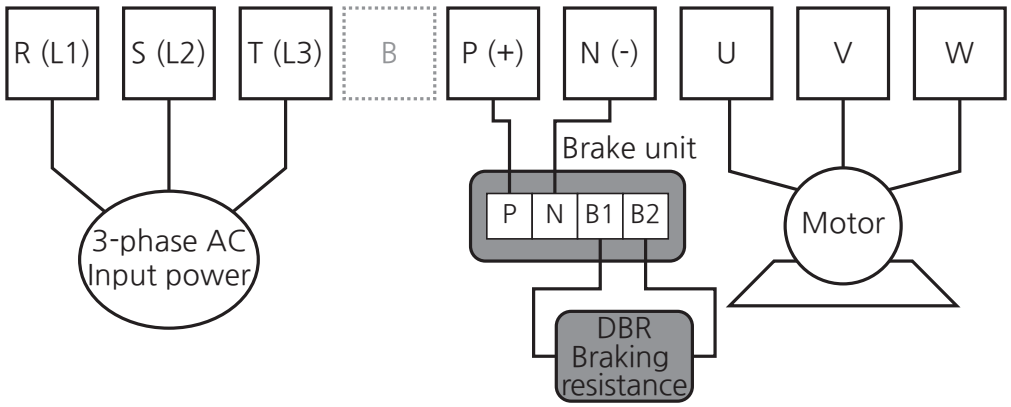


[Image 19. Braking resistor wiring – separate braking unit (200 V class 30-45 kW, 400 V class 45-75 kW)]

200 V class 55-75 kW / 400 V class 90-220 kW

Connect the braking unit to P (+) and N (-) terminals when using the separate braking unit.

Do not use a B terminal.



[Image 20. Braking resistor wiring – separate braking unit (200 V class 55-75 kW, 400 V class 90-220 kW)]

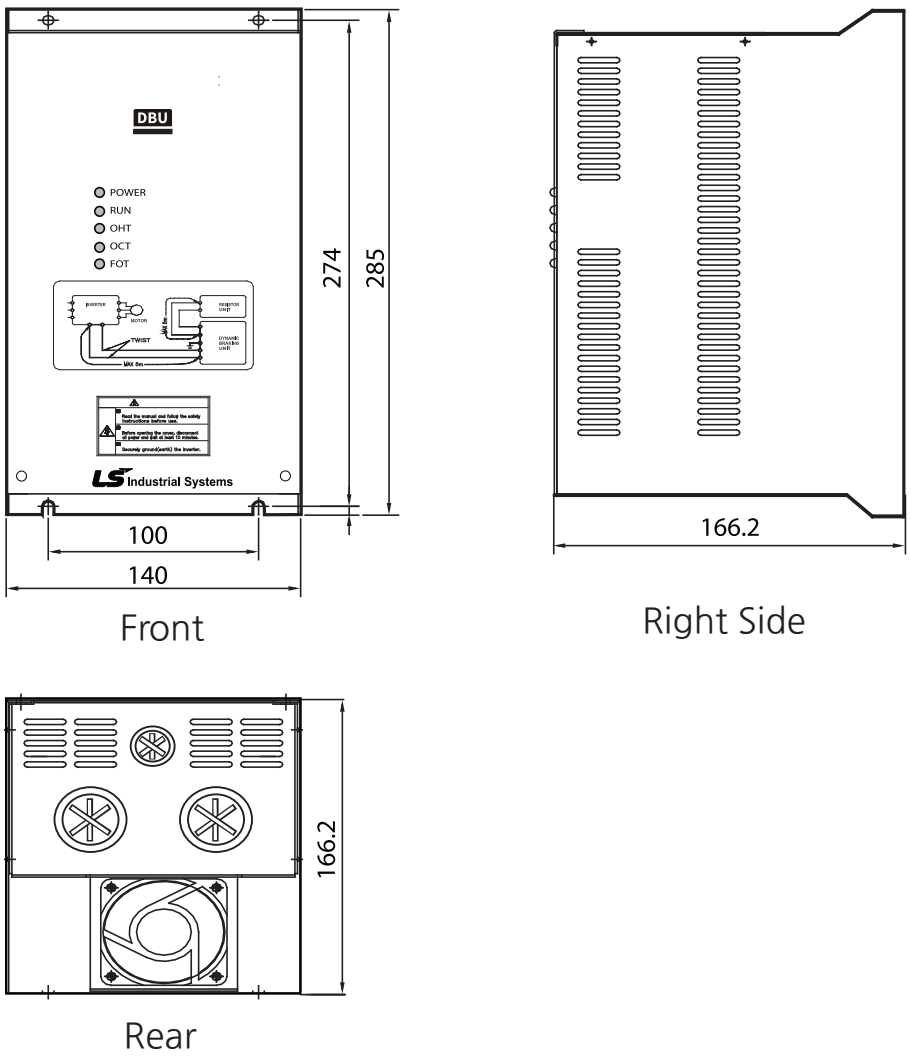
Table 24. Braking Resistor Terminal

Braking Resistor Terminal	Terminal Description
B1, B2	Wire correctly referring to the wiring diagram. Wire braking (DB) resistor to B1 and B2 terminals in the braking unit.
B	Do not use it.

16.6.4 Exterior Diagram of Braking Unit

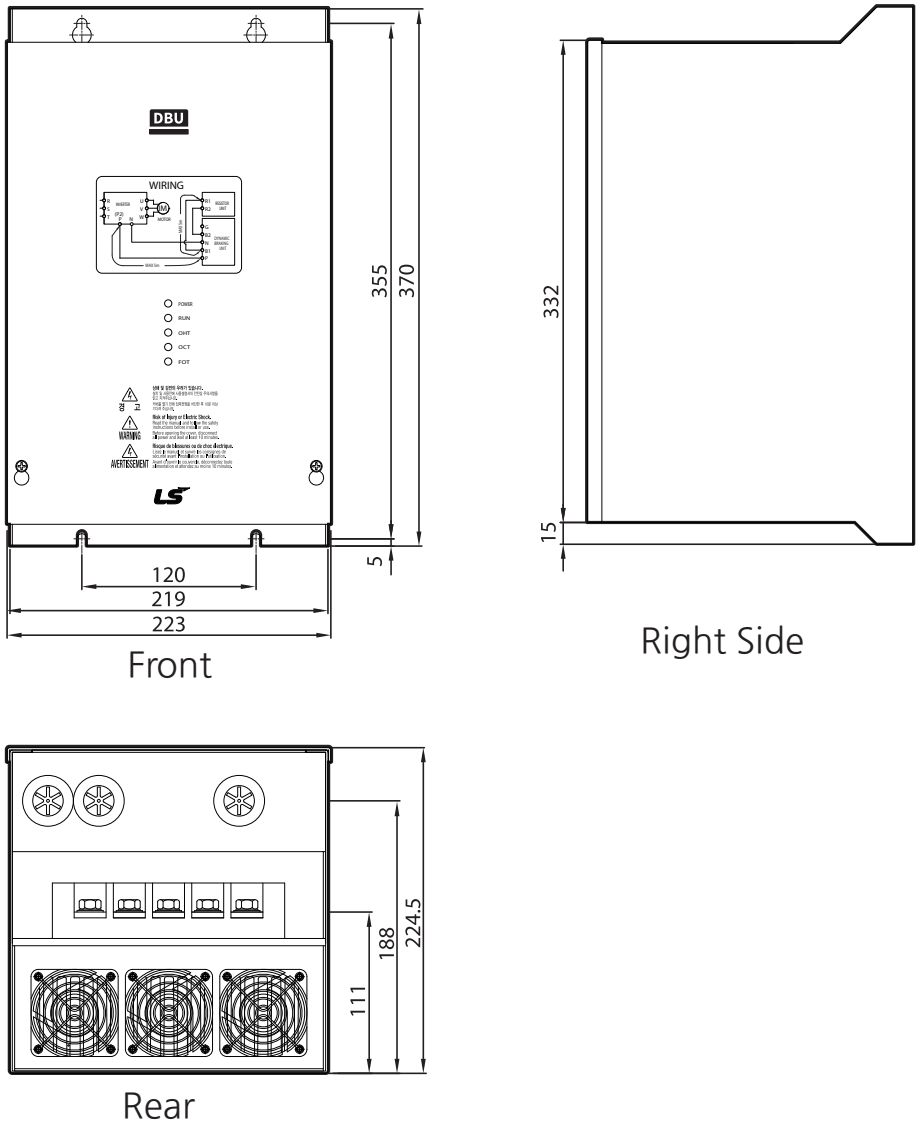
It shows the exterior diagram of the braking unit and product size.

Group 1



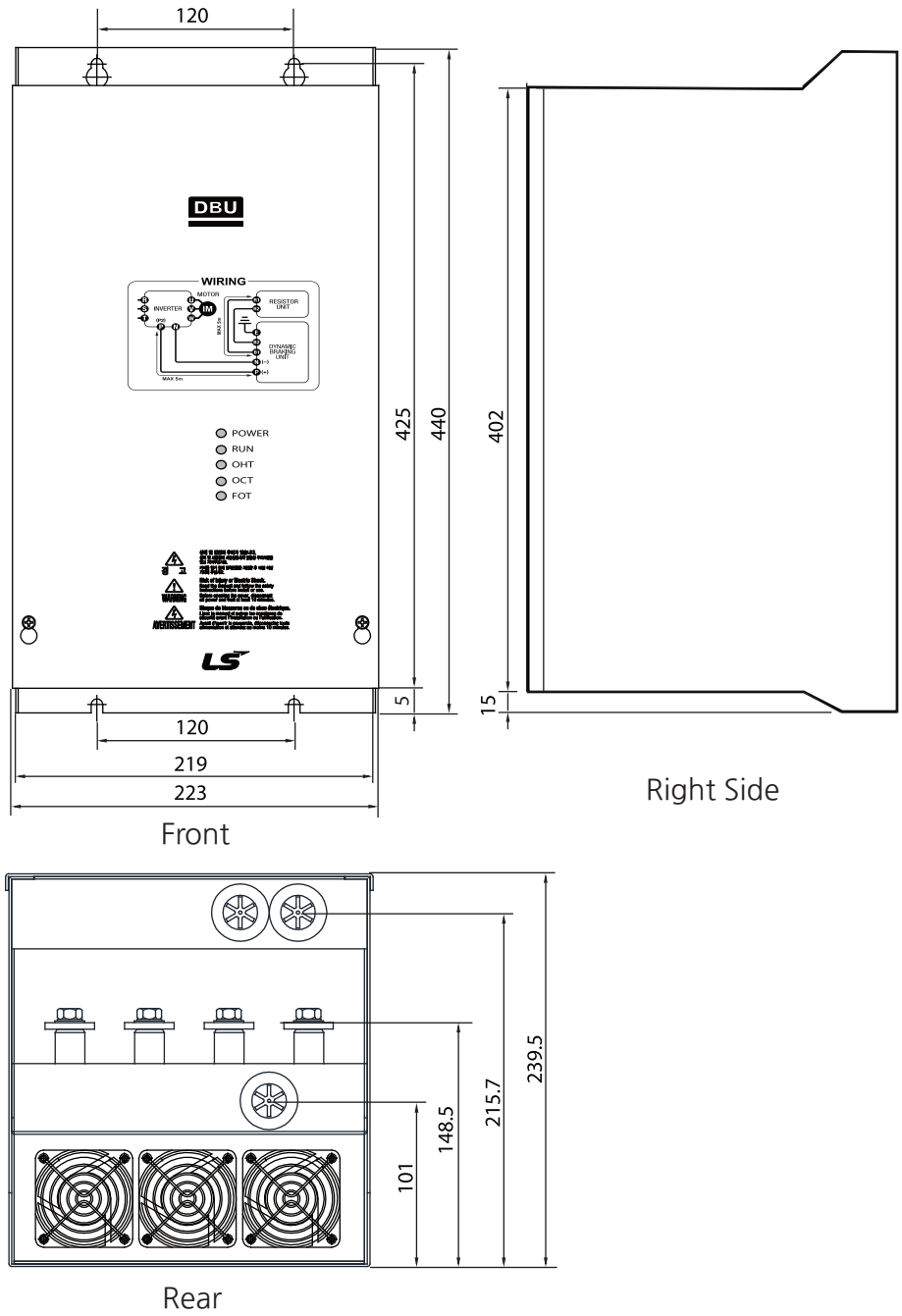
[Image 21. Exterior Diagram of Braking Unit - Group 1]

Group 2



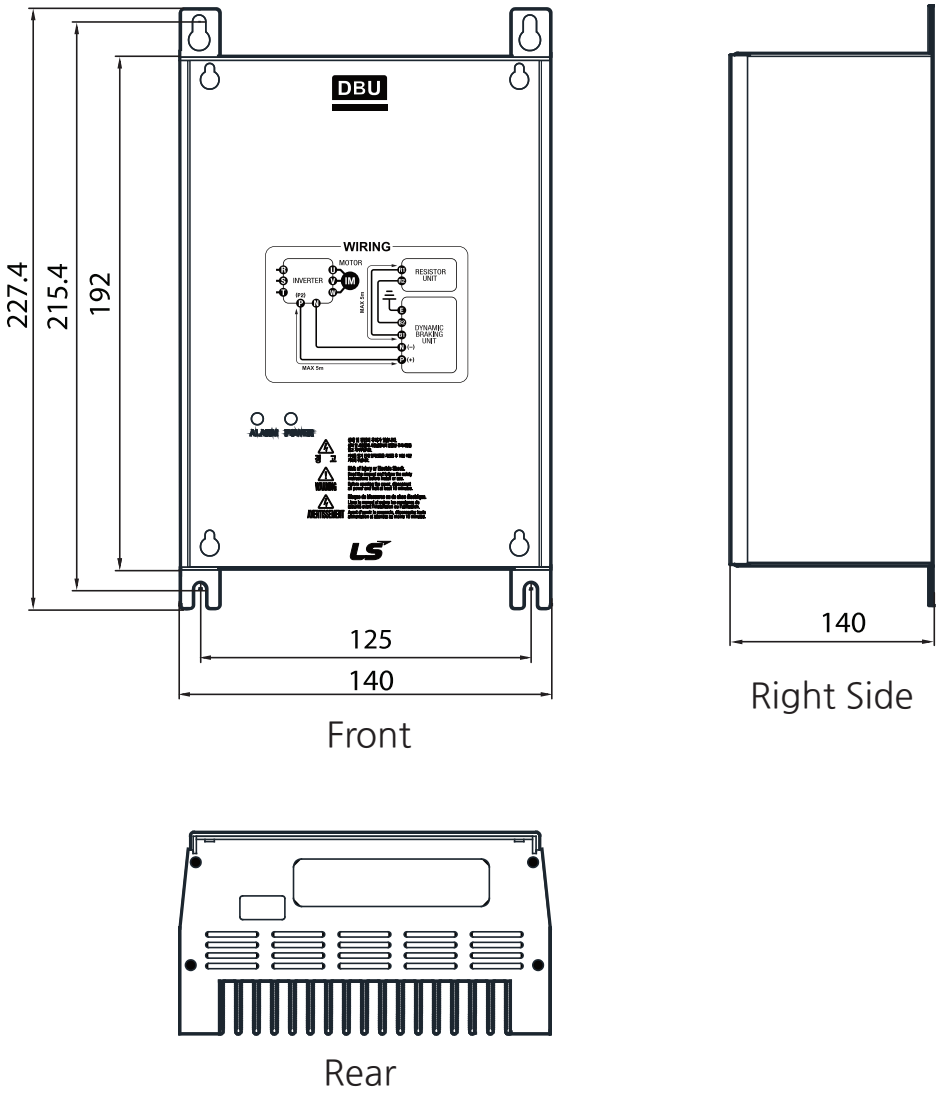
[Image 22. Exterior Diagram of Braking Unit - Group 2]

Group 3



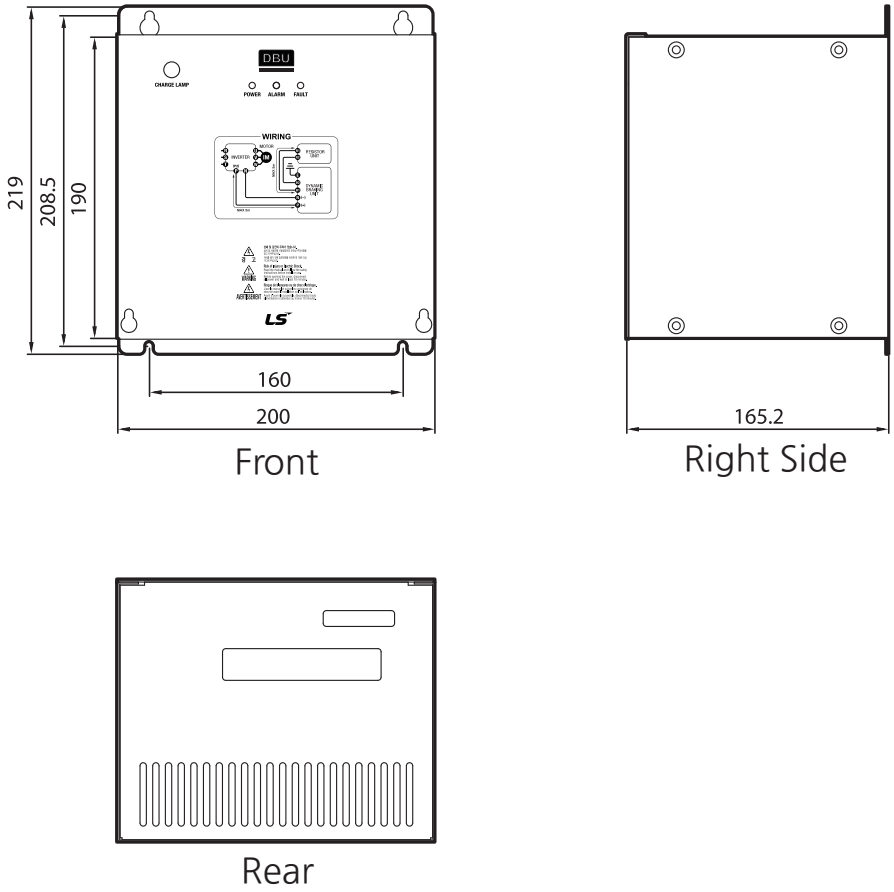
[Image 23. Exterior Diagram of Braking Unit - Group 3]

Group 4

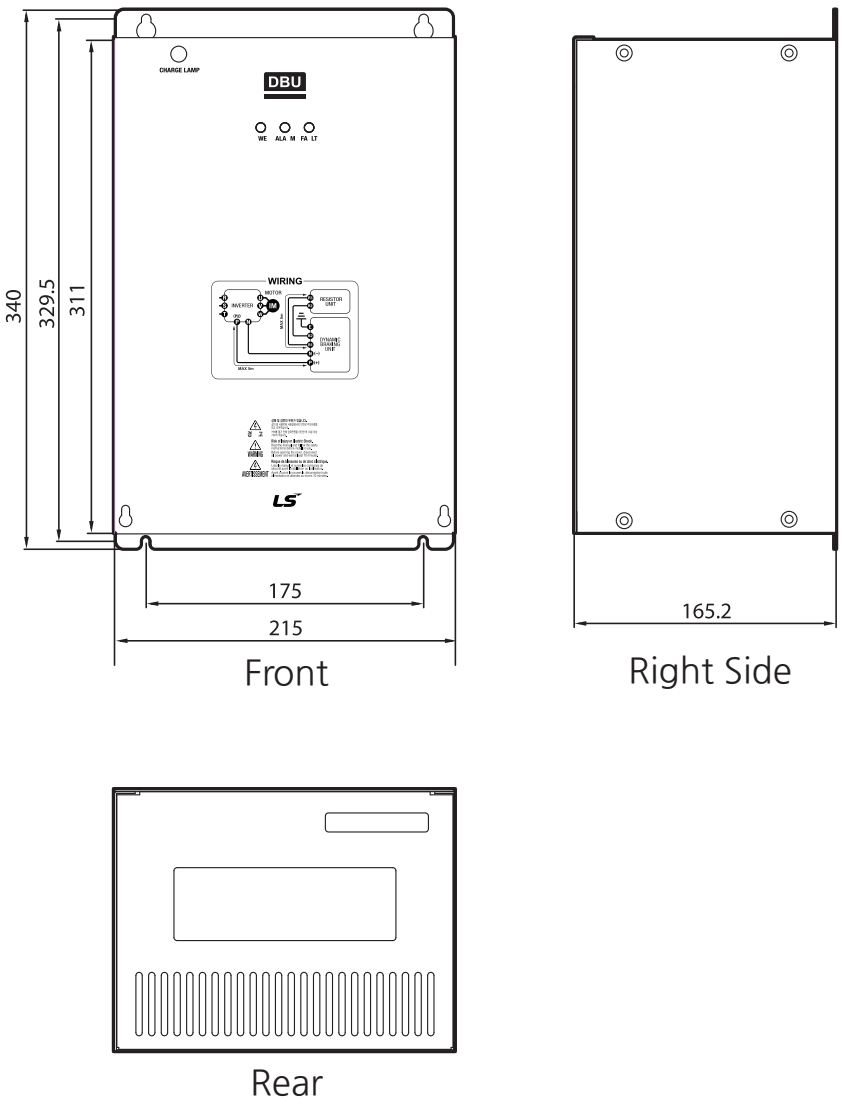


[Image 24. Exterior Diagram of Braking Unit - Group 4]

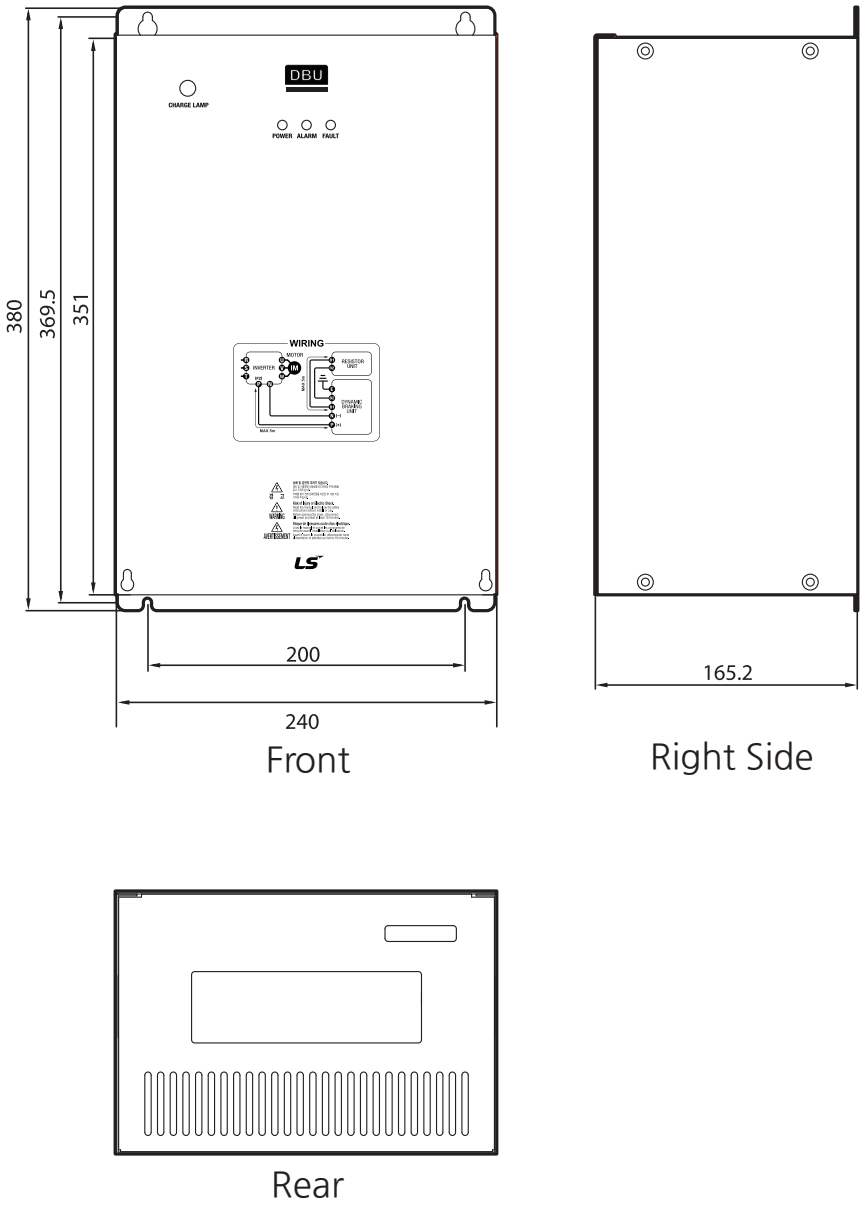
Group 5



[Image 25. Exterior Diagram of Braking Unit - Group 5: A Frame]



[Image 26. Exterior Diagram of Braking Unit - Group 5: B Frame]



[Image 27. Exterior Diagram of Braking Unit - Group 5: C Frame]

Table 25. Exterior Dimensions of Braking Unit (Group 5)

Frame	Voltage Used (V)	Capacity (kW)	Duty Cycle	Product Size (mm)				Installation Location (mm)		Weight	Hole Size for Installation
			(%ED)	W	H	H2	D	W1	H1	(Kg)	(f)
A Frame	220	37	50	200	219	190	165.2	160	208.5	3.77	M6
	440	37	50							3.84	
		75	50	3.98							
B Frame	220	75	50	215	340	311	8.48	175	329.5	8.26	
		90	50								
	440	90	50				8.30				
		132	50	8.40							
C Frame	440	160	50	240	380	351		200	369.5	9.40	
		220	50				9.70				

16.6.5 Braking Resistor Specifications

Table 26. Braking Resistor Specifications

Model LSLV□□□□	Reference Braking Unit	Braking resistance					
		100% Torque			150% Torque		
		Resistance (Ω)	Capacity (kW)		Resistance (Ω)	Capacity (kW)	
			ED 5%	ED 10%		ED 5%	ED 10%
0004S300-2	-	400	0.05	0.1	300	0.1	0.2
0008S300-2	-	200	0.1	0.2	150	0.15	0.3
0015S300-2	-	100	0.2	0.4	60	0.3	0.6
0022S300-2	-	60	0.3	0.6	50	0.4	0.8
0040S300-2	-	40	0.5	1	33	0.5	1
0055S300-2	-	30	0.6	1.2	20	0.8	1.6
0075S300-2	-	20	0.8	1.6	15	1.2	2.4
0110S300-2	-	15	1.2	2.4	10	2	4
0150S300-2	-	10	2	4	8	2	4

Model LSLV□□□□	Reference Braking Unit	Braking resistance					
		100% Torque			150% Torque		
		Resistance (Ω)	Capacity (kW)		Resistance (Ω)	Capacity (kW)	
			ED 5%	ED 10%		ED 5%	ED 10%
0185S300-2	-	10	2	4	5	3.6	7.2
0220S300-2	LSLV0220DBU-2LN	8.4	2	4	5.0	3.6	7.2
0300S300-2	LSLV0370DBU-2HN	6.0	3	6	4.0	4	8
0370S300-2	LSLV0370DBU-2HN	5.0	3.6	7.2	3.4	5	10
0450S300-2	LSLV0750DBU-2HN	4.0	4	8	2.8	6	12
0550S300-2	LSLV0750DBU-2HN	3.4	5	10	2.0	8	16
0750S300-2	LSLV0750DBU-2HN	2.4	6.4	12.8	1.6	9.6	19.2
0004S300-4	-	1800	0.05	0.1	1200	0.1	0.2
0008S300-4	-	900	0.1	0.2	600	0.15	0.3
0015S300-4	-	450	0.2	0.4	300	0.3	0.6
0022S300-4	-	300	0.3	0.6	200	0.4	0.8
0040S300-4	-	200	0.4	0.8	130	0.6	1.2
0055S300-4	-	120	0.6	1.2	85	1	2
0075S300-4	-	90	0.8	1.6	60	1.2	2.4
0110S300-4	-	60	1.2	2.4	40	2	4
0150S300-4	-	45	2	4	30	2.4	4.8
0185S300-4	-	35	2	4	20	3.6	7.2
0220S300-4	-	30	2.4	4.8	20	3.6	7.2
0300S300-4	-	20	3.6	7.2	16	5	10
0370S300-4	-	20	3.6	7.2	12	6.4	12.8
0450S300-4	LSLV0750DBU-4HN	16	4	8	10	6.4	12.8
0550S300-4	LSLV0750DBU-4HN	13.0	5	10	9.0	7.2	14.4
0750S300-4	LSLV0750DBU-4HN	10.0	6	12	6.8	9.6	19.2
0900S300-4	LSLV0900DBU-4HN	8.4	8	16	5.6	12	24
1100S300-4	LSLV1320DBU-4HN	6.4	9.6	19.2	4.6	15	30

Model LSLV□□□□	Reference Braking Unit	Braking resistance					
		100% Torque			150% Torque		
		Resistance (Ω)	Capacity (kW)		Resistance (Ω)	Capacity (kW)	
			ED 5%	ED 10%		ED 5%	ED 10%
1320S300-4	LSLV1320DBU-4HN	5.5	12	24	3.8	18	36
1600S300-4	LSLV1600DBU-4HN	4.8	15	30	3.2	20	40
1850S300-4	LSLV2200DBU-4HN	4.1	15	30	2.7	26	52
2200S300-4	LSLV2200DBU-4HN	3.4	20	40	2.3	30	60

Note

- Products that are less than 18.5 kW-200 V or 37 kW-400 V have a built-in braking unit by default and do not require separate installation.
- Refer to the user manual of each braking unit for more details on the specifications of the braking resistor applicable for the use of braking unit. Make sure you use the braking resistance value, watt, braking torque, and duty cycle described in the user manual of the braking unit.
- If you double the duty cycle (%ED) from the standard, you also need to double the rated watts of the separately installed resistor.
- Braking resistor is an object that heats during braking. Make sure there is enough distance from the inverter when you install it.

16.7 Derating

For more information about the derating, refer to the comprehensive user's manual on the website (https://www.ls-electric.com).

16.8 Parameter Default Values Based on the Motor Capacity

For more information about the parameter default values based on the motor capacity, refer to the comprehensive user's manual on the website (https://www.ls-electric.com).

16.9 Safe Torque Off (STO) Function

S300 series inverter offers a safety torque off (STO) function. In case of emergency, the inverter output can be immediately cut off to protect the users and prevent potential hazards. This manual provides only a basic overview of the safety functions. For more information, refer to the safety manual on the website (https://www.ls-electric.com).

16.9.1 Safety Standards

The safety torque off function of the S300 series complies with the following European directives and standards.

- European Machinery Directive 2006/42/EC
- EN 61800-5-2:2017 SIL2
- EN ISO 13849-1:2023 Category 3, PL d
- EN 61508:2010 SIL2

⚠ Caution

Use caution when utilizing safety functions, verify that the system's risk factors are identified and safety requirements are satisfied.

Note

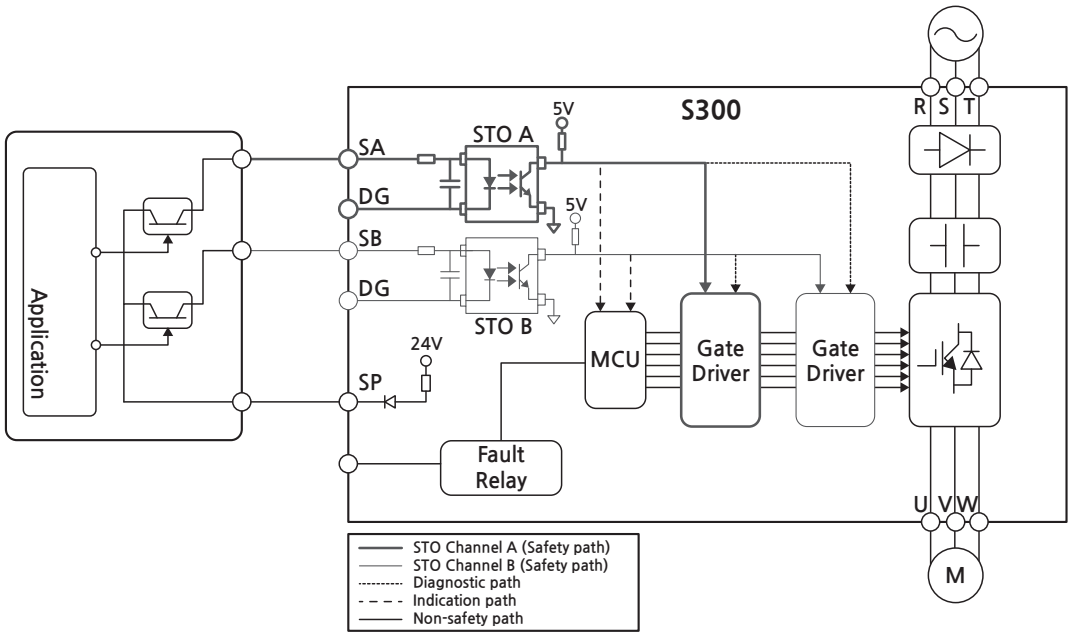
- When wiring or performing maintenance on the inverter, ensure that the power to the inverter is turned off.
- Safety functions are not designed to electrically isolate the inverter.

16.9.2 Safety Functions Description

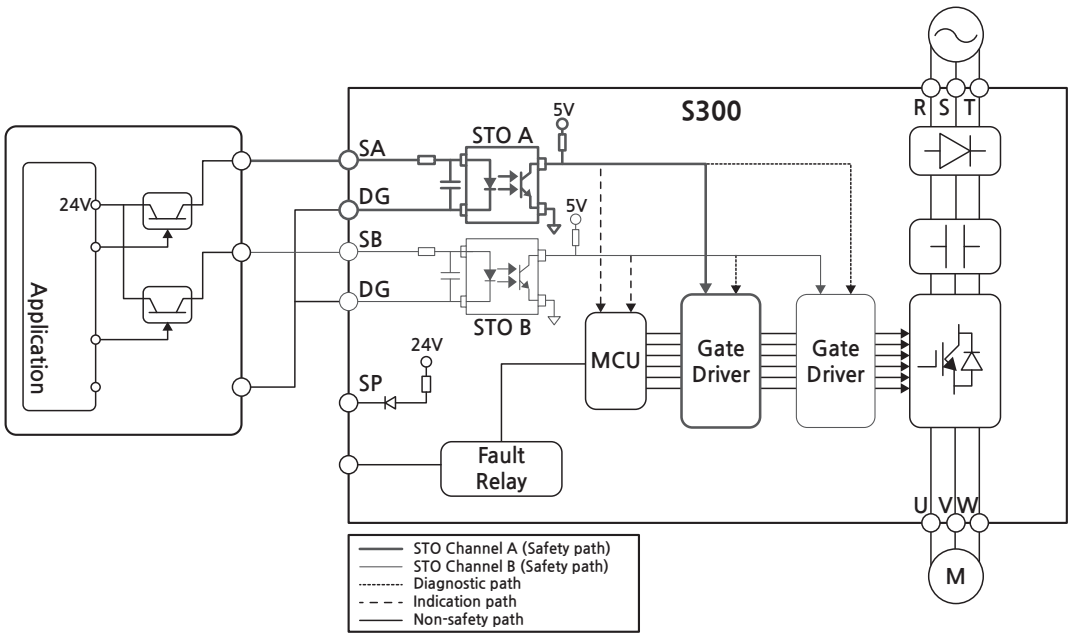
The STO function offered by the S300 inverter consists of two independent channels (SA, SB). If either channel is activated during operation, it interrupts the motor drive gate signals, cutting off power to the motor. When motor power is interrupted, torque output ceases, and the motor transitions to a free-run state. Depending on the active channel, the keypad will display either the **STO Feedback A** or **STO Feedback B** trip message.

The STO function can be activated by removing the safety connector from the SA, SB, and SP terminals on the control board. The inverter operates normally when SA and SB are connected to SP, and disconnecting the SA and SB from SP activates the STO function. To deactivate the safety function after activation, reconnect SA and SB to the SP using the safety connector and press the STOP/RESET key.

16.9.3 Safety Operation Diagram



[Image 28. Safety Operation Diagram (When using internal DC 24 V power)]



[Image 29. Safety Operation Diagram (When using external DC 24 V power)]

Product Warranty

Warranty Period

The warranty period for the purchased product is 24 months from the date of manufacture.

Warranty Coverage

1. The initial fault diagnosis should be conducted by the customer as a general principle. However, upon request, we or our service network can carry out this task for a fee. If the fault is found to be our responsibility, the service will be free of charge.
2. The warranty applies only when our products are used under normal conditions as specified in the handling instructions, user manual, catalog, and caution labels.
3. Even within the warranty period, the following cases will be subject to chargeable repairs:
   1) Replacement of consumables or lifespan parts (relays, fuses, electrolytic capacitors, batteries, fans, etc.)
   2) Failures or damage due to improper storage, handling, negligence, or accidents by the customer
   3) Failures due to the hardware or software design of the customer
   4) Failures due to modifications of the product without our consent (repairs or modifications recognized as done by others will also be refused, even if paid)
   5) Failures that could have been avoided if the customer's device, which incorporates our product, had been equipped with safety devices required by legal regulations or common industry practices.
   6) Failures that could have been prevented through proper maintenance and regular replacement of consumable parts as per the handling instructions and user manual
   7) Failures and damage caused by the use of inappropriate consumables or connected equipment
   8) Failures due to external factors, such as fire, abnormal voltage, and natural disasters like earthquakes, lightning, salt damage, and typhoons
   9) Failures due to reasons that could not have been foreseen with the scientific and technological standards at the time of our product shipment
   10) Other cases where the responsibility for failure, damage, or defect is acknowledged to lie with the customer

EC DECLARATION OF CONFORMITY

We, the undersigned,

Representative:	**LS ELECTRIC Co., Ltd.**
Address:	**LS Tower, 127, LS-ro, Dongan-gu, Anyang-si, Gyeonggi-do, Korea**
Manufacturer:	**LS ELECTRIC Co., Ltd.**
Address:	**56, Samseong 4-gil, Mokcheon-eup, Dongnam-gu, Cheonan-si, Chungcheongnam-do, Korea**

Certify and declare under our sole responsibility that the following apparatus:

Type of Equipment:	**Inverter (Power Conversion Equipment)**
Model Name:	**LSLV-S300 series**
Trade Mark:	**LS ELECTRIC Co.,Ltd.**

This declaration of conformity is under the sole responsibility of the manufacturer.

Conforms to the essential requirements of the directives:

2014/30/EU Directive of the European Parliament and of the Council on the harmonization of the laws of the Member States relating to electromagnetic compatibility.

2014/35/EU Directive of the European Parliament and of the Council on the harmonization of the laws of the Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits.

2011/65/EU Directive on the restriction of the use certain of certain Hazardous Substances in electrical and electronic equipment –RoHs.-

Based on the following specifications applied:

EN IEC 61800-3:2018
EN 61800-5-1:2007+A1:2017+ A11:2021
EN IEC 63000:2018

and therefore, complies with the essential requirements and provisions of the 2014/30/EU, 2014/35/EU and 2011/65/EU Directives.

Place: **Cheonan, Chungnam,**
Korea

박 창 근 2024. 5. 13 (Signature, Date)

Mr. PARK CHANGKEUN / Manager

UL mark

The UL mark applies to products in the United States and Canada. This mark indicates that UL has tested and evaluated the products and determined that the products satisfy the UL standards for product safety. If a product received UL certification, this means that all components inside the product had been certified for UL standards as well.

Suitable for Installation in a compartment Handing Conditioned Air

CE mark

The CE mark indicates that the products carrying this mark comply with European safety and environmental regulations. European standards include the Machinery Directive for machine manufacturers, the Low Voltage Directive for electronics manufacturers and the EMC guidelines for safe noise control.

Low Voltage Directive

We have confirmed that our products comply with the Low Voltage Directive (EN 61800-5-1).

EMC Directive

The Directive defines the requirements for immunity and emissions of electrical equipment used within the European Union. The EMC product standard (EN 61800-3) covers requirements stated for drives.

EAC mark

The EAC (EurAsian Conformity) mark is applied to the products before they are placed on the market of the Eurasian Customs Union member states.

It indicates the compliance of the products with the following technical regulations and requirements of the Eurasian Customs Union:

Technical Regulations of the Customs Union 004/2011 “On safety of low voltage equipment”

Technical Regulations of the Customs Union 020/2011 “On electromagnetic compatibility of technical products”

Manual Revision History

Revision History

No.	Date	Version	Changes
1	2023/7/7	1.0	First Issue
2	2024/1/26	1.1	Contents Improved
3	2024/5/8	1.2	Macro Setting/Winder Operation added
4	2024/12/11	1.3	STO Function added

FUTURING SMART ENERGY

We open up a brighter future through
efficient and convenient energy solutions.

Safety Instructions

- For your safety, please read user's manual thoroughly before operating.
- Contact the nearest authorized service facility for examination, repair, or adjustment.
- Please contact qualified service technician when you need maintenance.
  Do not disassemble or repair by yourself!
- Any maintenance and inspection shall be performed by the personnel having expertise concerned.

- According to The WEEE Directive, please do not discard the device with your household waste.

LS ELECTRIC

www.ls-electric.com

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- **LS ELECTRIC Middle East FZE (Dubai, U.A.E.)**
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- **LS ELECTRIC Europe B.V. (Hoofddorp, Netherlands)**
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- **LS ELECTRIC America Inc. (Chicago, USA)**
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- **LS ELECTRIC Türkiye Co., Ltd.**
  Tel: 90-212-806-1225 E-Mail: Türkiye @ls-electric.com

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2025. 01 | Specifications in this catalog are subject to change without notice due to continuous product development and improvement.