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

* LSLV-S100 is the official name for S100.

Safety Information

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

Safety symbols in this manual



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

⚠ Warning

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

① Caution

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

Safety information

▲ Danger

- Do not open the cover of the equipment while it is on or operating. Likewise, do not operate the
 inverter while the cover is open. Exposure of high voltage terminals or charging area to the external
 environment may result in an electric shock. Do not remove any covers or touch the internal circuit
 boards (PCBs) or electrical contacts on the product when the power is on or during operation. Doing
 so may result in serious injury, death, or serious property damage.
- Do not open the cover of the equipment even when the power supply to the inverter has been turned off unless it is necessary for maintenance or regular inspection. Opening the cover may result in an electric shock even when the power supply is off.
- The equipment may hold charge long after the power supply has been turned off. Use a multi-meter to make sure that there is no voltage before working on the inverter, motor or motor cable.

⚠ Warning

- This equipment must be grounded for safe and proper operation.
- Do not supply power to a faulty inverter. If you find that the inverter is faulty, disconnect the power supply and have the inverter professionally repaired.
- The inverter becomes hot during operation. Avoid touching the inverter until it has cooled to avoid burns
- Do not allow foreign objects, such as screws, metal chips, debris, water, or oil to get inside the inverter. Allowing foreign objects inside the inverter may cause the inverter to malfunction or result in a fire.
- Do not operate the inverter with wet hands. Doing so may result in electric shock.
- Check the information about the protection level for the circuits and devices.

The following connection terminals and devices are Protective Class 0. It means that the circuit protection level depends on the basic insulation. If there is no basic insulation is failed, it may cause electric shock accident. When installing or wiring the connection terminals and devices, take the same protective action as with the power wire.

- Multi-function Input: P1-P7, CM
- Analog Frequency Input: VR, V1, I2, TI
- Safety Function: SA, SB, SC
- Analog Output: AO1, AO2, TO
- Digital Output: Q1, EG, 24, A1/C1/B1
- Communication: S+/S-/SG
- Fan

The protection level of this equipment (inverter) is Protective Class I.

① Caution

- Do not modify the interior workings of the inverter. Doing so will void the warranty.
- The inverter is designed for 3-phase motor operation. Do not use the inverter to operate a single phase motor.
- Do not place heavy objects on top of electric cables. Doing so 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. Depending on the selected MCCB, the LSLV-S100 Series is suitable for use in circuits capable of delivering a maximum of 100 kA RMS symmetrical amperes at the drive's maximum rated voltage. The following table shows the recommended MCCB for RMS symmetrical amperes.

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-S100 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	UTS150 (N/H/L)	UTS250 (N/H/L)	UTS400 (N/H/L)	ABS103c	ABS203c	ABS403c
480V(50/60Hz)	35/65/100kA	35/65/100kA	35/65/100kA	26kA	26kA	35kA

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1 Preparing the Installation

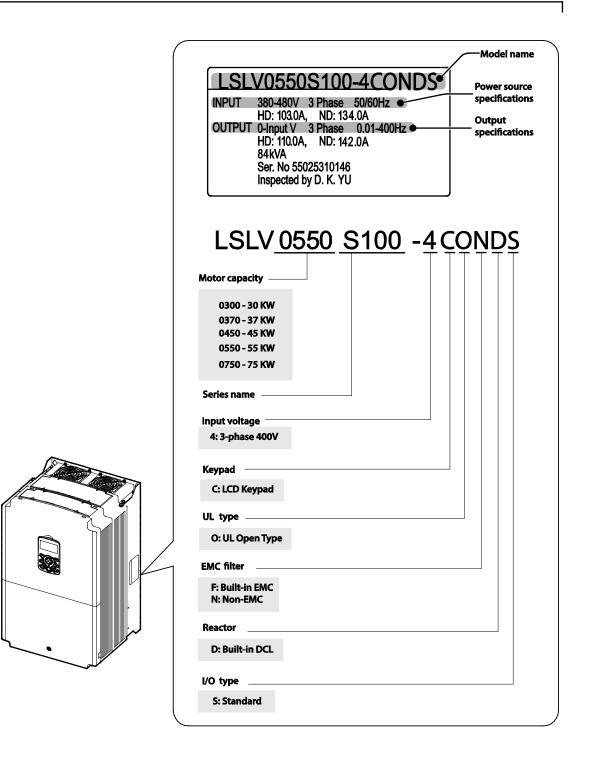
This chapter provides details on product identification, part names, correct installation and cable specifications. To install the inverter correctly and safely, carefully read and follow the instructions.

1.1 Product Identification

The S100 Inverter is manufactured in a range of product groups based on drive capacity and power source specifications. Product name and specifications are detailed on the rating plate. The illustration on the next page shows the location of the rating plate. Check the rating plate before installing the product and make sure that the product meets your requirements. For more detailed product specifications, refer to 9.1 Input and Output Specification on page 247.

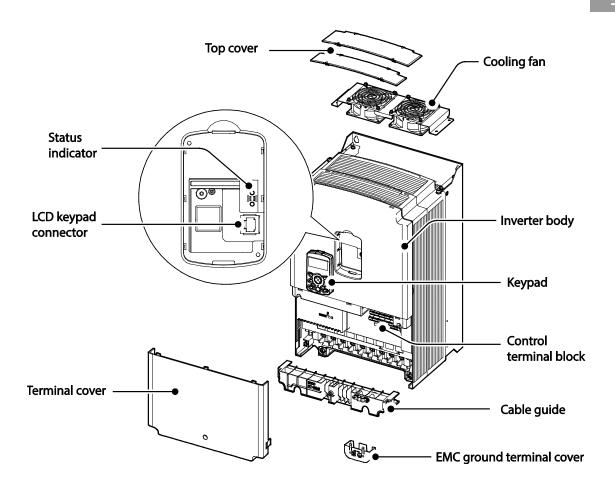
Note

Check the product name, open the packaging, and then confirm that the product is free from defects. Contact your supplier if you have any issues or questions about your product.



1.2 Part Names

The illustration below displays part names. Details may vary between product groups.



Note

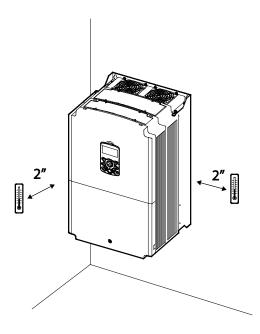
The grounding terminal cover of EMC is not existed in the 55-75kW inverters.

1.3 Installation Considerations

Inverters are composed of various precision, electronic devices, 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.

Items	Description
Ambient Temperature*	Heavy Duty: 14–104°F (-10–50°C) Normal Duty: 14–122°F (-10–40°C)
Ambient Humidity	90% relative humidity (no condensation)
Storage Temperature	-4–149°F (-20–65°C)
Environmental Factors	An environment free from corrosive or flammable gases, oil residue or dust
Altitude/Vibration	Lower than 3,280 ft (1,000 m) above sea level/less than 9.8m/sec ² (1G)
Air Pressure	70 –106kPa

^{*} The ambient temperature is the temperature measured at a point 2" (5 cm) from the surface of the inverter.



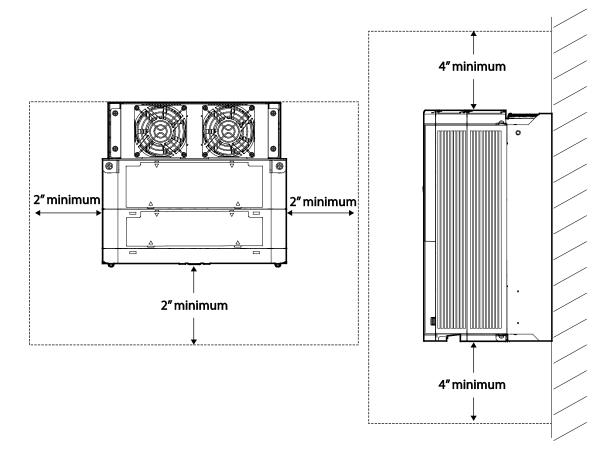
① Caution

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

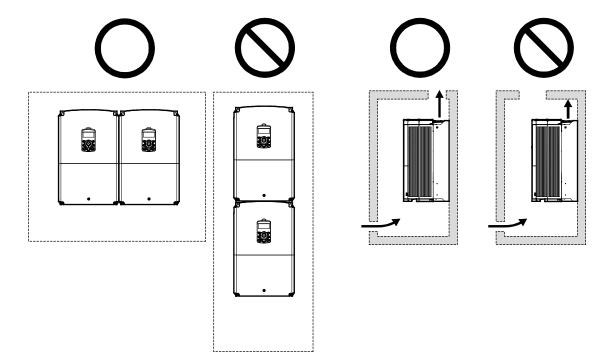
1.4 Selecting and Preparing a Site for Installation

When selecting an installation location consider the following points:

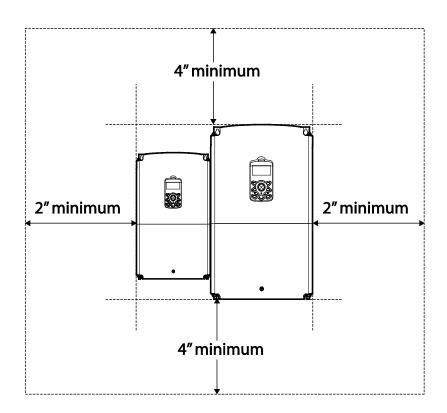
- The inverter must be installed on a wall that can support the inverter's weight.
- The location must be free from vibration. Vibration can adversely affect the operation of the inverter.
- The inverter can become very hot during operation. Install the inverter on a surface that is
 fire-resistant or flame-retardant and with sufficient clearance around the inverter to allow air
 to circulate. The illustrations below detail the required installation clearances.



• Ensure sufficient air circulation is provided around the inverter when it is installed. If the inverter is to be installed inside a panel, enclosure, or cabinet rack, carefully consider the position of the inverter's cooling fan and the ventilation louver. The cooling fan must be positioned to efficiently transfer the heat generated by the operation of the inverter.



• If you are installing multiple inverters, of different ratings, provide sufficient clearance to meet the clearance specifications of the larger inverter.



1.5 Cable Selection

When you install power and signal cables in the terminal blocks, only use cables that meet the required specification for the safe and reliable operation of the product. Refer to the following information to assist you with cable selection.

① Caution

- Wherever possible use cables with the largest cross-sectional area for mains power wiring, to ensure that voltage drop does not exceed 2%.
- Use copper cables rated for 600 V, 75℃ for power terminal wiring.
- Use copper cables rated for 300 V, 75°C for control terminal wiring.

Ground Cable and Power Cable Specifications

Load (kW)		Ground		Power I/O			
		mm²	AWG	mm²		AWG	
		mm		R/S/T	U/V/W	R/S/T	U/V/W
	30			25	25	4	4
	37	16	5	25	23	4	4
3-Phase 400 V	45						
	55	25	3	70	70	1/0	1/0
	75	35	2				

Signal (Control) Cable Specifications

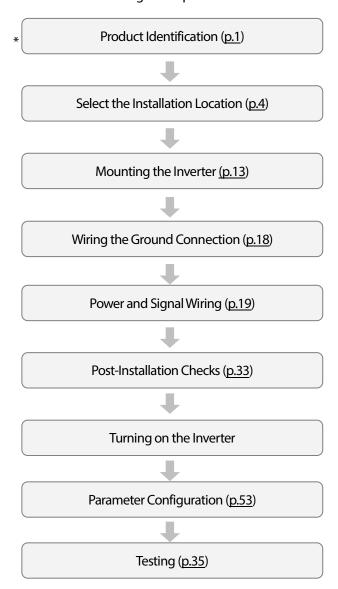
Signal (Control) Cable Specifications						
	Recommended wire thickness mm²(AWG) With Crimp					
Terminal	Without Crimp Terminal Connections (Bare wire)	Terminal Connectors (Bootlace Ferrule)	Terminal screw	Torque [Nm]	Electrical Specifications	
P1-P7, CM					-	
\/D					Output current/voltage: 12 V,	
VR					20 mA volume resistance: 1-5 kΩ	
V1					Maximum input voltage: -12V -	
VI					+12 V	
12					0-24 mA input (internal	
IZ					resistance: 249 Ω)	
AO1, AO2					Maximum output	
					current/voltage: 12 V, 24 mA	
Q1	1.0 (17)	1.5 (15)	M2-6	0.4	Less than DC 26 V, 100 mA	
EG		, ,			-	
24					Maximum output current: 100 mA	
TI]				0-32 kHz, 0-12 V	
TO					0-32 kHz, 0-12 V	
SA, SB, SC					Less than DC 24 V, 25 mA	
S+, S-, SG]				Less than AC 250 V, 1 A	
					Less than DC 30 V, 1 A	
A1, B1, C1					Less than AC 250 V, 5 A	
A2, C2					Less than DC 30 V, 5 A	

2 Installing the Inverter

This chapter describes the physical and electrical installation methods, including mounting and wiring of 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

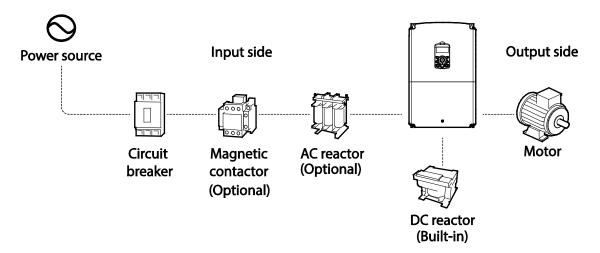
The flowchart lists the sequence to be followed during installation. The steps cover equipment installation and testing of the product. More information on each step is referenced in the steps.



Basic Configuration Diagram

The reference diagram below shows a typical system configuration showing the inverter and peripheral devices.

Prior to installing the inverter, ensure that the product is suitable for the application (power rating, capacity, etc). Ensure that all of the required peripherals and optional devices (resistor brakes, contactors, noise filters, etc.) are available. For more details on peripheral devices, refer to <u>9.4</u> <u>Peripheral Devices on page 253.</u>



① Caution

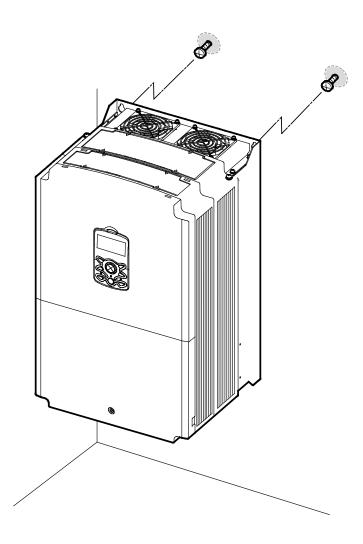
- Figures in this manual are shown with covers or circuit breakers removed to show a more detailed view of the installation arrangements. Install covers and circuit breakers before operating the inverter. Operate the product according to the instructions in this manual.
- Do not start or stop the inverter using a magnetic contactor, installed on the input power supply.
- If the inverter is damaged and loses control, the machine may cause a dangerous situation. Install an additional safety device such as an emergency brake to prevent these situations.
- High levels of current draw during power-on can affect the system. Ensure that correctly rated circuit breakers are installed to operate safely during power-on situations.
- Reactors can be installed to improve the power factor. Note that reactors may be installed within 30 ft (9.14 m) from the power source if the input power exceeds 10 times of inverter capacity. Refer to 9.5 Fuse and Reactor Specifications on page 253 and carefully select a reactor that meets the requirements.

2.1 Mounting the Inverter

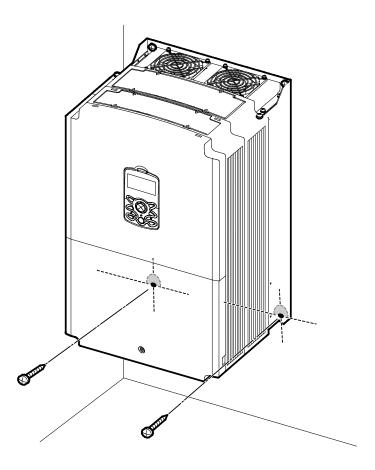
Mount the inverter on a wall or inside a panel following the procedures provided below. Before installation, ensure that there is sufficient space to meet the clearance specifications, and that there are no obstacles impeding the cooling fan's air flow.

Select a wall or panel suitable to support the installation. Refer to <u>9.3 External Dimensions (IP 20 Type)</u> on page <u>251</u> and check the inverter's mounting bracket dimensions.

- 1 Use a level to draw a horizontal line on the mounting surface, and then carefully mark the fixing points.
- 2 Drill the two upper mounting bolt holes, and then install the mounting bolts. Do not fully tighten the bolts at this time. Fully tighten the mounting bolts after the inverter has been mounted.

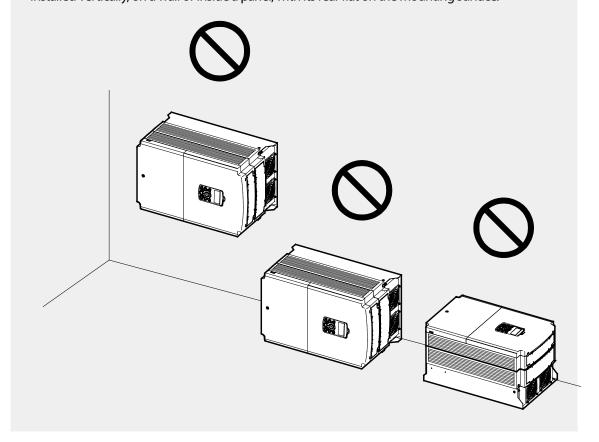


3 Mount the inverter on the wall or inside a panel using the two upper bolts, and then fully tighten the mounting bolts. Ensure that the inverter is placed flat on the mounting surface, and that the installation surface can securely support the weight of the inverter.



① Caution

- Do not transport the inverter by lifting with the inverter's covers or plastic surfaces. The inverter may tip over if covers break, causing injuries or damage to the product. Always support the inverter using the metal frames when moving it.
- Hi-capacity inverters are very heavy and bulky. Use an appropriate transport method that is suitable for the weight.
- 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.



2.2 Cable Wiring

Open the front cover, remove the cable guides 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 carrying out wiring connections to the inverter. All warning instructions must be followed.

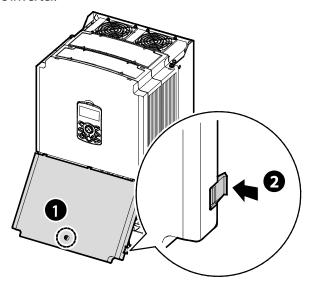
Caution

- Install the inverter before carrying out wiring connections.
- Ensure that no small metal debris, such as wire cut-offs, remain inside the inverter. Metal debris 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 short circuit or inverter failure. Refer to <u>9.6 Terminal Screw Specification</u> on
 page <u>254</u> for torque specifications.
- Do not place heavy objects on top of electric cables. Heavy objects may damage the cable and result in electric shock.
- The power supply system for this equipment (inverter) is a grounded system. Only use a grounded power supply system for this equipment (inverter). Do not use a TT, TN, IT, or corner grounded system with the inverter.
- The equipment may generate direct current in the protective ground wire. When installing the
 residual current device (RCD) or residual current monitoring (RCM), only Type B RCDs and RCMs can
 be used.
- Use cables with the largest cross-sectional area, appropriate for power terminal wiring, to ensure that voltage drop does not exceed 2%.
- Use copper cables rated at 600 V, 75 ^oC for power terminal wiring.
- Use copper cables rated at 300 V, 75 °C for control terminal wiring.
- Separate control circuit wires from the main sircuits and other high voltage circuits (200V relay sequence circuit).
- Check for short circuits or wiring failure in the control circuit. They could cause system failure or device malfunction.
- Use shielded cables when wiring the control circuit. Failure to do so may cause malfunction due to interference. If a ground is needed, use STP (Shielded Twisted Pair) cables.
- If you need to re-wire the terminals due to wiring-related faults, ensure that the inverter keypad display is turned off and the charge lamp under the front cover is off before working on wiring connections. The inverter may hold a high voltage electric charge long after the power supply has been turned off.

Step 1 Front Cover, Control Terminal Cover and Cable Guide

The front cover, control terminal cover and cable guide must be removed to install cables. Refer to the following procedures to remove the covers and cable guide. The steps to remove these parts may vary depending on the inverter model.

1 Loosen the bolt that secures the terminal cover (●). Push and hold the latch on the right side of the cover (●). Then remove the cover by lifting it from the bottom and moving it away from the front of the inverter.

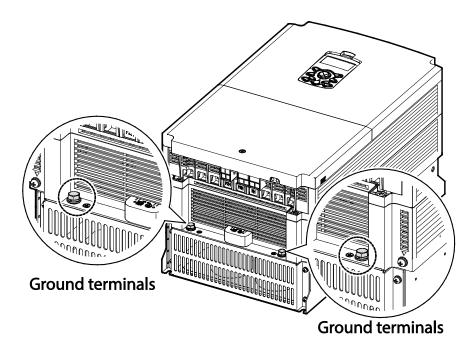


2 Connect the cables to the power terminals and the control terminals. For cable specifications, refer to <u>1.5 Cable Selection</u> on page <u>8</u>.

Step 2 Ground Connection

Remove the front cover, cable guide, and the control terminal cover. Then follow the instructions below to install the ground connection for the inverter.

1 Locate the ground terminal and connect an appropriately rated ground cable to the terminals. Refer to <u>1.5 Cable Selection</u> on page <u>8</u> to find the appropriate cable specification for your installation.



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

Note

400 V products require Special Class 3 grounding. Resistance to ground must be $< 10 \Omega$.

⚠ Warning

Install ground connections for the inverter and the motor by following the correct specifications to ensure safe and accurate operation. Using the inverter and the motor without the specified grounding connections may result in electric shock.

Step 3 Power Terminal Wiring

The following illustration shows the terminal layout 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 cables selected meet or exceed the specifications in <u>1.5 Cable Selection</u> on page <u>8</u> before installing them.

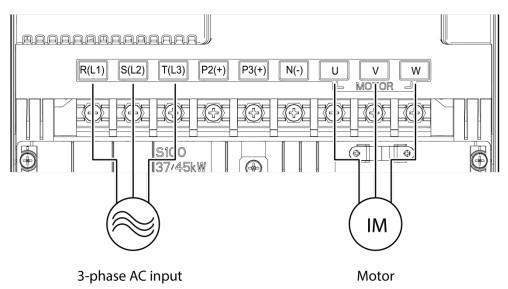
① Caution

- Tighten terminal screws to their specified torque. Loose terminal screws may allow the cables to disconnect and cause short circuit or inverter failure. Over tightening terminal screws may damage the terminals and cause short circuits and malfunctions.
- Use copper cables rated for 600 V, 75℃ for power terminal wiring.
- Use copper cables rated for 300 V, 75℃ for control terminal wiring.
- Do not connect two wires in a single terminal for power cable connections.
- Power supply cables must be connected to the R, S, and T terminals. Connecting power
 cables to the U, V, and W terminals will cause internal damage to the inverter. Connect
 motors to the U, V, and W terminals. Phase sequence arrangement is not necessary.

① 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.
- Ne jamais connecter deux câbles à une borne lors du câblage de l'alimentation.
- 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.

30~75kW (3-phase)



Power Terminal Labels and Descriptions

Terminal Labels	Name	Description	
R(L1)/S(L2)/T(L3)	AC power input terminal	Mains supply AC power connections.	
P2(+)/N(-)	DC link terminal	DC voltage terminals.	
P3(+)/N(-)	Brake unit terminals	Brake unit wiring connection.	
U/V/W	Motor output terminals	3-phase induction motor wiring	
0/ V/ VV	Wotor output terminals	connections.	

Note

- Do not use 3 core cables to connect a remotely located motor with the inverter.
- When you operating Brake resistor, the motor may vibrate under the Flux braking operation. In this case, please turn off the Flux braking (PRT-50).
- Make sure that the total cable length does not exceed 665ft (202m).
- 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 malfunction of equipment connected to the inverter.
- Voltage drop is calculated by using the following formula:

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

• 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.

Distance	<330ft (100m)	> 330ft (100m)
Allowed Carrier Frequency	< 5 kHz	< 2.5 kHz

⚠ Warning

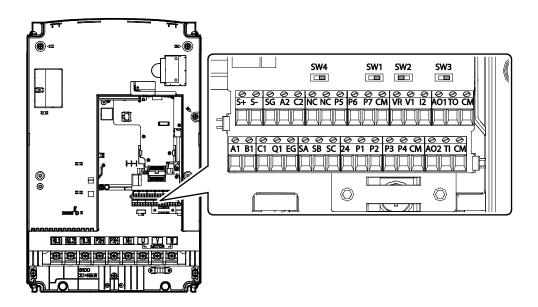
Do not connect power to the inverter until installation has been fully completed and the inverter is ready to be operated. Doing so may result in electric shock.

① Caution

- Power supply cables must be connected to the R, S, and T terminals. Connecting power cables to other terminals will damage the inverter.
- 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 to the inverter. To reduce interference the installation of noise filters or line filters may be required.
- To avoid circuit interruption or damaging connected equipment, do not install phase-advanced condensers, surge protection, or electronic noise filters on the output side of the inverter.
- To avoid circuit interruption or damaging connected equipment, do not install magnetic contactors on the output side of the inverter.

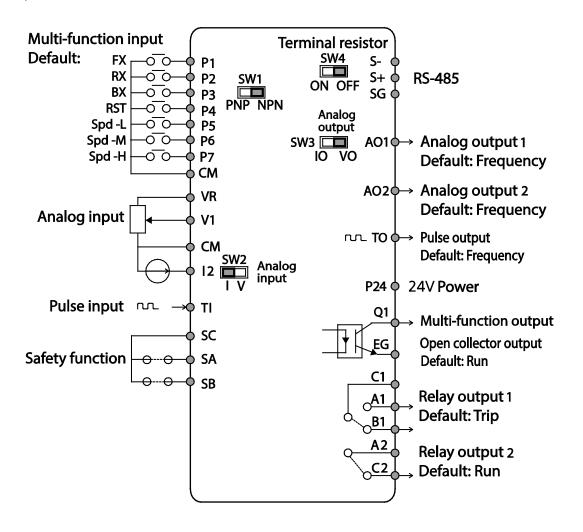
Step 4 Control Terminal Wiring

The illustrations below show the detailed layout of control wiring terminals, and control board switches. Refer to the detailed information provided below and $\underline{1.5 \, Cable \, Selection}$ on page $\underline{8}$ before installing control terminal wiring and ensure that the cables used meet the required specifications.



Control Board Switches

Switch	Description	
SW1	PNP/NPN mode selection switch	
SW2	analog voltage/current input terminal selection switch	
SW3	analog voltage/current output terminal selection switch	
SW4	Terminal resistor DIP switch	



Input Terminal Labels and Descriptions

Function	Label	Name	Description	
Multi- function terminal configuration	P1–P7	Multi-function Input 1-7	Configurable for multi-function input terminals.	
	СМ	Common Sequence	Common terminal for analog terminal inputs and outputs.	
Analog input configuration	VR	Potentiometer frequency reference input	Used to setup or modify a frequency reference via analog voltage or current input. • Maximum Voltage Output: 12 V • Maximum Current Output: 100 mA, • Potentiometer: 1–5 kΩ	
	V1	Voltage input for frequency reference input	Used to setup or modify a frequency reference via analog voltage input terminal. • Unipolar: 0–10 V (12 V Max.) • Bipolar: -10–10 V (±12 V Max.)	
	12	Voltage/current input for frequency reference input	Used to setup or modify a frequency reference via analog voltage or current input terminals. Switch between voltage (V2) and current (I2) modes using a control board switch (SW2). V2 Mode: • Unipolar: 0–10 V (12 V Max.) I2 Mode • Input current: 4–20 mA • Maximum Input current: 24 mA • Input resistance: 249 Ω	
	TI	Pulse input for frequency reference input (pulse train)	Setup or modify frequency references using pulse inputs from 0 to 32 kHz. • Low Level: 0–2.5 V • High Level: 3.5–12 V	
	SA	Safety input A	Used to block the output from the inverter in an	
Safety functionality configuration	SB	Safety input B	 emergency. Conditions: Normal Operation: Both the SA and SB terminals are connected to the SC terminal. Output Block: One or both of the SA and SB terminals lose connection with the SC terminal. 	
	SC	Safety input power source	DC 24 V, < 25 mA	

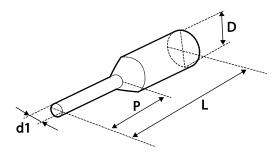
Output/Communication Terminal Labels and Descriptions

Function	Label	Name	Description
	AO1	Voltage/Current Output	Used to send inverter output information to external devices: output frequency, output current, output voltage, or a DC voltage. Operate switch (SW2) to select the signal output type (voltage or current) at the AO terminal. Output Signal Specifications: Output voltage: 0–10 V Maximum output voltage/current: 12 V/10 mA Output current: 0–20 mA (Load resistance: Less than 500 Ω) Maximum output current: 24 mA
Analog output	AO2	Analog voltage output terminal	Use to send inverter output information, such as output frequency, output current, output voltage, or DC voltage to external devices. • Output voltage: 0-10 V • Maximum output voltage/current: 12V/10 mA
	то	Pulse Output	Sends pulse signals to external devices to provide a single output value from the inverter of either: output frequency, output current, output voltage, or DC voltage. Output Signal Specifications: • Output frequency: 0–32 kHz • Output voltage: 0–12V When connecting to a pulse between the S100 inverters, • Standard I/O(30~75kW) <-> Multiple I/O(0.4~22kW): Connect to TO -> TI, CM -> CM • Standard I/O(30~75kW) <-> Standard I/O(30~75kW): Connect to TO -> TI, CM -> CM
	Q1	Multi-functional (open collector)	DC 26V, 100 mA or less
	EG	Common	Common ground contact for an open collector (with external power source)
Digital	24	External 24V power source	Maximum output current: 150 mA
output	A1/C1/B1	Fault signal output	 Sends out alarm signals when the inverter's safety features are activated (AC 250 V <1A, DC 30 V < 1A). Fault condition: A1 and C1 contacts are connected (B1 and C1 open connection) Normal operation: B1 and C1 contacts are connected

Function	Label	Name	Description
			(A1 and C1 open connection)
	A2, C2	I MILLITI-TI INCTIONAL	The signal is generated while operating. Define and use the multi-functional relay output terminal (Less than AC250 V 5A, Less than DC30 V 5A).
Terminal contacts	S+/S-/SG	RS-485 signal line	Used to send or receive RS-485 signals. Refer to 5 <u>RS-485</u> <u>Communication Features</u> on page <u>125</u> for more details.
	NC	NC	Not in use.

Preinsulated Crimp Terminal Connectors (Bootlace Ferrule).

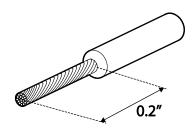
Use preinsulated crimp terminal connectors to increase reliability of the control terminal wiring. Refer to the specifications below to determine the crimp terminals to fit various cable sizes.



D/N	Cable Spec.		Dimensions (inches/mm)				Manufacturer
P/N	AWG	mm ²	L*	P	d1	D	Manufacturer
CE002506	26	0.25	10.4	0.4 / 6.0	0.04 / 1.1	0.1 / 2.5	JEONO (Japan Flostric
CE002508	20		12.4	0.5 / 8.0			
CE005006	22	0.50	12.0	0.45 / 6.0	0.05 / 1.3	0.125 / 3.2	(Jeono Electric, http://www.jeono.com/)
CE007506	20	0.75	12.0	0.45 / 6.0	0.06 / 1.5	0.13 / 3.4	http://www.jeono.com/

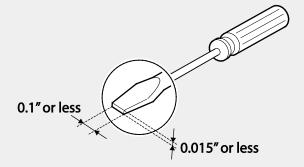
^{*} If the length (L) of the crimp terminals exceeds 0.5" (12.7mm) after wiring, the control terminal cover may not close fully.

To connect cables to the control terminals without using crimp terminals, refer to the following illustration detailing the correct length of exposed conductor at the end of the control cable.



Note

- While making wiring connections at the control terminals, ensure that the total cable length does not exceed 165ft (50m).
- Ensure that the length of any safety related wiring does not exceed 100ft (30m).
- Ensure that the cable length between an LCD keypad and the inverter does not exceed 10ft (3.04m). Cable connections longer than 10ft (3.04m) may cause signal errors.
- Use ferrite material to protect signal cables from electro-magnetic interference.
- Take care when supporting cables using cable ties, to apply the cable ties no closer than 6 inches from the inverter. This provides sufficient access to fully close the front cover.
- When making control terminal cable connections, use a small flat-tip screw driver (0.1in wide (2.5mm) and 0.015in thick (0.4mm) at the tip).



⚠ Warning

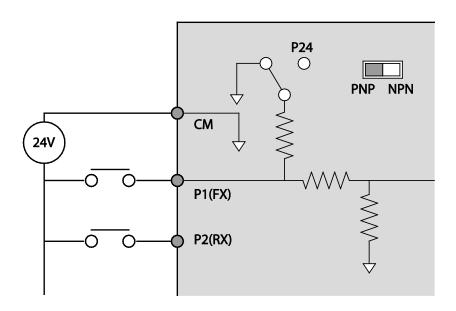
SA,SB, SC, they are shorted, have 24V voltage. Do not connect power to the inverter until installation has been fully completed and the inverter is ready to be operated. Doing so may result in electric shock.

Step 5 PNP/NPN Mode Selection

The S100 inverter supports both PNP (Source) and NPN (Sink) modes for sequence inputs at the terminal. Select an appropriate mode to suit requirements using the PNP/NPN selection switch (SW1) on the control board. Refer to the following information for detailed applications.

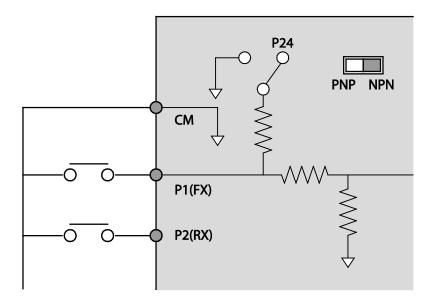
PNP Mode (Source)

Select PNP using the PNP/NPN selection switch (SW1). Note that the factory default setting is NPN mode. CM is is the common ground terminal for all analog inputs at the terminal, and P24 is 24V internal source. If you are using an external 24V source, build a circuit that connects the external source (-) and the CM terminal.



NPN Mode (Sink)

Select NPN using the PNP/NPN selection switch (SW1). Note that the factory default setting is NPN mode. CM is is the common ground terminal for all analog inputs at the terminal, and P24 is 24V internal source.



Step 6 Disabling the EMC Filter for Power Sources with Asymmetrical Grounding

S100, 400 V 30–45 kW (3 phase) inverters have EMC filters built-in and activated as a factory default design. An EMC filter prevents electromagnetic interference by reducing radio emissions from the inverter. EMC filter use is not always recommended, as it increases leakage current. If an inverter uses a power source with an asymmetrical grounding connection, the EMC filter must be turned off.

Note

S100, 400 V, 55-75 kW products do not have built-in EMC filters.

Asymmetrical G	Asymmetrical Grounding Connection						
One phase of a delta connection is grounded	R(L1) S(L2) T(L3)	Intermediate grounding point on one phase of a delta connection	S(L2) T(L3)				
The end of a single phase is grounded	L N	A 3-phase connection without grounding	R(L1) ————————————————————————————————————				

A Danger

- Do not activate the EMC filter if the inverter uses a power source with an asymmetrical grounding structure, for example a grounded delta connection. Personal injury or death by electric shock may result.
- Wait at least 10 minutes before opening the covers and exposing the terminal connections. Before starting work on the inverter, test the connections to ensure all DC voltage has been fully discharged. Personal injury or death by electric shock may result.

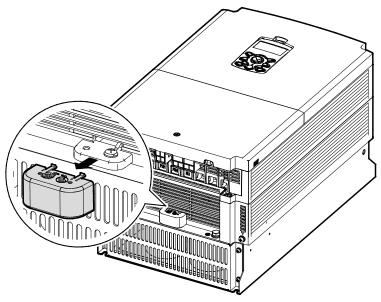
Before using the inverter, confirm the power supply's grounding system. Disable the EMC filter if the power source has an asymmetrical grounding connection.

Disabling the Built-in EMC Filter

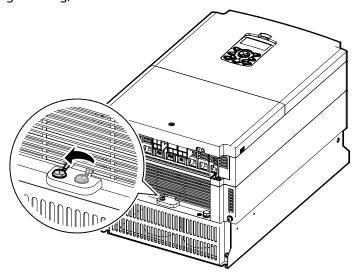
Refer to the figures below to locate the EMC filter on/off terminal and replace the metal bolt with the plastic bolt. If the EMC filter is required in the future, reverse the steps and replace the plastic bolt with the metal bolt to reconnect the EMC filter.

Follow the instructions listed below to disable the EMC filters.

1 Remove the EMC ground cover located at the bottom of the inverter.



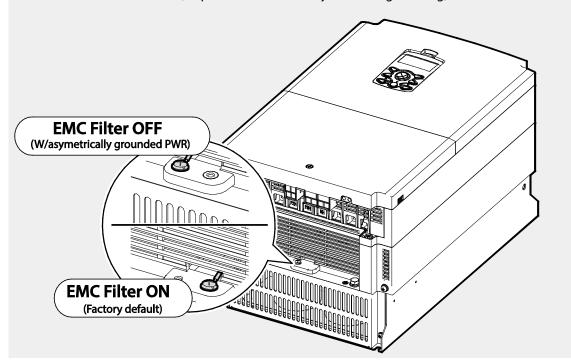
2 Remove the EMC ground cable from the right terminal (EMC filter-ON / factory default), and connect it to the left terminal (EMC filter-OFF / for power sources with asymmetrical grounding).



If the EMC filter is required in the future, reverse the steps and connect the EMC ground cable to the right terminal to enable the EMC filter.

Note

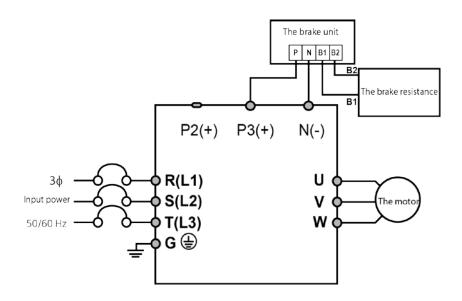
The terminal on the right is used to ENABLE the EMC filter (factory default). The terminal on the left is used to DISABLE the EMC filter (for power sources with asymmetrical grounding).



Step 7 Selecting the brake unit

Select the brake unit as following:

UL form	Capacity of applied motor	Braking unit
III to man	30~37kW	SV370DBU-4U
UL type (A type)	45~55kW	SV550DBU-4U
(A type)	75kW	SV750DBU-4U
Name III days a	30~37kW	SV037DBH-4
Non UL type (B type)	45~75kW	SV075DBH-4
(в туре)	45~/5KVV	SV075DB-4
Name III days a	30~37kW	LSLV0370DBU-4HN
Non UL type (C type)	3U~3/KVV	LSLV0370DBU-4LN
(C type)	45~75kW	LSLV0750DBU-4LN



Step 8 Re-assembling the Covers and Routing Bracket

Re-assemble the cable routing bracket and the covers after completing the wiring and basic configurations. 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.

Items	Check Point	Ref.	Result
	Is the installation location appropriate?	<u>p.4</u>	
	Does the environment meet the inverter's operating	<u>p.5</u>	
	conditions?	<u>p.5</u>	
Installation	Does the power source match the inverter's rated input?	<u>p.247</u>	
Location/Power	Is the inverter's rated output sufficient to supply the		
I/O Verification	equipment?		
	(Degraded performance will result in certain circumstances.	<u>p.247</u>	
	Refer to <u>9.8 Continuous Rated Current Derating</u> on page <u>260</u>		
	for details.		<u> </u>
	Is a circuit breaker installed on the input side of the inverter?	<u>p.12</u>	
	Is the circuit breaker correctly rated?	<u>p.247</u>	<u> </u>
	Are the power source cables correctly connected to the R/S/T		
	terminals of the inverter?	p.19	
	(Caution: connecting the power source to the U/V/W	<u> </u>	
	terminals may damage the inverter.)		<u> </u>
	Are the motor output cables connected in the correct phase		
	rotation (U/V/W)?	p.19	
	(Caution: motors will rotate in reverse direction if three phase		
	cables are not wired in the correct rotation.)		<u> </u>
Power Terminal	Are the cables used in the power terminal connections		
Wiring	correctly rated?	<u>p.8</u>	<u> </u>
· · · · · · · · · · · · · · · · · · ·	Is the inverter grounded correctly?	<u>p.18</u>	<u> </u>
	Are the power terminal screws and the ground terminal	p. 19	
	screws tightened to their specified torques?	<u> </u>	<u> </u>
	Are the overload protection circuits installed correctly on the		
	motors (if multiple motors are run using one inverter)?		<u> </u>
	Is the inverter separated from the power source by a magnetic	p.12	
	contactor (if a braking resistor is in use)?	<u> </u>	
	Are advanced-phase capacitors, surge protection and		
	electromagnetic interference filters installed correctly?	p.19	
	(These devices MUST not be installed on the output side of		
	the inverter.)		
	Are STP (shielded twisted pair) cables used for control	_	
	terminal wiring?		
Control Terminal	Is the shielding of the STP wiring properly grounded?	-	<u> </u>
Wiring	If 3-wire operation is required, are the multi-function input	<u>p.22</u>	
3	terminals defined prior to the installation of the control wiring		
	connections?		<u> </u>
	Are the control cables properly wired?	<u>p22</u>	<u> </u>

Items	Check Point	Ref.	Result
	Are the control terminal screws tightened to their specified torques?		
	Is the total cable length of all control wiring < 165ft (100m)?	<u>p.27</u>	
	Is the total length of safety wiring < 100ft (30m)?	<u>p.27</u>	
	Are optional cards connected correctly?	<u>-</u>	
	Is there any debris left inside the inverter?	<u>p.16</u>	
	Are any cables contacting adjacent terminals, creating a potential short circuit risk?	-	
	Are the control terminal connections separated from the power terminal connections?	-	
Miscellaneous	If capacitors have been in use for more than two years, have they been replaced?	-	
	Has a fuse been installed for the power source?	p.253	
	Are the connections to the motor separated from other connections?	-	
	If the fans have been in operation for more than three years, have they been replaced?	<u>p. 245</u>	

Note

STP (Shielded Twisted Pair) cable has a highly conductive, shielded screen around twisted cable pairs. STP cables protect conductors from electromagnetic interference.

2.4 Test Run

After the post-installation checklist has been completed, follow the instructions below to test the inverter.

- 1 Before starting a test drive, check the wiring conditions.
- 2 Turn on the power supply to the inverter. Ensure that the keypad display light is on.
- **3** Select the command source (Set the DRV code).
- **4** Set a frequency reference, and then check the following:
 - If V1 is selected as the frequency reference source, does the reference change according to the input voltage at VR?
 - If V2 is selected as the frequency reference source, is the voltage/current selector switch (SW2) set to voltage, and does the reference change according to the input voltage?
 - If I2 is selected as the frequency reference source, is the voltage/current selector switch (SW2) set to current, and does the reference change according to the input current?
- **5** Set the acceleration (ACC) time and deceleration (Dec) time.
- **6** Start the motor and check the following:
 - Ensure that the motor rotates in the correct direction (refer to the note below).
 - 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.

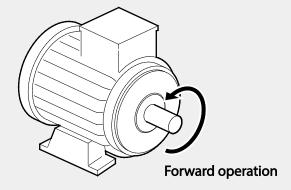
Remarque

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.

Verifying the Motor Rotation

- 1 On the keypad, set the DRV-06 (Frequency reference source) code to 0(Keypad).
- **2** Set a frequency reference.
- **3** Press the [RUN] key. Motor starts forward operation.
- 4 Observe the motor's rotation from the load side and ensure that the motor rotates counterclockwise (forward).

If the motor rotates in the reverse direction, two of the U/V/W terminals need to be switched.



① Caution

- Check the parameter settings before running the inverter. Parameter settings may have to be adjusted depending on the load.
- To avoid damaging the inverter, do not supply the inverter with an input voltage that exceeds the rated voltage for the equipment.
- Before running the motor at maximum speed, confirm the motor's rated capacity. As inverters can be used to easily increase motor speed, use caution to ensure that motor speeds do not accidently exceed the motor's rated capacity.

3 Learning to Perform Basic Operations

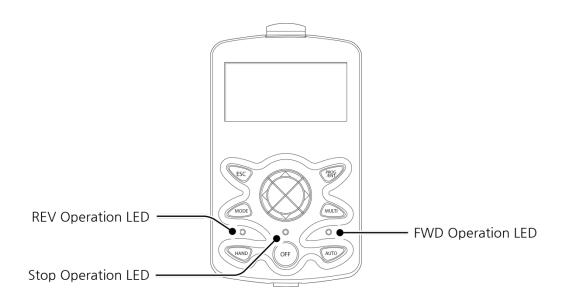
This chapter describes the keypad layout and functions. It also introduces parameter groups and codes required to perform basic operations. The chapter also outlines the correct operation of the inverter before advancing to more complex applications. Examples are provided to demonstrate how the inverter actually operates.

3.1 About the Keypad

The keypad is composed of two main components – the display and the operation (input) keys. Refer to the following illustration to identify part names and functions.

3.1.1 Operation Keys

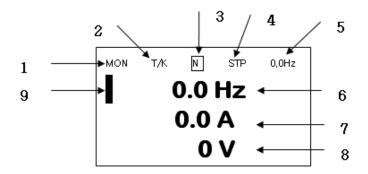
The following table lists the names and functions of the keypad's operation keys.



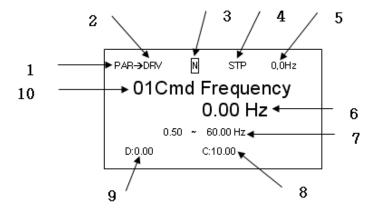
Key	Name	Description
MODE	[MODE] Key	Used to switch between modes.
PROG /ENT	[PROG / Ent] Key	Used to select, confirm, or save a parameter value.
	[UP] key [DOWN] key	Switch between codes or increase or decrease parameter values.
	[LEFT] key [RIGHT] key	Switch between groups or move the cursor during parameter setup or modification.
MULTI	[MULTI] Key	Used to perform special functions, such as user code registration.
ESC	[ESC] Key	 Used to cancel an input during parameter setup. Pressing the [ESC] key before pressing the [PROG / ENT] key reverts the parameter value to the previously set value. Pressing the [ESC] key while editing the codes in any function group makes the keypad display the first code of the function group. Pressing the [ESC] key while moving through the modes makes the keypad display Monitor mode.
FWD .	[FWD] Key	Used to operate the motor in the forward direction.
REV	[REV] Key	Used to operate the motor in the reversed direction.
STOP /RESET	[STOP/RESET] Key	Used to stop motor operation. Used to reset the inverter following fault or failure condition.

3.1.2 About the Display

Monitor mode display



Parameter settings display



Names displayed in monitor mode and parameter settings

No.	Names displayed in monitor mode	No.	Names displayed in parameter settings
1	Mode	1	Mode
2	Operating/frequency command	2	Group
3	Multi-functional key settings	3	Multi-functional key settings
4	Inverter operation status	4	Inverter operation status
5	Items displayed in the status window	5	Items displayed in the status window
6	Monitor mode display 1	6	Display parameters
7	Monitor mode display 2	7	Available settings range
8	Monitor mode display 3	8	Existing setting values
9	Monitor mode cursor	9	Factory default values
		10	Code numbers and names

Display details

No.	Name	Display	Description
		MON	Monitor Mode
1	Mode	PAR	Parameter Mode
ı	Mode	TRP	Trip Mode
		CNF	Config Mode
		K	Keypad operation command
		0	Field Bus communication option operation command
	Operation commands	Α	Application option operation command
	Commands	R	Internal 485 operation command
		Т	Terminal operation command
		K	Keypad frequency command
2		V	V1 input frequency command
_		P	Pulse input frequency command
	Frequency	U	Frequency command for UP operation (Up - Down operation)
	commands	D	Frequency command for DOWN operation (Up - Down operation)
		S	Frequency command for STOP operation (Up - Down operation)
		0	FBus Option frequency command

No.	Name	Display	Description
		J	Jog frequency command
		R	Int 485 frequency command
		1~9, A~F	Multi-step frequency command
		JOG Key	Keypad JOG operation mode
3	Multi- functional key	Local/Remote	Able to select either local or remote operation
3	settings	UserGrpSelKey	Register or delete user group parameters in parameter mode
		STP	Motor stopped
		FWD	Operating in forward direction
		REV	Operating in reverse direction
		DC	DC output
4	Inverter	WAN	Warning
4	operation status	STL	Stall
		SPS	Speed Search
		OSS	S/W overcurrent protective function is on
		OSH	H/W overcurrent protective function is on
		TUN	Auto Tuning

3.1.3 Display Modes

The S100 inverter uses 5 modes to monitor or configure different functions. The parameters in Parameter mode are divided into smaller groups of relevant functions. Press the [Mode] key to change to Parameter mode.

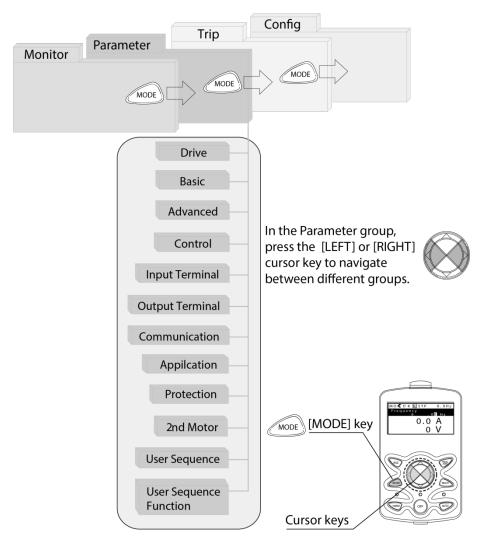


Table of Display Modes

The following table lists the 5 display modes used to control the inverter functions.

Mode Name	Keypad Display	Description
Monitor mode	MON	Displays the inverter's operation status information. In this mode, information including the inverter's frequency reference, operation frequency, output current, and voltage may be monitored.
Parameter mode	PAR	Used to configure the functions required to operate the inverter. These functions are divided into 14 groups based on purpose and complexity.
Trip mode	TRP	Used to monitor the inverter's fault trip information, including the previous fault trip history. When a fault trip occurs during inverter operation, the operation frequency, output current, and output voltage of the inverter at the time of the fault may be monitored. This mode is not displayed if the inverter is not at fault and fault trip history does not exist.
Config mode	CNF	Used to configure the inverter features that are not directly related to the operation of the inverter. The settings you can configure in the Config mode include keypad display language options, monitor mode environment settings, communication module display settings, and parameter duplication and initialization.

Parameter Setting Mode

The following table lists the functions groups under Parameter mode.

Function Group Name	Keypad Display	Description	
Drive	DRV	Configures basic operation parameters. These include ACC/Dec time settings, operation command settings, and functions necessary for operation.	
Basic	BAS	Configures basic operation parameters. These parameters include motor parameters and multi-step frequency parameters.	
Advanced	ADV	Configures acceleration or deceleration patterns, frequency limits, energy saving features, and, regeneration prevention features.	
Control	CON	Configures the features related to speed search and KEB (kinetic energy buffering).	
Input Terminal	IN	Configures input terminal–related features, including digital multi–functional inputs and analog inputs.	
Output Terminal	OUT	Configures output terminal-related features, including digital multi-functional outputs and analog outputs.	
Communication	СОМ	Configures the communication features for the RS-485, Modbus-RTU and Metasys N2. Optional communication module related features may be configured as well, if one is installed.	
Application	APP	Configures functions related to auto sequence operation and PID control.	
Protection	PRT	Configures motor and inverter protection features.	
Motor 2 (Secondary motor)	M2	Configures the secondary motor-related features.	
User Sequence	USS	Used to implement simple sequences with various function blocks.	
User Sequence Function	USF		

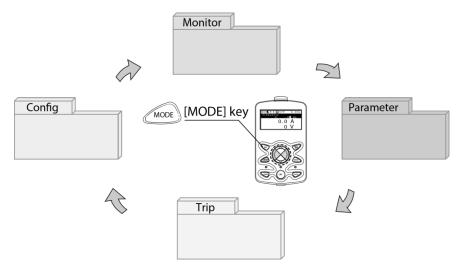
3.2 Learning to Use the Keypad

The keypad enables movement between groups and codes. It also enables users to select and configure functions. At code level, you can set parameter values to turn specific functions on or off or decide how the functions will be used. For detailed information on the codes in each function group, refer to 6. *Table of Functions* on page 155. Confirm the correct values (or the correct range of the values), then follow the examples below to configure the inverter with the keypad.

3.2.1 Display Mode Selection

The following figure illustrates how the display modes change when you press the [Mode] button on the keypad. You can continue to press the [Mode] key until you get to the desired mode.

User mode and Trip mode are not displayed when all the inverter settings are set to the factory default (User mode must be configured before it is displayed on the keypad, and Trip mode is displayed only when the inverter is at fault, or has previous trip fault history).

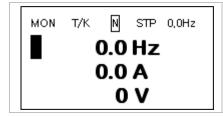


Mode selection in factory default condition

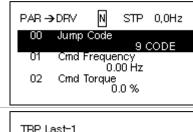


Switching between groups when Trip mode is added

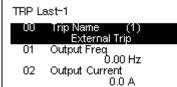
Trip mode is accessible only when the inverter has trip fault history. Refer to 4 Learning Basic Features on page 63 for information about monitoring faults.



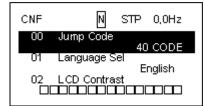
- When the power is turned on, Monitor mode is displayed.
- Press the [MODE] key.



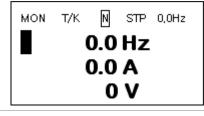
- Parameter mode
- Press the [MODE] key.



- Trip mode
- Press the [MODE] key.



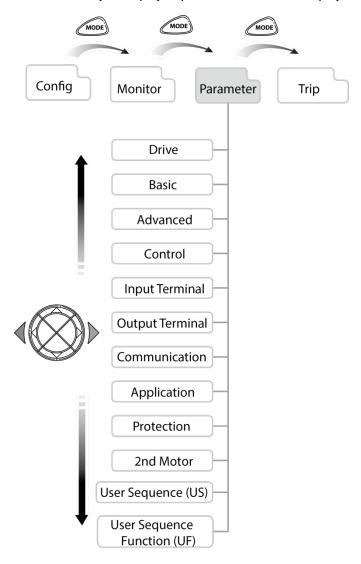
- CNF mode
- Press the [MODE] key.



· Monitor mode is displayed again.

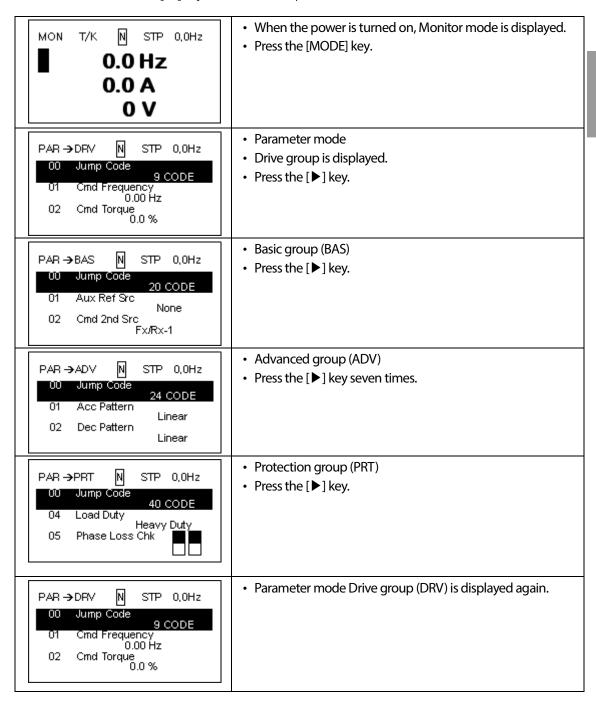
3.2.2 Switching Groups

Press the [MODE] key to display a specific mode. Modes displayed change in the following order:



Switching between Groups in Parameter Display Mode

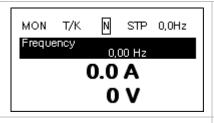
After entering Parameter mode from Monitor mode, press the $[\triangleright]$ key to change the display as shown below. Press the $[\blacktriangleleft]$ key to return to the previous mode.



3.2.3 Navigating through the Codes (Functions)

Code Navigation in Monitor mode

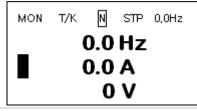
In monitor mode, press the $[\Delta]$, $[\nabla]$ key to display frequency, the output current, or voltage according to the cursor position.



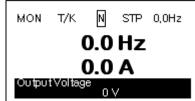
- When the power is turned on, Monitor mode is displayed.
- The cursor appears to the left of the frequency information.
- Press the [▼] key.



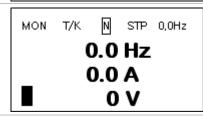
- Information about the second item in Monitor mode (Output Current) is displayed.
- Wait for 2 seconds until the information on the display disappears.



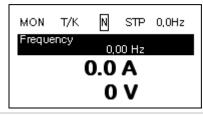
- Information about the second item in Monitor mode (Output Current) disappears and the cursor reappears to the left of the second item.
- Press the $[\, lacksquare$] key.



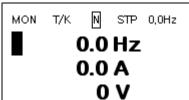
- Information about the third item in Monitor mode (Output Voltage) is displayed.
- Wait for 2 seconds until the information on the display disappears.



- Information about the third item in Monitor mode (Output Voltage) disappears and the cursor appears to the left of the third item.
- Press the [▼] key twice.



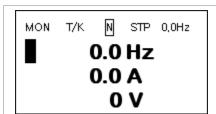
• Information about the first item in Monitor mode (Frequency) is displayed.



 Information about the first item in Monitor mode (Frequency) disappears and the cursor appears to the left of the first item.

Code Navigation in Parameter mode

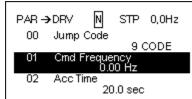
The following examples show you how to move through codes in different function groups (Drive group and Basic group) in Parameter mode. In parameter mode, press the $[\blacktriangle]$ or $[\blacktriangledown]$ key to move to the desired functions.



- When the power is on, monitor mode is displayed.
- Press the [MODE] key.



 Drive group (DRV) in Parameter mode is displayed. If any other group is displayed, press the [MODE] key until the Drive group is displayed, or press the [ESC] key.



- Press the [▼] key to move to the second code (DRV-01) of Drive group.
- Press the [▶] key

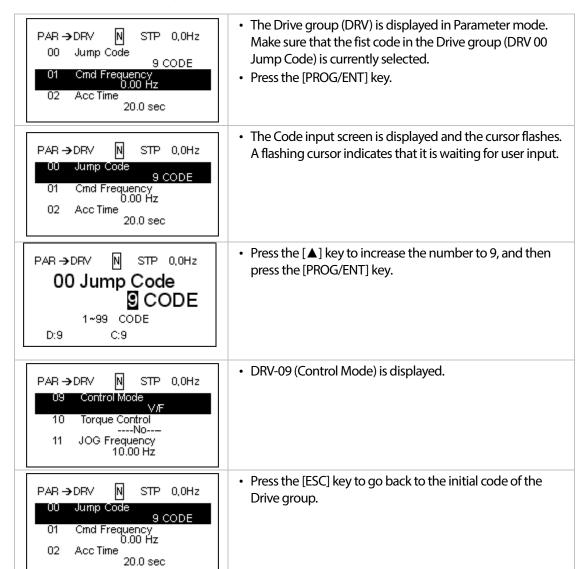


- Basic group is displayed.
- Press the [▲] or [▼] key to move to the desired codes and configure the inverter functions.

3.2.4 Navigating Directly to Different Codes

Parameter mode and Config mode allow direct jumps to specific codes. The code used for this feature is called the Jump Code. The Jump Code is the first code of each mode. The Jump Code feature is convenient when navigating for a code in a function group that has many codes.

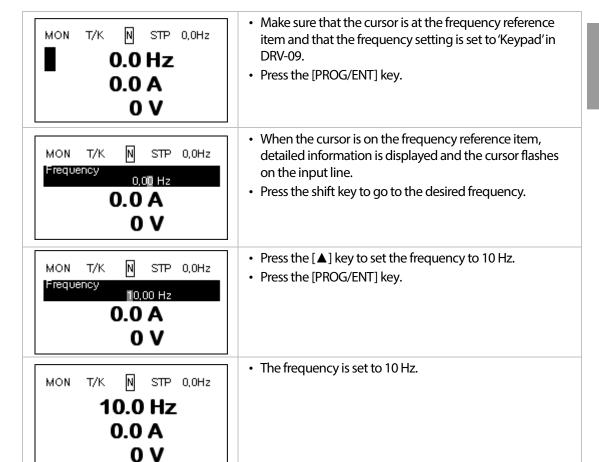
The following example shows how to navigate directly to code DRV- 09 from the initial code (DRV- 00 Jump Code) in the Drive group.



3.2.5 Parameter settings

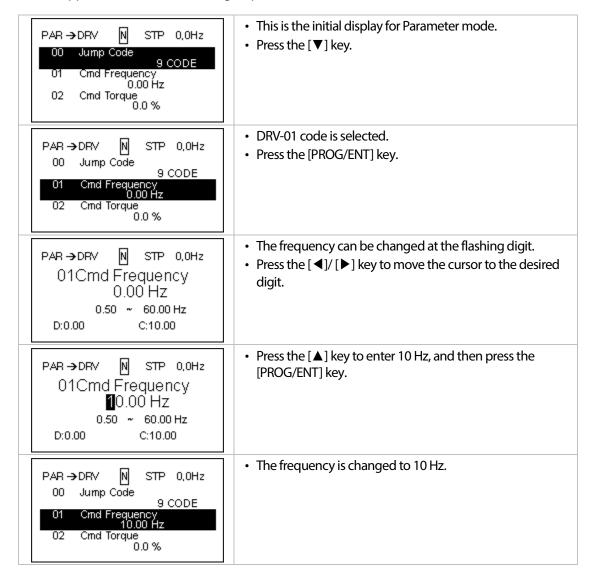
Parameter settings available in Monitor mode

The S100 inverter allows basic parameters to be modified in Monitor mode. The following example shows how to set the frequency.



Parameter settings in other modes and groups

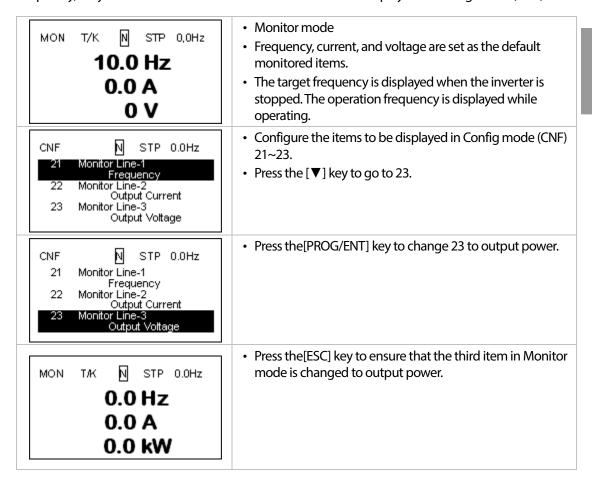
The following example shows how to change the frequency in the Drive group. This example can also be applied to other modes and groups.



3.2.6 Monitoring the Operation

How to use Monitor mode

There are 3 types of items that may be monitored in Monitor mode. Some items, including frequency, may be modified. Users can select the items to be displayed in Config mode (CNF).

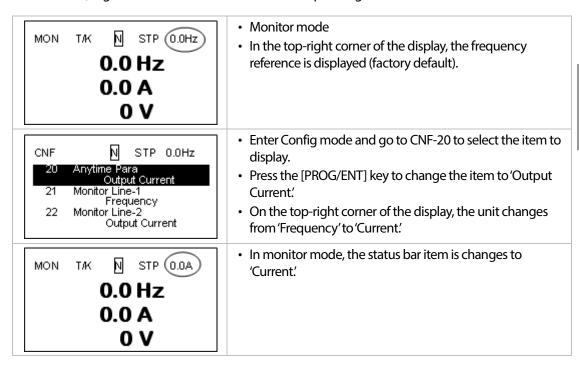


Items available for monitoring

Mode	Number	Display	Setti	ng Range	Initial value
20 21 22 CNF 23	20	Anytime Para	0	Frequency	0: Frequency
	21	Monitor Line-1	1	Speed	0: Frequency
	22	Monitor Line-2	2	Output Current	2:Output Current
			3	Output Voltage	
			4	Output Power	
			5	WHour Counter	
	Monitor Line-3	6	DCLink Voltage	3:Output Voltage	
		7	DI State		
		8	DO State		
		9	V1 Monitor[V]		
		10	V1 Monitor[%]		
		13	V2 Monitor[V]		
		14	V2 Monitor[%]		
		15	I2 Monitor[mA]		
		16	I2 Monitor[%]		
		17	PID Output		
		18	PID ref Value		
		19	PID Fbk Value		
			20	Torque	
			21	Torque Limit	
			22	Trq Bias Ref	
			23	Speed Limit	

How to use the status bar

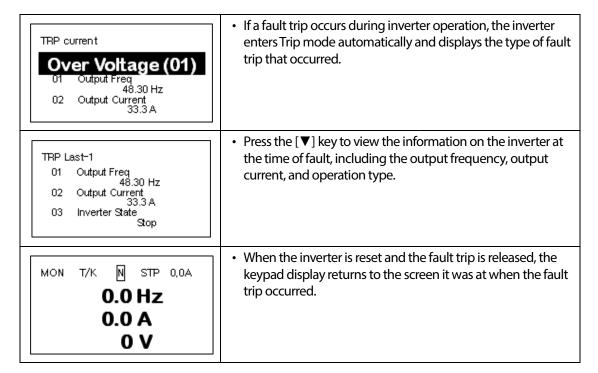
On the top-right corner of the display, there is a display item. This item is displayed as long as the inverter is on, regardless of the mode the inverter is operating in.



3.3 Fault Monitoring

Monitoring Faults during Inverter Operation 3.3.1

The following example shows how to monitor faults that occurred during inverter operation.



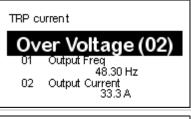
3.3.2 Monitoring Multiple Fault Trips

The following example shows how to monitor multiple faults that occur at the same time.

• If multiple fault trips occur at the same time, the number of TRP current fault trips occurred is displayed on the right side of the fault trip type. Over Voltage (02) • Press the [PROG/ENT] key. 02 Output Current 33.3 A • The types of fault trips that occurred are displayed. TRP current • Press the [PROG/ENT] key. 00 Trip Name (02) Over Voltage External Trip • The display returns to the screen it was at when the fault trip TRP current occurred. Over Voltage (02) Output Freq 48.30 Hz 02 Output Current 33.3 A

Fault trip history saving and monitoring

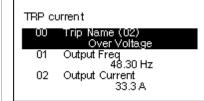
When fault trips occur, the trip mode saves the content. Up to five fault trips are saved in the history. Trip mode saves when the inverter is reset, and when a Low Voltage fault trip occurs due to power outages. If a trip occurs more than five times, the information for the five previous trips are automatically deleted.



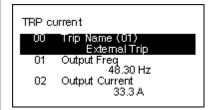
 If a fault trip occurs during inverter operation, the inverter enters Trip mode automatically and displays the type of fault trip that occurred.



- After the [RESET] key or terminal is pressed, the fault trip is saved automatically and returns to the screen it was on before the fault trip occurred.
- Press the [MODE] key toenterTrip mode.



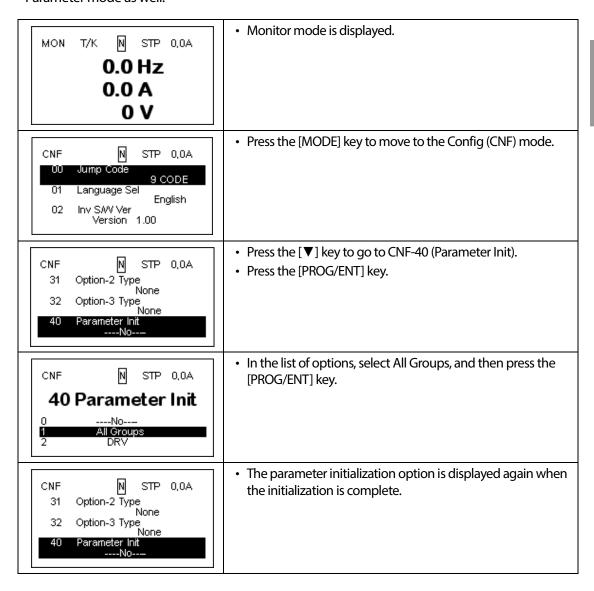
- The most recent fault trip is saved in Last-1 code.
- Press the [▶] key.



- The fault trip changes position and is saved in Last-2 code.
- When a fault trip occurs again, the content in Last-2 is moved to Last-3.

3.4 Parameter Initialization

The following example demonstrates how to revert all the parameter settings back to the factory default (Parameter Initialization). Parameter initialization may be performed for separate groups in Parameter mode as well.



4 Learning Basic Features

This chapter describes the basic features of the S100 inverter. Check the reference page in the table to see the detailed description for each of the advanced features.

Frequency reference source configuration for the keypad Frequency reference source configuration for the terminal block (input voltage) Frequency reference source configuration for the terminal block (input voltage) Frequency reference source configuration for the terminal block (input voltage) Frequency reference source configuration for the terminal block (input current) Frequency reference source configuration for the terminal block (input current) Frequency reference source configuration for the terminal block (input pulse) Frequency reference source configuration for RS-485 communication Frequency reference source configuration for RS-485 communication Motor operation display options Frequency configures the inverter to allow input pulse at the terminal block (II) and to setup or modify a frequency reference. Configures the inverter to allow communication signals from upper level controllers, such as PLCs or PCs, and to setup or modify a frequency reference. Enables the user to hold a frequency using analog inputs at terminals. Motor operation display options Multi-step speed (frequency) configures the display of motor operation values. Motor operation is displayed either in frequency (Hz) or speed (fremunity) configures multi-step frequency operations by receiving an input at the terminals defined for each step frequency. Configures the inverter to allow the manual operation of the [FWD], [REV] and [Stop] keys. Configures the inverter to accept inputs at the FX/RX terminals. Dought the terminal block inputs the inverter to accept communication signals from upper level controllers, such as PLCs or PCs. Configures the inverter to switch between local and remote operation modes when the [ESC] key is pressed. When the inverter is operated using remote inputs (any input other than one from the keypad), this configuration can be used to perform maintenance on the inverter, without losing or altering saved parameter settings. It can also be used to override remotes and use the keypad immediatel	Basic Tasks	Description	Ref.		
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or altering saved parameter settings. It can also be used to override remotes and use the keypad immediately in	_	, , , , , , , , , , , , , , , , , , ,	<u>p.84</u>		
override remotes and use the keypad immediately in	,	•			
		emergencies.			

Basic Tasks	Description	Ref.
Motor rotation control	Configures the inverter to limit a motor's rotation direction.	<u>p.86</u>
Automatic start-up at power-on	Configures the inverter to start operating at power-on. With this configuration, the inverter begins to run and the motor accelerates as soon as power is supplied to the inverter. To use automatic start-up configuration, the operation command terminals at the terminal block must be turned on.	p.87
Automatic restart after reset of a fault trip condition	Configures the inverter to start operating when the inverter is reset following a fault trip. In this configuration, the inverter starts to run and the motor accelerates as soon as the inverter is reset following a fault trip condition. For automatic start-up configuration to work, the operation command terminals at the terminal block must be turned on.	p.88
Acc/Dec time configuration based on the Max. Frequency	Configures the acceleration and deceleration times for a motor based on a defined maximum frequency.	<u>p.89</u>
Acc/Dec time configuration based on the frequency reference	Configures acceleration and deceleration times for a motor based on a defined frequency reference.	<u>p.90</u>
Multi-stage Acc/Dec time configuration using the multi-function terminal	Configures multi-stage acceleration and deceleration times for a motor based on defined parameters for the multi-function terminals.	<u>p.91</u>
Acc/Dec time transition speed (frequency) configuration	Enables modification of acceleration and deceleration gradients without configuring the multi-functional terminals.	<u>p.93</u>
Acc/Dec pattern configuration	Enables modification of the acceleration and deceleration gradient patterns. Basic patterns to choose from include linear and S-curve patterns.	<u>p.94</u>
Acc/Dec stop command	Stops the current acceleration or deceleration and controls motor operation at a constant speed. Multi-function terminals must be configured for this command.	<u>p.96</u>
Linear V/F pattern operation	Configures the inverter to run a motor at a constant torque. To maintain the required torque, the operating frequency may vary during operation.	<u>p.97</u>
Square reduction V/F pattern operation	Configures the inverter to run the motor at a square reduction V/F pattern. Fans and pumps are appropriate loads for square reduction V/F operation.	<u>p.98</u>
User V/F pattern configuration	Enables the user to configure a V/F pattern to match the characteristics of a motor. This configuration is for special-purpose motor applications to achieve optimal performance.	<u>p.99</u>
Manual torque boost	Manual configuration of the inverter to produce a momentary torque boost. This configuration is for loads that require a large amount of starting torque, such as elevators or lifts.	<u>p.101</u>
Automatic torque boost	Automatic configuration of the inverter that provides "auto tuning" that produces a momentary torque boost. This	<u>p.101</u>

Basic Tasks	Description	Ref.
	configuration is for loads that require a large amount of	
	starting torque, such as elevators or lifts.	
	Adjusts the output voltage to the motor when the power	
Output voltage adjustment	supply to the inverter differs from the motor's rated input	p.102
	voltage.	
	Accelerating start is the general way to start motor operation.	
Accelerating start	The typical application configures the motor to accelerate to a	p.103
receivating stare	target frequency in response to a run command, however	<u>p.105</u>
	there may be other start or acceleration conditions defined.	
	Configures the inverter to perform DC braking before the	
Start after DC braking	motor starts rotating again. This configuration is used when	p.103
3	the motor will be rotating before the voltage is supplied from	
	the inverter.	
	Deceleration stop is the typical method used to stop a motor.	
Deceleration stop	The motor decelerates to 0 Hz and stops on a stop command,	p.104
·	however there may be other stop or deceleration conditions defined.	
	Configures the inverter to apply DC braking during motor deceleration. The frequency at which DC braking occurs must	
Stopping by DC braking	be defined and during deceleration, when the motor reaches	p.105
	the defined frequency, DC braking is applied.	
	Configures the inverter to stop output to the motor using a	
Free-run stop	stop command. The motor will free-run until it slows down and	p.106
Tree runstop	stops.	<u>p.100</u>
	Configures the inverter to provide optimal, motor deceleration,	
Power braking	without tripping over-voltage protection.	<u>p.107</u>
Start/maximum frequency	Configures the frequency reference limits by defining a start	
configuration	frequency and a maximum frequency.	<u>p.108</u>
Upper/lower frequency limit	Configures the frequency reference limits by defining an upper	100
configuration	limit and a lower limit.	<u>p.108</u>
Francisco está una a	Configures the inverter to avoid running a motor in	- 110
Frequency jump	mechanically resonating frequencies.	<u>p.110</u>
2nd Operation Configuration	Used to configure the 2 nd operation mode and switch between	n 111
2 nd Operation Configuration	the operation modes according to your requirements.	<u>p.111</u>
Multi-function input	Enables the user to improve the responsiveness of the multi-	
terminal control	function input terminals.	p.112
configuration	Tunction input terminals.	
P2P communication	Configures the inverter to share input and output devices with	p.113
configuration	other inverters.	<u>p.115</u>
Multi-keypad configuration	Enables the user to monitor multiple inverters with one	p.114
	monitoring device.	2
User sequence configuration	Enables the user to implement simple sequences using various	p.115
	function blocks.	55

4.1 Setting Frequency Reference

The S100 inverter provides several methods to setup and modify a frequency reference for an operation. The keypad, analog inputs [for example voltage (V1, V2) and current (I2) signals], or RS-485 (digital signals from higher-level controllers, such as PC or PLC) can be used. If UserSeqLink is selected, the common area can be linked with user sequence output and can be used as frequency reference.

Group	Code	Name	LCD Display	Para	meter Setting	Setting Range	Unit
				0	KeyPad-1		
				1	KeyPad-2		
		Frequency reference source		2	V1	0-12	
	07			4	V2		
DRV			Ref Freq Src	5	12		-
				6	Int 485		
				8	Field Bus		
				9	UserSeqLink		
				12	Pulse		

4.1.1 Keypad as the Source (KeyPad-1 setting)

You can modify frequency reference by using the keypad and apply changes by pressing the [ENT] key. To use the keypad as a frequency reference input source, go to 07 (Frequency reference source) code in the DRV group and change the parameter value to 0 (Keypad-1). Input the frequency reference for an operation.

Group	Code	Name	LCD Display	Parameter Setting		Setting Range	Unit
DRV	07	Frequency reference source	Freq Ref Src	0	KeyPad-1	0–12	

^{*} You cannot set a frequency reference that exceeds the Max. Frequency, as configured with DRV-20.

4.1.2 Keypad as the Source (KeyPad-2 setting)

You can use the $[\blacktriangle]$ and $[\blacktriangledown]$ keys to modify a frequency reference. To use this as a second option, set the keypad as the source of the frequency reference, by going to 07 (Frequency reference source) code in the DRV group and change the parameter value to 1 (Keypad-2). This allows frequency reference values to be increased or decreased by pressing the $[\blacktriangle]$ and $[\blacktriangledown]$ keys.

Group	Code	Name	LCD Display	Parameter Setting		Setting Range	Unit
DRV	07	Frequency reference source	Freq Ref Src	1	KeyPad-2	0–12	-

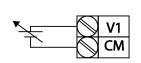
^{*} You cannot set a frequency reference that exceeds the Max. Frequency, as configured with DRV-20.

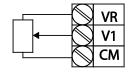
4.1.3 V1 Terminal as the Source

You can set and modify a frequency reference by setting voltage inputs when using the V1 terminal. Use voltage inputs ranging from 0 to $10\,V$ (unipolar) for forward only operation. Use voltage inputs ranging from $-10\,to+10\,V$ (bipolar) for both directions, where negative voltage inputs are used reverse operations.

4.1.3.1 Setting a Frequency Reference for 0–10 V Input

Set code 06 (V1 Polarity) to 0 (unipolar) in the Input Terminal group (IN). Use a voltage output from an external source or use the voltage output from the VR terminal to provide inputs to V1. Refer to the diagrams below for the wiring required for each application.





[External source application]

[Internal source (VR) application]

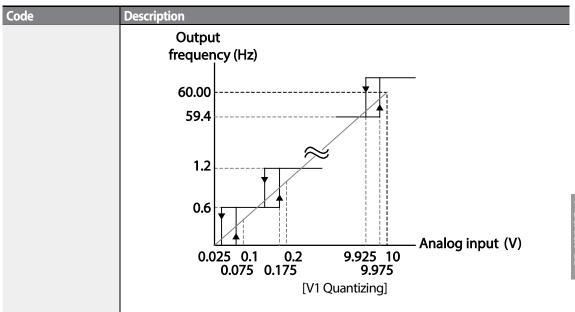
Group	Code	Name	LCD Display	Para	meter Setting	Setting Range	Unit
DRV	07	Frequency reference source	Freq Ref Src	2	V1	0–12	-
	01	Frequency at maximum analog input	Freq at 100%		kimum Juency	0.00– Max. Frequency	Hz
	05	V1 input monitor	V1 Monitor [V]	0.00)	0.00-12.00	V
	06	V1 polarity options	V1 Polarity	0	Unipolar	0-1	-
	07	V1 input filter time constant	V1 Filter	10		0–10000	ms
IN	08	V1 minimum input voltage	V1 volt x1	0.00		0.00-10.00	V
IIV	09	V1 output at minimum voltage (%)	V1 Perc y1	0.00		0.00-100.00	%
	10	V1 maximum input voltage	V1 Volt x2	10.0	00	0.00-12.00	V
	11	V1 output at maximum voltage (%)	V1 Perc y2	100	.00	0–100	%
	16	Rotation direction options	V1 Inverting	0	No	0–1	-
	17	V1 Quantizing level	V1 Quantizing	0.04	ļ	0.00*, 0.04– 10.00	%

^{*} Quantizing is disabled if '0' is selected.

0-10 V Input Voltage Setting Details

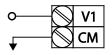
	ge Setting Details
Code	Description
IN-01 Freq at 100%	Configures the frequency reference at the maximum input voltage when a potentiometer is connected to the control terminal block. A frequency set with code IN-01 becomes the maximum frequency only if the value set in code IN-11 (or IN-15) is 100(%). • Set code IN-01 to 40.00 and use default values for codes IN-02–IN-16. Motor
	 will run at 40.00 Hz when a 10 V input is provided at V1. Set code IN-11 to 50.00 and use default values for codes IN-01–IN-16. Motor will run at 30.00 Hz (50% of the default maximum frequency–60 Hz) when a 10 V input is provided at V1.
IN-05 V1 Monitor[V]	Configures the inverter to monitor the input voltage at V1.
IN-07 V1 Filter	V1 Filter may be used when there are large variations between reference frequencies. Variations can be mitigated by increasing the time constant, but this will require an increased response time. The value t (time) indicates the time required for the frequency to reach 63% of the reference, when external input voltages are provided in multiple steps. V1 input from external source Frequency 100% 63% V1 Filter(t) [V1 Filter]
IN-08 V1 Volt x1– IN-11 V1 Perc y2	These parameters are used to configure the gradient level and offset values of the Output Frequency, based on the Input Voltage.

Code	Description
	Frequency reference
	IN-09 IN-09 IN-08 IN-10 [Volt x1-IN-11 V1 Perc y2]
IN-16 V1 Inverting	Inverts the direction of rotation. Set this code to 1 (Yes) if you need the motor to run in the opposite direction from the current rotation.
IN-17 V1 Quantizing	Quantizing may be used when the noise level is high in the analog input (V1 terminal) signal. Quantizing is useful when you are operating a noise-sensitive system, because it suppresses any signal noise. However, quantizing will diminish system sensitivity (resultant power of the output frequency will decrease based on the analog input). You can also turn on the low-pass filter using code IN-07 to reduce the noise, but increasing the value will reduce responsiveness and may cause pulsations (ripples) in the output frequency. Parameter values for quantizing refer to a percentage based on the maximum input. Therefore, if the value is set to 1% of the analog maximum input (60 Hz), the output frequency will increase or decrease by 0.6 Hz per 0.1V difference. When the analog input is increased, an increase to the input equal to 75% of the set value will change the output frequency, and then the frequency will increase according to the set value. Likewise, when the analog input decreases, a decrease in the input equal to 75% of the set value will make an initial change to the output frequency. As a result, the output frequency will be different at acceleration and deceleration, mitigating the effect of analog input changes over the output frequency.

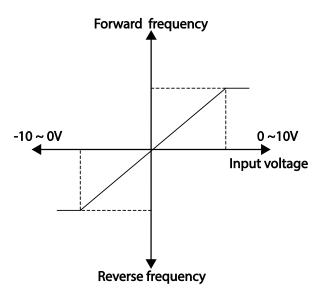


4.1.3.2 Setting a Frequency Reference for -10-10 V Input

Set the 07 (Frequency reference source) code in the DRV group to 2 (V1), and then set code 06 (V1 Polarity) to 1 (bipolar) in the Input Terminal group (IN). Use the output voltage from an external source to provide input to V1.



[V1 terminal wiring]



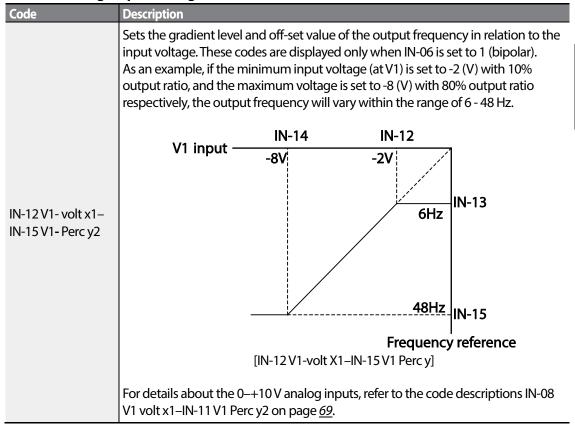
[Bipolar input voltage and output frequency]

Group	Code	Name	LCD Display	Parame	ter Setting	Setting Range	Unit
DRV	07	Frequency reference source	Freq Ref Src	2	V1	0–12	-
	01	Frequency at maximum analog input	Freq at 100%	60.00		0– Max Frequency	Hz
	05	V1 input monitor	V1 Monitor	0.00		0.00-12.00 V	V
	06	V1 polarity options	V1 Polarity	1	Bipolar	0–1	-
INI	12	V1 minimum input voltage	V1-volt x1	0.00		10.00-0.00 V	V
IN -	13	V1 output at minimum voltage (%)	V1- Perc y1	0.00		-100.00-0.00%	%
	14	V1maximum input voltage	V1-Volt x2	-10.00		-12.00 –0.00 V	V
	15	V1 output at maximum voltage (%)	V1- Perc y2	-100.00		-100.00-0.00%	%

Rotational Directions for Different Voltage Inputs

Command / Voltage	Input voltage					Input voltage		
Input 0-10 V		-10-0 V						
FWD	Forward	Reverse						
REV	Reverse	Forward						

-10-10 V Voltage Input Setting Details



4.1.3.3 Setting a Reference Frequency using Input Current (I2)

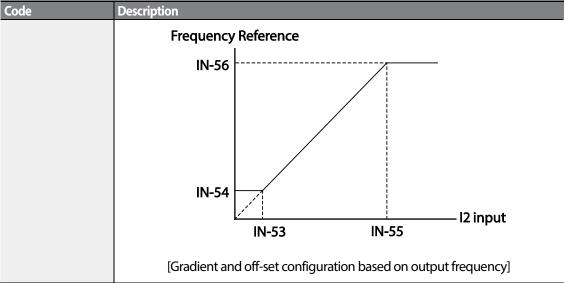
You can set and modify a frequency reference using input current at the I2 terminal after selecting current input at SW 2. Set the 07 (Frequency reference source) code in the DRV group to 5 (I2) and apply 4–20 mA input current to I2.

Group	Code	Name	LCD Display	Param	eter Setting	Setting Range	Unit
DRV	07	Frequency reference source	Freq Ref Src	5	12	0-12	-
	01	Frequency at maximum analog input	Freq at 100%	60.00		0- Maximum Frequency	Hz
	50	12 input monitor	I2 Monitor	0.00		0.00-24.00	mA
	52	12 input filter time constant	12 Filter	10		0-10000	ms
	53	12 minimum input current	I2 Curr x1	4.00		0.00-20.00	mA
IN	54	I2 output at minimum current (%)	I2 Perc y1	0.00		0-100	%
	55	I2 maximum input current	I2 Curr x2	20.00		0.00-24.00	mΑ
	56	I2 output at maximum current (%)	I2 Perc y2	100.00		0.00-100.00	%
	61	I2 rotation direction options	I2 Inverting	0	No	0-1	-
	62	12 Quantizing level	I2 Quantizing	0.04		0*, 0.04–10.00	%

^{*} Quantizing is disabled if '0' is selected.

Input Current (I2) Setting Details

Code	Description
	Configures the frequency reference for operation at the maximum current (when IN-56 is set to 100%).
IN-01 Freq at 100%	If IN-01 is set to 40.00 Hz, and default settings are used for IN-53–56, 20 mA input current (max) to I2 will produce a frequency reference of 40.00 Hz.
	• If IN-56 is set to 50.00 (%), and default settings are used for IN-01 (60 Hz) and IN-53–55, 20 mA input current (max) to I2 will produce a frequency reference of 30.00 Hz (50% of 60 Hz).
IN-50 I2 Monitor	Used to monitor input current at I2.
IN-52 I2 Filter	Configures the time for the operation frequency to reach 63% of target frequency based on the input current at I2.
IN-53 I2 Curr x1–IN- 56 I2 Perc y2	Configures the gradient level and off-set value of the output frequency.



4.1.4 Setting a Frequency Reference with Input Voltage (Terminal I2)

Set and modify a frequency reference using input voltage at I2 (V2) terminal by setting SW2 to V2. Set the Frq (Frequency reference source) code in the DRV group to 4 (V2) and apply 0-12V input voltage to I2 (=V2, Analog current/voltage input terminal). Codes IN-35-47 will not be displayed when I2 is set to receive current input (07 code parameter is set to 5).

Group	Code	Name	LCD Display	Paramet	ter Setting	Setting Range	Unit
DRV	07	Frequency reference source	Freq Ref Src	4	V2	0–12	-
	35	V2 input display	V2 Monitor	0.00		0.00-12.00	٧
37 38	37	V2 input filter time constant	V2 Filter	10		0–10000	ms
	38	Minimum V2 input voltage	V2 Volt x1 0.00			0.00-10.00	V
IN	39	Output% at minimum V2 voltage	V2 Perc y1	0.00		0.00-100.00	%
IIN	40	Maximum V2 input voltage	V2 Volt x2	10.00		0.00-10.00	V
	41	Output% at maximum V2 voltage	V2 Perc y2	100.00		0.00-100.00	%
	46	Invert V2 rotational direction	V2 Inverting	0	No	0-1	-
	47	V2 quantizing level	V2 Quantizing	0.04		0.00*, 0.04–10.00	%

^{*} Quantizing is disabled if '0' is selected.

Setting a Frequency with TI Pulse Input 4.1.5

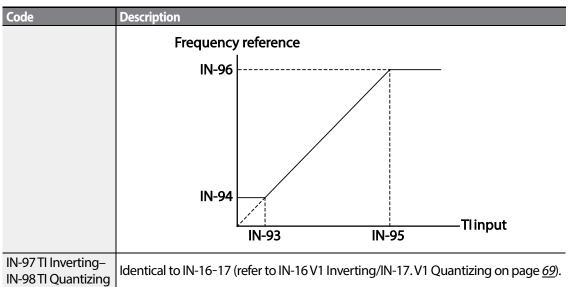
Set a frequency reference by setting the 07 (Frequency reference source) code in the DRV group to 12 (Pulse) and providing 0–32.00 kHz pulse frequency to Tl.

Group	Code	Name	LCD Display	Par	ameter Setting	Setting Range	Unit
DRV	07	Frequency reference source	Freq Ref Src	12	Pulse	0–12	-
	01	Frequency at maximum analog input	Freq at 100%	60.0	00	0.00– Maximum frequency	Hz
	91	Pulse input display	Pulse Monitor	0.00	0	0.00-50.00	kHz
9	92	TI input filter time constant	TI Filter	10		0–9999	ms
	93	TI input minimum pulse	TI Pls x1	0.00		0.00–32.00	kHz
IN	94	Output% at TI minimum pulse	TI Perc y1	0.00	0	0.00-100.00	%
	95	TI Input maximum pulse	TI Pls x2	32.0	00	0.00–32.00	kHz
	96	Output% at TI maximum pulse	TI Perc y2	100	0.00	0.00-100.00	%
	97	Invert TI direction of rotation	TI Inverting	0	No	0-1	-
	98	TI quantizing level	TI Quantizing	0.04	4	0.00*, 0.04– 10.00	%

^{*}Quantizing is disabled if '0' is selected.

TI Pulse Input Setting Details

Code	Description
IN-01 Freg at 100%	Configures the frequency reference at the maximum pulse input. The frequency reference is based on 100% of the value set with IN-96. • If IN-01 is set to 40.00 and codes IN-93–96 are set at default, 32 kHz input to TI
in-o i Freq at 100%	yields a frequency reference of 40.00 Hz.
	• If IN-96 is set to 50.00 and codes IN-01, IN-93–95 are set at default, 32 kHz input to the TI terminal yields a frequency reference of 30.00 Hz.
IN-91 Pulse	Displays the pulse frequency supplied at TI.
Monitor	Displays the paise frequency supplied at 11.
IN-92 TI Filter	Sets the time for the pulse input at TI to reach 63% of its nominal frequency (when the pulse frequency is supplied in multiple steps).
IN-93 TI Pls x1– IN-96 TI Perc y2	Configures the gradient level and offset values for the output frequency.



4.1.6 Setting a Frequency Reference via RS-485 Communication

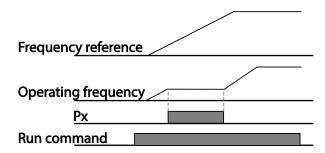
Control the inverter with upper-level controllers, such as PCs or PLCs, via RS-485 communication. Set the 07 (Frequency reference source) code in the DRV group to 6 (Int 485) and use the RS-485 signal input terminals (S+/S-/SG) for communication. Refer to $5 \, \underline{RS-485} \, \underline{Communication} \, \underline{Features}$ on page $\underline{125}$.

Group	Code	Name	LCD Display	Para	ameter Setting	Setting Range	Unit
DRV	07	Frequency reference source	Freq Ref Src	6	Int 485	0–12	-
01	01	Integrated RS-485 communication inverter ID	Int485 St ID	-	1	1–250	-
		Integrated		0	ModBus RTU		
	02	communication	Int485 Proto	1	Reserved	0–2	
COM		protocol		2	LS Inv 485		
COM	03	Integrated communication speed	Int485 BaudR	3	9600 bps	0–7	-
		Into grato d		0	D8/PN/S1		
	04	Integrated communication frame	Int485 Mode	1	D8/PN/S2	0–3	
	U 4	configuration	IIIL 1 03 MUUE	2	D8/PE/S1	0-3	_
		Cornigulation		3	D8/PO/S1		

4.2 Frequency Hold by Analog Input

If you set a frequency reference via analog input at the control terminal block, you can hold the operation frequency of the inverter by assigning a multi-function input as the analog frequency hold terminal. The operation frequency will be fixed upon an analog input signal.

group	Code	Name	LCD Display	Par	rameter Setting	Setting Range	Unit
			<u> </u>	0	Keypad-1		
DDV 07				1	Keypad-2		
			2	V1			
	07	Frequency reference source	Freq Ret Src	4	V2	0–12	
DRV	07			5	12		_
				6	Int 485		
				8	Field Bus		
				12	Pulse		
IN	65–71	Px terminal configuration	Px Define(Px: P1–P7)	21	Analog Hold	0–54	-



4.3 Changing the Displayed Units (Hz↔Rpm)

You can change the units used to display the operational speed of the inverter by setting DRV-21 (Speed unit selection) to 0 (Hz) or 1 (Rpm). This function is available only with the LCD keypad.

Group	Code	Name	LCD Display	Parameter Setting		Parameter Setting		Setting Range	Unit
DRV	Spee	Speed unit	Ll=/Dom Col	0	Hz Display	0-1	_		
DNV	21	selection	Hz/Rpm Sel	1	Rpm Display	0-1			

4.4 Setting Multi-step Frequency

Multi-step operations can be carried out by assigning different speeds (or frequencies) to the Px terminals. Step 0 uses the frequency reference source set with the 07 code in the DRV group. Px terminal parameter values 7 (Speed-L), 8 (Speed-M) and 9 (Speed-H) are recognized as binary commands and work in combination with Fx or Rx run commands. Select the frequency set in the BAS-50-BAS-60 (Multi-step frequency 1-7) code to operate the system.

Group	Code	Name	LCD Display	Parameter Setting		Setting Range	Unit
BAS	50–56	Multi-step frequency 1–7	Step Freq - 1-7	-		0-Maximum frequency	Hz
	65–71	Px terminal configuration	Px Define (Px·	7	Speed-L		-
				8	Speed-M	0–54	-
IN		Comiguration	, ,	9	Speed-H		-
	89	Multi-step command delay time	InCheck Time	1		1–5000	ms

Multi-step Frequency Setting Details

Code	Description
BAS-50–56 Step Freq - 1-7	Configure multi-step frequency 1–7.
IN 65 71 Dy Dofino	Choose the terminals to setup as multi-step inputs, and then set the relevant codes (IN-65-71) to 7(Speed-L), 8(Speed-M), or 9(Speed-H).
IN-65–71 Px Define	Provided that terminals P3, P4 and P5 have been set to Speed-L, Speed-M and Speed-H respectively, the following multi-step operation will be available.

Code	Description				
		Step 0	2		
	P5			5 6 7	0
	<u> 13</u> <u>P6</u>				
	<u> </u>				
	FX			<u>'</u>	
	RX				
		[An examp	le of a multi-ste	ep operation]	
	Speed	Fx/Rx	P7	P6	P5
	0	✓	-	-	-
	1	✓	-	-	✓
	2	✓	-	✓	-
	3	✓	-	✓	✓
	4	✓	✓	-	-
	5	✓	✓	-	√
	6	✓	√	✓	-
	7	✓	✓	✓	✓
	Set a time intervafter receiving a		er to check for a	dditional termina	l block inputs
IN-89 InCheck Time		puts at other ter	minals for 100n	nal is received at l ns, before procee ation.	

Basic Features

4.5 Command Source Configuration

Various devices can be selected as command input devices for the S100 inverter. Input devices available to select include keypad, multi-function input terminal, RS-485 communication and field bus adapter. If User SeqLink is selected, the common area can be linked with user sequence output and can be used as command.

Group	Code	Name	LCD Display	Param	eter Setting	Setting Range	Unit
				0	Keypad		
				1	Fx/Rx-1		
DRV	06	Command Source	Cmd Source*	2	Fx/Rx-2	0-5	
DNV	00	Command Source	Ciria Source	3	Int 485	0-3	-
				4	Field Bus		
				5	UserSeqLink		

4.5.1 The Keypad as a Command Input Device

The keypad can be selected as a command input device to send command signals to the inverter. This is configured by setting the drv (command source) code to 0 (Keypad). Press the [RUN] key on the keypad to start an operation, and the [STOP/RESET] key to end it.

group	Code	Name	LCD Display	Parameter Setting		Setting Range	Unit
DRV	06	Command source	Cmd Source*	0	KeyPad	0-4	-

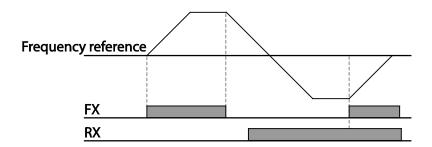
4.5.2 Terminal Block as a Command Input Device (Fwd/Rev Run Commands)

Multi-function terminals can be selected as a command input device. This is configured by setting the 06 (command source) code in the DRV group to 1(Fx/Rx). Select 2 terminals for the forward and reverse operations, and then set the relevant codes (2 of the 7 multi-function terminal codes, IN-65-71 for P1-P7) to 1(Fx) and 2(Rx) respectively. This application enables both terminals to be turned on or off at the same time, constituting a stop command that will cause the inverter to stop operation.

Group	Code	Name	LCD Display	Parameter Setting		Setting Range	Unit
DRV	06	Command source	Cmd Source*	1	Fx/Rx-1	0-5	-
IN	65-71	Px terminal	Px Define(Px: P1-	1	Fx	0-54	
IIN		configuration	P7)	2	Rx	υ-3 4	_

Fwd/Rev Command by Multi-function Terminal – Setting Details

Code	Description			
DRV-06	Cat to 1/Fy/Py 1)			
Cmd Source	Set to 1(Fx/Rx-1).			
IN-65–71 Px Define	Assign a terminal for forward (Fx) operation.			
in-05-7 i PX Deline	Assign a terminal for reverse (Rx) operation.			



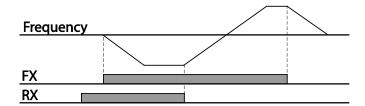
4.5.3 Terminal Block as a Command Input Device (Run and Rotation Direction Commands)

Multi-function terminals can be selected as a command input device. This is configured by setting the 06 (command source) code in the DRV group to 2 (Fx/Rx-2). Select 2 terminals for run and rotation direction commands, and then select the relevant codes (2 of the 7 multi-function terminal codes, IN-65-71 for P1-P7) to 1(Fx) and 2(Rx) respectively. This application uses an Fx input as a run command, and an Rx input to change a motor's rotation direction (On-Rx, Off-Fx).

Group	Code	Name	LCD Display	Para	ameter Setting	Setting Range	Unit
DRV	06	Command source	Cmd Source*	2	Fx/Rx-2	0-5	-
INI	65-71	Px terminal	Px Define (Px: P1	1	Fx	0-54	
IN		configuration	– P7)	2	Rx	0-34	_

Run Command and Fwd/ Rev Change Command Using Multi-function Terminal – Setting Details

Code	Description			
DRV-06	Cotto 2 (Ev/Dv 2)			
Cmd Source	Set to 2 (Fx/Rx-2).			
IN-65–71 Px Define	Assign a terminal for run command (Fx).			
iiv-o5-7 i PX Define	Assign a terminal for changing rotation direction (Rx).			



4.5.4 RS-485 Communication as a Command Input Device

Internal RS-485 communication can be selected as a command input device by setting the 06 (command source) code in the DRV group to 3(Int 485). This configuration uses upper level controllers such as PCs or PLCs to control the inverter by transmitting and receiving signals via the S+, S-, and Sg terminals at the terminal block. For more details, refer to 5 <u>RS-485 Communication Features</u> on page <u>125</u>.

Group	Code	Name	LCD Display	Paramo	eter Setting	Setting Range	Unit
DRV	06	Command source	Cmd Source*	3	Int 485	0-5	-
	01	Integrated communication inverter ID	Int485 St ID	1		1-250	-
COM	02	Integrated communication protocol	Int485 Proto	0	ModBus RTU	0-2	-
COM	03	Integrated communication speed	Int485 BaudR	3	9600 bps	0-7	-
	04	Integrated communication frame setup	Int485 Mode	0	D8/PN/ S1	0-3	-

4.6 Local/Remote Mode Switching

Local/remote switching is useful for checking the operation of an inverter or to perform an inspection while retaining all parameter values. Also, in an emergency, it can also be used to override control and operate the system manually using the keypad.

The [ESC] key is a programmable key that can be configured to carry out multiple functions.

Group	Code	Name	LCD Display	Parameter Setting		Setting Range	Unit
	90	[ESC] key functions	-	2	Local/Remote	0–2	-
DRV	06	Command source	Cmd Source*	1	Fx/Rx-1	0–5	-

Local/Remote Mode Switching Setting Details

Code		Description
DRV-90 [ESC] key fu	unctions	Set DRV-90 to 2(Local/Remote) to perform local/remote switching using the [ESC] key. Once the value is set, the inverter will automatically begin operating in remote mode. Changing from local to remote will not alter any previously configured parameter values and the operation of the inverter will not change. Press the [ESC] key to switch the operation mode back to "local." The SET light will flash, and the inverter will operate using the [RUN] key on the keypad. Press the [ESC] key again to switch the operation mode back to "remote." The SET light will turn off and the inverter will operate according to the previous dry code configuration.

Note

Local/Remote Operation

- Full control of the inverter is available with the keypad during local operation (local operation).
- During local operation, jog commands will only work if one of the P1–P7 multi-function terminals (codes IN-65–71) is set to 13 (RUN Enable) and the relevant terminal is turned on.
- During remote operation (remote operation), the inverter will operate according to the previously set frequency reference source and the command received from the input device.
- If ADV-10 (power-on run) is set to 0 (No), the inverter will NOT operate on power-on even when the following terminals are turned on:
 - Fwd/Rev run (Fx/Rx) terminal
 - Fwd/Rev jog terminal (Fwd jog/Rev Jog)
 - Pre-Excitation terminal

To operate the inverter manually with the keypad, switch to local mode. Use caution when switching back to remote operation mode as the inverter will stop operating. If ADV-10 (power-on run) is set to 0 (No), a command through the input terminals will work ONLY AFTER all the terminals listed above have been turned off and then turned on again.

If the inverter has been reset to clear a fault trip during an operation, the inverter will switch to local
operation mode at power-on, and full control of the inverter will be with the keypad. The inverter
will stop operating when operation mode is switched from "local" to "remote". In this case, a run
command through an input terminal will work ONLY AFTER all the input terminals have been turned
off.

Inverter Operation During Local/Remote Switching

Switching operation mode from "remote" to "local" while the inverter is running will cause the inverter to stop operating. Switching operation mode from "local" to "remote" however, will cause the inverter to operate based on the command source:

- Analog commands via terminal input: the inverter will continue to run without interruption based
 on the command at the terminal block. If a reverse operation (Rx) signal is ON at the terminal block
 at startup, the inverter will operate in the reverse direction even if it was running in the forward
 direction in local operation mode before the reset.
- Digital source commands: all command sources except terminal block command sources (which are
 analog sources) are digital command sources that include the keypad, LCD keypad, and
 communication sources. The inverter stops operation when switching to remote operation mode,
 and then starts operation when the next command is given.

① Caution

Use local/remote operation mode switching only when it is necessary. Improper mode switching may result in interruption of the inverter's operation.

4.7 Forward or Reverse Run Prevention

The rotation direction of motors can be configured to prevent motors to only run in one direction. Pressing the [REV] key on the LCD keypad when direction prevention is configured, will cause the motor to decelerate to 0 Hz and stop. The inverter will remain on.

Group	Code	Name	LCD Display	Parameter Setting		Setting Range	Unit
				0	None		
ADV	09	Run prevention options	Run Prevent	1	Forward Prev	0–2	-
				2	Reverse Prev		

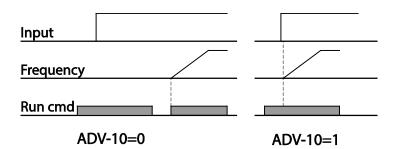
Forward/Reverse Run Prevention Setting Details

Code	Description								
	Choose a								
	Setting		Description						
ADV-09 Run	0	None	Do not set run prevention.						
Prevent	1	Forward Prev	Set forward run prevention.						
	2	Reverse Prev	Set reverse run prevention.						

4.8 Power-on Run

A power-on command can be setup to start an inverter operation after powering up, based on terminal block operation commands (if they have been configured). To enable power-on run set the dry (command source) code to 1(Fx/Rx-1) or 2 (Fx/Rx-2) in the DRV group.

Group	Code	Name	LCD Display	Parameter Setting		Setting Range	Unit
DRV	06	Command source	Cmd Source*	1, 2	Fx/Rx-1 or Fx/Rx-2	0–5	-
ADV	10	Power-on run	Power-on Run	1	Yes	0–1	-



Note

- A fault trip may be triggered if the inverter starts operation while a motor's load (fan-type load) is in free-run state. To prevent this from happening, set bit4 to 1 in CON-71 (speed search options) of the Control group. The inverter will perform a speed search at the beginning of the operation.
- If the speed search is not enabled, the inverter will begin its operation in a normal V/F pattern and accelerate the motor. If the inverter has been turned on without power-on run enabled, the terminal block command must first be turned off, and then turned on again to begin the inverter's operation.

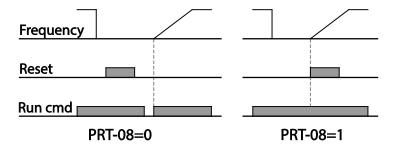
① Caution

Use caution when operating the inverter with Power-on Run enabled as the motor will begin rotating when the inverter starts up.

4.9 Reset and Restart

Reset and restart operations can be setup for inverter operation following a fault trip, based on the terminal block operation command (if it is configured). When a fault trip occurs, the inverter cuts off the output and the motor will free-run. Another fault trip may be triggered if the inverter begins its operation while motor load is in a free-run state.

Group	Code	Name	LCD Display	Parameter Setting		Setting Range	Unit
DRV	DDV 06	6 Command source	Cmd Source*	1	Fx/Rx-1 or	0–5	
DNV	00		Cma source	2	Fx/Rx-2	0–3	_
	08	Reset restart setup	RST Restart	1	Yes	0–1	
PRT	09	No. of auto restart	Retry Number	0		0–10	
	10	Auto restart delay time	Retry Delay	1.0		0–60	sec



Note

- To prevent a repeat fault trip from occurring, set CON-71 (speed search options) bit 2 equal to 1. The inverter will perform a speed search at the beginning of the operation.
- If the speed search is not enabled, the inverter will start its operation in a normal V/F pattern and accelerate the motor. If the inverter has been turned on without 'reset and restart' enabled, the terminal block command must be first turned off, and then turned on again to begin the inverter's operation.

① Caution

Use caution when operating the inverter with Power-on Run enabled as the motor will begin rotating when the inverter starts up.

4.10 Setting Acceleration and Deceleration Times

4.10.1 Acc/Dec Time Based on Maximum Frequency

Acc/Dec time values can be set based on maximum frequency, not on inverter operation frequency. To set Acc/Dec time values based on maximum frequency, set BAS- 08 (Acc/Dec reference) in the Basic group to 0 (Max Freq).

Acceleration time set at the ACC (Acceleration time) code in the DRV group (DRV-03 in an LCD keypad) refers to the time required for the inverter to reach the maximum frequency from a stopped (0 Hz) state. Likewise, the value set at the Dec (deceleration time) code in the DRV group (DRV-04 in an LCD keypad) refers to the time required to return to a stopped state (0 Hz) from the maximum frequency.

Group	Code	Name	LCD Display	Parameter Setting		Setting Range	Unit
	03	Acceleration time	AccTime	20.0		0.0-600.0	sec
DRV	04	Deceleration time	Dec Time	30.0		0.0-600.0	sec
טאע	20	Maximum frequency	Max Freq	60.00		40.00–400.00	Hz
BAS	08	Acc/Dec reference frequency	Ramp T Mode	0	Max Freq	0–1	-
	09	Time scale	Time scale	1	0.1sec	0–2	-

Acc/Dec Time Based on Maximum Frequency – Setting Details

Code	Descri	otion					
		Set the parameter value to 0 (Max Freq) to setup Acc/Dec time based on maximum frequency.					
	Conf	iguration	Description				
	0	Max Freq	Set the Acc/Dec time based on maximum				
BAS-08			frequency.				
Ramp T Mode	1	Delta Freq	Set the Acc/Dec time based on operating				
			frequency.				
	If, for example, maximum frequency is 60.00 Hz, the Acc/Dec times are set to 5 seconds, and the frequency reference for operation is set at 30 Hz (half of 60 Hz), the time required to reach 30 Hz therefore is 2.5 seconds (half of 5 seconds).						

Code	Description	on			
		Max. Freq			
		Frequency			
		Run cmd			
		4			
		Ac	c. time Dec. time		
	accurate		elated values. It is particularly useful when a more uired because of load characteristics, or when the be extended.		
BAS-09 Time scale	Configu	ıration	Description		
	0	0.01sec	Sets 0.01 second as the minimum unit.		
	1	0.1sec	Sets 0.1 second as the minimum unit.		
	2	1sec	Sets 1 second as the minimum unit.		

① Caution

Note that the range of maximum time values may change automatically when the units are changed. If for example, the acceleration time is set at 6000 seconds, a time scale change from 1 second to 0.01 second will result in a modified acceleration time of 60.00 seconds.

4.10.2 Acc/Dec Time Based on Operation Frequency

Acc/Dec times can be set based on the time required to reach the next step frequency from the existing operation frequency. To set the Acc/Dec time values based on the existing operation frequency, set BAS-08 (acc/dec reference) in the Basic group to 1 (Delta Freq).

Group	Code	Name	LCD Display	Parameter Setting		Setting Range	Unit
DDV	03	Acceleration time	n time Acc Time 20.0		0.0-600.0	sec	
DRV	04	Deceleration time	Dec Time	30.0		0.0-600.0	sec
BAS	08	Acc/Dec reference	Ramp T Mode	1	Delta Freq	0–1	-

Acc/Dec Time Based on Operation Frequency – Setting Details

Code	Description				
	Set the parameter value to 1 (Delta Freq) to set Acc/Dec times based on Maximum frequency.				
	Configura	tion	Description		
	0 1	Max Freq	Set the Acc/Dec time based on Maximum frequency.		
	1 Delta Freq Set the Acc/Dec time based or frequency.				
BAS-08 Ramp T Mode If Acc/Dec times are set to 5 seconds, and multiple frequency reference in the operation in 2 steps, at 10 Hz and 30 Hz, each acceleration stage seconds (refer to the graph below).					
		Frequency	30Hz		
		Run cmd	10Hz 5 7 12 time		

4.10.3 Multi-step Acc/Dec Time Configuration

Acc/Dec times can be configured via a multi-function terminal by setting the DRV-03 (Acceleration time) and DRV-04 (Deceleration time) codes in the DRV group.

Group	Code	Name	LCD Display	Parameter Setting	Setting Range	Unit
DRV	03	Acceleration time	AccTime	20.0	0.0-600.0	sec
	04	Deceleration time	Dec Time	30.0	0.0-600.0	sec
DAC	70-82	Multi-step acceleration time1-7	Acc Time 1-7	x.xx	0.0–600.0	sec
BAS	71-83	Multi-step deceleration time1-7	Dec Time 1-7	x.xx	0.0-600.0	sec
IN	65-71	Px terminal configuration	Px Define (Px: P1–P7)	11 XCEL-L 12 XCEL-M 49 XCEL-H	0–54	-
	89	Multi-step command delay time	In Check Time	1	1–5000	ms

Acc/Dec Time Setup via Multi-function Terminals – Setting Details

Acc/Dec Time Setup v			iis – Setting Details					
Code	Description	n						
BAS- 70–82 Acc Time 1–7	Set multi-	et multi-step acceleration time1-7.						
BAS-71–83 Dec Time 1– 7	Set multi-	et multi-step deceleration time 1-7.						
	Choose and configure the terminals to use for multi-step Acc/Dec time inputs.							
	Configu	ration	Description					
	11	XCEL-L	Acc/Dec command-	L				
	12	XCEL-M	Acc/Dec command-	M				
IN-65–71 Px Define (P1–P7)	49	XCEL-H	Acc/Dec command-	Н				
	acceleration and BAS-7	on and deceleration on and deceleration on and deceleration of the property of	on based on parameter volume of terminals are set as XC operation will be available Acc3 Dec0 Acc2					
	Acc	:/Dec time	P7	P6				
		0	-	-				
		1	-	✓				
		2	✓	-				
		3	✓	✓				
IN-89 In Check Time	set to 100 for other i	ms and a signal is nputs over the ne		nal block inputs. If IN-89 is nal, the inverter searches e expires, the Acc/Dec				

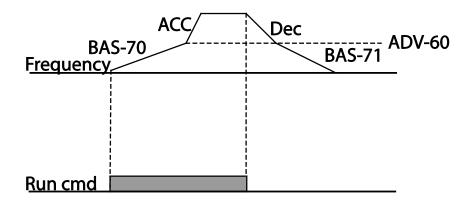
4.10.4 Configuring Acc/Dec Time Switch Frequency

You can switch between two different sets of Acc/Dec times (Acc/Dec gradients) by configuring the switch frequency without configuring the multi-function terminals.

Group	Code	Name	LCD Display	Parameter Setting	Setting Range	Unit
DDV	03	Acceleration time	Acc Time	10.0	0.0-600.0	sec
DRV	04	Deceleration time	Dec Time	10.0	0.0-600.0	sec
DAC	70	Multi-step acceleration time1	Acc Time-1	20.0	0.0-600.0	sec
BAS	71	Multi-step deceleration time1	Dec Time-1	20.0	0.0-600.0	sec
ADV	60	Acc/Dec time switch frequency	Xcel Change Frq	30.00	0-Maximum frequency	Hz

Acc/Dec Time Switch Frequency Setting Details

Code	Description
ADV-60 Xcel Change Fr	After the Acc/Dec switch frequency has been set, Acc/Dec gradients configured at BAS-70 and 71 will be used when the inverter's operation frequency is at or below the switch frequency. If the operation frequency exceeds the switch frequency, the configured gradient level, configured for the ACC and Dec codes, will be used. If you configure the P1-P7 multi-function input terminals for multi-step Acc/Dec gradients (XCEL-L, XCEL-M, XCEL-H), the inverter will operate based on the Acc/Dec inputs at the terminals instead of the Acc/Dec switch frequency configurations.



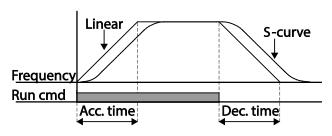
4.11 Acc/Dec Pattern Configuration

Acc/Dec gradient level patterns can be configured to enhance and smooth the inverter's acceleration and deceleration curves. Linear pattern features a linear increase or decrease to the output frequency, at a fixed rate. For an S-curve pattern a smoother and more gradual increase or decrease of output frequency, ideal for lift-type loads or elevator doors, etc. S-curve gradient level can be adjusted using codes ADV-03-06 in the Advanced group.

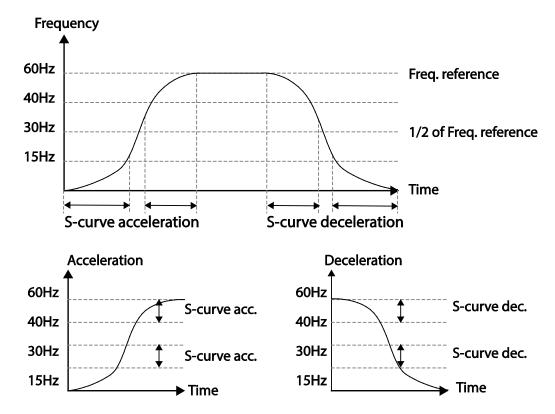
Group	Code	Name	LCD Display	Parameter Setting		Setting Range	Unit
BAS	08	Acc/Dec reference	Ramp T mode	0	Max Freq	0–1	-
	01	Acceleration pattern	Acc Pattern	0	Linear	0–1	-
ADV	02	Deceleration pattern	Dec Pattern	1	S-curve	0-1	-
	03	S-curve Acc start gradient	Acc S Start	40		1-100	%
	04	S-curve Acc end gradient	Acc S End	40		1-100	%
	05	S-curve Dec start gradient	Dec S Start	40		1–100	%
	06	S-curve Dec end gradient	Dec S End	40		1–100	%

Acc/Dec Pattern Setting Details

Code	Description
ADV-03 Acc S Start	Sets the gradient level as acceleration starts when using an S-curve, Acc/Dec pattern. ADV- 03 defines S-curve gradient level as a percentage, up to half of total acceleration. If the frequency reference and maximum frequency are set at 60 Hz and ADV- 03 is set to 50%, ADV- 03 configures acceleration up to 30 Hz (half of 60 Hz). The inverter will operate S-curve acceleration in the 0-15 Hz frequency range (50% of 30 Hz). Linear acceleration will be applied to the remaining acceleration within the 15-30 Hz frequency range.
ADV-04 Acc S End	Sets the gradient level as acceleration ends when using an S-curve Acc/Dec pattern. ADV- 03 defines S-curve gradient level as a percentage, above half of total acceleration. If the frequency reference and the maximum frequency are set at 60 Hz and ADV-04 is set to 50%, setting ADV- 04 configures acceleration to increase from 30 Hz (half of 60 Hz) to 60 Hz (end of acceleration). Linear acceleration will be applied within the 30-45 Hz frequency range. The inverter will perform an S-curve acceleration for the remaining acceleration in the 45-60 Hz frequency range.
ADV-05 Dec S Start –	Sets the rate of S-curve deceleration. Configuration for codes ADV-05 and ADV-
ADV-06 Dec S End	06 may be performed the same way as configuring codes ADV-03 and ADV-04.



[Acceleration / deceleration pattern configuration]



[Acceleration / deceleration S-curve parrten configuration]

Note

The Actual Acc/Dec time during an S-curve application

Actual acceleration time = user-configured acceleration time + user-configured acceleration time x starting gradient level/2 + user-configured acceleration time x ending gradient level/2. Actual deceleration time = user-configured deceleration time + user-configured deceleration time x starting gradient level/2 + user-configured deceleration time x ending gradient level/2.

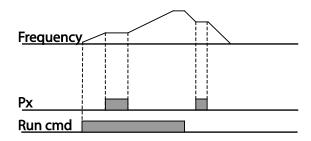
① Caution

Note that actual Acc/Dec times become greater than user defined Acc/Dec times when S-curve Acc/Dec patterns are in use.

4.12 Stopping the Acc/Dec Operation

Configure the multi-function input terminals to stop acceleration or deceleration and operate the inverter at a fixed frequency.

Grou	p Code	Name	LCD Display	Para	meter Setting	Setting Range	Unit
IN	65-71	Px terminal configuration	Px Define(Px: P1- P7)	25	XCEL Stop	0-54	-



4.13 V/F(Voltage/Frequency) Control

Configure the inverter's output voltages, gradient levels and output patterns to achieve a target output frequency with V/F control. The amount of of torque boost used during low frequency operations can also be adjusted.

4.13.1 Linear V/F Pattern Operation

A linear V/F pattern configures the inverter to increase or decrease the output voltage at a fixed rate for different operation frequencies based on V/F characteristics. A linear V/F pattern is partcularly useful when a constant torque load is applied.

Group	Code	Name	LCD Display	Parameter Setting		Setting Range	Unit
	09	Control mode	Control Mode	0 V/F		0–4	-
DRV	18	Base frequency	Base Freq	60.00		30.00-400.00	Hz
	19	Start frequency	Start Freq	0.50		0.01-10.00	Hz
BAS	07	V/F pattern	V/F Pattern	0	Linear	0–3	-

Linear V/F Pattern Setting Details

Description
Sets the base frequency. 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.
Sets the start frequency. A start frequency is a frequency at which the inverter starts voltage output. The inverter does not produce output voltage while the frequency reference is lower than the set frequency. However, if a deceleration stop is made while operating above the start frequency, output voltage will continue until the operation frequency reaches a full-stop (0 Hz). Base Freq. Inverter's rated voltage Voltage Run cmd

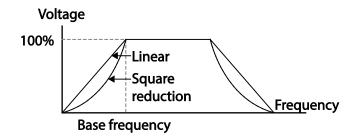
4.13.2 Square Reduction V/F pattern Operation

Square reduction V/F pattern is ideal for loads such as fans and pumps. It provides non-linear acceleration and deceleration patterns to sustain torque throughout the whole frequency range.

Group	Code	Name	LCD Display	Parameter Setting		Setting Range	Unit
DAC 07	07	V/F pattorn	V/F Dattorn	1	Square	0.3	
BAS	07	V/F pattern	V/F Pattern	3	Square2	0–3	

Square Reduction V/F pattern Operation - Setting Details

Code	Description						
	Sets the characte		alue to 1(Square) or 3(Square2) according to the load's start				
	Setting		Function				
BAS-07 V/F Pattern	1	Square	The inverter produces output voltage proportional to 1.5 square of the operation frequency.				
	3	Square2	The inverter produces output voltage proportional to 2 square of the operation frequency. This setup is ideal for variable torque loads such as fans or pumps.				



4.13.3 User V/F Pattern Operation

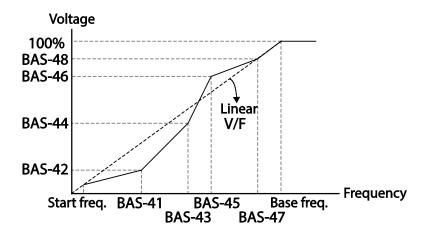
The S100 inverter allows the configuration of user-defined V/F patterns to suit the load characteristics of special motors.

Group	Code	Name	LCD Display	Parameter Setti	ng Setting Range	Unit
	07	V/F pattern	V/F Pattern	2 User V/F	0-3	-
	41	User Frequency1	User Freq 1	15.00	0-Maximum frequency	Hz
	42	User Voltage1	User Volt 1	25	0–100	%
	43	User Frequency2	User Freq 2	30.00	0-Maximum frequency	Hz
BAS	44	User Voltage2	User Volt 2	50	0–100	%
	45	User Frequency3	User Freq 3	45.00	0-Maximum frequency	Hz
	46	User Voltage3	User Volt 3	75	0–100	%
	47	User Frequency4	User Freq 4	Maximum frequency	0-Maximum frequency	Hz
	48	User Voltage4	User Volt 4	100	0-100%	%

User V/F pattern Setting Details

Code	Description
BAS-41 User Freq 1– BAS-48 User Volt 4	Set the parameter values to assign arbitrary frequencies (User Freq 1-4) for start and maximum frequencies. Voltages can also be set to correspond with each frequency, and for each user voltage (User Volt 1-4).

The 100% output voltage in the figure below is based on the parameter settings of BAS-15 (motor rated voltage). If BAS-15 is set to 0 it will be based on the input voltage.



① Caution

- When a normal induction motor is in use, care must be taken not to configure the output pattern away from a linear V/F pattern. Non-linear V/F patterns may cause insufficient motor torque or motor overheating due to over-excitation.
- When a user V/F pattern is in use, forward torque boost (DRV-16) and reverse torque boost (DRV-17) do not operate.

4.14 Torque Boost

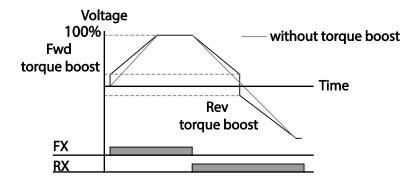
4.14.1 Manual Torque Boost

Manual torque boost enables users to adjust output voltage during low speed operation or motor start. Increase low speed torque or improve motor starting properties by manually increasing output voltage. Configure manual torque boost while running loads that require high starting torque, such as lift-type loads.

Group	Code	Name	LCD Display	Parameter Setting		Setting Range	Unit
	15	Torque boost options	Torque Boost	0	Manual	0–1	-
DRV	16	Forward torque boost	Fwd Boost	2.0		0.0-15.0	%
	17	Reverse torque boost	Rev Boost	2.0		0.0-15.0	%

Manual Torque Boost Setting Details

Code	Description
DRV-16 Fwd Boost	Set torque boost for forward operation.
DRV-17 Rev Boost	Set torque boost for reverse operation.



① Caution

Excessive torque boost will result in over-excitation and motor overheating.

4.14.2 Auto Torque Boost-1

Auto torque boost enables the inverter to automatically calculate the amount of output voltage required for torque boost based on the entered motor parameters. Because auto torque boost requires motor-related parameters such as stator resistance, inductance, and no-load current, auto tuning (BAS-20) has to be performed before auto torque boost can be configured. Similarly to manual torque boost, configure auto torque boost while running a load that requires high starting torque, such as lift-type loads.

Group	Code	Name	LCD Display	Parameter Setting		Setting Range	Unit
DRV	15	torque boost mode	Torque Boost	1	Auto1	0–2	-
BAS	20	auto tuning	Auto Tuning	3	Rs+Lsigma	0–6	-

4.14.3 Auto Torque Boost-2

In V/F operation, this adjusts the output voltage if operation is unavailable due to a low output voltage. It is used when operation is unavailable, due to a lack of starting torque, by providing a voltage boost to the output voltage via the torque current.

Group	Code	Name	LCD Display	Parameter Setting		Setting Range	Unit
DRV	15	torque boost mode	Torque Boost	2	Auto2	0–2	-

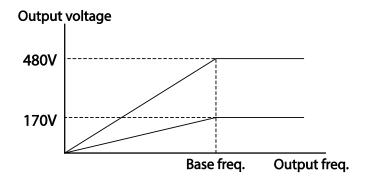
4.15 Output Voltage Setting

Output voltage settings are required when a motor's rated voltage differs from the input voltage to the inverter. Set BAS-15 to configure the motor's rated operating voltage. The set voltage becomes the output voltage of the inverter's base frequency. When the inverter operates above the base frequency, and when the motor's voltage rating is lower than the input voltage at the inverter, the inverter adjusts the voltage and supplies the motor with the voltage set at BAS-15 (motor rated voltage). If the motor's rated voltage is higher than the input voltage at the inverter, the inverter will supply the inverter input voltage to the motor.

If BAS-15 (motor rated voltage) is set to 0, the inverter corrects the output voltage based on the input voltage in the stopped condition. If the frequency is higher than the base frequency, when the input voltage is lower than the parameter setting, the input voltage will be the inverter output voltage.

Group	Code	Name	LCD Display	Parameter Setting	Setting Range	Unit
BAS	15	Motor rated voltage	Rated Volt	0	0,170-480	V





4.16 Start Mode Setting

Select the start mode to use when the operation command is input with the motor in the stopped condition.

4.16.1 Acceleration Start

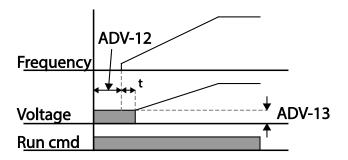
Acceleration start is a general acceleration mode. If there are no extra settings applied, the motor accelerates directly to the frequency reference when the command is input.

Group	Code	Name	LCD Display	Parameter Setting		Setting Range	Unit
ADV	07	Start mode	Start mode	0	Acc	0-1	-

4.16.2 Start After DC Braking

This start mode supplies a DC voltage for a set amount of time to provide DC braking before an inverter starts to accelerate a motor. If the motor continues to rotate due to its inertia, DC braking will stop the motor, allowing the motor to accelerate from a stopped condition. DC braking can also be used with a mechanical brake connected to a motor shaft when a constant torque load is applied, if a constant torque is required after the the mechanical brake is released.

Group	Code	Name	LCD Display	Parameter Setting		Setting Range	Unit
	07	Start mode	Start Mode	1	DC-Start	0–1	-
ADV	12	Start DC braking time	DC-Start Time	0.00		0.00-60.00	sec
	13	DC Injection Level	DC Inj Level	50		0–200	%



① Caution

The amount of DC braking required is based on the motor's rated current. Do not use DC braking resistance values that can cause current draw to exceed the rated current of the inverter. If the DC braking resistance is too high or brake time is too long, the motor may overheat or be damaged.

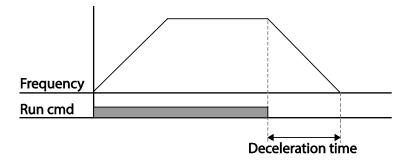
4.17 Stop Mode Setting

Select a stop mode to stop the inverter operation.

4.17.1 Deceleration Stop

Deceleration stop is a general stop mode. If there are no extra settings applied, the motor decelerates down to 0 Hz and stops, as shown in the figure below.

Group	Code	Name	LCD Display	Parameter:	Setting	Setting Range	Unit
ADV	08	Stop mode	Stop Mode	0	Dec	0-4	-



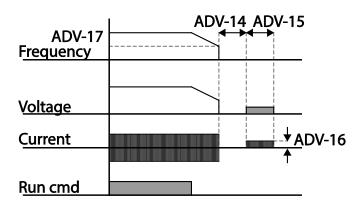
4.17.2 Stop After DC Braking

When the operation frequency reaches the set value during deceleration (DC braking frequency), the inverter stops the motor by supplying DC power to the motor. With a stop command input, the inverter begins decelerating the motor. When the frequency reaches the DC braking frequency set at ADV-17, the inverter supplies DC voltage to the motor and stops it.

Group	Code	Name	LCD Display	Parameter Setting		Setting Range	Unit
-	08	Stop mode	Stop Mode	0 Dec (0-4	-
	14	Output block time before braking	DC-Block Time	0.10		0.00-60.00	sec
ADV	15	DC braking time	DC-Brake Time	1.00		0–60	sec
-	16	DC braking amount	DC-Brake Level	50		0–200	%
	17	DC braking frequency	DC-Brake Freq	5.00		0.00-60.00	Hz

DC Braking After Stop Setting Details

De braking Arter Sto	p setting betains
Code	Description
ADV-14 DC-Block Time	Set the time to block the inverter output before DC braking. If the inertia of the load is great, or if DC braking frequency (ADV-17) is set too high, a fault trip may occur due to overcurrent conditions when the inverter supplies DC voltage to the motor. Prevent overcurrent fault trips by adjusting the output block time before DC braking.
ADV-15 DC-Brake Time	Set the time duration for the DC voltage supply to the motor.
ADV-16 DC-Brake Level	Set the amount of DC braking to apply. The parameter setting is based on the rated current of the motor.
ADV-17 DC-Brake Freq	Set the frequency to start DC braking. When the frequency is reached, the inverter starts deceleration. If the dwell frequency is set lower than the DC braking frequency, dwell operation will not work and DC braking will start instead.



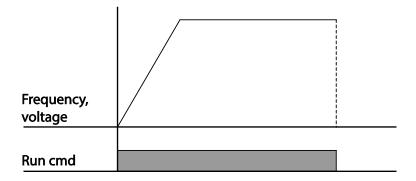
① Caution

- Note that the motor can overheat or be damaged if excessive amount of DC braking is applied to the motor, or DC braking time is set too long.
- DC braking is configured based on the motor's rated current. To prevent overheating or damaging motors, do not set the current value higher than the inverter's rated current.

4.17.3 Free Run Stop

When the Operation command is off, the inverter output turns off, and the load stops due to residual inertia.

Group	Code	Name	LCD Display	Param	eter Setting	Setting Range	Unit
ADV	08	Stop Method	Stop Mode	2	Free-Run	0-4	-



Caution

Note that when there is high inertia on the output side and the motor is operating at high speed, the load's inertia will cause the motor to continue rotating even if the inverter output is blocked.

4.17.4 Power Braking

When the inverter's DC voltage rises above a specified level due to motor regenerated energy, a control is made to either adjust the deceleration gradient level or reaccelerate the motor in order to reduce the regenerated energy. Power braking can be used when short deceleration times are needed without brake resistors, or when optimum deceleration is needed without causing an over voltage fault trip.

Group	Code	Name	LCD Display	Parameter Setting		Setting Range	Unit
ADV	08	Stop mode	Stop Mode	4	Power Braking	0–4	-

① Caution

- To prevent overheating or damaging the motor, do not apply power braking to the loads that require frequent deceleration.
- Stall prevention and power braking only operate during deceleration, and power braking takes priority over stall prevention. In other words, when both PRT-50 (stall prevention and flux braking) and ADV-08 (power braking) are set, power braking will take precedence and operate.
- Note that if deceleration time is too short or inertia of the load is too great, an overvoltage fault trip may occur.
- Note that if a free run stop is used, the actual deceleration time can be longer than the pre-set deceleration time.

4.18 Frequency Limit

Operation frequency can be limited by setting maximum frequency, start frequency, upper limit frequency and lower limit frequency.

4.18.1 Frequency Limit Using Maximum Frequency and Start Frequency

Group	Code	Name	LCD Display	Parameter Setting	Setting Range	Unit
DDV	19	Start frequency	Start Freq	0.50	0.01-10.00	Hz
DRV	20	Maximum frequency	Max Freq	60.00	40.00-400.00	Hz

Frequency Limit Using Maximum Frequency and Start Frequency - Setting Details

Code	Description
DRV-19 Start Freq	Set the lower limit value for speed unit parameters that are expressed in Hz or rpm. If an input frequency is lower than the start frequency, the parameter value will be 0.00.
DRV-20 Max Freq	Set upper and lower frequency limits. All frequency selections are restricted to frequencies from within the upper and lower limits. This restriction also applies when you in input a frequency reference using the keypad.

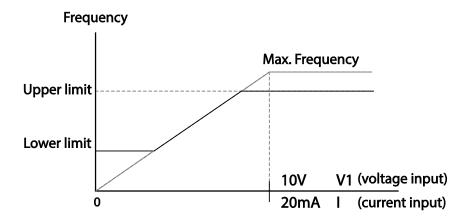
4.18.2 Frequency Limit Using Upper and Lower Limit Frequency **Values**

Group	Code	Name	LCD Display	Parameter Setting		Setting Range	Unit
	24	Frequency limit	Freq Limit	0 No		0–1	-
	25	Frequency lower limit value	Freq Limit Lo	0.50		0.0-maximum frequency	Hz
ADV	26	Frequency upper limit value	Freq Limit Hi	Maxin freque		minimum- maximum frequency	Hz

Frequency Limit Using Upper and Lower Limit Frequencies - Setting Details

Code	Description
ADV-24 Freq Limit	The initial setting is 0 (No). Changing the setting to 1 (Yes) allows the setting of frequencies between the lower limit frequency (ADV-25) and the upper limit frequency (ADV-26). When the setting is 0 (No), codes ADV-25 and ADV-26 are not visible.
ADV-25 Freq Limit	Set an upper limit frequency to all speed unit parameters that are expressed in
Lo,	Hz or rpm, except for the base frequency (DRV-18). Frequency cannot be set
ADV-26 Freq Limit Hi	higher than the upper limit frequency.

— without upper / lower limits

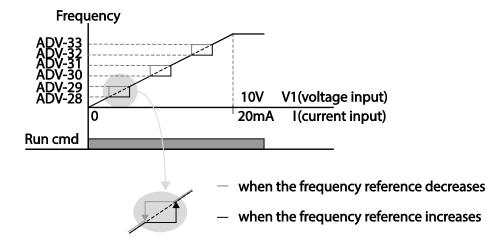


4.18.3 Frequency Jump

Use frequency jump to avoid mechanical resonance frequencies. Jump through frequency bands when a motor accelerates and decelerates. Operation frequencies cannot be set within the pre-set frequency jump band.

When a frequency setting is increased, while the frequency parameter setting value (voltage, current, RS-485 communication, keypad setting, etc.) is within a jump frequency band, the frequency will be maintained at the lower limit value of the frequency band. Then, the frequency will increase when the frequency parameter setting exceeds the range of frequencies used by the frequency jump band.

Group	Code	Name	LCD Display	Paramete	er Setting	Setting Range	Unit
	27	Frequency jump	Jump Freq	0	No	0–1	-
-	28	Jump frequency lower limit1	Jump Lo 1	10.00		0.00–Jump frequency upper limit 1	Hz
	29	Jump frequency upper limit1	Jump Hi 1	15.00		Jump frequency lower limit 1-Maximum frequency	Hz
ADV	30	Jump frequency lower limit 2	Jump Lo 2	20.00		0.00–Jump frequency upper limit 2	Hz
	31	Jump frequency upper limit 2	Jump Hi 2	25.00		Jump frequency lower limit 2-Maximum frequency	Hz
32	32	Jump frequency lower limit 3	Jump Lo 3	30.00		0.00–Jump frequency upper limit 3	Hz
	33	Jump frequency upper limit 3	Jump Hi 3	35.00		Jump frequency lower limit 3-Maximum frequency	Hz



4.19 2nd Operation Mode Setting

Apply two types of operation modes and switch between them as required. For both the first and second command source, set the frequency after shifting operation commands to the multifunction input terminal. Mode swiching can be used to stop remote control during an operation using the communication option and to switch operation mode to operate via the local panel, or to operate the inverter from another remote control location.

Select one of the multi-function terminals from codes IN-65-71 and set the parameter value to 15 (2nd Source).

Group	Code	Name	LCD Display	Parameter Setting		Setting Range	Unit
	06	Command source	Cmd Source*	1	Fx/Rx-1	0–5	-
DRV	07	Frequency reference source	Freq Ref Src	2	V1	0–12	-
	04	2 nd Command source	Cmd 2nd Src	0	Keypad	0–4	-
BAS	05	2 nd Frequency reference source	Freq 2nd Src	0	KeyPad-1	0–12	-
IN	65-71	Px terminal configuration	Px Define (Px: P1-P7)	15	2nd Source	0–54	-

2nd Operation Mode Setting Details

Code	Description
Src RAS-05 Freq 2nd	If signals are provided to the multi-function terminal set as the 2 nd command source (2nd Source), the operation can be performed using the set values from BAS-04-05 instead of the set values from the 06 and 07 codes in the DRV group. The 2nd command source settings cannot be changed while operating with the 1 st command source (Main Source).

① Caution

- When setting the multi-function terminal to the 2nd command source (2nd Source) and input (On) the signal, operation state is changed because the frequency setting and the Operation command will be changed to the 2nd command. Before shifting input to the multi-function terminal, ensure that the 2nd command is correctly set. Note that if the deceleration time is too short or inertia of the load is too high, an overvoltage fault trip may occur.
- Depending on the parameter settings, the inverter may stop operating when you switch the command modes.

4.20 Multi-function Input Terminal Control

Filter time constants and the type of multi-function input terminals can be configured to improve the response of input terminals

Group	Code	Name	LCD Display	Parameter Setting	Setting Range	Unit
	85	Multi-function input terminal On filter	DI On Delay	10	0-10000	ms
IN	86	Multi-function input terminal Off filter	DI Off Delay	3	0-10000	ms
IIN	87	Multi-function input terminal selection	DI NC/NO Sel	000 0000*	-	-
	90	Multi-function input terminal status	DI Status	000 0000*	-	-

Multi-function Input Terminal Control Setting Details

Code	Description						
	Select whether or not to activate the time values set at IN-85 and IN-86. If deactivated, the time values are set to the default values at IN-85 and IN-86. If activated, the set time values at IN-85 and IN-86 are set to the corresponding terminals.						
IN-84 DI Delay Sel	Туре	B terminal status (Normally Closed)	A terminal status (Normally Open)				
	LCD keypad						
IN-85 DI On Delay, IN-86 DI Off Delay	•	If the input terminal's state is not changed during the set time, when the terminal receives an input, it is recognized as On or Off.					
IN-87 DI NC/NO Sel	indicator light of With the botto terminal (Norm terminal is cont	contact types for each input ter corresponds to the segment that m segment on, it indicates that the hally Open) contact. With the top s figured as a B terminal (Normally of P7, from right to left.	is on as shown in the table below. he terminal is configured as a A segment on, it indicates that the				
	Туре	B terminal status (Normally Closed)	A terminal status (Normally Open)				
	LCD keypad						

Code	Description		
IN-90 DI Status	terminal using on. The Off con contacts are co	ofiguration of each contact. When DRV-87, the On condition is indic dition is indicated when the botten figured as B terminals, the segment period of the P1-P7, from right to left to left to left to left the properties of the pr	ated by the top segment turning om segment is turned on. When nent lights behave conversely.
	Туре	A terminal setting (On)	A terminal setting (Off)
	LCD keypad		

4.21 P2P Setting

The P2P function is used to share input and output devices between multiple inverters. To enable P2P setting, RS-485 communication must be turned on .

Inverters connected through P2P communication are designated as either a master or slaves . The Master inverter controls the input and output of slave inverters. Slave inverters provide input and output actions. When using the multi-function output, a slave inverter can select to use either the master inverter's output or its own output. When using P2P communication, first designate the slave inverter and then the master inverter. If the master inverter is designated first, connected inverters may interpret the condition as a loss of communication.

Master Parameter

Group	Code	Name	LCD Display	Parameter Setting		Setting Range	Unit
COM	95	P2P Communication selection	Int 485 Func	1	P2P Master	0-3	-
	80	Analog input1	P2P In V1	0		0-12,000	%
	81	Analog input2	P2P In I2	0		-12,000-12,000	%
USS	82	Digital input	P2P In DI	0		0-0x7F	bit
	85	Analog output	P2P Out AO1	0		0-10,000	%
	88	Digital output	P2P Out DO	0		0-0x03	bit

Slave Parameter

Group	Code	Name	LCD Display	Parameter Setting		Setting Range	Unit
COM	95	P2P Communication selection	Int 485 Func	2	P2P Slave	0-3	-
	96	P2P DO setting selection	P2P OUT Sel	0	No	0-2	bit

P2P Setting Details

Code	Description
COM-95 Int 485 Func	Set master inverter to 1(P2P Master), slave inverter to 2(P2P Slave).
USS-80–82 P2P Input Data	Input data sent from the slave inverter.
USS-85, 88 P2P Output Data	Output data transmitted to the slave inverter.

Caution

- P2P features work only with code version 1.00, IO S/W version 0.11, and keypad S/W version 1.07 or higher versions.
- Set the user sequence functions to use P2P features.

4.22 Multi-keypad Setting

Use multi-keypad settings to control more than one inverter with one keypad. To use this function, first configure RS-485 communication.

The group of inverters to be controlled by the keypad will include a master inverter. The master inverter monitors the other inverters, and slave inverter responds to the master inverter's input. When using multi-function output, a slave inverter can select to use either the master inverter's output or its own output. When using the multi keypad, first designate the slave inverter and then the master inverter. If the master inverter is designated first, connected inverters may interpret the condition as a loss of communication.

Master Parameter

Group	Code	Name	LCD Display	Para	ameter Setting	Setting Range	Unit
COM	95	P2P Communication selection	Int 485 Func	3	KPD-Ready	0-3	-
CNF	03	Multi-keypad ID	Multi KPD ID	3		3-99	-
	42	Multi-function key selection	Multi Key Sel	4	Multi KPD	0-4	-

Slave Parameter

Group	Code	Name	LCD Display	Para	ameter Setting	Setting Range	Unit
СОМ	01	Station ID	Int485 St ID	3		3-99	-
	95	P2P communication options	Int 485 Func	3	KPD-Ready	0-3	-

Multi-keypad Setting Details

Code	Description				
COM 01 1-+405 C+1D	revents conflict by designating a unique identification value to an inverter.				
COM-01 Int485 St ID	Values can be selected from numbers between 3-99.				
COM-95 Int 485 Func	Set the value to 3 (KPD-Ready) for both master and slave inverter				
CNF-03 Multi KPD ID	Select an inverter to monitor from the group of inverters.				
CNF-42 Multi key Sel	Select a multi-function key type 4 (Multi KPD) .				

Caution

- Multi-keypad (Multi-KPD) features work only with code version 1.00, IO S/W version 0.11, and keypad S/W version 1.07 or higher versions.
- The multi-keypad feature will not work when the multi-keypad ID (CNF-03 Multi-KPD ID) setting is identical to the RS-485 communication station ID (CM-01 Int485 st ID) setting.
- The master/slave setting cannot be changed while the inverter is operating in slave mode.

4.23 User Sequence Setting

User Sequence creates a simple sequence from a combination of different function blocks. The sequence can comprise of a maximum of 18 steps using 29 function blocks and 30 void parameters.

1 Loop refers to a single execution of a user configured sequence that contains a maximum of 18 steps. Users can select a Loop Time of between 10-1,000 ms.

The codes for user sequences configuration can be found in the USS group (for user sequence settings) and the USF group (for function block settings).

Group	Code	Name	LCD Display	Parameter Setting	Setting Range	Unit
APP	02	User sequence activation	User Seq En	0	0–1	-
	01	User sequence operation command	User Seq Con	0	0–2	-
	02	User sequence operation time	User Loop Time	0	0–5	-
	11- 28	Output address link1-18	Link UserOut1- 18	0	0-0xFFFF	-
	31- 60	Input value setting1-30	Void Para1-30	0	-9999–9999	-
	80	Analog input 1	P2P In V1(-10-10 V)	0	0–12,000	%
	81	Analog input 2	P2P In I2	0	-12,000	%

Group	Code	Name	LCD Display	Parameter Setting	Setting Range	Unit
	82	Digital input	P2P In D	0	-12,000	bit
	85	Analog output	P2P Out AO1	0	0-0x7F	%
	88	Digital output	P2P Out DO	0	0-0x03	bit
	01	User function 1	User Func1	0	0-28	-
	02	User function input 1-A	User Input 1-A	0	0-0xFFFF	-
	03	User function input 1-B	User Input 1-B	0	0-0xFFFF	-
	04	User function input 1-C	User Input 1-C	0	0-0xFFFF	-
	05	User function output 1	User Output 1	0	-32767-32767	-
	06	User function 2	User Func2	0	0-28	-
	07	User function input 2-A	User Input 2-A	0	0-0xFFFF	-
	08	User function input 2-B	User Input 2-B	0	0-0xFFFF	-
	09	User function input 2-C	User Input 2-C	0	0-0xFFFF	-
	10	User function output 2	User Output 2	0	-32767-32767	-
	11	User function 3	User Func3	0	0-28	-
	12	User function input 3-A	User Input 3-A	0	0-0xFFFF	-
	13	User function input 3-B	User Input 3-B	0	0-0xFFFF	-
	14	User function input 3-C	User Input 3-C	0	0-0xFFFF	-
	15	User function output 3	User Output 3	0	-32767-32767	-
LICE	16	Uer function 4	User Func4	0	0-28	-
USF	17	User function input 4-A	User Input 4-A	0	0-0xFFFF	-
	18	User function input 4-B	User Input 4-B	0	0-0xFFFF	-
	19	User function input 4-C	User Input 4-C	0	0-0xFFFF	-
	20	User function output 4	User Output 4	0	-32767-32767	-
	21	User function 5	User Func5	0	0-28	-
	22	User function input 5-A	User Input 5-A	0	0-0xFFFF	-
	23	User function input 5-B	User Input 5-B	0	0-0xFFFF	-
	24	User function input 5-C	User Input 5-C	0	0-0xFFFF	-
	25	User function output 5	User Output 5	0	-32767-32767	-
	26	User function 6	User Func6	0	0-28	-
	27	User function input 6-A	User Input 6-A	0	0-0xFFFF	-
	28	User function input 6-B	User Input 6-B	0	0-0xFFFF	-
	29	User function input 6-C	User Input 6-C	0	0-0xFFFF	-
	30	User function output 6	User Output 6	0	-32767-32767	-
	31	User function 7	User Func7	0	0-28	-
	32	User function input 7-A	User Input 7-A	0	0-0xFFFF	-

Group	Code	Name	LCD Display	Parameter Setting	Setting Range	Unit
	33	User function input 7-B	User Input 7-B	0	0-0xFFFF	-
	34	User function input 7-C	User Input 7-C	0	0-0xFFFF	-
	35	User function output 7	User Output 7	0	-32767-32767	-
	36	User function 8	User Func8	0	0-28	-
	37	User function input 8-A	User Input 8-A	0	0-0xFFFF	-
	38	User function input8-B	User Input 8-B	0	0-0xFFFF	-
	39	User function input 8-C	User Input 8-C	0	0-0xFFFF	-
	40	User function output 8	User Output 8	0	-32767-32767	-
	41	User function 9	User Func9	0	0-28	-
	42	User function input 9-A	User Input 9-A	0	0-0xFFFF	-
	43	User function input 9-B	User Input 9-B	0	0-0xFFFF	-
	44	User function input 9-C	User Input 9-C	0	0-0xFFFF	-
	45	User function output 9	User Output 9	0	-32767-32767	-
	46	User function 10	User Func10	0	0-28	-
	47	User function input 10-A	User Input 10-A	0	0-0xFFFF	-
	48	User function input 10-B	User Input 10-B	0	0-0xFFFF	-
	49	User function input 10-C	User Input 10-C	0	0-0xFFFF	-
	50	User function output 10	User Output 10	0	-32767-32767	-
	51	User function 11	User Func11	0	0-28	-
	52	User function input 11-A	User Input 11-A	0	0-0xFFFF	-
	53	User function input 11-B	User Input 11-B	0	0-0xFFFF	-
	54	User function input 11-C	User Input 11-C	0	0-0xFFFF	-
	55	User function output 11	User Output 11	0	-32767-32767	-
	56	User function 12	User Func12	0	0-28	-
	57	User function input 12-A	User Input 12-A	0	0-0xFFFF	-
	58	User function input 12-B	User Input 12-B	0	0-0xFFFF	-
	59	User function input 12-C	User Input 12-C	0	0-0xFFFF	-
	60	User function output 12	User Output 12	0	-32767-32767	-
	61	User function 13	User Func13	0	0-28	-
	62	User function input 13-A	User Input 13-A	0	0-0xFFFF	-
	63	User function input 13-B	User Input 13-B	0	0-0xFFFF	-
	64	User function input 13-C	User Input 13-C	0	0-0xFFFF	-
	65	User function output 13	User Output 13	0	-32767-32767	-
	66	User function 14	User Func14	0	0-28	-
	67	User function input 14-A	User Input 14-A	0	0-0xFFFF	-

Group	Code	Name	LCD Display	Parameter Setting	Setting Range	Unit
	68	User function input14-B	User Input 14-B	0	0-0xFFFF	-
	69	User function input 14-C	User Input 14-C	0	0-0xFFFF	-
	70	User function output 14	User Output 14	0	-32767-32767	-
	71	User function 15	User Func15	0	0-28	-
	72	User function input 15-A	User Input 15-A	0	0-0xFFFF	-
	73	User function input 15-B	User Input 15-B	0	0-0xFFFF	-
	74	User function input 15-C	User Input 15-C	0	0-0xFFFF	-
	75	User function output 15	User Output 15	0	-32767-32767	-
	76	User function 16	User Func16	0	0-28	-
	77	User function input 16-A	User Input 16-A	0	0-0xFFFF	-
	78	User function input 16-B	User Input 16-B	0	0-0xFFFF	-
	79	User function input 16-C	User Input 16-C	0	0-0xFFFF	-
	80	User function output 16	User Output 16	0	-32767-32767	-
	81	User function 17	User Func17	0	0-28	-
	82	User function input 17-A	User Input 17-A	0	0-0xFFFF	-
	83	User function input 17-B	User Input 17-B	0	0-0xFFFF	-
	84	User function input 17-C	User Input 17-C	0	0-0xFFFF	-
	85	User function output 17	User Output 17	0	-32767-32767	-
	86	User function 18	User Func18	0	0-28	-
	87	User function input 18-A	User Input 18-A	0	0-0xFFFF	-
	88	User function input 18-B	User Input 18-B	0	0-0xFFFF	-
	89	User function input 18-C	User Input 18-C	0	0-0xFFFF	-
	90	User function output 18	User Output 18	0	-32767-32767	-

User Sequence Setting Details

Code	Description				
APP-02 User Seq En	Display the parameter groups related to a user sequence.				
	Set Sequence Run and Sequence Stop with the keypad.				
USS-01 User Seq Con	Parameters cannot be adjusted during an operation. To adjust parameters,				
	the operation must be stopped.				
USS-02 User Loop Time	Set the user sequence Loop Time.				
USS-UZ USEI LOOP TIITIE	User sequence loop time can be set to 0.01s/0.02s/ 0.05s/0.1s/0.5s/1s.				
	Set parameters to connect 18 Function Blocks. If the input value is 0x0000,				
USS-11-28	an output value cannot be used.				
Link UserOut1–18	To use the output value in step 1 for the frequency reference (Cmd				
LITIK USETOULT-10	Frequency), input the communication address (0x1101) of the Cmd				
	frequency as the Link UserOut1 parameter.				

Code	Description		
USS-31-60 Void Para1-	Set 30 void parameters. Use when constant (Const) parameter input is		
30	needed in the user function block.		
	Set user defined functions for the 18 function blocks.		
USF-01-90	If the function block setting is invalid, the output of the User Output@ is -1.		
035-01-90	All the outputs from the User Output@ are read only, and can be used with		
	the user output link@ (Link UserOut@) of the USS group.		

Function Block Parameter Structure

Туре	Description
User Func @*	Choose the function to perform in the function block.
User Input @-A	Communication address of the function's first input parameter.
User Input @-B	Communication address of the function's second input parameter.
User Input @-C	Communication address of the function's third input parameter.
User Output @	Output value (Read Only) after performing the function block.

^{* @} is the step number (1-18).

User Function Operation Condition

N. J.	-	
Number	· ·	Description
0	NOP	No Operation.
1	ADD	Addition operation, (A + B) + C
		If the C parameter is 0x0000, it will be recognized as 0.
2	SUB	Subtraction operation, (A - B) - C
		If the C parameter is 0x0000, it will be recognized as 0.
3	ADDSUB	Addition and subtraction compound operation, (A + B) - C
	ADD30B	If the C parameter is 0x0000, it will be recognized as 0.
4	MIN	Output the smallest value of the input values, MIN(A, B, C).
4	IVIIIN	If the C parameter is 0x0000, operate only with A, B.
5	MAX	Output the largest value of the input values, MAX(A, B, C).
<u> </u>	IVIAX	If the C parameter is 0x0000, operate only with A, B.
6	ABS	Output the absolute value of the A parameter, A .
	705	This operation does not use the B, or C parameter.
7	NEGATE	Output the negative value of the A parameter, -(A).
	NEGATE	This operation does not use the B, or C parameter.
8	REMAINDER	Remainder operation of A and B, A % B
	TIENTAINDEIT	This operation does not use the C parameter.
9	MPYDIV	Multiplication, division compound operation, (A x B)/C.
	IVII I DIV	If the C parameter is 0x0000, output the multiplication operation of (A x B).
	COMPARE-GT (greater than)	Comparison operation: if $(A > B)$ the output is C; if $(A < /=B)$ the output is 0.
10		If the condition is met, the output parameter is C. If the condition is not met,
		the output is 0(False). If the C parameter is 0x0000 and if the condition is
	COMPADE	met, the output is 1(True).
	COMPARE-	Comparison operation; if $(A > /= B)$ output is C; if $(A < B)$ the output is 0.
11	GTEQ	If the condition is met, the output parameter is C. If the condition is not met,
	(great than or	the output is 0(False). If the C parameter is 0x0000 and if the condition is met, the output is 1(True).
	equal to)	Comparison operation, if(A == B) then the output is C. For all other values
		the output is 0.
12	COMPARE-	If the condition is met, the output parameter is C. if the condition is not met,
12	EQUAL	the output is 0(False). If the C parameter is 0x0000 and if the condition is
		met, the output is 1(True).
		Comparison operation, if (A!= B) then the output is C. For all other values the
	COMPARE-	output is 0.
13	NEQUAL	If the condition is met, the output parameter is C. If the condition is not met,
	NEQUAL	the output is 0(False). If the C parameter is 0x0000 and if the condition is
		met, the output is 1 (True).
		Adds 1 each time a user sequence completes a loop.
		A: Max Loop, B: Timer Run/Stop, C: Choose output mode.
1.4	TIMED	If input of B is 1, timer stops (output is 0). If input is 0, timer runs.
14	TIMER	If input of C is 1, output the current timer value.
		If input of C is 0, output 1 when timer value exceeds A(Max) value.
		If the C parameter is 0x0000, C will be recognized as 0. Timer overflow Initializes the timer value to 0.
		nimer overnow initializes the timer value to 0.

Number	Туре	Description
		Sets a limit for the A parameter.
		If input to A is between B and C, output the input to A.
15	LIMIT	If input to A is larger than B, output B. If input of A is smaller than C, output
		C.
		B parameter must be greater than or equal to the C parameter.
16	AND	Output the AND operation, (A and B) and C.
	71110	If the C parameter is 0x0000, operate only with A, B.
17	OR	Output the OR operation, (A B) C.
		If the C parameter is 0x0000, operate only with A, B.
18	XOR	Output the XOR operation, $(A \land B) \land C$.
		If the C parameter is 0x0000, operate only with A, B.
19	AND/OR	Output the AND/OR operation, (A andB) C.
		If the C parameter is 0x0000, operate only with A, B. Output a value offer selecting one of two inputs if (A) then B otherwise C
20	SWITCH	Output a value after selecting one of two inputs, if (A) then B otherwise C. If the input at A is 1, the output will be B. If the input at A is 0, the output
20	SWITCH	parameter will be C.
-		Test the B bit of the A parameter, BITTEST(A, B).
	BITTEST	If the B bit of the A input is 1, the output is 1. If it is 0, then the output is 0.
21		The input value of B must be between 0-16. If the value is higher than 16, it
		will be recognized as 16. If input at B is 0, the output is always 0.
-		Set the B bit of the A parameter, BITSET(A, B). Output the changed value
		after setting the B bit to input at A.
22	BITSET	The input value of B must be between 0-16. If the value is higher than 16, it
	BITCLEAR	will be recognized as 16. If the input at B is 0, the output is always 0. This
		operation does not use the C parameter.
		Clear the B bit of the A parameter, BITCLEAR(A, B). Output the changed
		value after clearing the B bit to input at A.
23		The input value of B must be between 0-16. If the value is higher than 16, it
23		will be recognized as 16. If the input at B is 0, the output is always 0. This
		operation does not use the C parameter.
		Output the input at A as the B filter gains time constant, B x US-02 (US Loop
		Time.
24	LOWPASSFILTER	In the above formula, set the time when the output of A reaches 63.3%
		C stands for the filter operation. If it is 0, the operation is started.
-		P, I gain = A, B parameter input, then output as C.
		Conditions for PI PROCESS output: C = 0: Const PI,
		C=1:PI PROCESS-B>=PI PROCESS-OUT>=0,
25	PI_CONTROL	$C = 2$: PI_PROCESS-B >= PI_PROCESS-OUT >= -(PI_PROCESS-B),
		P gain = A/100, I gain = 1/(Bx Loop Time),
		If there is an error with PI settings, output -1.
		A is an input error, B is an output limit, C is the value of Const PI output.
26	PI_PROCESS	Range of C is 0-32,767.
		Tidinge of C130 32,101.

Number	Туре	Description
27	UPCOUNT	Upcounts the pulses and then output the value- UPCOUNT(A, B, C). After receiving a trigger input (A), outputs are upcounted by C conditions. If the B inputs is 1, do not operate and display 0. If the B inputs is 0, operate. If the C parameter is 0, upcount when the input at A changes from 0 to 1. If the C parameter is 1, upcount when the input at A is changed from 1 to 0. If the C parameter is 2, upcount whenever the input at A changes. Output range is: 0-32767
28	DOWNCOUNT	Downcounts the pulses and then output the value- DOWNCOUNT(A, B, C). After receiving a trigger input (A), outputs are downcounted by C conditions. If the B input is 1, do not operate and display the initial value of C. If the B input is 0, operate. Downcounts when the A parameter changes from 0 to 1.

Note

The PI process block (PI_PROCESS Block) must be used after the PI control block (PI_CONTROL Block) for proper PI control operation. PI control operation cannot be performed if there is another block between the two blocks, or if the blocks are placed in an incorrect order.

① Caution

User sequence features work only with code version 1.00, IO S/W version 0.11, and keypad S/W version 1.07 or higher versions.

4.24 Fire Mode Operation

This function is used to allow the inverter to ignore minor faults during emergency situations, such as fire, and provides continuous operation to fire pumps.

When turned on, Fire mode forces the inverter to ignore all minor fault trips and repeat a Reset and Restart for major fault trips, regardless of the restart trial count limit. The retry delay time set at PRT-10 (Retry Delay) still applies while the inverter performs a Reset and Restart.

Fire Mode Parameter Settings

Group	Code	Name	LCD Display	Parameter Setting		Setting Range	Unit
45)/	80	Fire Mode selection	Fire Mode Sel	1	Fire Mode	0–2	-
	81	Fire Mode frequency	Fire Mode Freq	0-60		0–60	
ADV	82	Fire Mode run direction	Fire Mode Dir	0–1		0–1	
	83	Fire Mode operation count	Fire Mode Cnt	Not	configurable	-	-
IN	65– 71	Px terminal configuration	Px Define (Px: P1– P7)	51	Fire Mode	0–54	-

The inverter runs in Fire mode when ADV-80 (Fire Mode Sel) is set to '2 (Fire Mode)', and the multifunction terminal (IN-65–71) configured for Fire mode (51: Fire Mode) is turned on. The Fire mode count increases by 1 at ADV-83 (Fire Mode Count) each time a Fire mode operation is run.

① Caution

Fire mode operation may result in inverter malfunction. Note that Fire mode operation voids the product warranty – the inverter is covered by the product warranty only when the Fire mode count is '0'.

Fire Mode Function Setting Details

Code	Description	Details
ADV-81 Fire Mode frequency	Fire mode frequency reference	The frequency set at ADV-81 (Fire mode frequency) is used for the inverter operation in Fire mode. The Fire mode frequency takes priority over the Jog frequency, Multi-step frequencies, and the keypad input frequency.
DRV-03 Acc Time / DRV-04 Dec Time	Fire mode Acc/Dec times	When Fire mode operation is turned on, the inverter accelerates for the time set at DRV-03 (Acc Time), and then decelerates based on the deceleration time set at DRV-04 (Dec Time). It stops when the Px terminal input is turned off (Fire mode operation is turned off).
	Fault trip process	Some fault trips are ignored during Fire mode operation. The fault trip history is saved, but trip outputs are disabled even when they are configured at the multi-function output terminals.
		Fault trips that are ignored in Fire mode BX, External Trip, Low Voltage Trip, Inverter Overheat, Inverter Overload, Overload, Electrical Thermal Trip, Input/Output Open Phase, Motor Overload, Fan Trip, No Motor Trips, and other minor fault trips.
PRT-10 Retry Delay		For the following fault trips, the inverter performs a Reset and Restart until the trip conditions are released. The retry delay time set at PRT-10 (Retry Delay) applies while the inverter performs a Reset and Restart.
		Fault trips that force a Reset Restart in Fire mode Over Voltage, Over Current1 (OC1), Ground Fault Trip
		The inverter stops operating when the following fault trips occur: Fault trips that stop inverter operation in Fire mode
		H/W Diag, Over Current 2 (Arm-Short)

5 RS-485 Communication Features

This section in the user manual explains how to control the inverter with a PLC or a computer over a long distance using the RS-485 communication features. To use the RS-485 communication features, connect the communication cables and set the communication parameters on the inverter. Refer to the communication protocols and parameters to configure and use the RS-485 communication features.

5.1 Communication Standards

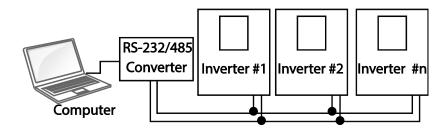
Following the RS-485 communication standards, S100 products exchange data with a PLC and computer. The RS-485 communication standards support the Multi-drop Link System and offer an interface that is strongly resistant to noise. Please refer to the following table for details about the communication standards.

Item	Standard			
Communication method/ Transmission type	RS-485/Bus type, Multi-drop Link System			
Inverter type name	S100			
Number of connected inverters/Transmission distance	Maximum of 16 inverters / Maximum1,200 m (recommended distance: within 700 m)			
Recommended cable size	0.75 mm², (18AWG), Shielded Type Twisted-Pair (STP) Wire			
Installation type	Dedicated terminals (S+/S-/SG) on the control terminal block			
Power supply	Supplied by the inverter - insulated power source from the inverter's internal circuit			
Communication speed	1,200/2,400/9,600/19,200/38,400/57,600/115,200 bps			
Control procedure	Asynchronous communications system			
Communication system	Half duplex system			
Character system	Modbus-RTU: Binary / LS Bus: ASCII			
Stop bit length	1-bit/2-bit			
Frame error check	2 bytes			
Parity check	None/Even/Odd			

5.2 Communication System Configuration

In an RS-485 communication system, the PLC or computer is the master device and the inverter is the slave device. When using a computer as the master, the RS-232 converter must be integrated with the computer, so that it can communicate with the inverter through the RS-232/RS-485 converter. Specifications and performance of converters may vary depending on the manufacturer, but the basic functions are identical. Please refer to the converter manufacturer's user manual for details about features and specifications.

Connect the wires and configure the communication parameters on the inverter by referring to the following illustration of the communication system configuration.



5.2.1 Communication Line Connection

Make sure that the inverter is turned off completely, and then connect the RS-485 communication line to the S+/S-/SG terminals of the terminal block. The maximum number of inverters you can connect is 16. For communication lines, use shielded twisted pair (STP) cables.

The maximum length of the communication line is 1,200 meters, but it is recommended to use no more than 700 meters of communication line to ensure stable communication. Please use a repeater to enhance the communication speed when using a communication line longer than 1,200 meters or when using a large number of devices. A repeater is effective when smooth communication is not available due to noise interference.

① Caution

When wiring the communication line, make sure that the SG terminals on the PLC and inverter are connected. SG terminals prevent communication errors due to electronic noise interference.

5.2.2 **Setting Communication Parameters**

Before proceeding with setting communication configurations, make sure that the communication lines are connected properly. Turn on the inverter and set the communication parameters.

Group	Code	Name	LCD Display	Para	ameter Setting	Setting range	Unit
	01	Built-in communication inverter ID	Int485 St ID	1		1-250	-
	02	Built-in communication protocol	Int485 Proto	0	ModBus RTU	0, 2	-
СОМ	03	Built-in communication speed	Int485 BaudR	3	9600 bps	0-7	-
	04	Built-in communication frame setting	Int485 Mode	0	D8/PN/S1	0-3	-
	05	Transmission delay after reception	Resp Delay	5		0-1000	ms

Communication Parameters Setting Details

Code	Description				
COM-01 Int485 St ID	Set the inverter station ID be	tween 1 and 250.			
	Select one of the two built-in protocols: Modbus-RTU or LS INV 485.				
COM-02 Int485 Proto	Setting	Function			
	0 Modbus-RTU	Modbus-RTU compatible protocol			
	2 LS INV 485	Dedicated protocol for the LS inverter			
	Set a communication setting speed up to 115,200 bps.				
	Setting	Function			
	0	1,200 bps			
	1	2,400 bps			
COM-03 Int485 BaudR	2	4,800 bps			
	3	9,600 bps			
	4	19,200 bps			
	5	38,400 bps			
	6	56K bps			
	7	115 Kbps			
COM-04 Int485 Mode	Set a communication config and the number of stop bits.	uration. Set the data length, parity check method,			
	Setting	Function			
	0 D8/PN/S1	8-bit data / no parity check / 1 stop bit			

Code	Description				
	1	D8/PN/S2	8-bit data / no parity	y check / 2 stop bits	
	2	D8/PE/S1	8-bit data / even pa	rity / 1 stop bit	
	3	D8/PO/S1	8-bit data / odd pari	ity / 1 stop bit	
	master. Re too fast fo	esponse time is use	d in a system where to process. Set this c	act to the request from the the slave device response is code to an appropriate value	
COM-05 Resp Delay	Maste Slave	•	Reque	Response	

5.2.3 **Setting Operation Command and Frequency**

To select the built-in RS485 communication as the source of command, set the DRV-06 code to 3 (Int485). Then, set common area parameters for the operation command and frequency via communication.

Group	Code	Name	LCD Display	Para	meter Setting	Setting range	Unit
	06	Command source	Cmd Source	3	Int 485	0-5	-
DRV	07	Frequency setting method	Freq Ref Src	6	Int 485	0-12	-

5.2.4 Command Loss Protective Operation

Configure the command loss decision standards and protective operations run when a communication problem lasts for a specified period of time.

Command Loss Protective Operation Setting Details

	Command Loss Protective Operation Setting Details						
Code	Description						
		he operation to ru exceeding the time	un when a communication error has occurred and e set at PRT- 13.				
	Settin	g	Function				
	0	None	The speed command immediately becomes the operation frequency without any protection function.				
PRT-12 Lost Cmd Mode, PRT-13 Lost Cmd Time	1	Free-Run	The inverter blocks output. The motor performs in free-run condition.				
	2	Dec	The motor decelerates and then stops at the time set at PRT-07 (Trip Dec Time).				
	3	Hold Input	The inverter calculates the average input value for 10 seconds before the loss of the speed command and uses it as the speed reference.				
		Hold Output	The inverter calculates the average output value for 10 seconds before the loss of the speed command and uses it as the speed reference.				
		Lost Preset	The inverter operates at the frequency set at PRT-14 (Lost Preset F).				

5.2.5 **Setting Virtual Multi-Function Input**

Multi-function input can be controlled using a communication address (0h0385). Set codes COM-70-77 to the functions to operate, and then set the BIT relevant to the function to 1 at 0h0322 to operate it. Virtual multi-function operates independently from IN-65-71 analog multi-function inputs and cannot be set redundantly. Virtual multi-function input can be monitored using COM-86 (Virt DI Status). Before you configure the virtual multi-function inputs, set the DRV-06 code according to the command source.

Group	Code	Name	LCD Display	Paran	neter Setting	Setting range	Unit
	70-77	Communication multi-	Virtual DI x	0	None	0-49	_
	70 77	function input x	(x: 1-8)	U			
COM 8		Communication multi-					
	86	function input	Virt DI Status	-	-	-	-
		monitoring					

Example: When sending an Fx command by controlling virtual multi-function input in the common area via Int485, set COM-70 to FX and set address 0h0322 to 0h0001.

Note

The following are values and functions that are applied to address 0h0322:.

Setting	Function	
0h0001	Forward operation (Fx)	
0h0003	Reverse operation (Rx)	
0h0000	Stop	

5.2.6 Saving Parameters Defined by Communication

If you turn off the inverter after setting the common area parameters or keypad parameters via communication and operate the inverter, the changes are lost and the values changed via communication revert to the previous setting values when you turn on the inverter.

Set CNF-48 to 1 (Yes) to allow all the changes over comunication to be saved, so that the inverter retains all the existing values even after the power has been turned off.

Setting address 0h03E0 to 0 and then setting it again to 1 via communication allows the existing parameter settings to be saved. However, setting address 0h03E0 to 1 and then setting it to 0 does not carry out the same function.

Group	Code	Name	LCD Display	Param	neter Setting	Setting range	Unit
CNE	48	Cava navameters	Parameter Save	0	No	0-1	
CNF	40	Save parameters		1	Yes		

5.2.7 Total Memory Map for Communication

Communication Area	Memory Map	Details		
Communication common compatible area	0h0000-0h00FF	iS5, iP5A, iV5, iG5A compatible area		
Dana na atau ya si stuati an tuna	0h0100-0h01FF	Areas registered at COM-31–38 and COM-51–58		
Parameter registration type area	0h0200-0h023F	Area registered for User Group		
area	0h0240-0h027F	Area registered for Macro Group		
	0h0280-0h02FF	Reserved		
	0h0300-0h037F	Inverter monitoring area		
	0h0380-0h03DF	Inverter control area		
	0h03E0-0h03FF	Inverter memory control area		
	0h0400-0h0FFF	Reserved		
	0h1100	DRV Group		
	0h1200	BAS Group		
S100 communication	0h1300	ADV Group		
common area	0h1400	CON Group		
	0h1500	IN Group		
	0h1600	OUT Group		
	0h1700	COM Group		
	0h1800	APP Group		
	0h1B00	PRT Group		
	0h1C00	M2 Group		

5.2.8 **Parameter Group for Data Transmission**

By defining a parameter group for data transmission, the communication addresses registered in the communication function group (COM) can be used in communication. Parameter group for data transmission may be defined to transmit multiple parameters at once, into the communication frame.

Group	Code	Name	LCD Display	Param	eter Setting	Setting range	Unit
COM	l laddress x	Para Status-x	-	-	0000-FFFF	Hex	
COM	51-58	Input communication address x	Para Control-x	-	-	0000-FFFF	Hex

Currently Registered CM Group Parameter

	Address	Parameter	Assigned content by bit
Ī			Parameter communication code value registered at COM-31-
	0110100-0110107	Status Parameter-8	38 (Read-only)
Ī	0h0110-0h0117	Control Parameter-1-	Parameter communication code value registered at COM-51-58 (Read/Write access)
		Control Parameter-8	58 (Read/Write access)

Note

When registering control parameters, register the operation speed (0h0005, 0h0380, 0h0381) and operation command (0h0006, 0h0382) parameters at the end of a parameter control frame. For example, when the parameter control frame has 5 parameter control items (Para Control - x), register the operation speed at Para Control-4 and the operation command to Para Control-5.

5.3 Communication Protocol

The built-in RS-485 communication supports LS INV 485 and Modbus-RTU protocols.

5.3.1 LS INV 485 Protocol

The slave device (inverter) responds to read and write requests from the master device (PLC or PC).

Request

ENQ	Station ID	CMD	Data	SUM	EOT
1 byte	2 bytes	1 byte	n bytes	2 bytes	1 byte

Normal Response

ACK	Station ID	CMD	Data	SUM	EOT
1 byte	2 bytes	1 byte	n x 4 bytes	2 bytes	1 byte

Error Response

NAK	Station ID	CMD	Error code	SUM	EOT
1 byte	2 bytes	1 byte	2 bytes	2 bytes	1 byte

- A request starts with ENQ and ends with EOT.
- A normal response starts with ACK and ends with EOT.
- An error response starts with NAK and ends with EOT.
- A station ID indicates the inverter number and is displayed as a two-byte ASCII-HEX string that uses characters 0-9 and A-F.
- CMD: Uses uppercase characters (returns an IF error if lowercase characters are encountered)—please refer to the following table.

Character	ASCII-HEX	Command	
'R'	52h	Read	
'W'	57h	Write	
'X'	58h	Request monitor registration	
Ύ;	59h	Perform monitor registration	

- Data: ASCII-HEX (for example, when the data value is 3000: 3000 \rightarrow '0"B"B"8'h \rightarrow 30h 42h 42h 38h)
- Error code: ASCII-HEX (refer to 5.3.1.4 Error Code on page 137)

- Transmission/reception buffer size: Transmission=39 bytes, Reception=44 bytes
- Monitor registration buffer: 8 Words
- SUM: Checks communication errors via sum.

SUM=a total of the lower 8 bits values for station ID, command and data (Station ID+CMD+Data) in ASCII-HEX.

For example, a command to read 1 address from address 3000:

SUM='0'+'1'+'R'+'3'+'0'+'0'+'0'+'1'=30h+31h+52h+33h+30h+30h+30h+31h=1 (the control value is not included: ENQ, ACK, NAK, etc.).

ENQ	Station ID	CMD	Address	Number of Addresses	SUM	EOT
05h	'01'	'R'	'3000'	'1'	'A7'	04h
1 byte	2 bytes	1 byte	4 bytes	1 byte	2 bytes	1 byte

Note

Broadcasting

Broadcasting sends commands to all inverters connected to the network simultaneously. When commands are sent from station ID 255, each inverter acts on the command regardless of the station ID. However no response is issued for commands transmitted by broadcasting.

5.3.1.1 Detailed Read Protocol

Read Request: Reads successive n words from address XXXX.

ENQ	Station ID	CMD	Address	Number of Addresses	SUM	EOT
05h	'01'-'FA'	'R'	'XXXX'	'1'-'8'=n	'XX'	04h
1 byte	2 bytes	1 byte	4 bytes	1 byte	2 bytes	1 byte

Total bytes=12. Characters are displayed inside single quotation marks(').

Read Normal Response

ACK	Station ID	CMD	Data	SUM	EOT
06h	'01'-'FA'	'R'	'XXXX'	'XX'	04h
1 byte	2 bytes	1 byte	n x 4 bytes	2 bytes	1 byte

Total bytes= $(7 \times n \times 4)$: a maximum of 39

Read Error Response

NAK	Station ID	CMD	Error code	SUM	EOT
15h	'01'-'FA'	'R'	/ ** /	'XX'	04h
1 byte	2 bytes	1 byte	2 bytes	2 bytes	1 byte

Total bytes=9

5.3.1.2 Detailed Write Protocol

Write Request: Writes successive n words to address XXXX.

ENQ	Station ID	CMD	Address	Number of Addresses	Data	SUM	EOT
05h	'01'-'FA'	'W'	'XXXX'	'1'-'8'= n	'XXXX'	'XX'	04h
1 byte	2 bytes	1 byte	4 bytes	1 byte	n x 4 bytes	2 bytes	1 byte

Total bytes= $(12 + n \times 4)$: a maximum of 44

Write Normal Response

ACK	Station ID	CMD	Data	SUM	EOT
06h	'01'-'FA'	'W'	'XXXX'	'XX'	04h
1 byte	2 bytes	1 byte	n x 4 bytes	2 bytes	1 byte

Total bytes= $(7 + n \times 4)$: a maximum of 39

Write Error Response

NAK	Station ID	CMD	Error Code	SUM	EOT
15h	'01'-'FA'	'W'	/ ** /	'XX'	04h
1 byte	2 bytes	1 byte	2 bytes	2 bytes	1 byte

Total bytes=9

5.3.1.3 Monitor Registration Detailed Protocol

Monitor registration request is made to designate the type of data that requires continuous monitoring and periodic updating.

Monitor Registration Request: Registration requests for *n* addresses (where *n* refers to the number of addresses. The addresses do not have to be contiguous.)

ENQ	Station ID	CMD	Number of Addresses	Address	SUM	EOT
05h	'01'-'FA'	'X'	'1'-'8'=n	'XXXX'	'XX'	04h
1 byte	2 bytes	1 byte	1 byte	n x 4 bytes	2 bytes	1 byte

Total bytes= $(8 + n \times 4)$: a maximum of 40

Monitor Registration Normal Response

ACK	Station ID	CMD	SUM	EOT
06h	'01'-'FA'	′X′	'XX'	04h
1 byte	2 bytes	1 byte	2 bytes	1 byte

Total bytes=7

Monitor Registration Error Response

NAK	Station ID	CMD	Error Code	SUM	EOT
15h	'01'-'FA'	'X'	/ ** /	'XX'	04h
1 byte	2 bytes	1 byte	2 bytes	2 bytes	1 byte

Total bytes=9

Monitor Registration Perform Request: A data read request for a registered address, received from a monitor registration request

ENQ	Station ID	CMD	SUM	EOT
05h	'01'-'FA'	Ύ′	'XX'	04h
1 byte	2 bytes	1 byte	2 bytes	1 byte

Total bytes=7

Monitor Registration Execution Normal Response

ACK	Station ID	CMD	Data	SUM	EOT
06h	'01'-'FA'	Ύ′	'XXXX'	'XX'	04h
1 byte	2 bytes	1 byte	n x 4 bytes	2 bytes	1 byte

Total bytes= $(7 + n \times 4)$: a maximum of 39

Monitor Registration Execution Error Response

NAK	Station ID	CMD	Error Code	SUM	EOT
15h	'01'-'FA'	Ύ′	/ ** /	'XX'	04h
1 byte	2 bytes	1 byte	2 bytes	2 bytes	1 byte

Total bytes=9

5.3.1.4 Error Code

Code	Abbreviation	Description
ILLEGAL FUNCTION	IF	The requested function cannot be performed by a slave
ILLEGAL FUNCTION		because the corresponding function does not exist.
ILLEGAL DATA ADDRESS	IA	The received parameter address is invalid at the slave.
ILLEGAL DATA VALUE	ID	The received parameter data is invalid at the slave.
		Tried writing (W) to a parameter that does not allow writing
WRITE MODE ERROR	WM	(read-only parameters, or when writing is prohibited during
		operation)
FRAME ERROR	FE	The frame size does not match.

5.3.1.5 ASCII Code

Character	Hex	Character	Hex	Character	Hex
Α	41	q	71	@	40
В	42	r	72	[5B
C	43	S	73	١	5C
D	44	t	74]	5D
E	45	u	75		5E
F	46	v	76		5F
G	47	w	77		60
Н	48	x	78	{	7B
1	49	у	79		7C
J	4A	z	7A	}	7D
K	4B	0	30	-	7E
L	4C	1	31	BEL	07
M	4D	2	32	BS	08
N	4E	3	33	CAN	18
0	4F	4	34	CR	0D
P	50	5	35	DC1	11
Q	51	6	36	DC2	12
R	52	7	37	DC3	13
S	53	8	38	DC4	14
T	54	9	39	DEL	7F

Character	Hex	Character	Hex	Character	Hex
U	55	space	20	DLE	10
V	56	!	21	EM	19
W	57	"	22	ACK	06
Χ	58	#	23	ENQ	05
Υ	59	\$	24	EOT	04
Z	5A	%	25	ESC	1B
a	61	&	26	ETB	17
b	62	1	27	ETX	03
С	63	(28	FF	0C
d	64)	29	FS	1C
e	65	*	2A	GS	1D
f	66	+	2B	HT	09
g	67	,	2C	LF	0A
h	68	-	2D	NAK	15
i	69	•	2E	NUL	00
j	6A	/	2F	RS	1E
k	6B	:	3A	S1	OF
1	6C	;	3B	SO	0E
m	6D	<	3C	SOH	01
n	6E	=	3D	STX	02
0	6F	>	3E	SUB	1A
p	70	?	3F	SYN	16
				US	1F
				VT	OB

5.3.2 Modbus-RTU Protocol

5.3.2.1 Function Code and Protocol (unit: byte)

In the following section, station ID is the value set at COM-01 (Int485 St ID), and starting address is the communication address. (starting address size is in bytes). For more information about communication addresses, refer to <u>5.4 Compatible Common Area Parameter</u> on page <u>142</u>.

Function Code #03: Read Holding Register

Query Field Name
Station ID
Function(0x03)
Starting Address Hi
Starting Address Lo
of Points Hi
of Points Lo
CRC Lo
CRC Hi

Response Field Name	
Station ID	
Function (0x03)	
Byte Count	
Data Hi	
Data Lo	
	// // // // // // // // // // // // //
	# number of Points
Data Hi	
Data Lo	
CRC Lo	
CRC Hi	

Function Code #04: Read Input Register

Query Field Name
Station ID
Function(0x04)
Starting Address Hi
Starting Address Lo
of Points Hi
of Points Lo
CRC Lo
CRC Hi

Response Field Name	
Station ID	
Function (0x04)	
Byte Count	
Data Hi	
Data Lo	
	# number of Points
Data Hi	
Data Lo	_)
CRC Lo	
CRC Hi	

Function Code #06: Preset Single Register

Query Field Name
Station ID
Function (0x06)
Starting Address Hi
Register Address Lo
Preset Data Hi
Preset Data Lo
CRC Lo
CRC Hi

Response Field Name
Station ID
Function (0x06)
Register Address Hi
Register Address Lo
Preset Data Hi
Preset Data Lo
CRC Lo
CRC Hi

Function Code #16 (hex 0h10): Preset Multiple Register

Query Field Name
Station ID
Function (0x10)
Starting Address Hi
Starting Address Lo
of Register Hi
of Register Lo
Byte Count
Data Hi
Data Lo
•••
Data Hi
Data Lo
CRC Lo
CRC Hi

Response Field Name
Station ID
Function (0x10)
Starting Address Hi
Starting Address Lo
of Register Hi
of Register Lo
CRC Lo
CRC Hi

number of Points

Exception Code

Code
01: ILLEGAL FUNCTION
02: ILLEGAL DATA ADRESS
03: ILLEGAL DATA VALUE
06: SLAVE DEVICE BUSY

Response

Field Name
Station ID
Function*
Exception Code
CRC Lo
CRC Hi

^{*} The function value uses the top level bit for all query values.

Example of Modbus-RTU Communication in Use

When the Acc time (Communication address 0x1103) is changed to 5.0 sec and the Dec time (Communication address 0x1104) is changed to 10.0 sec.

Frame Transmission from Master to Slave (Request)

Item	Station ID	Function		# of Register	Byte Count	Data 1	Data 2	CRC
Hex	0x01	0x10	0x1102	0x0002	0x04	0x0032	0x0064	0x1202
Description	COM-01 Int485 St ID	Preset Multiple Register	Starting Address -1 (0x1103-1)	-	-	50 (ACC time 5.0sec)	100 (DEC time 10.0sec)	-

Frame Transmission from Slave to Master (Response)

Item	Station ID	Function	Starting Address	# of Register	CRC
Hex	0x01	0x10	0x1102	0x0002	0xE534
Description	COM-01	Preset Multiple	Starting Address -1		
Description	Int485 St ID	Register	(0x1103-1)	-	-

5.4 Compatible Common Area Parameter

The following are common area parameters compatible with iS5, iP5A, iV5, and iG5A.

Comm. Address	Parameter	Scale	Unit	R/W	Assigned Content by Bit
0h0000	Inverter model	-	-	R	6: S100
0h0001	Inverter capacity	-	-	R	0: 0.75 kW, 1: 1.5 kW, 2: 2.2 kW 3: 3.7 kW, 4: 5.5 kW, 5: 7.5 kW 6: 11 kW, 7: 15 kW, 8: 18.5 kW 9: 22 kW 10: 30 kW, 11: 37 kW 12: 45 kW 13: 55 kW, 14: 75 kW 256: 0.4 kW, 257: 1.1 kW, 258: 3.0 kW 259: 4.0 kW
0h0002	Inverter input voltage	-	-	R	0: 220 V product 1: 440 V product
0h0003	Version	-	-	R	Example 0h0100: Version 1.00 Example 0h0101: Version 1.01
0h0004	Reserved	-	-	R/W	
0h0005	Command frequency	0.01	Hz	R/W	
0h0006	Operation command (option)	_	-	R/W	B15 Reserved B14 0: Keypad Freq, B13 1: Keypad Torq B12 2-16: Terminal block multistep speed B10 17: Up, 18: Down B10 19: STEADY 22: V1, 24: V2, 25: I2, 26: Reserved 27: Built-in 485 28: Communication option 30: JOG, 31: PID B8 0: Keypad B7 1: Fx/Rx-1 2: Fx/Rx-2 3: Built-in 485 4: Communication option B5 Reserved B4 Emergency stop B3 W: Trip initialization (0→1), R: Trip status B2 Reverse operation (R) B1 Forward operation (F) B0 Stop (S)
		 		<u> </u>	BO Stop (S)
0h0007	Acceleration time	0.1	S	R/W	-

Comm. Address	Parameter	Scale	Unit	R/W	Assigne	d Content by Bit	
0h0008	Deceleration time	0.1	S	R/W	-		
0h0009	Output current	0.1	Α	R	-		
0h000A	Output frequency	0.01	Hz	R	-		
0h000B	Output voltage	1	V	R	-		
0h000C	DC link voltage	1	V	R	-		
0h000D	Output power	0.1	kW	R	-		
					B15	0: Remote, 1: Keypad Local	
					D1.4	1: Frequency command	
					B14	source by communication (built-in, option)	
						1: Operation command	
					B13	source by communication	
						(built-in, option)	
					B12	Reverse operation command	
					B11	Forward operation command	
					B10	Brake release signal	
-1					B9	Jog mode	
0h000E	Operation status	-	-	R	B8	Drive stopped.	
					B7	DC Braking	
					B6	Speed reached	
					B5	Decelerating	
					B4	Accelerating	
					DO	Fault Trip - operates	
					B3	according to OUT-30 setting	
					B2	Operating in reverse direction	
					D1	Operating in forward	
					B1	direction	
					В0	Stopped	
					B15	Reserved	
					B14	Reserved	
					B13	Reserved	
					B12	Reserved	
					B11	Reserved	
					B10	H/W-Diag	
	Fault trip				B9	Reserved	
0h000F	information	-	-	R	B8	Reserved	
	Illioirriation				B7	Reserved	
					B6	Reserved	
					B5	Reserved	
					B4	Reserved	
					B3	Level Type trip	
					B2	Reserved	
					B1	Reserved	

Comm. Address	Parameter	Scale	Unit	R/W	Assigned C	ontent by Bit
					B0	Latch Type trip
					B15- B7	Reserved
					B6	P7
					B5	P6
0h0010	Input terminal information	-	-	R	B4	P5
	Information				B3	P4
					B2	P3
					B1	P2
					B0	P1
					B15	Reserved
					B14	Reserved
					B13	Reserved
					B12	Reserved
	Output terminal information				B11	Reserved
		-			B10	Reserved
			-	R	B9	Reserved
01-0011					B8	Reserved
0h0011					B7	Reserved
					B6	Reserved
					B5	Reserved
					B4	Reserved
					B3	Reserved
					B2	Reserved
					B1	MO
					B0	Relay 1
0h0012	V1	0.01	%	R	V1 input v	oltage
0h0013	V2	0.01	%	R	V2 input v	oltage
0h0014	12	0.01	%	R	I2 input cu	irrent
0h0015	Motor rotation speed	1	rpm	R	Displays ex	xisting motor rotation speed
0h0016 - 0h0019	Reserved	-	-	-	-	
0h001A	Select Hz/rpm	-	-	R	0: Hz unit,	1: rpm unit
0h001B	Display the number of poles for the selected motor	-	-	R	Display the number of poles for the selected motor	

5.5 S100 Expansion Common Area Parameter

Monitoring Area Parameter (Read Only)

Comm. Address	Parameter	Scale	Unit	Assigned content by bit		
0h0300	Inverter model	-	-	S100: 0006h		
				0.4 kW: 1900h, 0.75 kW: 3200h		
				1.1 kW: 4011h, 1.5 kW: 4015h		
				2.2 kW: 4022h, 3.0 kW: 4030h		
				3.7 kW: 4037h, 4.0 kW: 4040h		
0h0301	Inverter capacity	-	-	5.5 kW: 4055h, 7.5 kW: 4075h		
				11 kW: 40B0h, 15 kW: 40F0h		
				18.5 kW: 4125h, 22 kW: 4160h 30 kW: 41E0h, 37 kW: 4250h 45 kW: 42D0h, 55 kW: 4370h 75 kW: 44B0h		
0h0302 0h0303	Inverter input voltage/power (Single phase, 3- phase)/cooling method Inverter S/W version	-	-	100 V single phase self cooling: 0120h, 200 V 3-phase forced cooling: 0231h 100 V single phase forced cooling: 0121h, 400 V single phase self cooling: 0420h 200 V single phase self cooling: 0220h, 400 V 3-phase self cooling: 0430h 200 V 3-phase self cooling: 0230h, 400 V single phase forced cooling: 0421h 200 V single phase forced cooling: 0221h, 400 V 3-phase forced cooling: 0431h (Ex) 0h0100: Version 1.00		
				0h0101:Version 1.01		
0h0304	Reserved	-	-	-		
				B15 0: Normal state 4: Warning occurred		
				8: Fault occurred [operates		
01 0205	Inverter operation			according to PRT- 30 (Trip Out		
0h0305	state	-	-	B12 Mode) setting.]		
				B11		
				B8		
				B7 1: Speed searching		

Comm. Address	Parameter	Scale	Unit	Assigned	content by bit
				B6	2: Accelerating
					3: Operating at constant rate
				B5	4: Decelerating
					5: Decelerating to stop
				B4	6: H/W OCS
					7: S/W OCS
					8: Dwell operating
				B3	- 0: Stopped
				B2	1: Operating in forward direction
				B1	2: Operating in reverse direction
				В0	3: DC operating (0 speed control)
				B15	Operation command source
				B14	0: Keypad
				B13	1: Communication option
				B12	2: User Sequence
				B11	3: Built-in RS 485
				B10	4: Terminal block
				B9	1
				B8	1
	Inverter operation			B7	Frequency command source
0h0306	frequency	_	_	B6	0: Keypad speed
0110300	command source			B5	1: Keypad torque
	Communa source			B4	2-4: Up/Down operation speed
				В3	5: V1, 7: V2, 8: I2
				B2	9: Pulse
				B1	10: Built-in RS 485
					11: Communication option
					12: User Sequence
				B0	13: Jog
					14: PID
	LCD kovmad CAM				25-39: Multi-step speed frequency
0h0307	LCD keypad S/W version	-	-	(Ex.) 0h01	00: Version 1.00
	LCD keypad title				
0h0308	version	-	-	(Ex.) 0h01	101: Version 1.01
0h0309 -0h30F	Reserved	-	-	-	
0h0310	Output current	0.1	Α	-	
0h0311	Output frequency	0.01	Hz	-	
0h0312	Output rpm	0	rpm	-	
0h0313	Motor feedback speed	0	rpm	-32768 rp	om-32767 rpm (directional)
0h0314	Output voltage	1	٧	-	

Comm. Address	Parameter	Scale	Unit	Assigned cor	ntent by bit
0h0315	DC Link voltage	1	٧	-	
0h0316	Output power	0.1	kW	-	
0h0317	Output torque	0.1	%	_	
0h0318	PID reference	0.1	%	_	
0h0319	PID feedback	0.1	%	_	
0h031A	Display the number of poles for the 1 st motor	-	-	Displays the motor	number of poles for the first
0h031B	Display the number of poles for the 2 nd motor	-	-	Displays the motor	number of poles for the 2nd
0h031C	Display the number of poles for the selected motor	-	-	Displays the motor	number of poles for the selected
0h031D	Select Hz/rpm	-	-	0: Hz, 1: rpm	
0h031E - 0h031F	Reserved	-	-	-	
				BI5	Reserved
				_	-
0h0320				B7	Reserved
				B6	P7(I/O board)
	Digital input			B5	P6(I/O board)
Unu320	information			B4	P5(I/O board)
				B3	P4(I/O board)
				B2	P3(I/O board)
				B1	P2(I/O board)
				B0	P1(I/O board)
				BI5	Reserved
				-	Reserved
	Digital output			B4	Reserved
0h0321	Digital output information	-	-	B3	Reserved
	Illioiriation			B2	Reserved
				B1	Q1
				B0	Relay 1
				B15	Reserved
				-	Reserved
				B8	Reserved
0h0322	Virtual digital input			B7	Virtual DI 8(COM-77)
UIIU3ZZ	information	-	_	B6	Virtual DI 7(COM-76)
				B5	Virtual DI 6(COM-75)
				B4	Virtual DI 5(COM-74)
]		B3	Virtual DI 4(COM-73)

Comm. Address	Parameter	Scale	Unit	Assigned cor	ntent by bit
				B2	Virtual DI 3(COM-72)
			B2 Virtual DI 30		
				B2 Virtual DI 3(COM-72) B1 Virtual DI 2(COM-71) B0 Virtual DI 1(COM-70) 0: 1st motor/1: 2nd motor Analog input V1 (I/O board) Analog input V2 (I/O board) Analog output 1 (I/O board) Analog output 2 (I/O board) Analog output 2 (I/O board) Reserved Reserved B15 Fuse Open Trip B14 Over Heat Trip B18 Arm Short B12 External Trip B11 Overvoltage Trip B10 Overcurrent Trip B10 Overcurrent Trip B2 Reserved B3 Reserved B6 Input open-phase trip B6 Ground Fault Trip B1 Underload Trip B1 Underload Trip B1 Underload Trip B1 Reserved B1 Reserved B1 Reserved B1 Reserved B1 Reserved B2 Inverter Overload Trip B3 E-Thermal Trip B4 Ground Trip B5 Reserved B6 Reserved B7 Reserved B8 Reserved B8 Reserved B9 Safety B B1 Reserved	
0h0323	Display the selected motor	-	-		
0h0324	Al1	0.01	%	Analog inpu	rt V1 (I/O board)
0h0325	Reserved	0.01	%	<u> </u>	
0h0326	Al3	0.01		Analog inpu	rt V2 (I/O board)
0h0327	Al4	0.01	%		
0h0328	AO1	0.01	%	<u> </u>	
0h0329	AO2	0.01	%		
0h032A	AO3	0.01			,
0h032B	AO4	0.01	%	Reserved	
0h032C	Reserved	-	_	-	
0h032D	Inverter module temperature	1	°C	-	
0h032E	Inverter power consumption	1	kWh	-	
0h032F	Inverter power consumption	1	MWh	-	
				BI5	Fuse Open Trip
				BI4	Over Heat Trip
				BI3	Arm Short
	selected motor Al1 Reserved Al3 Al4 AO1 AO2 AO3 AO4 Reserved Inverter module temperature Inverter power consumption Inverter power consumption Latch type trip			BI2	External Trip
				BI1	Overvoltage Trip
				BIO	Overcurrent Trip
				B9	NTCTrip
01-0220	Latch type trip			B8	Reserved
0h0330	information - 1	-	-	B7	Reserved
				B6	Input open-phase trip
				B5	Output open-phase trip
				B4	Ground Fault Trip
				B3	E-Thermal Trip
					·
				B1	Underload Trip
				BI5	
0h0331		-	-		,
	inionnation-2			BI1	Reserved

Comm. Address	Parameter	Scale	Unit	Assigned con	•
				B8	External brake trip
		nosis Trip n		B7	
				B6	
				B5	
				B4	
				B3	·
				B2	
					-
				B15	Reserved
				-	-
					External brake trip Bad contact at basic I/O board Pre PID Fail Error while writing parameter Reserved FAN Trip Reserved Watchdog-2 error Watchdog-1 error EEPROM error ADC error Reserved Auto Tuning failed Keypad lost Encoder disconnection Wrong installation of encoder DB FAN running Lost command
	Level type trip				-
0h0332	information	-	-		B7 Bad contact at basic I/O board B6 Pre PID Fail B5 Error while writing parameter B4 Reserved B3 FAN Trip B2 Reserved B1 Reserved B0 Reserved B1 Reserved B1 Reserved B2 Reserved B3 Reserved B4 Reserved B5 Reserved B6 Reserved B7 Reserved B8 Reserved B8 Reserved B9 Reserved B1 Reserved B1 Reserved B2 Reserved B3 Keypad Lost Command B2 Lost Command B2 Lost Command B1 LV B0 BX B15 Reserved B6 Reserved B6 Reserved B7 Reserved B8 Reserved B8 Reserved B9 Reserved B9 Reserved B9 Reserved B1 Reserved B1 Reserved B2 Reserved B3 Watchdog-2 error B2 Watchdog-1 error B1 EEPROM error B1 EEPROM error B1 Reserved
	H/W Diagnosis Trip information B4 B3 B2 B1 B0 B15 - B6 B5 B4 B3 B4 B4				
		etrip on			
		B0 B15 - B6 B5			
				ВІЗ	
				P6	-
0h0333	H/W Diagnosis Trip				
0110333	information	-	_		
					-
				013	
				-	Reserved
				B10	
				B9	
	Warning			B8	Keypad lost
0h0334	information	-	-	B7	Encoder disconnection
	in ionnation			B6	Wrong installation of encoder
				B5	DB
				B4	FAN running
				B3	
				B2	Inverter Overload
	1	<u> </u>		102	

Comm. Address	Parameter	Scale	Unit	Assigned cont	tent by bit			
				B1	Underload			
				B0	Overload			
0h0335 -0h033F	Reserved	-	-	-				
0h0340	On Time date	0	Day	Total number powered on	of days the inverter has been			
0h0341	On Time minute	0	Min	Total number of minutes excluding the total number of On Time days Total number of days the inverter has driven				
0h0342	Run Time date	0	Day	Total number of days the inverter has driven the motor				
0h0343	Run Time minute	0	Min	Total number of minutes excluding the total number of Run Time days				
0h0344	Fan Time date	0	Day	Total number been running	of days the heat sink fan has			
0h0345	Fan Time minute	0	Min	Total number number of Fa	of minutes excluding the total in Time days			
0h0346 -0h0348	Reserved	-	-	-				
0h0349	Reserved	-	-	-				
0h034A	Option 1	-	-	0: None, 9: CA	Nopen			
0h034B	Reserved	-	-					
0h034C	Reserved							

5.5.2 Control Area Parameter (Read/Write)

Comm. Address	Parameter	Scale	Unit	Assigne	d Content by Bit
0h0380	Frequency command	0.01	Hz	Comma	and frequency setting
0h0381	RPM command	1	rpm	Comma	and rpm setting
				B7	Reserved
				B6	Reserved
				B5	Reserved
Oh0382 Oh0383 Acceleration time Oh0384 Oh0384 Oh0385 Virtual digital input control (Oroff, 1:On)			B4	Reserved	
				В3	0 → 1: Free-run stop
060202	Operation			B2	0 → 1:Trip initialization
0110362	command	_	-	B1	0: Reverse command, 1: Forward command
				ВО	0: Stop command, 1: Run command
					e: Forward operation command 0003h, operation command 0001h.
0h0383		0.1	s	Accelera	ation time setting
0h0384		0.1	s	Deceler	ration time setting
0h0384		_		BI5	Reserved
				-	Reserved
				B8	Reserved
				B7	Virtual DI 8(COM-77)
	Virtual digital			B6	Virtual DI 7(COM-76)
0h0385	input control (0:		-	B5	Virtual DI 6(COM-75)
	Off, 1:On)			B4	Virtual DI 5(COM-74)
				B3	Virtual DI 4(COM-73)
				B2	Virtual DI 3(COM-72)
				B1	Virtual DI 2(COM-71)
				B0	Virtual DI 1(COM-70)
				BI5	Reserved
				BI4	Reserved
				BI3	Reserved
				BI2	Reserved
	Digital output			BI1	Reserved
0h0386	control	-	-	BIO	Reserved
	(0:Off, 1:On)			B9	Reserved
				B8	Reserved
				B7	Reserved
				B6	Reserved
				B5	Reserved

Comm. Address	Parameter	Scale	Unit	Assigne	d Content by Bit
				B4	Relay 4 (Ext I/O, OUT-31: None)
				В3	Relay 3 (Ext I/O, OUT-31: None)
				B2	Relay 2 (30~75kW, OUT-31: None)
				B1	Q1 (0.4~75kW, OUT-33: None)
				В0	Relay 1(0.4~75kW, OUT-31: None)
0h0387	Reserved	-	-	Reserve	d
0h0388	PID reference	0.1	%	PID refe	rence command
0h0389	PID feedback value	0.1	%	PID feed	lback value
0h038A	Motor rated current	0.1	Α	-	
0h038B	Motor rated voltage	1	V	-	
0h038C- 0h038F	Reserved			-	
0h0390	Torque Ref	0.1	%	Torque	command
0h0391	Fwd Pos Torque Limit	0.1	%	Forward	d motoring torque limit
0h0392	Fwd Neg Torque Limit	0.1	%	Forward	d regenerative torque limit
0h0393	Rev Pos Torque Limit	0.1	%	Reverse	motoring torque limit
0h0394	Rev Neg Torque Limit	0.1	%	Reverse	regenerative torque limit
0h0395	Torque Bias	0.1	%	Torque	bias
0h0396-0h399	Reserved	-	-	-	
0h039A	Anytime Para	-	-	Set the	CNF-20 value
0h039B	Monitor Line-1	-	-	Set the	CNF-21 value
0h039C	Monitor Line-2	-	-	Set the	CNF-22 value
0h039D	Monitor Line-3	-	-	Set the	CNF-23 value

Note

A frequency set via communication using the common area frequency address (0h0380, 0h0005) is not saved even when used with the parameter save function. To save a changed frequency to use after a power cycle, follow these steps:

- Set DRV-07 to Keypad-1 and select a random target frequency. 1
- 2 Set the frequency via communication into the parameter area frequency address (0h1101).
- 3 Perform the parameter save (0h03E0: '1') before turning off the power. After the power cycle, the frequency set before turning off the power is displayed.

5.5.3 Inverter Memory Control Area Parameter (Read and Write)

Comm. Address	Parameter	Scale	Unit	Changeable During Operation	Function
0h03E0	Save parameters	-	-	X	0: No, 1:Yes
0h03E1	Monitor mode initialization	-	-	О	0: No, 1:Yes
0h03E2	Parameter initialization	-	-	х	0: No, 1: All Grp, 2: DRV Grp 3: BAS Grp, 4: ADV Grp, 5: CON Grp 6: IN Grp, 7: OUT Grp, 8: COM Grp 9: APP Grp, 12: PRT Grp, 13: M2 Grp Setting is prohibited during fault trip interruptions.
0h03E3	Display changed parameters	-	-	О	0: No, 1: Yes
0h03E4	Reserved	-	-	-	-
0h03E5	Delete all fault history	-	-	0	0: No, 1: Yes
0h03E6	Delete user- registrated codes	-	-	0	0: No, 1: Yes
0h03E7	Hide parameter mode	0	Hex	0	Write: 0-9999 Read: 0: Unlock, 1: Lock
0h03E8	Lock parameter mode	0	Hex	0	Write: 0-9999 Read: 0: Unlock, 1: Lock
0h03E9	Easy start on (easy parameter setup mode)	-	_	О	0: No, 1: Yes
0h03EA	Initializing power consumption	-	-	О	0: No, 1: Yes
0h03EB	Initialize inverter operation accumulative time	-	-	0	0: No, 1: Yes
0h03EC	Initialize cooling fan accumulated operation time	-	_	О	0: No, 1: Yes

Note

- When setting parameters in the inverter memory control area, the values are reflected to the inverter operation and saved. Parameters set in other areas via communication are reflected to the inverter operation, but are not saved. All set values are cleared following an inverter power cycle and revert back to its previous values. When setting parameters via communication, ensure that a parameter save is completed prior to shutting the inverter down.
- Set parameters very carefully. After setting a parameter to 0 via communication, set it to another value. If a parameter has been set to a value other than 0 and a non-zero value is entered again, an error message is returned. The previously-set value can be identified by reading the parameter when operating the inverter via communication.
- The addresses 0h03E7 and 0h03E8 are parameters for entering the password. When the password is entered, the condition will change from Lock to Unlock, and vice versa. When the same parameter value is entered continuously, the parameter is executed just once. Therefore, if the same value is entered again, change it to another value first and then re-enter the previous value. For example, if you want to enter 244 twice, enter it in the following order: $244 \rightarrow 0 \rightarrow 244$.

① Caution

It may take longer to set the parameter values in the inverter memory control area because all data is saved to the inverter. Be careful as communication may be lost during parameter setup if parameter setup is continues for an extended period of time.

6 Table of Functions

This chapter lists all the function settings for S100 series inverter. Set the parameters required according to the following references. If a set value input is out of range, the following messages will be displayed on the keyboard. In these cases, the inverter will not operate with the [ENT] key.

- Set value not allocated: rd
- Set value repetition (multi-function input, PID reference, PID feedback related): OL
- Set value not allowed (select value, V2, I2): no

6.1 Drive group (PAR→DRV)

In the following table, data shaded in grey will be displayed when the related code has been selected.

SL: Sensorless vector control (DRV-09), I – IM Sensorless, P – PM Sensorless

*O/X: Write-enabled during operation

Code	Comm. Address	Name	LCD Display	Sett	ing Range	Initial value	Property*	V/F	SL	Ref.
00	-	Jump Code	Jump Code	1-99	9	9	0	0	I/P	p.52
01	0h1101	Target frequency	Cmd Frequency	- Ma	rt frequency aximum Juency(Hz)	0.00	0	0	I/P	<u>p.66</u>
02	0h1102	Torque command	Cmd Torque	-180	0~180[%]	0.0	0	X	I	-
03	0h1103	Acceleration time	Acc Time	0.0-	600.0(s)	20.0	0	0	I/P	<u>p.89</u>
04	0h1104	Deceleration time	Dec Time	0.0-	600.0(s)	30.0	0	0	I/P	<u>p.89</u>
06	0h1106	Command source	Cmd Source	0 1 2 3 4 5	Keypad Fx/Rx-1 Fx/Rx-2 Int 485 Field Bus UserSeqLi nk	1: - Fx/Rx-1	х	Ο	I/P	p.81
07	0h1107	Frequency reference source	Freq Ref Src	0 1 2 4 5	Keypad-1 Keypad-2 V1 V2 I2	0: Keypad-1	х	0	I/P	<u>p.66</u>

Code	Comm. Address	Name	LCD Display	Sett	ing Range	Initial value	Property*	V/F	SL	Ref.
				6	Int 485					
				8	Field Bus					
				9	UserSeqLi					
					nk .					
				12	Pulse					
<u> </u>				0	Keypad-1					
				1	Keypad-2					
				2	V1					
		Tawarra		4	V2					
00	0h1108	Torque Reference	Tra Dof Car	5	12	0:	х	Х	١.	
80	0111108	Setting	Trq Ref Scr	6	Int485	Keypad-1	^	^	I	_
		Setting		8	Fieldbus					
				9	UserSeqLi					
					nk					
				12	Pulse					
<u> </u>				0	V/F					
				2	Slip					
09	9 Oh1109 Control mode Cor	Control Mode	2	Compen	0: V/F	х	0	I/P	n 07	
09	0111109	Control mode	Control Mode	4	IM	U: V/F	^	U	1/1/	<u>p.97</u>
				4	Sensorless					
				6	PM S/L					
10	0h110A	Torque Control	Torque	0	No	0: No	Х	Χ	ı	
10	UIIIIUA	Torque Control	Control	1	Yes	U. NO	^	^		
11	0h110B	Jog frequency	Jog Frequency	freq Max), Start Juency- kimum Juency(Hz)	10.00	0	0	I/P	-
12	0h110C	Jog run acceleration time	Jog Acc Time	0.0-	600.0(s)	20.0	0	0	I/P	-
13	0h110D	Jog run deceleration time	Jog Dec Time	0.0-	600.0(s)	30.0	0	0	I/P	-
14	0h110E	Motor capacity	Motor Capacity	1: 0. 2: 0. 3: 1. 4: 1. 5: 2. 6: 3. 7: 3. 8: 4.	2 kW, 4 kW 75 kW, 1 kW 5 kW, 2 kW 0 kW, 7 kW 0 kW, 5 kW	Varies by Motor capacity	х	Ο	I/P	-

Code	Comm. Address	Name	LCD Display	Setting Range	Initial value	Property*	V/F	SL	Ref.
				10: 7.5 kW, 11: 11.0 kW 12: 15.0 kW, 13: 18.5 kW 14: 22.0 kW 15: 30.0 kW 16:37 kW 17:45.0 kW 18:55.0 kW 19:75 kW					
15	0h110F	Torque boost options	Torque Boost	0 Manual 1 Auto1 2 Auto2	0: Manual	Х	0	Х	
16 ¹	0h1110	Forward Torque boost	Fwd Boost	0.0-15.0(%)	2.0	Х	0	Х	<u>p.101</u>
17 ¹	0h1111	Reverse Torque boost	Rev Boost	0.0-15.0(%)	2.0	Х	0	Х	<u>p.101</u>
18	0h1112	Base frequency	Base Freq	30.00~400.00(Hz) [V/F, Slip Compen] 40.00~120.00(Hz) [IM Sensorless] 30.00~180.00(Hz) [PM Sensorless]	60.00	х	0	I/P	p.97
19	0h1113	Start frequency	Start Freq	0.01-10.00(Hz)	0.50	Х	0	I/P	<u>p.97</u>
20	0h1114	Maximum frequency	Max Freq	40.00~400.00(Hz) [V/F, Slip Compen] 40.00~120.00(Hz) [IM Sensorless] 40.00~180.00(Hz) [PM Sensorless]	60.00	х	Ο	I/P	p.108

¹ Displayed when DRV-15 is set to 0 (Manual) or 2(Auto2)

Code	Comm. Address	Name	LCD Display	Set	ting Range	Initial value	Property*	V/F	SL	Ref.
		Select speed		0	Hz Display	0:Hz				
21	0h1115	unit	Hz/Rpm Sel	1	Rpm Display	Display	0	0	I/P	<u>p.78</u>
22 ²	0h1116	(+) Torque Gain	(+) Trq Gain	50.0	0-150.0[%]	100[%]	0	Х	I	-
23 ²	0h1117	(-)Torque Gain	(-) Trq Gain	50.0	0-150.0[%]	80.0[%]	0	Χ	I	-
24 ²	0h1118	(-)Torque Gain0	(-) Trq Gain0	50.0	0-150.0[%]	80.0[%]	0	Х	I	-
25 ²	0h1119	(-)Torque Offset	(-) Trq Offset	0.0	-100.0[%]	40.0[%]	0	Х	I	-
80	0h1150	Select ranges at power input	-	inv disp	ect ranges erter blays at wer input Run frequency Acceleration time Deceleration time Command source Frequency reference source Multi-step speed frequency1 Multi-step speed frequency2 Multi-step speed frequency3 Output current Motor RPM Inverter DC voltage User select signal (DRV-81)	0: run frequency	Ο	Ο	I/P	-

² Displayed when DRV-10 is set to 1 (Yes)

Code	Comm. Address	Name	LCD Display	Set	ting Range	Initial value	Property*	V/F	SL	Ref.
				12	Currently out of order					
				13	Select run direction					
				14	output current2					
				15	Motor RPM2					
				16	Inverter DC voltage2					
				17	User select signal2 (DRV-81)					
					nitors user					
					ected code Output	-				
		Select monitor		0	voltage(V)	0:				
81	0h1151	code	-		Output	output	0	0	I/P	-
				1	electric	voltage				
					power(kW) Torque(kgf	-				
				2	·m)					
		Display		0	View All	0.				
89	0h03E3	changed parameter	-	1	View Changed	0: View All	0	0	I/P	-
					Move to					
				0	initial					
90	0h115A	[ESC] key	_		position	0:	Х	0	I/P	p.84
70	OIIIIJA	functions		1	JOG Key	None			1/1	<u>p.0+</u>
				2	Local/Rem ote					
91	0h115B	Smart copy	SmartCopy	0	None					
				1	SmartDow nload	0:None	Х	0	I/P	_
				3	SmartUpLo	O.NOTIC	^		1/1	
					ad					
				0	No					
				1	All Grp					
				2	DRV Grp					
93	0h115D	Parameter		3	BAS Grp ADV Grp	0:No	Х		I/P	
93	טנוווטט	initialization	-	5	CON Grp	0:No	^	0	1/17	-
				6	IN Grp	1				
				7	OUT Grp	1				
				8	COM Grp					
	•	•				•				-

Code	Comm. Address	Name	LCD Display	Setting Range		Initial value	Property*	V/F	SL	Ref.
				9	APP Grp	-				
				12 13	PRT Grp M2 Grp					
94	0h115E	Password registration	-	0- 99 99			0	0	I/P	-
95	0h115F	Parameter lock settings	-	0- 99 99			О	0	I/P	-
97	0h1161	Software version	-					О	I/P	-
98	0h1162	Display I/O board version	IO S/W Ver					0	I/P	
99	0h1163	Display I/O board HW version	IO H/W Ver	1 2	Multiple IO Standard IO Standard IO (M)	Standard IO		0	I/P	-

6.2 Basic Function group (PAR→BAS)

In the following table, the data shaded in grey will be displayed when a related code has been selected.

SL: Sensorless vector control function (DRV-09), I – IM Sensorless, P – PM Sensorless

*O/X: Write-enabled during operation

Code	Comm. Address	Name	LCD Display	Set	ting Range	Initial Value	Property *	V/F	SL	Ref.
00	-	Jump Code	Jump Code	1-9	9	20	0	0	I/P	p.52
				0	None					
		Auxiliary		1	V1					
01	0h1201	reference	Aux Ref Src	3	V2	0:None	Χ	0	I/P	-
		source		4	12					
				6	Pulse					
				0	M+(G*A)					
		Auvilianu		1	Mx (G*A)					
02 ³	0h1202	Auxiliary command	Aux Calc Type	2	M/(G*A)	0:	Х	0	I/P	_
02	0111202		Aux Calc Type	3	M+[M*(G*A)]	M+(GA)	^		1/ Γ	_
		calculation type	<u> </u>	4	M+G*2(A- 50%)					

³ Displayed when BAS-01 is not set to 0 (None)

Code	Comm. Address	Name	LCD Display	Set	ting Range	Initial Value	Property *	V/F	SL	Ref.
				5	Mx[G*2(A-					
					50%) M/[G*2(A-					
				6	50%)]					
				7	M+M*G*2(A- 50%)					
03 ³	0h1203	Auxiliary command gain	Aux Ref Gain	-20	0.0-200.0(%)	100.0	0	0	I/P	-
				0	Keypad					
		2nd command		1	Fx/Rx-1	1:				
04	0h1204	source	Cmd 2nd Src	2	Fx/Rx-2	Fx/Rx-1	Χ	0	I/P	<u>p.111</u>
		Jource		3	Int 485					
				4	FieldBus					
				0	Keypad-1					
				1	Keypad-2					
				2	V1					
		2nd frequency		4	V2	0:				
05	0h1205	source	Freq 2nd Src	5	12	Keypad-	0	0	I/P	<u>p.111</u>
		Source		6	Int 485	1				
				8	FieldBus					
				9	UserSeqLink					
				12	Pulse					
				0	Keypad-1					
				1	Keypad-2					
				2	V1					
		2nd Torque		4	V2	0:				
06	0h1206	command	Trq 2 nd Src	5	12	Keypad-	0	Χ	I	
		source		6	Int 485	1				
				8	FieldBus					
				9	UserSeqLink					
-				12	Pulse					
				0	Linear					
07	0h1207	V/F pattern	V/F Pattern	1	Square	0:	Х	0	Χ	p.97
07	0111207	options	V/I I deterii	2	User V/F	Linear	^		^	<u>p.57</u>
				3	Square 2					
		Acc/dec		0	Max Freq	0:				
80	0h1208	standard frequency	Ramp T Mode	1	Delta Freq	Max Freq	Х	0	I/P	<u>p.89</u>
]	Time scale		0	0.01 sec]				
09	0h1209	settings	Time Scale	1	0.1 sec	1:0.1 sec	Χ	0	I/P	<u>p.89</u>
				2	1 sec					
10	0h120A	Input power	60/50 Hz Sel	0	60 Hz	0:60 Hz	Х	0	I/P	
	UIIIZUA	frequency	00/30 172 301	1	50 Hz	0.00 FIZ	^	Ľ	I/F	Ĺ
11	0h120B	Number of motor poles	Pole Number	2-4	8	Depend ent on	Х	0	I/P	-

Code	Comm. Address	Name	LCD Display	Setting Range		Initial Value	Property *	V/F	SL	Ref.
12	0h120C	Rated slip speed	Rated Slip	0-3000(Rpm)		motor setting	Х	0	I	-
13	0h120D	Motor rated current	Rated Curr	1.0	-1000.0(A)		Х	0	I/P	-
14	0h120E	Motor noload current	Noload Curr	0.0	-1000.0(A)		Х	0	I	-
15	0h120F	Motor rated voltage	Rated Volt	170	0-480(V)	0	Х	0	I/P	<u>p.102</u>
16	0h1210	Motor efficiency	Efficiency	64-	100(%)	Depend ent on motor setting	Х	0	I/P	-
17	0h1211	Load inertia rate	Inertia Rate	0-8	i e		Х	0	I/P	-
18	0h1212	Trim power display	Trim Power %	70-	130(%)		0	0	I/P	-
19	0h1213	Input power voltage	AC Input Volt	170	0-480 V	220/380 V	0	0	I/P	-
20	-	Auto Tuning	Auto Tuning	0 1 2 3 6	None All (Rotation type) ALL (Static type) Rs+Lsigma (Rotation type) Tr (Static type) All PM	0:None	x	х	I/P	-
21	_	Stator resistor	Rs				X	Х	I/P	
22	-	Leakage inductance	Lsigma		pendent on	Depend ent on	Х	Х	I	-
23	-	Stator inductance	Ls	IIIC	otor setting	motor setting	Х	Х	I	-
24 ⁴	-	Rotor time constant	Tr	25-5000(ms)		-	Х	Х	I	-
25 ⁴	-	Stator inductance scale	Ls Scale	50-150(%)		100	Х	Х	I	-
26 ⁴	-	Rotor time constant scale	Tr Scale	50-	150(%)	100	Х	Х	I	-

⁴ Displayed when DRV-09 is set to 4(IM Sensorless)

Code	Comm. Address	Name	LCD Display	Setting Range	Initial Value	Property *	V/F	SL	Ref.
28 ⁵	-	D-axis inductance	Ld (PM)	Settings vary	0	Х	Х	Р	
29 ⁵		Q-axis inductance	Lq (PM)	depending on the motor	0	Х	Х	Р	
30 ⁵		Flux reference	PM Flux Ref	specifications.	0.147	Х	Х	Р	
31 ⁴		Regeneration inductance scale	Ls Regen Scale	70 ~ 100[%]	80	Х	Х	I	-
32 ⁵	-	Q-axis inductance scale	Lq(PM) Scale	50–150[%]	100	Х	Х	Р	
34 ⁵	-	PM auto tuning level	Ld,Lq Tune Lev	20.0–50.0[%]	33.3	Х	Х	Р	
35 ⁵	-	PM auto tuning frequency	Ld,Lq Tune Hz	80.0–150.0[%]	100.0	Х	Х	Р	
41 ⁶	0h1229	User frequency1	User Freq 1	0.00-Maximum frequency(Hz)	15.00	Х	0	Х	<u>p.99</u>
42 ⁶	0h122A	User voltage1	User Volt 1	0-100(%)	25	Χ	0	Χ	<u>p.99</u>
43 ⁶	0h122B	User frequency2	User Freq 2	0.00-0.00- Maximum frequency(Hz)	30.00	Х	0	х	<u>p.99</u>
44 ⁶	0h122C	User voltage2	User Volt 2	0-100(%)	50	Χ	0	Χ	<u>p.99</u>
45 ⁶	0h122D	User frequency3	User Freq 3	0.00-Maximum frequency(Hz)	45.00	Х	0	Х	<u>p.99</u>
46 ⁶	0h122E	User voltage3	User Volt 3	0-100(%)	75	Χ	0	Χ	<u>p.99</u>
47 ⁶	0h122F	User frequency4	User Freq 4	0.00-Maximum frequency(Hz)	Maximu m frequen cy	x	0	х	<u>p.99</u>
48 ⁶	0h1230	User voltage4	User Volt 4	0-100(%)	100	Х	0	Χ	<u>p.99</u>
50	0h1232	Multi-step speed frequency1	Step Freq-1	0.00-Maximum frequency(Hz)	10.00	0	0	I/P	<u>p.79</u>
51	0h1233	Multi-step speed frequency2	Step Freq-2	0.00-Maximum frequency(Hz)	20.00	О	0	I/P	<u>p.79</u>

 $^{^{\}rm 5}\,$ Displayed when DRV-09 (Control Mode) is set to 6 (PM Sensorless).

⁶ Displayed when either BAS-07 or M2-25 is set to 2 (User V/F)

Code	Comm. Address	Name	LCD Display	Setting Range	Initial Value	Property *	V/F	SL	Ref.
52	0h1234	Multi-step speed frequency3	Step Freq-3	0.00-Maximum frequency(Hz)	30.00	0	0	I/P	<u>p.79</u>
53 ⁷	0h1235	Multi-step speed frequency4	Step Freq-4	0.00-Maximum frequency(Hz)	40.00	0	0	I/P	<u>p.79</u>
54 ⁷	0h1236	Multi-step speed frequency5	Step Freq-5	0.00-Maximum frequency(Hz)	50.00	0	0	I/P	<u>p.79</u>
55 ⁷	0h1237	Multi-step speed frequency6	Step Freq-6	0.00-Maximum frequency(Hz)	Maximu m frequen cy	0	0	I/P	<u>p.79</u>
56 ⁷	0h1238	Multi-step speed frequency7	Step Freq-7	0.00-Maximum frequency(Hz)	Maximu m frequen cy	0	0	I/P	<u>p.79</u>
70	0h1246	Multi-step acceleration time1	Acc Time-1	0.0-600.0(s)	20.0	0	0	I/P	<u>p.91</u>
71	0h1247	Multi-step deceleration time1	Dec Time-1	0.0-600.0(s)	20.0	0	0	I/P	<u>p.91</u>
72 ⁸	0h1248	Multi-step acceleration time2	AccTime-2	0.0-600.0(s)	30.0	0	0	I/P	<u>p.91</u>
73 ⁸	0h1249	Multi-step deceleration time2	Dec Time-2	0.0-600.0(s)	30.0	0	0	I/P	<u>p.91</u>
74 ⁸	0h124A	Multi-step acceleration time3	AccTime-3	0.0-600.0(s)	40.0	0	0	I/P	<u>p.91</u>
75 ⁸	0h124B	time3	Dec Time-3	0.0-600.0(s)	40.0	О	0	I/P	<u>p.91</u>
76 ⁸	0h124C	Multi-step acceleration time4	Acc Time-4	0.0-600.0(s)	50.0	О	О	I/P	<u>p.91</u>
77 ⁸	0h124D	Multi-step deceleration time4	Dec Time-4	0.0-600.0(s)	50.0	0	0	I/P	<u>p.91</u>

⁷ Displayed when one of IN-65-71 is set to Speed-L/M/H

⁸ Displayed when one of IN-65-71 is set to Xcel-L/M/H

Code	Comm. Address	Name	LCD Display	Setting Range	Initial Value	Property *	V/F	SL	Ref.
78 ⁸	0h124E	Multi-step acceleration time5	Acc Time-5	0.0-600.0(s)	40.0	0	0	I/P	<u>p.91</u>
79 ⁸	0h124F	Multi-step deceleration time5	Dec Time-5	0.0-600.0(s)	40.0	0	0	I/P	<u>p.91</u>
80 ⁸	0h1250	Multi-step acceleration time6	AccTime-6	0.0-600.0(s)	30.0	0	0	I/P	<u>p.91</u>
81 ⁸	0h1251	Multi-step deceleration time6	Dec Time-6	0.0-600.0(s)	30.0	0	0	I/P	<u>p.91</u>
82 ⁸	0h1252	Multi-step acceleration time7	Acc Time-7	0.0-600.0(s)	20.0	0	0	I/P	<u>p.91</u>
83 ⁸	0h1253	Multi-step deceleration time7	Dec Time-7	0.0-600.0(s)	20.0	0	0	I/P	<u>p.91</u>

6.3 Advanced Function group (PAR→ADV)

In the following table, the data shaded in grey will be displayed when a related code has been selected.

SL: Sensorless vector control (DRV-09), I – IM Sensorless, P – PM Sensorless

*O/X: Write-enabled during operation

Code	Comm. Address	Name	LCD Display	Set	ting Range	Initial Value	Property*	V/F	SL	Ref.
00	-	Jump Code	Jump Code	1-9	9	24	0	0	I/P	<u>p.52</u>
01	0h1301	Acceleration pattern	Acc Pattern	0	Linear	0:	Χ	0	I/P	<u>p.94</u>
02	0h1302	Deceleration pattern	Dec Pattern	1	S-curve	Linear	Χ	0	I/P	<u>p.94</u>
039	0h1303	S-curve acceleration start point gradient	Acc S Start	1-1	00(%)	40	Х	0	I/P	<u>p.94</u>

⁹ Displayed when ADV- 01 is set to 1 (S-curve)

Code	Comm. Address	Name	LCD Display	Set	ting Range	Initial Value	Property*	V/F	SL	Ref.
04 ⁹	0h1304	S-curve acceleration end point gradient	Acc S End	1-1	00(%)	40	Х	O	I/P	<u>p.94</u>
05 ¹⁰	0h1305	S-curve deceleration start point gradient	Dec S Start	1-1	00(%)	40	Х	0	I/P	<u>p.94</u>
06 ¹⁰	0h1306	S-curve deceleration end point gradient	Dec S End	1-1	00(%)	40	X	0	I/P	<u>p.94</u>
07	0h1307	Start Mode	Start Mode	0	Acc DC-Start	0:Acc	Х	0	I/P	<u>p.103</u>
08 ¹¹	0h1308	Stop Mode	Stop Mode	0 1 2 4	Dec DC-Brake Free-Run Power Braking	0:Dec	х	О	I/P	p.104
09	0h1309	Selection of prohibited rotation direction	Run Prevent	0 1 2	None Forward Prev Reverse Prev	0: None	х	0	I/P	p.86
10	0h130A	Starting with power on	Power-on Run	0	No Yes	0:No	0	0	I/P	<u>p.87</u>
12 ¹²	0h130C	DC braking time at startup	DC-Start Time	0.0	0-60.00(s)	0.00	Х	0	I/P	<u>p.103</u>
13	0h130D	Amount of applied DC	DC Inj Level	0-2	00(%)	50	Х	0	I/P	<u>p.103</u>
14 ¹³	0h130E	Output blocking time before DC braking	DC-Block Time	0.0	0- 60.00(s)	0.10	х	0	I/P	<u>p.104</u>
15 ¹³	0h130F	DC braking time	DC-Brake Time	0.0	0- 60.00(s)	1.00	Х	0	I/P	<u>p.104</u>
16 ¹³	0h1310	DC braking rate	DC-Brake Level	0-2	00(%)	50	Х	0	I/P	<u>p.104</u>

¹⁰ Displayed when ADV- 02 is set to 1 (S-curve)

¹¹ DC braking and power braking (ADV-08, stop mode options 1 and 4) are not available when DRV-09 (Control Mode) is set to 6 (PM Sensorless).

¹² Displayed when ADV- 07 is set to 1 (DC-Start)

¹³ Displayed when ADV- 08 is set to 1 (DC-Brake)

Code	Comm. Address	Name	LCD Display	Setting Range	Initial Value	Property*	V/F	SL	Ref.
17 ¹³	0h1311	DC braking frequency	DC-Brake Freq	Start frequency- 60 Hz	5.00	х	О	I/P	<u>p.104</u>
20	0h1314	Dwell frequency on acceleration	Acc Dwell Freq	Start frequency- Maximum frequency(Hz)	5.00	Х	0	I/P	-
21	0h1315	Dwell operation time on acceleration	Acc Dwell Time	0.0-60.0(s)	0.0	Х	0	I/P	-
22	0h1316	Dwell frequency on deceleration	Dec Dwell Freq	Start frequency- Maximum frequency(Hz)	5.00	х	0	I/P	-
23	0h1317	Dwell operation time on deceleration	Dec Dwell Time	0.0-60.0(s)	0.0	х	О	I/P	-
24	0h1318	Frequency limit	Freq Limit	0 No 1 Yes	0:No	X	0	I/P	<u>p.108</u>
25 ¹⁴	0h1319	Frequency lower limit value	Freq Limit Lo	0.00-Upper limit frequency(Hz)	0.50	0	0	I/P	<u>p.108</u>
26 ¹⁴	0h131A	Frequency upper limit value	Freq Limit Hi	Lower limit frequency- Maximum frequency(Hz)	maxim um freque ncy	х	0	I/P	<u>p.108</u>
27	0h131B	Frequency jump	Jump Freq	0 No 1 Yes	0:No	Х	О	I/P	<u>p.110</u>
28 ¹⁵	0h131C	Jump frequency lower limit1	Jump Lo 1	0.00-Jump frequency upper limit1(Hz)	10.00	0	О	I/P	<u>p.110</u>
29 ¹⁵	0h131D	Jump frequency upper limit1	Jump Hi 1	Jump frequency lower limit1- Maximum frequency(Hz)	15.00	0	0	I/P	<u>p.110</u>
30 ¹⁵	0h131E	Jump frequency lower limit2	Jump Lo 2	0.00-Jump frequency upper limit2(Hz)	20.00	0	0	I/P	<u>p.110</u>
31 ¹⁵	0h131F	Jump frequency upper limit2	Jump Hi 2	Jump frequency lower limit2- Maximum frequency(Hz)	25.00	0	0	I/P	<u>p.110</u>
32 ¹⁵	0h1320	Jump frequency lower limit3	Jump Lo 3	0.00-Jump frequency upper limit3(Hz)	30.00	0	О	I/P	<u>p.110</u>

¹⁴ Displayed when ADV- 24 is set to 1 (Yes)

 $^{^{\}rm 15}\,$ Displayed when ADV- 27 is set to 1 (Yes)

Code	Comm.	Name	LCD Display	Set	ting Range	Initial	Property*	V/F	SL	Ref.
33 ¹⁵	Address 0h1321	Jump frequency upper limit3	Jump Hi 3	Jun Iow Ma	mp frequency ver limit3- ximum quency(Hz)	35.00	0	0	I/P	p.110
41 ¹⁶	0h1329	Brake release current	BR Rls Curr		-180.0(%)	50.0	0	0	I/P	-
42 ¹⁶	0h132A	Brake release delay time	BR RIs Dly	0.0	0-10.00(s)	1.00	Х	0	I/P	-
44 ¹⁶	0h132C	Brake release Forward frequency	BR RIs Fwd Fr		0-Maximum quency(Hz)	1.00	Х	0	I/P	-
45 ¹⁶	0h132D	Brake release Reverse frequency	BR RIs Rev Fr		0-Maximum quency(Hz)	1.00	Х	0	I/P	-
46 ¹⁶	0h132E	Brake engage delay time	BR Eng Dly	0.0	0-10.00(s)	1.00	Х	0	I/P	-
47 ¹⁶	0h132F	Brake engage frequency	BR Eng Fr		0-Maximum quency(Hz)	2.00	Х	0	I/P	-
50	0h1332	Energy saving operation	E-Save Mode	0 1 2	None Manual Auto	0:Non e	Х	0	х	-
51 ¹⁷	0h1333	Energy saving level	Energy Save	0-3	0(%)	0	0	0	Х	-
60	0h133C	Acc/Dec time transition frequency	Xcel Change Fr		0-Maximum quency(Hz)	0.00	х	0	I/P	<u>p.93</u>
61	0h133D	Rotation count speed gain	Load Spd Gain	0.1	~6000.0[%]	100.0	0	0	I/P	-
62	0h133E	Rotation count speed scale	Load Spd Scale	0 1 2 3 4	x 1 x 0.1 x 0.01 x 0.001 x 0.0001	0: x 1	0	0	I/P	-
63	0h133F	Rotation count speed unit	Load Spd Unit	0	Rpm mpm	0: rpm	0	0	I/P	-
64	0h1340	Cooling fan control	FAN Control	0 1 2	During Run Always ON Temp Control	0:Duri ng Run	0	0	I/P	-
65	0h1341	Up/down operation frequency save	U/D Save Mode	1	No Yes	0:No	О	0	I/P	-

 $^{^{\}rm 16}\,$ Displayed when either OUT-31 or OUT-33 is set to 35 (BR Control)

 $^{^{\}rm 17}\,$ Displayed when ADV-50 is not set to 0 (None)

Code	Comm. Address	Name	LCD Display	Setting Range		Initial Value	Property*	V/F	SL	Ref.
66	0h1342	Output contact On/Off control options	On/Off Ctrl Src	0 1 3 4 6	None V1 V2 I2 Pulse	0:Non e	х	О	I/P	-
67	0h1343	Output contact On level	On-Ctrl Level		tput contact level- 100.00%	90.00	Х	0	I/P	-
68	0h1344	Output contact Off level	Off-Ctrl Level		0.00-output ntact on level	10.00	Х	0	I/P	-
70	0h1346	Safe operation selection	Run En Mode	0	Always Enable DI Dependent	0:Alwa ys Enable	х	O	I/P	-
71 ¹⁸	0h1347	Safe operation stop options	Run Dis Stop	0 1 2	Q-Stop Q-Stop Resume	0:Free- Run	X	0	I/P	-
72 ¹⁸	0h1348	Safe operation deceleration time	Q-Stop Time	0.0-	-600.0(s)	5.0	0	0	I/P	-
74 ¹⁹	0h134A	Selection of regeneration evasion function for press	RegenAvd Sel	1	No Yes	0:No	Х	0	I	-
75 ¹⁹	0h134B	Voltage level of regeneration evasion motion for press	RegenAvd Level			350 700	Х	0	I	-
76 ²⁰	0h134C	Compensation frequency limit of regeneration evasion for press	CompFreq Limit	0.00- 10.00 Hz		1.00	Х	0	I	-
77 ²⁰	0h134D	Regeneration evasion for press P gain	RegenAvd Pgain	0.0- 100.0%		50.0	O	O	I	-

¹⁸ Displayed when ADV-70 is set to 1 (DI Dependent)

 $^{^{19}\,}$ Displayed when DRV-09 (Control Mode) is not set to 6 (PM Sensorless).

²⁰ Displayed when ADV-74 is set to 1 (Yes)

Code	Comm. Address	Name	LCD Display	Set	ting Range	Initial Value	Property*	V/F	SL	Ref.		
78 ²⁰	0h134E	Regeneration evasion for press I gain	RegenAvd Igain	20-	30000(ms)	500	0	O	I	-		
79	0h134F	DB Unit turn on	DB Turn On	200V: Min ²¹ ~400[V]		Min ²¹ ~400[V]		390[V]	Χ	0	I/P	
79	U11134F	voltage level	Lev	400 Mir)V: 1 ²¹ ~800[V]	780[V]	^		I/P	_		
80	0h1350	Fire Mode Selection	Fire Mode Sel	0 1 2	None Fire Mode Fire Mode Test	0:Non e	х	0	I/P	<u>p.123</u>		
81 ²²	0h1351	Fire Mode operation frequency	Fire Mode Freq	0.0	0-60.00[Hz]	60.00	х	0	I/P	<u>p.123</u>		
		Fire Mode		0	Forward	0:						
82 ²²	0h1352	operation direction	Fire Mode Dir	1	Reverse	Forwar d	X	0	I/P	<u>p.123</u>		
83 ²²	-	Fire Mode Count	Fire Mode Cnt		t able to dify	-	-	-	-	<u>p.123</u>		

 $^{^{21}}$ DC voltage value (convert BAS-19 AC Input voltage) + 20V (200V type) or + 40V (400V type)

²² Displayed when ADV-80 is set to 1(Yes)

6.4 Control Function group (PAR→CON)

In the following table, the data shaded in grey will be displayed when a related code has been selected.

SL: Sensorless vector control (DRV-09), I – IM Sensorless, P – PM Sensorless

<u> </u>	. Comm Initial										
Code	Comm. Address	Name	LCD Display	Setting Range		Initial Value	Property*	V/F	SL	Ref.	
00	-	Jump Code	Jump Code	1-99		4	0	0	I/P	<u>p.52</u>	
04	0h1404	Carrier frequency	Carrier Freq	Heavy Duty	V/F: 1.0~15.0 (kHz) ²³ IM: 2.0~15.0 (kHz) PM: 2.0~10.0(kHz)	3.0	x	0	I/P	-	
				Normal Duty ²⁴	V/F: 1.0~ 5.0 (kHz) ²⁵ IM: 2.0~5.0 (kHz)	2.0				-	
05	0h1405	Switching	PWM	0	Normal PWM	0:Norma	х	0	ı	_	
	0111403	mode	Mode	1	Lowleakage PWM	IPWM	^			_	
09 ²⁶	0h1409	Initial excitation time	PreExTime	0.00-60.00)(s)	1.00	X	х	I	-	
10 ²⁶	0h140A	Initial excitation amount	Flux Force	100.0-300.0(%)		100.0	х	х	I	-	

In case of 0.4 \sim 4.0kW, the setting range is 2.0 \sim 15.0(kHz)

²⁴ PM synchronous motor sensorless vector control mode does not support normal duty operation [when DRV-09 (Control Mode) is set to 6 (PM Sensorless)].

 $^{^{25}}$ In case of 0.4~4.0kW, the setting range is 2.0~5.0(kHz).

²⁶ Displayed when DRV-09 (Control Mode) is not set to 6 (PM Sensorless).

Code	Comm. Address	Name	LCD Display	Setting Range		Initial Value	Property*	V/F	SL	Ref.
11	0h140B	Continued operation duration	Hold Time	0.00-	-60.00(s)	0.00	х	Х	ı	-
12 ²⁷	0h140D	PM S/L speed controller proportion al gain1	ASR P Gain 1	0~50	000	100	х	х	Р	-
13 ²⁷	0h140F	PM S/L speed controller integral gain1	ASR P Gain 1	0~50	000	150	х	х	Р	-
15 ²⁷	0h1410	PM S/L speed controller proportion al gain2	ASR P Gain 1	0~5000		100	х	х	Р	-
16 ²⁷	0h1410	PM S/L speed controller integral gain2	ASR P Gain 1	0~99	999	150	х	x	Р	-
20 ²⁶	0h1414	Sensorless 2 nd gain	SL2 G View Sel	0	No	0:No	0	х	I	-
		display setting		1	Yes					
21 ²⁶	0h1415	Sensorless speed controller proportion al gain1	ASR-SL P Gain1	0-5000(%)		Depend	0	х	I	-
22 ²⁶	0h1416	Sensorless speed controller integral gain1	ASR-SL I Gain1	10-9999(ms)		ent on motor setting	0	Х	I	-
23 ²⁸	0h1417	Sensorless speed	ASR-SL P Gain2	1.0-1000.0(%)			0	Х	I	-

 $^{^{\}rm 27}$ Displayed when DRV-09 (Control Mode) is set to 6 (PM Sensorless).

 $^{^{28}\,}$ Displayed when DRV-09 is set to 4 (IM Sensorless) and CIN-20 is set to 1 (YES)

Code	Comm. Address	Name	LCD Display	Setting Range	Initial Value	Property*	V/F	SL	Ref.
		controller proportion al gain2							
24 ²⁸	0h1418	Sensorless speed controller integral gain2	ASR-SL I Gain2	1.0-1000.0(%)		0	Х	I	-
25 ²⁸	0h1419	Sensorless speed controller integral gain0	ASR-SL I Gain0	10-9999(ms)		0	х	I	-
26 ²⁸	0h141A	Flux estimator proportion al gain	Flux P Gain	10-200(%)		0	Х	I	-
27 ²⁸	0h141B	Flux estimator integral gain	Flux I Gain	10-200(%)		0	Х	I	-
28 ²⁸	0h141C	Speed estimator proportion al gain	S-Est P Gain1	0-32767		0	Х	I	-
29 ²⁸	0h141D	Speed estimator integral gain1	S-Est I Gain1	100-1000		О	х	I	-
30 ²⁸	0h141E	Speed estimator integral gain2	S-Est I Gain2	100-10000		О	х	I	-
31 ²⁸	0h141F	Sensorless current controller proportion al gain	ACR SL P Gain	10-1000		0	х	I	-
32 ²⁸	0h1420	Sensorless current controller integral gain	ACR SL I Gain	10 -1000		0	х	I	-

Code	Comm. Address	Name	LCD Display	Setting Range	Initial Value	Property*	V/F	SL	Ref.
33 ²⁹	0h1421	PM D-axis back-EMF estimation gain [%]	PM EdGain Perc	0~300.0[%]	100.0	х	х	Р	-
34 ²⁹	0h1422	PM Q-axis back-EMF estimation gain [%]	PM EqGain Perc	0~300.0[%]	100.0	х	х	Р	-
35 ²⁹	0h1423	Initial pole position detection retry number	PD Repeat Num	0~10	2	х	х	Р	-
36 ²⁹	0h1424	Initial pole position detection pulse interval	Pulse Interval	1~100	20	х	х	Р	-
37 ²⁹	0h1425	Initial pole position detection current level [%]	Pulse Curr %	10~100	15	х	х	Р	-
38 ²⁹	0h1426	Initial pole position detection voltage level [%]	Pulse Volt %	100~4000	500	х	х	Р	-
39 ²⁹	0h1427	PM dead time range [%]	PMdeadBan d Per	50.0~100.0	100.0	Х	Х	Р	-
40 ²⁹	0h1428	PM dead time voltage [%]	PMdeadVol t Per	50.0~100.0	100.0	Х	Х	Р	-
41 ²⁹	0h1429	Speed estimator P gain1	PM SpdEst Kp	0~32000	100	Х	Х	Р	-
42 ²⁹	0h142A	Speed estimator I gain1	PM SpdEst Ki	0~32000	10	Х	Х	Р	-
43 ²⁹	0h142B	Speed estimator P gain2	PM SpdEst Kp 2	0~32000	300	Х	Х	Р	-

 $^{^{\}rm 29}$ Displayed when DRV-09 (Control Mode) is set to 6 (PM Sensorless).

Code	Comm. Address	Name	LCD Display	Setting Range		Initial Value	Property*	V/F	SL	Ref.
44 ²⁹	0h142C	Speed estimator I gain2	PM SpdEst Ki 2	0~32000		30	Х	Х	Р	-
45 ²⁹	0h142D	Speed estimator feed forward high speed rate [%]	PM Flux FF %	0~100	[%]	30.0	х	х	Р	-
		Initial pole		0	None					
46 ²⁹	0h142E	position detection	Init Angle Sel	1 Angle		1	Х	Х	Р	_
		options	Sei	2 Align						
48 ²⁹	0h1430	Current controller P gain	ACR P Gain	0-1000	00	1200	0	х	I	-
49 ²⁹	0h1431	Current controller I gain	ACR I Gain	0-10000		120	0	Х	0	-
50 ²⁹	0h1432	Voltage controller limit	V Con HR	0~100	.0[%]	10.0	X	Х	Р	-
51 ²⁹	0h1433	Voltage controller I gain	V Con Ki	0~100	0.0[%]	10.0	Х	Х	Р	-
52	0h1434	Torque controller output filter	Torque Out LPF	0-2000)(ms)	0	x	Х	I/P	-
53	0h1435	Torque limit setting options	Torque Lmt Src	0 Keypad-1 1 Keypad-2 2 V1 4 V2 5 I2 6 Int 485 8 FieldBus 9 UserSeqLink		0: Keypad- 1	х	х	I/P	-
54 ³⁰	0h1436	Positive- direction reverse torque limit	FWD +Trq Lmt	12 Pulse 0.0-200.0(%)		180	О	х	I/P	-

Displayed when DRV-09 is set to 4 (IM Sensorless). This will change the initial value of the parameter at ADV-74 (Torque limit) to 150%.

Code	Comm. Address	Name	LCD Display	Setting	Range	Initial Value	Property*	V/F	SL	Ref.
55 ³⁰	0h1437	Positive- direction regenerati on torque limit	FWD -Trq Lmt	0.0-200.0(%)		180	О	х	I/P	-
56 ³⁰	0h1438	Negative- direction regenerati on torque limit	REV +Trq Lmt	0.0-200.0(%)		180	О	х	I/P	-
57 ³⁰	0h1439	Negative- direction reverse torque limit	REV -Trq Lmt	0.0-200.0(%)		180	0	х	I/P	-
62 ³⁰	0h143E	Speed limit setting	Speed Lmt Src	0 1 2 4 5 6 7 8	Keypad-1 Keypad-2 V1 V2 I2 Int 485 FieldBus UserSeqLink	0:Keypa d-1	Х	х	I/P	-
63 ³⁰	0h143F	Positive- direction speed limit	FWD Speed Lmt	0.00-Ma	aximum ıcy [Hz]	60.00	0	Х	I/P	-
64 ³⁰	0h1440	Negative- direction speed limit	REV Speed Lmt	0.00-Ma	aximum ncy [Hz]	60.00	0	х	I/P	-
65 ³⁰	0h1441	Speed limit operation gain	Speed Lmt Gain	100~5000(%)		500	О	Х	I/P	-
69 ³¹		PM speed search current	SS Pulse Curr	15		10~100	0	Х	Р	
70	0h1446	Speed search mode selection	SS Mode	0 Flying Start-1 ³²		0: Flying Start-1	Х	0	I/P	-

³¹ Displayed when DRV-09 (Control Mode) is set to 6 (PM Sensorless).

 $^{^{\}rm 32}\,$ Will not be Displayed when DRV-09 is set to 4 (IM Sensorless)

Code	Comm. Address	Name	LCD Display	Sotting Range		Initial Value	Property*	V/F	SL	Ref.
				1	Flying Start-2					
				2	Flying Start- 3 ³¹					
				bit	0000-1111					
				0001	Selection of speed search on acceleration					
71	0h1447	Speed search operation	Speed Search	0010	When starting on initialization after fault trip	0000	X	0	I/P	-
		selection	Search	0100	When restarting after instantaneous power interruption					
				1000	When starting with power on					
72 ³³	0h1448	Speed search reference current	SS Sup- Current	80-200(%)	150	0	0	I	-
73 ³⁴	0h1449	Speed search proportion al gain	SS P-Gain	0-9999		Flying Start-1:100 Flying Start-2:600 ³⁵	0	0	I	-
74 ³⁴	0h144A	Speed search integral gain	SS I-Gain	0-9999		Flying Start-1:200 Flying Start-2:1000	• О	О	I	-

³³ Displayed when any of the CON-71 code bits are set to 1 and CON-70 is set to 0 (Flying Start-1)

 $^{^{\}rm 34}\,$ Displayed when any of the CON-71 code bits are set to 1

 $^{^{35}}$ The initial value is 1200 when the motor-rated capacity is less than 7.5 kW

Code	Comm. Address	Name	LCD Display	Setting Range		Initial Value	Property*	V/F	SL	Ref.
75 ³⁴	0h144B	Output blocking time before speed search	SS Block Time	0.0-60.0(s)		1.0	х	О	I/P	-
76 ³⁴	0h144C	Speed search Estimator gain	Spd Est Gain	50-150(%)		100	0	0	I	-
		Energy		0 No						
77	0h144D	buffering	KEB Select	1	KEB-1	0:No	Х	0	I/P	-
		selection		2	KEB-2					
78 ³⁶	0h144E	Energy buffering start level	KEB Start Lev	110.0-200.0(9	6)	125.0	х	0	I/P	-
79 ³⁶	0h144F	Energy buffering stop level	KEB Stop Lev	CON78~210.	O(%)	130.0	х	0	I/P	-
80 ³⁶	0h1450	Energy buffering P gain	KEB P Gain	0-20000		1000	0	0	I/P	-
81 ³⁶	0h1451	Energy buffering I gain	KEB I Gain	1~20000		500	0	0	I/P	-
82 ³⁶	0h1452	Energy buffering Slip gain	KEB Slip Gain	0~2000.0%		30.0	0	0	I	-
83 ³⁶	0h1453	Energy buffering acceleratio n time	KEB Acc Time	0.0~600.0(s)		10.0	0	0	I/P	-
85 ³⁷	0h1455	Flux estimator proportion al gain1	Flux P Gain1	100-700		370	0	х	I	-

 $^{^{\}rm 36}\,$ Displayed when CON-77 is not set to 0 (No).

 $^{^{\}rm 37}\,$ Displayed when CON-20 is set to 1 (Yes)

Code	Comm. Address	Name	LCD Display	Setting Range	Initial Value	Property*	V/F	SL	Ref.
86 ³⁷	0h1456	Flux estimator proportion al gain2	Flux P Gain2	0-100	0	О	х	I	-
87 ³⁷	0h1457	Flux estimator proportion al gain3	Flux P Gain3	0-500	100	О	х	I	-
88 ³⁷	0h1458	Flux estimator integral gain1	Flux I Gain1	0-200	50	0	Х	I	-
89 ³⁷	0h1459	Flux estimator integral gain2	Flux I Gain2	0-200	50	0	Х	I	-
90 ³⁷	0h145A	Flux estimator integral gain3	Flux I Gain3	0-200	50	0	х	I	-
91 ³⁷	0h145B	Sensorless voltage compensat ion1	SL Volt Comp1	0-60		0	х	I	-
92 ³⁷	0h145C	Sensorless voltage compensat ion2	SL Volt Comp2	0-60	Depend ent on motor setting	0	Х	I	-
93 ³⁷	0h145D	Sensorless voltage compensat ion3	SL Volt Comp3	0-60		0	х	I	-
94 ³⁷	0h145E	Sensorless field weakening start frequency	SL FW Freq	80.0-110.0(%)	100.0	х	х	I	-
95 ³⁷	0h145F	Sensorless gain switching frequency	SL Fc Freq	0.00-8.00(Hz)	2.00	Х	х	I	-

6.5 Input Terminal Block Function group (PAR→IN)

In the following table, the data shaded in grey will be displayed when a related code has been selected.

SL: Sensorless vector control (DRV-09), I – IM Sensorless, P – PM Sensorless

Code	Comm. Address	Name	LCD Display	Set	tting Range	Initial Value	Property*	V/F	SL	Ref.
00	-	Jump Code	Jump Code	1-9	9	65	0	0	I/P	<u>p.52</u>
01	0h1501	Frequency for maximum analog input	Freq at 100%	at 100% Start frequency- Maximum frequency(Hz)		Maxim um freque ncy	0	0	I/P	<u>p.67</u>
02	0h1502	Torque at maximum analog input	Torque at100%	0.0	9-200.0(%)	100.0	0	Х	Χ	-
05	0h1505	V1 input voltage display	V1 Monitor(V)	-12	2.00-12.00(V)	0.00	0	0	I/P	<u>p.67</u>
		V1 input		0 Unipolar		0:				
06	0h1506	polarity selection	V1 Polarity	1 Bipolar		Unipol ar	Х	0	I/P	<u>p.67</u>
07	0h1507	Time constant of V1 input filter	V1 Filter	0-1	0000(ms)	10	0	0	I/P	p.67
08	0h1508	V1 Minimum input voltage	V1 Volt x1	0.0	0-10.00(V)	0.00	0	О	I/P	<u>p.67</u>
09	0h1509	V1 output at Minimum voltage (%)	V1 Perc y1	0.0	00-100.00(%)	0.00	0	0	I/P	p.67
10	0h150A	V1 Maximum input voltage	V1 Volt x2	0.0	0-12.00(V)	10.00	0	О	I/P	<u>p.67</u>
11	0h150B	V1 output at Maximum voltage (%)	V1 Perc y2	0.00-100.00(%)		100.00	0	0	I/P	p.67
12 ³⁸	0h150C	V1 Minimum input voltage	V1 -Volt x1'	1' -10.00- 0.00(V)		0.00	О	0	I/P	<u>p.72</u>
13 ³⁸	0h150D	V1output at Minimum voltage (%)	V1 -Perc y1'	1' -100.00-0.00(0.00	О	0	I/P	<u>p.72</u>

³⁸ Displayed when IN-06 is set to 1 (Bipolar)

Code	Comm. Address	Name	LCD Display	Set	tting Range	Initial Value	Property*	V/F	SL	Ref.
14 ³⁸	0h150E	V1 Maximum input voltage	V1 -Volt x2'	-12	2.00-0.00(V)	-10.00	0	0	I/P	<u>p.72</u>
15 ³⁸	0h150F	V1 output at Maximum voltage (%)	V1 -Perc y2'	-100.00-0.00(%)		-100.00	0	0	I/P	<u>p.72</u>
16	0h1510	V1 rotation direction change	V1 Inverting	1	No Yes	0: No	0	0	I/P	<u>p.67</u>
17	0h1511	V1 quantization level	V1 Quantizing		0 ³⁹ , 0.04- 00(%)	0.04	х	0	I/P	<u>p.67</u>
35 ⁴⁰	0h1523	V2 input voltage display	V2 Monitor(V)	0.0	0-12.00(V)	0.00	0	0	I/P	<u>p.75</u>
37 ⁴⁰	0h1525	V2 input filter time constant	V2 Filter	0-1	0000(ms)	10	0	0	I/P	<u>p.75</u>
38 ⁴⁰	0h1526	V2 Minimum input voltage	V2 Volt x1	0.0	0-10.00(V)	0.00	0	Х	I/P	<u>p.75</u>
39 ⁴⁰	0h1527	V2 output at Minimum voltage (%)	V2 Perc y1	0.0	0-100.00(%)	0.00	0	0	I/P	<u>p.75</u>
40 ⁴⁰	0h1528	V2 Maximum input voltage	V2 Volt x2	0.0	0-10.00(V)	10	0	Х	I/P	<u>p.75</u>
41 ⁴⁰	0h1529	V2 output at Maximum voltage (%)	V2 Perc y2	0.0	0-100.00(%)	100.00	0	0	I/P	<u>p.75</u>
40	01.4505	V2 rotation		0	No				. /5	
46 ⁴⁰	0h152E	direction change	V2 Inverting	1	Yes	0:No	0	0	I/P	<u>p.75</u>
47 ⁴⁰	0h152F	V2 quantization level	V2 Quantizing	0.00 ³⁹ , 0.04- 10.00(%)		0.04	0	0	I/P	<u>p.75</u>
50 ⁴¹	0h1532	I2 input current display	I2 Monitor (mA)	0-24(mA)		0.00	О	0	I/P	<u>p.74</u>
52 ⁴¹	0h1534	I2 input filter time constant	12 Filter	0-10000(ms)		10	0	0	I/P	<u>p.74</u>

³⁹ Quantizing is not used when set to 0.

⁴⁰ Displayed when V is selected on the analog current/voltage input circuit selection switch (SW2

 $^{^{41}\,}$ Displayed when I is selected on the analog current/voltage input circuit selection switch (SW2)

Code	Comm. Address	Name	LCD Display	Setting Range		Initial Value	Property*	V/F	SL	Ref.
53 ⁴¹	0h1535	I2 minimum input current	I2 Curr x1	0.0	0-20.00(mA)	4.00	0	0	I/P	<u>p.74</u>
54 ⁴¹	0h1536	I2 output at Minimum current (%)	I2 Perc y1	0.00-100.00(%)		0.00	О	0	I/P	<u>p.74</u>
55 ⁴¹	0h1537	I2 maximum input current	I2 Curr x2	0.0	0-24.00(mA)	20.00	0	0	I/P	<u>p.74</u>
56 ⁴¹	0h1538	I2 output at Maximum current (%)	I2 Perc y2	0.0	0-100.00(%)	100.00	0	0	I/P	<u>p.74</u>
61 ⁴¹	0h153D	Changing rotation direction of I2	I2 Inverting	1	No Yes	0:No	0	0	I/P	<u>p.74</u>
62 ⁴¹	0h153E	l2 quantization level	I2 Quantizing		0 ³⁹ ,0.04- 00(%)	0.04	0	0	I/P	<u>p.74</u>
		P1 terminal		0	None					
65	0h1541	function setting	P1 Define	1	Fx	1:Fx	Х	0	I/P	<u>p.81</u>
66	0h1542	P2 terminal function setting	P2 Define	2	Rx	2:Rx	х	0	I/P	<u>p.81</u>
67	0h1543	P3 terminal function setting	P3 Define	3	RST	5:BX	Х	0	I/P	-
68	0h1544	P4 terminal function setting	P4 Define	4	External Trip	3:RST	х	0	I/P	-
69	0h1545	P5 terminal function setting	P5 Define	5	BX	7:Sp-L	х	0	I/P	-
70	0h1546	P6 terminal function setting	P6 Define	6	JOG	8:Sp-M	х	0	I/P	-
71	0h1547	P7 terminal function setting	P7 Define	7	Speed-L	9:Sp-H	Х	0	I/P	<u>p.79</u>
				8	Speed-M					<u>p.79</u>
				9	Speed-H	1				<u>p.79</u>
				11	XCEL-L	4				<u>p.91</u>
					XCEL-M	-				<u>p.91</u>
			<u> </u>	13	RUN Enable					_

Code	Comm. Address	Name	LCD Display	Set	ting Range	Initial Value	Property*	V/F	SL	Ref.
				14	3-Wire					-
				15	2nd Source					p.111
				16	Exchange					-
				17	Up					-
				18	Down					-
				20	U/D Clear					-
				21	Analog Hold					p.78
				22	I-Term Clear					-
					PID Openloop					-
				24	P Gain2					-
				25	XCEL Stop					p.96
				26	2nd Motor					-
				34	Pre Excite					-
				38	Timer In					-
				40	dis Aux Ref					-
				46	FWD JOG					-
				47	REV JOG					-
				49	XCEL-H					p.91
				50	User Seq					p.115
				51	Fire Mode					p.123
				52	KEB-1 Select					-
		Multi-function		P7	~ P1					
0.4	0h1554	input terminal	DI Dalay Cal	0	Disable(Off)	1 1 1 1 1 1			I/D	112
84	0h1554	On filter	DI Delay Sel	1	F	1 11111	0	0	I/P	<u>p.112</u>
		selection		1	Enable(On)					
		Multi-function								
85	0h1555	input terminal	DI On Delay	0_1	0000(ms)	10	0	0	I/P	p.112
65	0111333	On filter	Di Oli Delay	0-1	0000(1115)	10	U		1/ [<u>p.112</u>
		Multi-function								
86	0h1556	input terminal	DI Off Delay	0-1	0000(ms)	3	О	0	I/P	<u>p.112</u>
		Off filter								
		Multi-function		P7	– P1					
87	0h1557	input	DI NC/NO Sel	0	A contact	000	Χ	0	I/P	p.112
0,	0111337	contact	21110,110 00.		(NO)	0000	,		., .	<u> </u>
-		selection		1	B contact (NC)					
00	0h1550	Multi-step	la Cha als Tina a	1 5	(000()	1	v		I/D	70
89	0h1559	command	InCheck Time	1-5	6000(ms)	1	Χ	0	I/P	<u>p.79</u>
		delay time		D7	– P1			-		
		Multi-function		0	release(Off)	000				
90	0h155A	input terminal	DI Status		Connection	0000	О	0	I/P	<u>p.112</u>
		status		1	(On)	3000				
	l	<u> </u>	<u> </u>	<u> </u>	(311)	I .	1	1	1	L

Code	Comm. Address	Name	LCD Display	Set	ting Range	Initial Value	Property*	V/F	SL	Ref.
91	0h155B	Pulse input amount display	Pulse Monitor (kHz)	0.0	0-50.00(kHz)	0.00	О	O	I/P	<u>p.76</u>
92	0h155C	TI input filter time constant	TI Filter	0-9	9999(ms)	10	0	0	I/P	<u>p.76</u>
93	0h155D	TI Minimum input pulse	TI Pls x1	0.0	0-32.00(kHz)	0	О	0	I/P	<u>p.76</u>
94	0h153E	TI output at Minimum pulse (%)	TI Perc y1	0.0	0-100.00(%)	0.00	О	О	I/P	<u>p.76</u>
95	0h155F	TI Maximum input pulse	TI Pls x2	0.0	0-32.00(kHz)	32.00	0	0	I/P	<u>p.76</u>
96	0h1560	TI Output at Maximum pulse (%)	TI Perc y2	0-1	00(%)	100.00	О	0	I/P	<u>p.76</u>
		TI rotation		0	No					
97	0h1561	direction change	TI Inverting	1	Yes	0:No	0	0	I/P	<u>p.76</u>
98	0h1562	TI quantization level	TI Quantizing		0 ³⁹ , 0.04- 00(%)	0.04	О	0	I/P	<u>p.76</u>
99	0h1563	SW1(NPN/PNP), SW2(V2[I2]) Status display	IO SW State	Bit 00 01 10	00~11 V2, NPN V2, PNP I2, NPN I2, PNP	00	О	О	I/P	-

6.6 Output Terminal Block Function group (PAR→OUT)

In the following table, the data shaded in grey will be displayed when a related code has been selected.

SL: Sensorless vector control (DRV-09), I – IM Sensorless, P – PM Sensorless

Code	Comm. Address	Name	LCD Display	Setti	ng Range	Initial Value	Property*	V/F	SL	Ref.
00	-	Jump Code	JumpCode	1-99		30	0	0	I/P	<u>p.52</u>
				0	Frequency					
				1	Output Current					
				2	Output Voltage					
				3	DCLink Voltage					
				4	Torque					
				5	Output Power					
		Analog output		6	Idse	0:				
01	0h1601	1 item	AO1 Mode	7	lqse	Freque	0	0	I/P	-
		Titem		<u> </u>		ncy				
				9 Ramp Freq						
				10 Speed Fdb						
				12 PID Ref Value						
				13 PID Fdb Value						
				14 PID Output						
				15 Constant						
02	0h1602	Analog output 1 gain	AO1 Gain	-100	0.0-1000.0(%)	100.0	0	0	I/P	-
03	0h1603	Analog output 1 bias	AO1 Bias	-100	.0-100.0(%)	0.0	0	О	I/P	-
04	0h1604	Analog output 1 filter	AO1 Filter	0-10	000(ms)	5	0	0	I/P	-
05	0h1606	Analog constant output 1	AO1 Const %	0.0-1	00.0(%)	0.0	0	0	I/P	-
06	0h1606	Analog output 1 monitor	AO1 Monitor	0.0-1	000.0(%)	0.0		0	I/P	
				0	Frequency					
				1 Output Current						
				2 Output Voltage						
07	0h1607	Analog output	AO2 Mode	3	DCLink Voltage					
		2 item		4	Torque					
				5	Output Power					
				—	•					
				6	Idse					

	Comm.		LCD			Initial				
Code	Address	Name	Display	Setting Range		Value	Property*	V/F	SL	Ref.
				7	lqse					
				8	Target Freq					
				9	Ramp Freq					
				10	Speed Fdb					
				12	PID Ref Value					
				13	PID Fdb Value					
				14	PID Output					
				15	Constant					
08	0h1608	Analog output 2 gain	AO2 Gain	-100	0.0~1000.0(%)	100.0	0	0	I/P	-
09	0h1609	Analog output 2 bias	AO2 Bias	-100	0.0~100.0(%)	0.0	0	0	I/P	-
10	0h160A	Analog output 2 filter	AO2 Filter	0~1	0000(ms)	5	О	0	I/P	-
11	0h160B	Analog constant output 2	AO2 Const %	0.0~	100.0(%)	0.0	О	0	I/P	-
12	0h160C	Analog output 2 monitor	AO2 Monitor	0.0~	1000.0(%)	0.0		0	I/P	-
-				bit	000-111					
				1	Low voltage					
					Any faults other					
30	0h161E	Fault output	Trip Out	2	than low	010	0	0	I/P	
30	OITIOIL	item	Mode		voltage	010			1/ F	
					Automatic					
				3	restart final					
					failure					
				0	None	-				
				1	FDT-1					
				3	FDT-2					
				4	FDT-3 FDT-4					
				5	Over Load					
				6	IOL	1				
		Multi-function		7	Under Load					
31	0h161F	relay 1 item	Relay 1	8	Fan Warning	29:Trip	0	О	I/P	-
				9	Stall	1				
				10	Over Voltage]				
				11	Low Voltage]				
				12	Over Heat	1				
				13	Lost Command					
				14	Run	1				
]		15	Stop					<u> </u>

Code	Comm. Address	Name	LCD Display	Sett	ing Range	Initial Value	Property*	V/F	SL	Ref.
			. ,	16	Steady					
				17	Inverter Line					
				18	Comm Line					
				19	Speed Search					
				22	Ready					
				28	Timer Out					
				29	Trip					
				31	DB Warn%ED					
				34	On/Off Control					
				35	BR Control					
				36	CAP. Exchange					
				37	Fan Exchange					
				38	Fire Mode					
				39	TO ⁴²					
				40	KEB Operating					
				0	None					
				1	FDT-1					
				2	FDT-2					
				3	FDT-3					
				4	FDT-4			0		
				5	Over Load					
				6	IOL					
				7	Under Load					
				8	Fan Warning					
				9	Stall					
				10	Over Voltage					
				11 12	Low Voltage					
22	0h1620	Multi-function	Delev 2		Over Heat Lost Command	1 4.D			L/D	
32	Un 1620	relay 2 item	Relay 2	13 14	Run	14:Run	0	U	I/P	-
				15	Stop					
				16	Steady					
				17	Inverter Line					
				18	Comm Line					
				19	Speed Search					
				22	Ready					
				28	Timer Out					
				29	Trip		1			
				31	DB Warn%ED		1			
				34	On/Off Control		1			
				35	BR Control		1			
				36	CAP. Exchange		1			

⁴² Supprted only Standard I/O

Code	Comm. Address	Name	LCD Display	Setting Range 37 Fan Exchange		Initial Value	Property*	V/F	SL	Ref.
				37	Fan Exchange					
				38	Fire Mode					
				39	TO ⁴²					
				40	KEB Operating	1				
				0	None					
				1	FDT-1					
				2	FDT-2					
				3	FDT-3					
				4	FDT-4					
				5	Over Load					
				6	IOL					
				7	Under Load					
				8	Fan Warning					
				9	Stall					
				10	Over Voltage					
				11	Low Voltage					
				12	Over Heat	1				
				13	Lost Command	1				
				14	Run					
33	0h1621	Multi-function	Q1 Define	15	Stop	14:Run	0	0	I/P	_
		output1 item		16	Steady				"	
				17	Inverter Line	1				
				18	Comm Line	1				
				19	Speed Search	1				
				22	Ready	1				
				28	Timer Out					
				29	Trip					
				31	DB Warn%ED	1				
				34	On/Off Control	1				
				35	BR Control	1				
				36	CAP. Exchange					
				37	Fan Exchange					
				38	Fire Mode					
				39	TO ⁴²					
				40	KEB Operating	-				
		Multi-function								
41	0h1629	output	DO Status	_		00	Х	_	_	_
-	1	monitor								
		Multi-function								
50	0h1632	output	DO On	0.00	-100.00(s)	0.00	0	0	I/P	_
50	3111032	On delay	Delay	0.00	. 50.00(5)	3.00			"'	
	1	Multi-function		1		1	1			
51	0h1633	output	DO Off	0.00	-100.00(s)	0.00	0	0	I/P	_
<i>3</i> I	3111033	Off delay	Delay	0.00	100.00(3)	3.00			"'	
	<u> </u>	On delay		1			<u> </u>		<u> </u>	L

Code	Comm. Address	Name	LCD Display	Setti	ng Range	Initial Value	Property*	V/F	SL	Ref.
		Multi-function		Q1, F	Relay1					
52	0h1634	output	DO	0	A contact (NO)	00	Х	0	I/P	_
32	0111034	contact	NC/NO Sel	1	B contact (NC)	100	^		1/ F	-
		selection			D contact (NC)					
53	0h1635	Fault output	TripOut	0.00-	100.00(s)	0.00	0	О	I/P	_
		On delay	OnDly							
54	0h1636	Fault output Off delay	TripOut OffDly	0.00-	100.00(s)	0.00	0	0	I/P	-
		Timer	TimerOn	,						
55	h1637	On delay	Delay	0.00-100.00(s)		0.00	0	0	I/P	-
		Timer	TimerOff							
56	0h1638	Off delay	Delay	0.00-100.00(s)		0.00	0	0	I/P	-
	-1	Detected	FDT	0.00-Maximum						
57	0h1639	frequency	Frequency	frequency(Hz)		30.00	0	0	I/P	-
		Detected	, ,		•					
58	0h163A	frequency	FDT Band	0.00-Maximum		10.00	0	0	I/P	-
		band		frequency(Hz)						
				0 Frequency						
				1 Output Current						
				2	Output Voltage					
				3	DCLink Voltage					
				4	Torque					
				5	Output Power					
		Pulse output		6	Idse	0:				
61	0h163D	gain	TO Mode	7	Iqse	Freque	0	0	I/P	-
		gani		8	Target Freq	ncy				
				9	Ramp Freq					
				10	Speed Fdb					
				12	PID Ref Value					
				13	PID Fdb Value					
				14	PID Output					
				15	Constant					
62	0h163E	Pulse output gain	TO Gain	-100	0.0-1000.0(%)	100.0	0	0	I/P	-
63	0h163F	Pulse output	TO Bias	-100	.0-100.0(%)	0.0	0	О	I/P	-
		bias		-	- ,		-			
64	0h1640	Pulse output filter	TO Filter	0-10000(ms)		5	0	0	I/P	-
		Pulse output		, ,						
65	0h1641	constant	TO	0.0-100.0(%)		0.0	0	0	I/P	_
03	3.1.0 17	output 2	Const %	0.0	 (/)	3.0		Ĭ	"'	
		Pulse output	ТО							
66	0h1642	monitor	Monitor	0.0-1	000.0(%)	0.0	0	0	I/P	-

6.7 Communication Function group (PAR→COM)

In the following table, the data shaded in grey will be displayed when a related code has been selected.

SL: Sensorless vector control (DRV-09), I – IM Sensorless, P – PM Sensorless

	Comm.	Jied ddinig opeid								
Code	Address	Name	LCD Display	Setting Range		Value	Property*	V/F	SL	Ref.
00	-	Jump Code	Jump Code	1-9	9	20	0	0	I/P	<u>p.52</u>
01	0h1701	Built-in communication inverter ID	Int485 St ID	1-2	50	1	0	0	I/P	<u>p.127</u>
		Built-in	Int485	0	ModBus RTU	0:				
02 ⁴³	0h1702	communication protocol	Proto	2	LS Inv 485	ModBus RTU	0	Ο	I/P	<u>p.127</u>
				0	1200 bps					
				1	2400 bps					
		D 11. 1		2	4800 bps					
03 ⁴³	0l- 1702	Built-in	Int485	3 9600 bps		3:			I/D	127
03	0h1703	communication	BaudR	4	19200 bps	9600 bps	0	0	I/P	<u>p.127</u>
		speed		5	38400 bps					
				6	56 Kbps					
				7	115 Kbps ⁴⁴					
		D 11. 1		0	D8/PN/S1					
04 ⁴³	0h1704	Built-in	Int485	1	D8/PN/S2	0:			I/D	n 127
04	UN 1704	communication frame setting	Mode	2	D8/PE/S1	D8/PN/S1	0	0	/P	<u>p.127</u>
		J		3	D8/PO/S1					
05 ⁴³	0h1705	Transmission delay after reception	Resp Delay	0-1	000(ms)	5ms	0	0	I/P	<u>p.127</u>
06 ⁴⁵	0h1706	Communication option S/W version	FBus S/W Ver	-		0.00	0	0	I/P	-
07 ⁴⁵	0h1707	Communication option inverter ID	FBus ID	0-2	55	1	0	0	I/P	-
08 ⁴⁵	0h1708	FIELD BUS communication speed	FBUS BaudRate	-		12Mbps	-	0	I/P	-

 $^{^{43}\,}$ Will not be displayed when P2P and Multi KPD is set

⁴⁴ 115,200 bps

⁴⁵ Displayed only when a communication option card is installed

Code	Comm. Address	Name	LCD Display	Setting Range	Initial Value	Property*	V/F	SL	Ref.
09 ⁴⁵	0h1709	Communication option LED status	FieldBus LED	-	-	О	О	I/P	-
30	0h171E	Number of output parameters	ParaStatus Num	0-8	3	0	o	I/P	<u>p.132</u>
31 ⁴⁶	0h171F	Output Communication address1	Para Stauts-	0000-FFFF Hex	000A	0	o	I/P	p.132
32 ⁴⁶	0h1720	Output Communication address2	Para Stauts- 2	0000-FFFF Hex	000E	O	О	I/P	<u>p.132</u>
33 ⁴⁶	0h1721	Output Communication address3	Para Stauts- 3	0000-FFFF Hex	000F	0	О	I/P	<u>p.132</u>
34 ⁴⁶	0h1722	Output Communication address4	Para Stauts- 4	0000-FFFF Hex	0000	0	o	I/P	<u>p.132</u>
35 ⁴⁶	0h1723	Output Communication address5	Para Stauts- 5	0000-FFFF Hex	0000	0	o	I/P	<u>p.132</u>
36 ⁴⁶	0h1724	Output Communication address6	Para Stauts-	0000-FFFF Hex	0000	0	o	I/P	<u>p.132</u>
37 ⁴⁶	0h1725	Output Communication address7	Para Stauts-	0000-FFFF Hex	0000	0	0	I/P	<u>p.132</u>
38 ⁴⁶	0h1726	Output Communication address8	Para Stauts-	0000-FFFF Hex	0000	О	О	I/P	<u>p.132</u>
50	0h1732	Number of input parameters	Para Ctrl Num	0-8	2	0	0	I/P	<u>p.132</u>
51 ⁴⁷	0h1733	Input Communication address1	Para Control-1	0000-FFFF Hex	0005	х	o	I/P	<u>p.132</u>
52 ⁴⁷	0h1734	Input Communication address2	Para Control-2	0000-FFFF Hex	0006	Х	o	I/P	<u>p.132</u>
53 ⁴⁷	0h1735	Input Communication address3	Para Control-3	0000-FFFF Hex	0000	х	О	I/P	<u>p.132</u>

 $^{^{\}rm 46}\,$ Only the range of addresses set at COM-30 is displayed.

 $^{^{\}rm 47}\,$ Only the range of addresses set at COM-50 is displayed.

Code	Comm. Address	Name	LCD Display	Sett	ing Range	Initial Value	Property*	V/F	SL	Ref.
54 ⁴⁷	0h1736	Input Communication address4	Para Control-4	000	0-FFFF Hex	0000	Х	О	I/P	<u>p.132</u>
55 ⁴⁷	0h1737	Input Communication address5	Para Control-5	000	0-FFFF Hex	0000	х	o	I/P	<u>p.132</u>
56 ⁴⁷	0h1738	Input Communication address6	Para Control-6	000	0-FFFF Hex	0000	х	0	I/P	<u>p.132</u>
57 ⁴⁷	0h1739	Input Communication address7	Para Control-7	000	0-FFFF Hex	0000	х	o	I/P	<u>p.132</u>
58 ⁴⁷	0h173A	Input Communication address8	Para Control-8	000	0-FFFF Hex	0000	х	O	I/P	<u>p.132</u>
68	0h1744	Field bus data swap	FBus Swap Sel	0	No Yes	0	Х	0	I/P	-
70	0h1746	Communication multi-function input 1	Virtual DI 1	0	None	0:None	0	o	I/P	<u>p.151</u>
71	0h1747	Communication multi-function input 2	Virtual DI 2	1	Fx	0:None	0	О	I/P	<u>p.151</u>
72	0h1748	Communication multi-function input 3	Virtual DI 3	2	Rx	0:None	0	О	I/P	<u>p.151</u>
73	0h1749	Communication multi-function input 4	Virtual DI 4	3	RST	0:None	O	0	I/P	<u>p.151</u>
74	0h174A	Communication multi-function input 5	Virtual DI 5	4	External Trip	0:None	0	0	I/P	<u>p.151</u>
75	0h174B	Communication multi-function input 6	Virtual DI 6	5	BX	0:None	0	0	I/P	<u>p.151</u>
76	0h174C	Communication multi-function input 7	Virtual DI 7	6	JOG	0:None	0	О	I/P	<u>p.151</u>
77	0h174D	Communication multi-function input 8	Virtual DI 8	7 8 9 11 12	Speed-L Speed-M Speed-H XCEL-L XCEL-M	0:None	О	О	I/P	p.151

Code	Comm. Address	Name	LCD Display	Sett	ing Range	Initial Value	Property*	V/F	SL	Ref.
				13	RUN Enable					
				14	3-Wire					
				15	2nd Source					
				16	Exchange					
				17	Up					
				18	Down					
				20	U/D Clear					
				21	Analog Hold					
				22	I-Term Clear					
				23	PID					
				23	Openloop					
				24	P Gain2					
				25	XCEL Stop					
				26	2nd Motor					
				34	Pre Excite					
				38	Timer In					
				40	dis Aux Ref					
				46	FWD JOG					
				47	REV JOG					
				49	XCEL-H					
				50	User Seq					
				51	Fire Mode					
				52 54	KEB-1 Select					
		Communication		3 4	11					
86	0h1756	multi-function	Virt DI			0	Х	0	I/D	p.130
80	0111730	input monitoring	Status	_		U	^	U	1/ [<u>p.130</u>
		Selection of data		0	Int485					
		frame	Comm	0	1111403					
90	0h175A	communication	Mon Sel	1	Keypad	0	0	0	I/P	-
		monitor		'	Кеурас					
		Data frame Rev	Rev Frame							
91	0h175B	count	Num	0-65	5535	0	0	0	I/P	-
92	0h175C	Data frame Err	Err Frame	0-65	5535	0	0	0	I/P	_
		count	Num							
93	0h175D	NAK frame	NAK Frame	0-64	5535	0	0	0	I/P	_
	3117,30	count	Num	0.0.	1			Ľ	", '	
94 ⁴⁸		Communication	Comm	0	No	O:No			I/D	
94	-	data upload	Update	1	Yes	0:No		0	I/P	_

 $^{^{\}rm 48}\,$ Displayed only when a communication option card is installed

Code	Comm. Address	Name	LCD Display			Initial Value	Property*	V/F	SL	Ref.							
				0	Disable All												
		P2P	Int 485	1	P2P Master	0:											
95	0h1760	communication	n Func	2	P2P Slave	Disable	X	0	I/P	p.113							
		selection		runc	runc	ruic	ruic	ruic	runc	runc	3	M-KPD	All				
				3	Ready												
				0	No												
					Multi-												
4.0		DO sotting									1	function					
96 ⁴⁹	96 ⁴⁹ - DO setting selection	_	P2P DO Sel		setting	0:No	0	0	I/P	p.113							
		Selection			Multi-												
			2	function													
					output												

6.8 Application Function group (PAR→APP)

In the following table, the data shaded in grey will be displayed when a related code has been selected.

SL: Sensorless vector control (DRV-09), I – IM Sensorless, P – PM Sensorless

Code	Comm. Address	Name	LCD Display	Setti	ng Range	Initial Value	Property*	V/F	SL	Ref.
00	-	Jump Code	Jump Code	1-99		20	0	0	I/P	<u>p.52</u>
		Application		0	None	0:				
01	0h1801	function	App Mode	1	-	None	Χ	0	I/P	-
		selection		2	Proc PID	None				
02		Enable user	Hear Coa En	0	No	0:No	Х	0	I/D	n 11E
02	-	sequence	User Seq En	1	Yes	U.INO	^	٥	1/1	<u>p.115</u>
16 ⁵⁰	0h1810	PID output monitor	PID Output	(%)		0.00		0	I/P	-
17 ⁵⁰	0h1811	PID reference monitor	PID Ref Value	(%)		50.00		0	I/P	-
18 ⁵⁰	0h1812	PID feedback monitor	PID Fdb Value	(%)		0.00		0	I/P	-
19 ⁵⁰	0h1813	PID reference setting	PID Ref Set	-100 100.	.00- 00(%)	50.00	0	0	I/P	-

⁴⁹ Displayed when APP-01 is set to 2 (Proc PID)

⁵⁰ Displayed when APP-01 is set to 2 (Proc PID)

Code	Comm. Address	Name	LCD Display	Setting Range	Initial Value	Property*	V/F	SL	Ref.
20 ⁵⁰	0h1814	PID reference source	PID Ref Source	0 Keypad 1 V1 3 V2 4 I2 5 Int 485 7 FieldBus 8 UserSeqLi nk 11 Pulse	- 0: - Keypad	х	О	I/P	-
21 ⁵⁰	0h1815	PID feedback source	PID F/B Source	0 V1 2 V2 3 I2 4 Int 485 6 FieldBus 7 UserSeqLi nk 10 Pulse	- 0:V1	х	0	I/P	-
22 ⁵⁰	0h1816	PID controller proportional gain	PID P-Gain	0.0-1000.0(%)	50.0	0	0	I/P	-
23 ⁵⁰	0h1817	PID controller integral time	PID I-Time	0.0-200.0(s)	10.0	0	0	I/P	-
24 ⁵⁰	0h1818	PID controller differentiation time	PID D-Time	0-1000(ms)	0	0	0	I/P	-
25 ⁵⁰	0h1819	PID controller feed-forward compensation gain	PID F-Gain	0.0-1000.0(%)	0.0	0	0	I/P	-
26 ⁵⁰	0h181A	Proportional gain scale	P Gain Scale	0.0-100.0(%)	100.0	Х	0	I/P	-
27 ⁵⁰	0h181B	PID output filter	PID Out LPF	0-10000(ms)	0	0	0	I/P	-
28 ⁵⁰	0h181C	PID Mode	PID Mode	0 Process PID 1 Normal PID	0	х	0	I/P	-
29 ⁵⁰	0h181D	PID upper limit frequency	PID Limit Hi	PID lower limit frequency- 300.00(Hz)	60.00	0	0	I/P	-
30 ⁵⁰	0h181E	PID lower limit frequency	PID Limit Lo	-300.00 -PID upper limit frequency(Hz)	-60.00	0	0	I/P	-
31 ⁵⁰	0h181F	PID output inverse	PID Out Inv	0 No 1 Yes	0:No	Х	0	I/P	-

Code	Comm. Address	Name	LCD Display	Setting Range	Initial Value	Property*	V/F	SL	Ref.
32 ⁵⁰	0h1820	PID output scale	PID Out Scale	0.1-1000.0(%)	100.0	Х	0	I/P	-
34 ⁵⁰	0h1822	PID controller motion frequency	Pre-PID Freq	0.00- Maximum frequency(Hz)	0.00	Х	0	I/P	-
35 ⁵⁰	0h1823	PID controller motion level	Pre-PID Exit	0.0-100.0(%)	0.0	Х	0	I/P	-
36 ⁵⁰	0h1824	PID controller motion delay time	Pre-PID Delay	0-9999(s)	600	0	0	I/P	-
37 ⁵⁰	0h1825	PID sleep mode delay time	PID Sleep DT	0.0-999.9(s)	60.0	0	0	I/P	-
38 ⁵⁰	0h1826	PID sleep mode frequency	PID Sleep Freq	0.00- Maximum frequency(Hz)	0.00	0	0	I/P	-
39 ⁵⁰	0h1827	PID wake-up level	PIDWakeUp Lev	0-100(%)	35	0	0	I/P	-
40 ⁵⁰	0h1828	PID wake-up mode setting	PID WakeUp Mod	0 Below Level 1 Above Level 2 Beyond Level	0:Below Level	0	0	I/P	-
42 ⁵⁰	0h182A	PID controller unit selection	PID Unit Sel	0 % 1 Bar 2 mBar 3 Pa 4 kPa 5 Hz 6 rpm 7 V 8 I 9 kW 10 HP 11 °C 12 °F	0:%	О	О	I/P	-
43 ⁵⁰	0h182B	PID unit gain	PID Unit Gain	0.00- 300.00(%)	100.00	0	0	I/P	-
44 ⁵⁰	0h182C	PID unit scale	PID Unit Scale	0 x100 1 x10 2 x1 3 x0.1 4 x0.01	2:x 1	0	О	I/P	-

Table	Function

Code	Comm. Address	Name	LCD Display	Setting Range	Initial Value	Property*	V/F	SL	Ref.
45 ⁵⁰	0h182D	PID 2nd proportional gain	PID P2-Gain	0.0-1000.0(%)	100.0	Х	0	I/P	-

6.9 Protection Function group (PAR→PRT)

In the following table, the data shaded in grey will be displayed when a related code has been selected.

SL: Sensorless vector control (DRV-09), I – IM Sensorless, P – PM Sensorless

Code	Comm. Address	Name	LCD Display	Set	ting Range	Initial Value	Property*	V/F	SL	Ref.
00	-	Jump Code	Jump Code	1-9	9	40	О	0	I/P	<u>p.52</u>
04	0h1B04	Load level	Load Duty	0	Normal Duty	1:Heavy	Х	0	I/P	
04	UIIIDU4	setting	Load Duty	1	Heavy Duty	Duty	^		1/1/	-
				bit	00-11					
05	0h1B05	Input/output open-phase	Phase Loss Chk	10 Input open		00	X	0	I/P	-
		protection	CIIK	10 Input open phase						
06	0h1B06	Input voltage range during open-phase	IPO V Band	1-100(V)		15	х	0	I/P	-
07	0h1B07	Deceleration time at fault trip	Trip Dec Time	0.0-600.0(s)		3.0	0	0	I/P	-
		Selection of		0	No					
08	0h1B08	startup on trip reset	RST Restart	1	Yes	0:No	0	0	I/P	-
09	0h1B09	Number of automatic restarts	Retry Number	0-1	0	0	0	О	I/P	-

Code	Comm. Address	Name	LCD Display	Set	ting Range	Initial Value	Property*	V/F	SL	Ref.
10 ⁵¹	0h1B0A	Automatic restart delay time	Retry Delay	0.0	-60.0(s)	1.0	О	0	I/P	-
				0	None					
				1	Free-Run					
12	0h1B0C	Motion at speed	Lost Cmd	2	Dec	0:None	0	0	I/P	-
12	OITIBOC	command loss	Mode	3	Hold Input	0.NOHE		U	1/ Γ	-
				4	Hold Output					
				5	Lost Preset					
13 ⁵²	0h1B0D	Time to decide speed command loss	Lost Cmd Time	0.1-120(s)		1.0	0	0	I/P	-
14 ⁵²	0h1B0E	Operation frequency at speed command loss	Lost Preset F	Start frequency- Maximum frequency(Hz)		0.00	0	0	I/P	-
15 ⁵²	0h1B0F	Analog input loss decision	Al Lost Level			0:Half of	0	0	I/P	-
		level		1	Below x1	XI				
		Overload	OL Warn	0	No					
17	0h1B11	warning selection	Select	1	Yes	0:No	0	0	I/P	-
18	0h1B12	Overload alarm level	OL Warn Level	30-	180(%)	150	0	О	I/P	-
19	0h1B13	Overload warning time	OL Warn Time	0.0	-30.0(s)	10.0	0	0	I/P	-
			OLT:	0	None	1, -				
20	0h1B14	Motion at overload fault	OL Trip Select	1	Free-Run	1:Free- Run	0	0	I/P	-
		overroud radic	Sciecci	2	Dec	Tion 1				
21	0h1B15	Overload fault level	OL Trip Level	30-200(%)		180	0	0	I/P	-
22	0h1B16	Overload fault time	OLTripTime	0.0-60.0(s)		60.0	0	0	I/P	-
		Underload		0	No					
25	0h1B19	warning selection	UL Warn Sel	1	Yes	0:No	0	0	I/P	-

⁵¹ Displayed when PRT-09 is set higher than 0

 $^{^{52}\,}$ Displayed when PRT-12 is not set to 0 (NONE)

Code	Comm. Address	Name	LCD Display	Set	ting Range	Initial Value	Property*	V/F	SL	Ref.		
26	0h1B1A	Underload warning time	UL Warn Time	0.0-	-600.0(s)	10.0	0	0	I/P	-		
27	0h1B1B	Underload fault selection	UL Trip Sel	0 1 2	None Free-Run Dec	0:None	0	0	I/P	-		
28	0h1B1C	Underload fault time	ULTrip Time	0.0-	-600.0(s)	30.0	0	0	I/P	-		
29	0h1B1D	Underload lower limit level	UL LF Level	10-3	30(%)	30	0	0	I/P	-		
30	0h1B1E	Underload upper limit level	UL BF Level	30-	100(%)	30	0	0	I/P	-		
31	0h1B1F	No motor motion at detection	No Motor Trip	0 None1 Free-Run		0:None	0	0	I	-		
32	0h1B20	No motor detection current level	No Motor Level	1-10	00(%)	5	0	0	I	-		
33	0h1B21	No motor detection delay	No Motor Time	0.1-10.0(s)		3.0	0	О	I	-		
		Electronic		0	None							
40	0h1B28	thermal fault	ETH Trip Sel	1	Free-Run	0:None	0	0	I/P	-		
		selection		2	Dec							
		Motor cooling	Motor	0	Self-cool	0:Self-						
41	0h1B29	fan type	Cooling	1	Forced-cool	cool	0	0	I/P	-		
42	0h1B2A	Electronic thermal 1 minute rating	ETH 1min	120)-200(%)	150	0	0	I/P	-		
43	0h1B2B	Electronic thermal continuous rating	ETH Cont	50-	150(%)	120	0	0	I/P	-		
45	0h1B2D	BX trip mode	BX Mode	0	Free-Run Dec	0	Х	0	I/P	-		
50	0h1B32	Stall prevention motion and flux	Stall Prevent	bit	0000-1111	0000	х	0	X	-		
	3232	braking		00 01 Accelerating		00 Accelerating						

Code	Comm. Address	Name	LCD Display	Sett	ing Range	Initial Value	Property*	V/F	SL	Ref.
				00 10	At constant speed					
				01 00	At deceleration					
				10 00	FluxBraking					
51	0h1B33	Stall frequency1	Stall Freq 1	Stall	t frequency- uency2(Hz)	60.00	0	0	Х	-
52	0h1B34	Stall level1	Stall Level 1	30-2	250(%)	180	Χ	0	Χ	-
53	0h1B35	Stall frequency2	Stall Freq 2	frequency3(Hz)		60.00	0	0	Х	-
54	0h1B36	Stall level2	Stall Level 2	30-2	250(%)	180	Χ	0	Χ	-
55	0h1B37	Stall frequency3	Stall Freq 3	Stall frequency2- Stall frequency4(Hz)		60.00	0	0	х	-
56	0h1B38	Stall level3	Stall Level 3	30-2	250(%)	180	Χ	0	Χ	-
57	0h1B39	Stall frequency4	Stall Freq 4	Max	l frequency3- kimum uency(Hz)	60.00	0	0	Х	-
58	0h1B3A	Stall level4	Stall Level 4	30-2	250(%)	180	Χ	0	Χ	-
59	0h1B3B	Flux braking gain	Flux Brake Kp	0~1	50	0	0	0	I	-
60	0h1B3C	CAP diagnosis current level	CAP. DiagCurr Perc	10-	100(%)	0	0	0	I/P	-
61 ⁵³	0h1B3D	CAP diagnosis mode	CAP. Diag	0 None 1 Ref Diag 2 Pre Diag 3 Init Diag		0	X	0	I/P	-
62 ⁵³	0h1B3E	CAP Exchange Level	CAP Exchange Level	50.0~95.0(%)		0	х	0	I/P	-
63 ⁵³	0h1B3F	CAP Diag Level	CAP Diag Level	0.0~100.0(%)		0.0		0	I/P	-

 $^{^{53}\,}$ The PRT-61–63 codes are displayed when the PRT-60 (CAP. DiagPerc) is set to more than 0.

Code	Comm. Address	Name	LCD Display	Set	ting Range	Initial Value	Property*	V/F	SL	Ref.
66	0h1B42	DB resistor warning level	DB Warn %ED	0-3	0(%)	0	0	0	I/P	-
73	0h1B22	Speed deviation trip	Speed Dev Trip	0 1	No Yes	0:No	0	0	I/P	-
74 ⁵⁴	0h1B23	Speed deviation band	Speed Dev Band	1~2	20	5	0	0	I/P	-
75 ⁵⁴	0h1B24	Speed deviation decision time	Speed Dev Time	0~1	120	60	0	0	I/P	-
79	0h1B4F	Cooling fan fault	FANTrip	0	Trip	1:Warni	0	0	I/P	_
	OITID-II	selection	Mode	1	Warning	ng			1/1	
		Motion	Opt Trip	0	None	1:Free-				
80	0h1B50	selection	Mode	1	Free-Run	Run	0	0	I/P	-
		at option trip		2	Dec					
81	0h1B51	Low voltage fault decision delay time	LVT Delay	0.0-60.0(s)		0.0	Х	0	I/P	-
82	0h1B52	LV2 Selection	LV2 Enable	0	No	0: No	Х	0	I/P	-
86	0h1B56	Accumulated percent of fan usage	Fan Time Perc		Yes ~100.0(%)	0.0	-	0	I/P	-
87	0h1B57	Fan exchange warning level	Fan Exchange level	0.0	~100.0(%)	90.0	0	0	I/P	-
88	0h1B58	Fan reset time	Fan Time Rst	0	No	0	Х	0	I/P	_
				1 Bit	Yes					
			CAP, FAN	00	00~10					
89	0h1B59	CAP, FAN Status	State	01	CAP Warning	00	-	0	I/P	-
				10	FAN Warning					
90	0h1B5A	Warning information	-	-		-		0	I/P	-
91	0h1B5B	Fault history 1	-	-		-		0	I/P	-
92	0h1B5C	Fault history 2	-	-		-		0	I/P	-
93	0h1B5D	Fault history 3	-	-		-		0	I/P	-
94	0h1B5E	Fault history 4	-	-		-		0	I/P	-

 $^{^{54}\,}$ Displayed when PRT-73 is set to 1(YES)

Code	Comm. Address	Name	LCD Display	Setting Range		Initial Value	Property*	V/F	SL	Ref.
95	0h1B5F	Fault history 5	-	-		-		0	I/P	-
96 Oh1B	0h1R60	Fault history	-	0	No	0:No		0	I/P	
	0111000	deletion		1	Yes	U.INU		O	1/ [_

6.10 2nd Motor Function group (PAR→M2)

The 2nd Motor function group will be displayed if any of IN-65-71 is set to 26 (2nd MOTOR). In the following table, the data shaded in grey will be displayed when a related code has been selected.

SL: Sensorless vector control (DRV-09), I – IM Sensorless, P – PM Sensorless

Code	Comm. Address	Name	LCD Display	Setting Range		Initial Value	Property*	V/F	SL	Ref.
00	-	Jump Code	Jump Code	1-9	9	14	0	0	I	<u>p.52</u>
04	0h1C04	Acceleration time	M2-Acc Time	0.0	-600.0(s)	20.0	О	0	I	-
05	0h1C05	Deceleration time	M2-Dec Time	0.0-600.0(s)		30.0	О	0	I	-
				0 0.2 kW						
			M2-Capacity	1	0.4 kW					
				2	0.75 kW	-				
		C06 Motor capacity		3	1.1 kW					
	0h1C06			4	1.5 kW					
				5	2.2 kW					
				6	3.0 kW					
				7	3.7 kW					
				8	4.0 kW					
				9	5.5 kW					
06				10	7.5 kW		X	О	I	-
				11						
				12						
				13						
					22.0 kW					
				15						
				16						
					45.0 kW					
					55.0 kW					
				19						
				20	90.0 kW		1			

Code	Comm. Address	Name	LCD Display	Set	tting Range	Initial Value	Property*	V/F	SL	Ref.
07	0h1C07	Base frequency	M2-Base Freq	30.00- 400.00(Hz)		60.00	Х	О	ı	-
08	0h1C08	8 Control mode	M2-Ctrl Mode	2	V/F Slip Compen	0:V/F	x	0	_	_
			Wode	4	IM Sensorless					
10	0h1C0A	Number of motor poles	M2-Pole Num	2-4	18		х	О	I	-
11	0h1C0B	Rated slip speed	M2-Rated Slip	0-3	000(rpm)		х	0	I	-
12	0h1C0C	Motor rated current	M2-Rated Curr	1.0-1000.0(A)		Depen dent on motor setting s	х	О	I	-
13	0h1C0D	Motor no-load current	M2-Noload Curr	0.5-1000.0(A)			х	0	I	-
14	0h1C0E	Motor rated voltage	M2-Rated Volt	170-480(V)			х	О	I	-
15	0h1C0F	Motor efficiency	M2- Efficiency	64-100(%)			х	О	I	-
16	0h1C10	Load inertia rate	M2-Inertia Rt	0-8			Χ	0	I	-
17	-	Stator resistor	M2-Rs	Dependent on motor settings			Χ	0	I	-
18	-	Leakage inductance	M2-Lsigma				Х	0	I	-
19	-	Stator inductance	M2-Ls				Х	О	I	-
20 ⁵⁵	-	Rotor time constant	M2-Tr	25-	-5000(ms)		х	О	I	-
				0	Linear		x c			
25	0h1C19	V/F pattern	M2-V/F Patt	1	Square	0: Linear		0	I	-
				2	User V/F					
26	0h1C1A	Forward Torque boost	M2-Fwd Boost	0.0-15.0(%)		2.0	х	О	I	-
27	0h1C1B	Reverse Torque boost	M2-Rev Boost	0.0-15.0(%)		2.0	Х	О	I	-
28	0h1C1C	Stall prevention level	M2-Stall Lev	30-150(%)		150	Х	О	I	-
29	0h1C1D	Electronic thermal 1 minute rating	M2-ETH 1min	100	0-200(%)	150	Х	О	I	-

 $^{^{55}\,}$ Displayed when M2-08 is set to 4 (IM Sensorless)

Code	Comm. Address	Name	LCD Display	Set	ting Range	Initial Value	Property*	V/F	SL	Ref.
30	0h1C1E	Electronic thermal continuous rating	M2-ETH Cont	50-	150(%)	100	х	0	I	-
40	0h1C28	Rotation count speed gain	Load Spd Gain	0~6000.0[%]		100.0	0	0	I	-
	0h1C29	Rotation count speed scale	Load Spd Scale	0	x 1	0: x 1				
				1	x 0.1					
41				2	x 0.01		0	0	I	-
				3	x 0.001					
				4	x 0.0001					
42	0h1C2A	Rotation count Load Sp		0	Rpm	O. rom	0	0		
		speed unit	Unit	1	mpm	0: rpm O		U	I	-

6.11 User Sequence group (USS)

This group appears when APP-02 is set to 1 (Yes) or COM-95 is set to 2 (P2P Master). The parameter cannot be changed while the user sequence is running.

SL: Sensorless vector control function (DRV-09), I – IM Sensorless, P – PM Sensorless

Code	Comm. Address	Name	LCD Display	Setting Range		Initial Value	Property*	V/F	SL	Ref.
00	-	Jump code	Jump Code	1-99		31	0	0	I/P	p.52
		11		0	Stop					
01	0h1D01	User sequence operation	User Seq Con		Run	0: Stop	Χ	0	I/P	p.115
O1	OIIIDOI	command			Digital In	0. 3top	^		1/ F	<u>p.115</u>
				2	Run					
	0h1D02	User sequence operation loop time		0	0.01s					
				1	0.02s					
02			US Loop Time		0.05s	1: 0.02s	x	0	I/P	p.115
02			US LOOP TIME	3	0.1s	1.0.023	^	0 0	1/ F	<u> </u>
				4	0.5s					
				5	1s					
11	0h1D0B	Output address link1	Link UserOut1	0-0xFFFF		0	Х	0	I/P	<u>p.115</u>
12	0h1D0C	Output address link2	Link UserOut2	0-0xFFFF		0	Х	0	I/P	<u>p.115</u>
13	0h1D0D	Output address link3	Link UserOut3	0-0xFFFF		0	Х	0	I/P	<u>p.115</u>

Code	Comm. Address	Name	LCD Display	Setting Range	Initial Value	Property*	V/F	SL	Ref.
14	0h1D0E	Output address link4	Link UserOut4	0-0xFFFF	0	Х	0	I/P	<u>p.115</u>
15	0h1D0F	Output address link5	Link UserOut5	0-0xFFFF	0	Х	0	I/P	<u>p.115</u>
16	0h1D10	Output address link6	Link UserOut6	0-0xFFFF	0	X	0	I/P	<u>p.115</u>
17	0h1D11	Output address link7	Link UserOut7	0-0xFFFF	0	Х	0	I/P	<u>p.115</u>
18	0h1D12	Output address link8	Link UserOut8	0-0xFFFF	0	Х	0	I/P	<u>p.115</u>
19	0h1D13	Output address link9	Link UserOut9	0-0xFFFF	0	Х	0	I/P	<u>p.115</u>
20	0h1D14	Output address link10	Link UserOut10	0-0xFFFF	0	Х	0	I/P	<u>p.115</u>
21	0h1D15	Output address link11	Link UserOut11	0-0xFFFF	0	Х	0	I/P	<u>p.115</u>
22	0h1D16	Output address	Link UserOut12 Link	0-0xFFFF	0	Х	0	I/P	<u>p.115</u>
23	0h1D17	Output address	UserOut13	0-0xFFFF	0	Х	0	I/P	<u>p.115</u>
24	0h1D18	Output address link14 Output address	UserOut14	0-0xFFFF	0	Х	0	I/P	<u>p.115</u>
25	0h1D19	link15 Output address	UserOut15	0-0xFFFF	0	Х	0	I/P	<u>p.115</u>
26	0h1D1A	link16 Output address	UserOut16	0-0xFFFF	0	Х	0	I/P	<u>p.115</u>
27	0h1D1B	link17 Output address	UserOut17	0-0xFFFF	0	Х	0	I/P	<u>p.115</u>
28	0h1D1C	link18	UserOut18	0-0xFFFF	0	Х	0	I/P	<u>p.115</u>
31	0h1D1F	setting1	Void Para1	-9999-9999	0	Х	0	I/P	<u>p.115</u>
32	0h1D20	setting2 Input constant	Void Para2	-9999-9999	0	X	0		<u>p.115</u>
33	0h1D21	setting3 Input constant	Void Para3	-9999-9999	0	X	0		<u>p.115</u>
34	0h1D22	setting4 Input constant	Void Para4	-9999-9999	0	Х	0		<u>p.115</u>
35	0h1D23	setting5 Input constant	Void Para5	-9999-9999	0	Х	0		<u>p.115</u>
36	0h1D24	setting6	Void Para6	-9999-9999	0	Х	0		<u>p.115</u>
37	0h1D25	setting7	Void Para7	-9999-9999	0	Х	0	I/P	<u>p.115</u>

Code	Comm. Address	Name	LCD Display	Setting Range	Initial Value	Property*	V/F	SL	Ref.
38	0h1D26	Input constant setting8	Void Para8	-9999-9999	0	Х	0	I/P	<u>p.115</u>
39	0h1D27	Input constant setting9	Void Para9	-9999-9999	0	Х	0	I/P	<u>p.115</u>
40	0h1D28	Input constant setting 10	Void Para10	-9999-9999	0	Х	0	I/P	<u>p.115</u>
41	0h1D29	Input constant setting11	Void Para11	-9999-9999	0	Х	0	I/P	<u>p.115</u>
42	0h1D2A	Input constant setting 12	Void Para12	-9999-9999	0	Х	0	I/P	<u>p.115</u>
43	0h1D2B	Input constant setting 13	Void Para13	-9999-9999	0	Х	0	I/P	<u>p.115</u>
44	0h1D2C	Input constant setting 14	Void Para14	-9999-9999	0	Х	0	I/P	<u>p.115</u>
45	0h1D2D	Input constant setting15	Void Para15	-9999-9999	0	Х	0	I/P	p.115
46	0h1D2E	Input constant setting 16	Void Para16	-9999-9999	0	Х	0	I/P	<u>p.115</u>
47	0h1D2F	Input constant setting17	Void Para17	-9999-9999	0	Х	0	I/P	<u>p.115</u>
48	0h1D30	Input constant setting 18	Void Para18	-9999-9999	0	Х	0	I/P	<u>p.115</u>
49	0h1D31	Input constant setting19	Void Para19	-9999-9999	0	Х	0	I/P	<u>p.115</u>
50	0h1D32	Input constant setting 20	Void Para20	-9999-9999	0	Х	0	I/P	<u>p.115</u>
51	0h1D33	Input constant setting21	Void Para21	-9999-9999	0	Х	0	I/P	<u>p.115</u>
52	0h1D34	Input constant setting22	Void Para22	-9999-9999	0	Х	0	I/P	<u>p.115</u>
53	0h1D35	Input constant setting23	Void Para23	-9999-9999	0	Х	0	I/P	<u>p.115</u>
54	0h1D36	Input constant setting24	Void Para24	-9999-9999	0	Х	0	I/P	<u>p.115</u>
55	0h1D37	Input constant setting25	Void Para25	-9999-9999	0	Х	0	I/P	<u>p.115</u>
56	0h1D38	Input constant setting26	Void Para26	-9999-9999	0	Х	0	I/P	<u>p.115</u>
57	0h1D39	Input constant setting27	Void Para27	-9999-9999	0	Х	0	I/P	<u>p.115</u>
58	0h1D3A	Input constant setting28	Void Para28	-9999-9999	0	Х	0	I/P	<u>p.115</u>
59	0h1D3B	Input constant setting 29	Void Para29	-9999-9999	0	Х	0	I/P	<u>p.115</u>

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Code	Comm. Address	Name	LCD Display	Setting Range	Initial Value	Property*	V/F	SL	Ref.
60	0h1D3C	Input constant setting30	Void Para30	-9999-9999	0	Х	0	I/P	<u>p.115</u>
80	0h1D50S	Analog input 1	P2P In V1	0-12,000			0	I/P	p.115
81	0h1D51	Analog input2	P2P In I2	-12,000- 12,000			0	I/P	<u>p.115</u>
82	0h1D52	Digital input	P2P In DI	0-0x7F			0	I/P	p.115
85	0h1D55	Analog output	P2P OutAO1	0-10,000	0	Χ	0	I/P	p.115
89	0h1D58	Digital output	P2P OutDO	0-0x03	0	Χ	0	I/P	p.115

6.12 User Sequence Function group(USF)

This group appears when APP-02 is set to 1 (Yes) or COM-95 is set to 2 (P2P Master). The parameter cannot be changed while the user sequence is running.

SL: Sensorless vector control function (DRV-09), I – IM Sensorless, P – PM Sensorless

*O/X: Write-enabled during operation

Code	Comm. Address	Name	LCD Display	Set	ting Range	Initial Value	Property*	V/F	SL	Ref.																																					
00	-	Jump code	Jump Code	1-9	9	41	0	0	I/P	<u>p.52</u>																																					
				0	NOP																																										
				1	ADD																																										
				2	SUB																																										
				3	ADDSUB																																										
				4	MIN						ص ا																																				
		User function1		5	MAX						lable																																				
			User Func1	6	ABS						שוו																																				
	0h1E01			7	NEGATE																																										
01				User Func1	User Func1	User Func1	User Func1	User Func1	User Func1	User Func1	User Func1	User Func1	User Func1	User Func1	User Func1	User Func1	User Func1	User Func1	User Func1	User Func1	User Func1	User Func1	User Func1	User Func1	User Func1	User Func1	User Func1	User Func1	User Func1	User Func1	User Func1	User Func1	User Func1	User Func1	User Func1	User Func1	User Func1	8	MPYDIV	0:NOP	Х	0	I/P	p.115			
																														9	REMAINDER																
				10	COMPARE-GT]																																									
				11	COMPARE-GEQ																																										
						-						12	COMPARE-																																		
							12	EQUAL																																							
							1	1					1	1	1	-																								13	COMPARE-						
																																							1.4	NEQUAL							
																	14																														
				15	LIMIT																																										

Code	Comm. Address	Name	LCD Display	Set	ting Range	Initial Value	Property*	V/F	SL	Ref.
				16	AND					
				17	OR					
				18	XOR					
				19	ANDOR					
				20	SWITCH					
				21	BITTEST					
				22	BITSET					
				23	BITCLEAR					
				24	LOWPASSFILTER					
				25	PI_CONTORL					
				26	PI_PROCESS					
				27	UPCOUNT					
				28	DOWNCOUNT					
02	0h1E02	User function input1-A	User Input1- A	0-0)xFFFF	0	X	О	I/P	<u>p.115</u>
03	0h1E03	User function input1-B	User Input1- B	0-0	xFFFF	0	Х	0	I/P	<u>p.115</u>
04	0h1E04	User function input1-C	User Input1- C	0-0	xFFFF	0	Х	0	I/P	<u>p.115</u>
05	0h1E05	User function output1	User Output1	-32	767-32767	0		0	I/P	<u>p.115</u>
				0	NOP					
				1	ADD					
				2	SUB					
				3	ADDSUB					
				4	MIN					
				5	MAX					
				6	ABS					
06	0h1E06	User function 2	User Func2	7	NEGATE	0: NOP	Χ	0	I/P	p.115
				8	MPYDIV					
				9	REMAINDER					
				10	COMPARE-GT					
				11	COMPARE-GEQ					
				12	COMPARE- EQUAL					
				13	COMPARE- NEQUAL					

-	
Table	Function

Code	Comm. Address	Name	LCD Display	Set	ting Range	Initial Value	Property*	V/F	SL	Ref.
				14	TIMER					
				15	LIMIT					
				16	AND					
				17	OR					
				18	XOR					
				19	ANDOR					
					SWITCH					
				21	BITTEST					
				22	BITSET					
				23	BITCLEAR					
				24	LOWPASSFILTER					
				25	PI_CONTORL					
				26	PI_PROCESS					
				27	UPCOUNT					
				28	DOWNCOUNT					
07	0h1E07	User function input2-A	User Input2- A	0-0	xFFFF	0	X	О	I/P	<u>p.115</u>
08	0h1E08	User function input2-B	User Input2- B	0-0	xFFFF	0	X	О	I/P	<u>p.115</u>
09	0h1E09	User function input2-C	User Input2- C	0-0	xFFFF	0	X	О	I/P	<u>p.115</u>
10	0h1E0A	User function output2	User Output2	-32	767-32767	0		0	I/P	<u>p.115</u>
				0	NOP					
				1	ADD					
				2	SUB					
				3	ADDSUB					
				4	MIN					·
				5	MAX					
11	0h1E0B	User function3	User Func3	6	ABS	0:NOP	Х	0	I/P	p.115
	OTTLOD	oser ranctions	oser raries	7	NEGATE	0101	`		.,.	<i>p.113</i>
				8	MPYDIV	1				
				9	REMAINDER					
				10	COMPARE-GT					
				11	COMPARE-GEQ	!				
				12	COMPARE-					
				12	EQUAL					

Code	Comm. Address	Name	LCD Display	Set	ting Range	Initial Value	Property*	V/F	SL	Ref.
				13	COMPARE-					
				1/1	NEQUAL TIMER					
					LIMIT					
					AND					
				17						
				18	XOR					
				19	ANDOR					
				20	SWITCH					
				21	BITTEST					
				22	BITSET					
				23	BITCLEAR					
				24	LOWPASSFILTER					
				25	PI_CONTORL					
				26	PI_PROCESS					
					UPCOUNT					
				28	DOWNCOUNT					
12	0h1E0C	User function input3-A	User Input3- A	0-0	xFFFF	0	Х	0	I/P	<u>p.115</u>
13	0h1E0D	User function input3-B	User Input3- B	0-0	xFFFF	0	Х	0	I/P	<u>p.115</u>
14	0h1E0E	User function input3-C	User Input3- C	0-0	xFFFF	0	Х	0	I/P	<u>p.115</u>
15	0h1E0F	User function output3	User Output3	-32	767-32767	0		0	I/P	p.115
		-		0	NOP					
				1	ADD					
				2	SUB					
				3	ADDSUB					
				4	MIN					
16	0h1E10	User function4	User Func4	5	MAX	O·NI○D	X	0	I/P	p.115
10	OITILIO	Oser fullction4	OSEI I UIIC 4	6	ABS	0:NOP	^		1/ [<u>p.113</u>
				7	NEGATE					
				8	MPYDIV					
				9	REMAINDER					
					COMPARE-GT	_				
				11	COMPARE-GEQ					

Code Address Name LCD Display Setting Range Value Property* V/F Setting Range Today Value Property* V/F Setting Range Today Value Property* V/F Setting Range Today Value Property* V/F Setting Range	SL Ref.
12 EQUAL 13 COMPARE- NEQUAL 14 TIMER	
13 NEQUAL 14 TIMER	
15 LIMIT	
17 OR	
18 XOR	
19 ANDOR	
20 SWITCH	
21 BITTEST	
22 BITSET	
23 BITCLEAR	
24 LOWPASSFILTER	
25 PI_CONTORL	
26 PI_PROCESS	
27 UPCOUNT	
28 DOWNCOUNT	
17 Oh1E11 User function User Input4- O-0xFFFF O X O I	I/P <u>p.115</u>
18 Oh1E12 User function User Input4-B O-0xFFFF O X O I	I/P <u>p.115</u>
19 Oh1E13 User function User Input4- O-0xFFFF 0 X O I	I/P <u>p.115</u>
User function User	I/P <u>p.115</u>
0 NOP	
1 ADD	
2 SUB	
3 ADDSUB	
4 MIN	
21 Oh1E15 User function5 User Func5 5 MAX OINOP X OI	I/P <i>p.115</i>
6 ABS	
7 NEGATE 8 MPYDIV	
9 REMAINDER	
10 COMPARE-GT	
11 COMPARE-GEQ	

Function Table

Code	Comm. Address	Name	LCD Display	Set	ting Range	Initial Value	Property*	V/F	SL	Ref.
	Address			12 13 14 15 16 17 18 19 20 21 22 23 24	COMPARE- EQUAL COMPARE- NEQUAL TIMER LIMIT AND OR XOR ANDOR SWITCH BITTEST BITCLEAR	Value				
					PI_PROCESS					
					UPCOUNT					
				28	DOWNCOUNT					
22	0h1E16	User function input5-A	User Input5- A	0-0	xFFFF	0	Х	0	I/P	<u>p.115</u>
23	0h1E17	User function input5-B	User Input5- B	0-0	xFFFF	0	Х	0	I/P	<u>p.115</u>
24	0h1E18	User function input5-C	User Input5- C	0-0	xFFFF	0	Х	0	I/P	<u>p.115</u>
25	0h1E19	User function output5	User Output5	-32	767-32767	0		0	I/P	<u>p.115</u>
				0	NOP					
				1	ADD					
				2	SUB					
				3	ADDSUB					
26	26 Oh1E1A User function6 User Func	User Func6	4	MIN	0: NOP X		0	I/P	p.115	
				5	MAX					
				6	ABS					
				7	NEGATE	_				
			I F	8	MPYDIV	_				
				9	REMAINDER					

5	
5	Funct Table
5	tion
5	

Code	Comm. Address	Name	LCD Display	Setting Range		Initial Value	Property*	V/F	SL	Ref.
				10	COMPARE-GT					
				11	COMPARE-GEQ	-				
				12	COMPARE- EQUAL					
				13	COMPARE- NEQUAL					
				14	TIMER					
				15	LIMIT					
				16	AND					
				17	OR					
				18	XOR					
				19	ANDOR					
				20	SWITCH					
				21	BITTEST					
				22	BITSET					
				23	BITCLEAR					
				24	LOWPASSFILTER					
				25	PI_CONTORL					
				26	PI_PROCESS					
				27	UPCOUNT					
				28	DOWNCOUNT					
27	0h1E1B	User function input6-A	User Input6- A	0-0	xFFFF	0	X	0	I/P	<u>p.115</u>
28	0h1E1C	User function input6-B	User Input6- B	0-0	xFFFF	0	X	0	I/P	<u>p.115</u>
29	0h1E1D	User function input6-C	User Input6- C	0-0	xFFFF	0	Х	О	I/P	<u>p.115</u>
30	0h1E1E	User function output6	User Output6	-32	767-32767	0		О	I/P	<u>p.115</u>
				0	NOP					
				1	ADD					
				2	SUB					
31	0h1E1F	User function7	User Func7	3	ADDSUB	0:NOP	Х	0	I/P	<u>p.115</u>
				4	MIN					
				5	MAX					
				6	ABS					

7 NEGATE 8 MPYDIV 9 REMAINDER 10 COMPARE-GT 11 COMPARE-GEQ 12 COMPARE-EQUAL 13 COMPARE- 14 TIMER 15 LIMIT 16 AND 17 OR 18 XOR 19 ANDOR 20 SWITCH	
9 REMAINDER 10 COMPARE-GT 11 COMPARE-GEQ 12 COMPARE-EQUAL 13 COMPARE- 14 TIMER 15 LIMIT 16 AND 17 OR 18 XOR 19 ANDOR	
10 COMPARE-GT 11 COMPARE-GEQ 12 COMPARE- EQUAL 13 COMPARE- 14 TIMER 15 LIMIT 16 AND 17 OR 18 XOR 19 ANDOR	
11 COMPARE-GEQ 12 COMPARE-EQUAL 13 COMPARE- 14 TIMER 15 LIMIT 16 AND 17 OR 18 XOR 19 ANDOR	
12 COMPARE- EQUAL 13 COMPARE- 14 TIMER 15 LIMIT 16 AND 17 OR 18 XOR 19 ANDOR	
12 EQUAL 13 COMPARE- 14 TIMER 15 LIMIT 16 AND 17 OR 18 XOR 19 ANDOR	
14 TIMER 15 LIMIT 16 AND 17 OR 18 XOR 19 ANDOR	
15 LIMIT 16 AND 17 OR 18 XOR 19 ANDOR	
16 AND 17 OR 18 XOR 19 ANDOR	
17 OR 18 XOR 19 ANDOR	
18 XOR 19 ANDOR	
19 ANDOR	
20 SWITCH	
	. 1
21 BITTEST	
22 BITSET	
23 BITCLEAR	
24 LOWPASSFILTER	
25 PI_CONTORL	
26 PI_PROCESS	
27 UPCOUNT	
28 DOWNCOUNT	
32 Oh1E20 User function input7-A User Input7- O-0xFFFF O X O	I/P <u>p.115</u>
33 Oh1E21 User function input7-B User Input7- O-0xFFFF O X O	I/P <u>p.115</u>
34 Oh1E22 User function input7-C User Input7- O-0xFFFF O X O	I/P <u>p.115</u>
35 Oh1E23 User function output7 User Output7 -32767-32767 O	I/P <u>p.115</u>
0 NOP	
1 ADD	
36 Oh1E24 User function8 User Func8 2 SUB O:NOP X O	I/P <u>p.115</u>
3 ADDSUB	
4 MIN	

Code	Comm. Address	Name	LCD Display	Set	ting Range	Initial Value	Property*	V/F	SL	Ref.
				5	MAX					
				6	ABS					
				7	NEGATE					
				8	MPYDIV					
				9	REMAINDER					
				10	COMPARE-GT					
				11	COMPARE-GEQ					
				12	COMPARE- EQUAL					
				13	COMPARE- NEQUAL					
				14	TIMER					
				15	LIMIT					
				16	AND					
				17	OR					
				18	XOR					
				19	ANDOR					
				20	SWITCH					
				21	BITTEST					
				22	BITSET					
				23	BITCLEAR					
				24	LOWPASSFILTER					
				25	PI_CONTORL					1
				26	PI_PROCESS					
				27	UPCOUNT					
				28	DOWNCOUNT					
37	0h1E25	User function input8-A	User Input8- A	0-0	xFFFF	0	х	0	I/P	<u>p.115</u>
38	0h1E26	User function input8-B	User Input8- B	0-0	xFFFF	0	х	0	I/P	<u>p.115</u>
39	0h1E27	User function input8-C	User Input8- C	0-0	xFFFF	0	х	0	I/P	<u>p.115</u>
40	0h1E28	User function output8	User Output8		767-32767	0		0	I/P	<u>p.115</u>
				0	NOP					
41	0h1E29	User function9	User Func9	1	ADD	0:NOP	Х	0	I/P	<u>p.115</u>
				2	SUB					

Code	Comm. Address	Name	LCD Display	Set	ting Range	Initial Value	Property*	V/F	SL	Ref.
				3	ADDSUB					
				4	MIN					
				5	MAX					
				6	ABS					
				7	NEGATE					
				8	MPYDIV					
				9	REMAINDER					
				10	COMPARE-GT					
				11	COMPARE-GEQ					
				12	COMPARE- EQUAL					
				13	COMPARE- NEQUAL					
				14 TIMER						
				15	LIMIT					
				16 AND						
				17	OR					
				18	XOR					
				19	ANDOR					
				20	SWITCH					
				21	BITTEST					
				22	BITSET					
				23	BITCLEAR					
				24	LOWPASSFILTER					
				25	PI_CONTORL					
				26	PI_PROCESS					
				27	UPCOUNT					
				28	DOWNCOUNT					
42	0h1E2A	User function input9-A	User Input9- A	0-0	xFFFF	0	Х	0	I/P	<u>p.115</u>
43	0h1E2B	User function input9-B	User Input9- B	0-0	xFFFF	0	X	0	I/P	<u>p.115</u>
44	0h1E2C	User function input9-C	User Input9- C	0-0xFFFF		0	X	0	I/P	<u>p.115</u>
45	0h1E2D	User function output9	User Output9	-32	767-32767	0		0	I/P	<u>p.115</u>

Code	Comm. Address	Name	LCD Display	Set	ting Range	Initial Value	Property*	V/F	SL	Ref.
				0	NOP					
				1	ADD					
				2	SUB					
				3	ADDSUB					
				4	MIN					
				5	MAX					
				6	ABS					
				7	NEGATE					
				8	MPYDIV					
				9	REMAINDER					
				10	COMPARE-GT					
				11	COMPARE-GEQ					
				12	COMPARE- EQUAL					
46	0h1E2E	User function 10	User Func10	13	NEQUAL 0:NC	0:NOP X	X	0	I/P	p.115
				14 TIMER					<u> </u>	
			15 LIMIT 16 AND 17 OR							
					XOR					
					ANDOR					
					SWITCH					
				21						
					BITSET					
				23						
					LOWPASSFILTER					
					PI_CONTORL					
					PI_PROCESS					
					UPCOUNT					
				28	DOWNCOUNT					
47	0h1E2F	User function input10-A	User Input10-A	0-0	xFFFF	0	X	0	I/P	<u>p.115</u>
48	0h1E30	User function input 10-B	User	0-0	xFFFF	0	Χ	0	I/P	p.115
	01.4==-	User function	Input10-B User	2 -						
49	0h1E31	input10-C	Input10-C	0-0)xFFFF	0	Х	0	I/P	<u>p.115</u>

Code	Comm. Address	Name	LCD Display	Set	ting Range	Initial Value	Property*	V/F	SL	Ref.
50	0h1E32	User function output 10	User Output10	-32	767-32767	0		0	I/P	<u>p.115</u>
				0	NOP					
				1	ADD					
				2	SUB					
				3	ADDSUB					
				4	MIN					
				5	MAX					
				6	ABS					
				7	NEGATE					
				8	MPYDIV					
				9	REMAINDER					
				10	COMPARE-GT					
				11	-					
				12	COMPARE- EQUAL					
51	0h1E33	User function 11	User Func11	13	COMPARE- NEQUAL	0: NOP	Х	0	I/D	p.115
31	UITESS	Oser runction i	User Func I I	14	TIMER	U. INOP			I/P	<u>p.113</u>
				15	LIMIT	1				
				16	AND					
				17	OR					
				18	XOR					
				19	ANDOR					
				20	SWITCH					
				21	BITTEST					
				22	BITSET					
				23	BITCLEAR					
				24	LOWPASSFILTER					
				25	PI_CONTORL					
				26	PI_PROCESS					
				27	UPCOUNT					
				28	DOWNCOUNT					
52	0h1E34	User function input11-A	User Input11-A	0-0	xFFFF	0	Х	0	I/P	<u>p.115</u>
53	0h1E35	User function input11-B	User Input11-B	0-0	xFFFF	0	х	0	I/P	<u>p.115</u>

Code	Comm. Address	Name	LCD Display	y Setting Range		Initial Value	Property*	V/F	SL	Ref.						
54	0h1E36	User function input11-C	User Input11-C	0-0	xFFFF	0	Х	0	I/P	<u>p.115</u>						
55	0h1E37	User function output 11	User Output11	-32	767-32767	0		0	I/P	<u>p.115</u>						
				0	NOP											
				1	ADD											
				2	SUB											
				3	ADDSUB											
				4	MIN											
				5	MAX											
				6	ABS											
				7	NEGATE											
				8	MPYDIV											
				9	REMAINDER											
					COMPARE-GT	1										
			11	COMPARE-GEQ												
				12	COMPARE- EQUAL											
56	0h1E38 User function12 User F	Licor Func12	User Func12	13	COMPARE- NEQUAL	0:NOP	Х	0	I/P	p.115						
30	OITILSO	Oser function 12		OSEIT UTICTZ	OSEI I UIICIZ	OSEIT UTICTZ	OSEIT UTICTZ	OSEIT UTICTZ	O3CITUTIC12	O3CITUTIC12	14	TIMER	0.1101	^		1/1
				15	LIMIT											
				16	AND											
				17	OR											
				18	XOR					ומטות						
					19	ANDOR					ח					
				20	SWITCH											
				21	BITTEST					_						
				22	BITSET											
				23	BITCLEAR											
				24	LOWPASSFILTER											
				25	PI_CONTORL											
				26	PI_PROCESS											
				27	UPCOUNT											
				28	DOWNCOUNT											
57	0h1E39	User function input12-A	User Input12-A	0-0	xFFFF	0	Х	0	I/P	<u>p.115</u>						

Code	Comm. Address	Name	LCD Display	Setting Range		Initial Value	Property*	V/F	SL	Ref.
58	0h1E3A	User function input12-B	User Input12-B	0-0	xFFFF	0	Х	0	I/P	<u>p.115</u>
59	0h1E3B	User function input12-C	User Input12-C	0-0	xFFFF	0	Х	О	I/P	<u>p.115</u>
60	0h1E3C	User function output12	User Output12	-32	767-32767	0		0	I/P	<u>p.115</u>
				0	NOP					
				1	ADD					
				2	SUB					
				3	ADDSUB					
				4	MIN					
				5	MAX					
				6	ABS					
				7	NEGATE					
			8	MPYDIV						
				10 COMPARE-G 11 COMPARE-G 12 COMPARE-EQUAL 13 COMPARE-	REMAINDER		X	0		
						-				
61	0h1E3D	User function 13	User Func13		COMPARE- NEQUAL	0: NOP			I/P	p.115
01	OTTLOD	oser ranetion 13	OSCIT GITCTS	14	TIMER	0.1101			1/1	<u>p.113</u>
				15	LIMIT					
				16	AND					
				17	OR					
				18	XOR					
				19	ANDOR					
				20	SWITCH					
				21	BITTEST					
					BITSET					
				23	BITCLEAR					
				24	LOWPASSFILTER					
				25	PI_CONTORL					
				26	PI_PROCESS					
			UPCOUNT							
				28	DOWNCOUNT					

Code	Comm. Address	Name	LCD Display	LCD Display Setting Range		Initial Value	Property*	V/F	SL	Ref.			
62	0h1E3E	User function input13-A	User Input13-A	0-0	xFFFF	0	Х	0	I/P	<u>p.115</u>			
63	0h1E3F	User function input13-B	User Input13-B	0-0	xFFFF	0	Х	О	I/P	p.115			
64	0h1E40	User function input13-C	User Input13-C	0-0	xFFFF	0	Х	О	I/P	<u>p.115</u>			
65	0h1E41	User function output 13	User Output13	-32	767-32767	0		О	I/P	<u>p.115</u>			
				0	NOP								
				1	ADD								
				2	SUB								
				3	ADDSUB	_							
				4	MIN								
				5	MAX								
				6	ABS								
				7	NEGATE								
					8	MPYDIV							
							9	REMAINDER					
									10	COMPARE-GT			
				11	COMPARE-GEQ								
				12	COMPARE- EQUAL								
66	0h1E42	User function 14	User Func14	13	COMPARE- NEQUAL	0: NOP	X	0	I/P	<u>p.115</u>			
				14	TIMER					-			
				15	LIMIT								
				16	AND					(
				17	OR								
				18	XOR								
				19	ANDOR								
				20	SWITCH								
				21	BITTEST								
				22	BITSET								
				23	BITCLEAR								
			 	24	LOWPASSFILTER								
					PI_CONTORL								
				26	PI_PROCESS	1							

Code	Comm. Address	Name	LCD Display	Set	tting Range	Initial Value	Property*	V/F	SL	Ref.						
					UPCOUNT	-										
				28	DOWNCOUNT											
67	0h1E43	User function input14-A	User Input14-A	0-0)xFFFF	0	Х	0	I/P	<u>p.115</u>						
68	0h1E44	User function input14-B	User Input14-B	0-0)xFFFF	0	Х	О	I/P	<u>p.115</u>						
69	0h1E45	User function input14-C	User Input14-C	0-0)xFFFF	0	Х	0	I/P	<u>p.115</u>						
70	0h1E46	User function output14	User Output14	-32	2767-32767	0		0	I/P	<u>p.115</u>						
				0	NOP											
				1	ADD											
				2	SUB											
				3	ADDSUB											
				4	MIN											
				5	MAX											
				6	ABS											
				7	NEGATE	1										
								8	MPYDIV							
						9	REMAINDER									
											10	COMPARE-GT				
									11	COMPARE-GEQ						
71	0h1E47	User function 15	User Func15	12	COMPARE- EQUAL	0:NOP	Х	0	I/P	<u>p.115</u>						
				13	COMPARE- NEQUAL											
				14	TIMER											
				15	LIMIT											
				16	AND											
				17	OR											
				18	XOR											
				19	ANDOR											
				20	SWITCH											
				21	BITTEST											
				22	BITSET											
				23	BITCLEAR	-										
				24	LOWPASSFILTER											

Code	Comm. Address	Name	LCD Display	Set	ting Range	Initial Value	Property*	V/F	SL	Ref.
				25	PI_CONTORL					
				26	PI_PROCESS					
				27	UPCOUNT					
				28	DOWNCOUNT					
72	0h1E48	User function input15-A	User Input15-A	0-0	xFFFF	0	Х	0	I/P	<u>p.115</u>
73	0h1E49	User function input15-B	User Input15-B	0-0	xFFFF	0	Х	0	I/P	<u>p.115</u>
74	0h1E4A	User function input15-C	User Input15-C	0-0	xFFFF	0	Х	О	I/P	<u>p.115</u>
75	0h1E4B	User function output 15	User Output15	-32	767-32767	0		0	I/P	<u>p.115</u>
				0	NOP					
				1	ADD					
				2	SUB					
				3 ADDSUB						
				4	5 MAX					
				5						
				6	ABS					
				7	NEGATE					
				8	MPYDIV					
				9	REMAINDER					
				10	COMPARE-GT					
76	01.1546	6 11 16	5 46	11	COMPARE-GEQ	O NIOD	V		1/0	115
76	0h1E4C	User function 16	User Func16	12	COMPARE- EQUAL	0:NOP	X	0	I/P	<u>p.115</u>
				13	COMPARE- NEQUAL					
				14	TIMER					
				15	LIMIT					
				16	AND					
				17	OR					
				18	XOR					
				19	ANDOR					
				20	SWITCH					
				21	BITTEST	1				
				22	BITSET					

Code	Comm. Address	Name	LCD Display	Setting Range		Initial Value	Property*	V/F	SL	Ref.
				23	BITCLEAR					
				24	LOWPASSFILTER					
				25	PI_CONTORL					
				26	PI_PROCESS					
				27	UPCOUNT					
				28	DOWNCOUNT					
77	0h1E4D	User function input16-A	User Input16-A	0-0	xFFFF	0	Х	O	I/P	<u>p.115</u>
78	0h1E4E	User function input16-B	User Input16-B	0-0	xFFFF	0	X	0	I/P	<u>p.115</u>
79	0h1E4F	User function input16-C	User Input16-C	0-0	xFFFF	0	Х	0	I/P	<u>p.115</u>
80	0h1E50	User function output16	User Output16	-32	767–32767	0		0	I/P	<u>p.115</u>
				0	NOP					
				1	ADD					
		2 SUB 3 ADDSUB 4 MIN 5 MAX 6 ABS		2	SUB					
				4	MIN					
				5	MAX					
					ABS					
				7	NEGATE	-				
				8	MPYDIV	-				
				9	REMAINDER					
81	0h1E51	User function 17	User Func17	10		0: NOP	Х	0	I/P	p.115
01	OIIILSI	Oser function 17	OSEL LUICI7	11	7	0.1101	^		1/1	<u>p.113</u>
				12	COMPARE- EQUAL					
				13	COMPARE- NEQUAL					
				14	TIMER					
				15	LIMIT					
				16	AND					
				17	OR					
			18	18	XOR					
					ANDOR					
				20	SWITCH					

Code	Comm. Address	Name	LCD Display	Set	ting Range	Initial Value	Property*	V/F	SL	Ref.	
				21	BITTEST						
				22	BITSET						
				23	BITCLEAR						
				24	LOWPASSFILTER						
				25	PI_CONTORL						
				26	PI_PROCESS						
				27	UPCOUNT						
				28	DOWNCOUNT						
82	0h1E52	User function input17-A	User Input17-A	0-0	xFFFF	0	X	О	I/P	<u>p.115</u>	
83	0h1E53	User function input17-B	User Input17-B	0-0	xFFFF	0	Х	0	I/P	<u>p.115</u>	
84	0h1E54	User function input17-C	User Input17-C	0-0	xFFFF	0	Х	О	I/P	<u>p.115</u>	
85	0h1E55	User function output17	User Output17	-32767-32767		0		О	I/P	p.115	
				0	NOP						
				1	ADD						
				2	SUB						
				3	3	ADDSUB					
				4	MIN						
				5	MAX						
				6	ABS						
				7	NEGATE						
				8	MPYDIV	1					
86	0h1E56	User function 18	User Func18	9	REMAINDER	0: NOP	Х		I/D	n 115	
80	UNIESO	User function 18	Oser Functo	10	COMPARE-GT	U: NOP	^	0	I/P	<u>p.115</u>	
				11	COMPARE-GEQ						
				12	COMPARE-						
					EQUAL	_					
				13	COMPARE- NEQUAL						
				14	TIMER	1					
				15	LIMIT	1					
				16	AND	1					
				17	OR	1					
				18	XOR						

Code	Comm. Address	Name	LCD Display	Set	ting Range	Initial Value	Property*	V/F	SL	Ref.
				19	ANDOR					
				20	SWITCH					
				21	BITTEST					
				22	BITSET					
				23	BITCLEAR					
				24	LOWPASSFILTER					
				25	PI_CONTORL					
				26	PI_PROCESS					
				27	UPCOUNT					
				28	DOWNCOUNT					
87	0h1E57	User function input18-A	User Input18-A	0-0xFFFF		0	Х	0	I/P	<u>p.115</u>
88	0h1E58	User function input18-B	User Input18-B	0-0xFFFF		0	Х	0	I/P	<u>p.115</u>
89	0h1E59	User function input18-C	User Input18-C	10-0xFFFF		0	Х	О	I/P	<u>p.115</u>
90	0h1E5A	User function output 18	User Output18	-32	767-32767	0		0	I/P	<u>p.115</u>

6.13 Groups for LCD Keypad Only

6.13.1 Trip Mode (TRP Last-x)

Code	Name	LCD Display	Set	ting Range	Initial Value	Ref.
00	Trip type display	Trip Name(x)	-		-	-
01	Frequency reference at trip	Output Freq	-		-	-
02	Output current at trip	Output Current	-		-	-
03	Acceleration/Deceleration state at trip	Inverter State	tate -		-	-
04	DC section state	DCLink Voltage -			-	-
05	NTC temperature	Temperature	-		-	-
06	Input terminal state	DI State	-		0000 0000	-
07	Output terminal state	DO State	-		000	-
08	Trip time after Power on	Trip On Time	-		0/00/00 00:00	-
09	Trip time after operation start	Trip Run Time	-		0/00/00 00:00	-
10	Delete trip history	Trip Delete?	0	No		
	Defete trip filstory	mp belete:	1	Yes		

6.13.2 Config Mode (CNF)

Code	Name	LCD Display	Setting Range	Initial Value	Ref.
00	Jump code	Jump Code	1-99	42	<u>p.52</u>
			0 English		
	Keypad language		1 Russian		
01	selection	Language Sel	2 Spanish	0 : English	-
	Selection		3 Italian		
			4 Turkish		
02	LCD constrast adjustment	LCD Contrast	-	-	-
03	Multi keypad ID	Multi KPD ID	3-99	3	<u>p.114</u>
10	Inverter S/W version	Inv S/W Ver	-	-	-
11	LCD keypad S/W version	Keypad S/W Ver	-	-	-
12	LCD keypad title version	KPD Title Ver	-	-	-

Code	Name	LCD Display	Set	ting Range	Initial Value	Ref.
20	Status window display item	Anytime Para	0	Frequency	0: Frequency	-
21	Monitor mode display item1	Monitor Line-1	1	Speed	0: Frequency	-
22	Monitor mode display item2	Monitor Line-2	2	Output Current	2:Output Current	-
			3	Output Voltage		
			4	Output Power		
			5	WHour Counter		
			6	DCLink Voltage		
			7	DI State		
			8	DO State		
			9	V1 Monitor(V)		
			10	V1 Monitor(%)		
			13	V2 Monitor(V)		
23	Monitor mode display item3	Monitor Line-3	14	V2 Monitor(%)	3:Output Voltage	-
			15	I2 Monitor(mA)	voltage	
				I2 Monitor(%)		
			17	PID Output		
			18	PID Ref Value		
			19	PID Fdb Value		
			20	Torque		
			21	Torque Limit		
			23	Speed Limit		
			24	Load Speed		
24	Monitor mode	Mon Mode Init	0	No	0:No	
24	initialization	Mon Mode mit	1	Yes	UINO	-
30	Option slot 1 type display	Option-1 Type	0	None	0:None	-
31	Option slot 2 type display	Option-2Type	6	Ethernet	0:None	-
32	Option slot 3 type display	Option-3 Type	9	CANopen	0:None	-
			0	No		
			1	All Grp		
			2	DRV Grp		
40	Parameter initialization	Parameter Init	3	BAS Grp		-
			4	ADV Grp		
			5	CON Grp		
			6	IN Grp		

Code	Name	LCD Display	Set	ting Range	Initial Value	Ref.
			7	OUT Grp		
			8	COM Grp		
			9	APP Grp		
			11	APO Grp ⁵⁶		
			12	PRT Grp		
			13	M2 Grp		
41	Display changed	Changed Para	0	View All	0:View All	-
	Parameter	Changed Fara	1	View Changed	O.VIEW All	
			0	None		-
			1	JOG Key		
42	Multi key item	Multi Key Sel	2	Local/Remote	0:None	
42	Multi key item	Multi Rey Sei	3	UserGrp SelKey	O.INOTIE	
			4	Multi KPD	-	
43	Macro function item Macro Select 0 None		None	0:None	-	
	14 Trip history deletion	Erase All Trip	0	No	ONe	-
44			1	Yes	0:No	
45	User registration code	6 4115 1	0	No	ON-	-
45	deletion	UserGrp AllDel	1	Yes	0:No	
16	Danda anatana		0	No	ON-	-
46	Read parameters	Parameter Read	1	Yes	0:No	
47	Muito va va va ata va	Parameter	0	No	O. N	-
47	Write parameters	Write	1	Yes	0: No	
40		D . C	0	No	ON	-
48	Save parameters	Parameter Save	1	Yes	0:No	
50	Hide parameter mode	View Lock Set	0-9	999	Un-locked	-
51	Password for hiding parameter mode	View Lock Pw	0-9	999	Password	-
52	Lock parameter edit	Key Lock Set	0-9999		Un-locked	-
53	Password for locking parameter edit	Key Lock Pw	0-9999		Password	-
60		Add Title Us	0	No	0:No	-
60	Additional title update	Add Title Up	1	Yes	0:No	
<i>C</i> 1	Cincolo manage ()	Fam. Charl O	0	No	1 1/	-
61	Simple parameter setting	Easy Start On	1	Yes	1:Yes	

⁵⁶ Supported only Extention I/O(Option)

Table of Functions

Code	Name	LCD Display	Set	ting Range	Initial Value	Ref.
62	Power consumption	WHCount Reset	0	No	0:No	_
	initialization		1	Yes		
70	Accumulated inverter motion time	On-time	Year/month/day hour:minute		-	
71	Accumulated inverter operation time	Run-time	Year/month/day hour:minute		-	-
	Accumulated inverter		0	No	0:No	-
72	operation time initialization	Time Reset		Yes		
74	Accumulated cooling fan operation time	Fan Time	Year/month/day hour:minute		-	-
-	Reset of accumulated		0	No		-
75	cooling fan operation time	Fan Time Rst		Yes	0:No	

roublehooting

7 Troubleshooting

This chapter explains how to troubleshoot a problem when inverter protective functions, fault trips, warning signals, or a fault occurs. If the inverter does not work normally after following the suggested troubleshooting steps, please contact the LSIS customer service center.

7.1 Trips and Warnings

When the inverter detects a fault, it stops the operation (trips) or sends out a warning signal. When a trip or warning occurs, detailed information is shown on the LCD display. Users can read the warning message at PRT-90. When more than 2 trips occur at roughly the same time, the LCD keypad shows the information for the fault trip that occurred first.

The fault conditions can be categorized as follows:

- Level: When the fault is corrected, the trip or warning signal disappears and the fault is not saved in the fault history.
- Latch: When the fault is corrected and a reset input signal is provided, the trip or warning signal disappears.
- Fatal: When the fault is corrected, the fault trip or warning signal disappears only after the
 user turns off the inverter, waits until the charge indicator light goes off, and turns the inverter
 on again. If the the inverter is still in a fault condition after powering it on again, please
 contact the supplier or the LSIS customer service center.

7.1.1 Fault Trips

Protection Functions for Output Current and Input Voltage

rotection ranctions for output current and input voltage					
LCD Display	Туре	Description			
Overload	Latch	Displayed when the motor overload trip is activated and the actual load level exceeds the set level. Operates when PRT-20 is set to a value other than 0.			
Underload	Latch	Displayed when the motor underload trip is activated and the actual load level is less than the set level. Operates when PRT-27 is set to a value other than 0.			
Over Current1	Latch	Displayed when inverter output current exceeds 200% of the rated current.			
Over Voltage	Latch	Displayed when internal DC circuit voltage exceeds the specified value.			
Low Voltage	Level	Displayed when internal DC circuit voltage is less than the specified value.			

LCD Display	Туре	Description
Low Voltage2	Latch	Displayed when internal DC circuit voltage is less than the specified value during inverter operation.
Ground 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	Displayed based on inverse time-limit thermal characteristics to prevent motor overheating. Operates when PRT-40 is set to a value other than 0.
Out Phase Open	Latch	Displayed when a 3-phase inverter output has one or more phases in an open circuit condition. Operates when bit 1 of PRT-05 is set to 1.
In Phase Open	Latch	Displayed when a 3-phase inverter input has one or more phases in an open circuit condition. Operates only when bit 2 of PRT-05 is set to 1.
Inverter OLT	Latch	Displayed when the inverter has been protected from overload and resultant overheating, based on inverse time-limit thermal characteristics. Allowable overload rates for the inverter are 150% for 1 min and 200% for 4 sec. Protection is based on inverter rated capacity, and may vary depending on the device's capacity.
No Motor Trip	Latch	Displayed when the motor is not connected during inverter operation. Operates when PRT-31 is set to 1.

^{*} S100 inverters rated for 4.0 kW or less do not support the ground fault trip (GFT) feature. Therefore, an over current trip (OCT) or over voltage trip (OVT) may occur when there is a lowresistance ground fault.

Protection Functions Using Abnormal Internal Circuit Conditions and External Signals

LCD Display	Туре	Description
Over Heat	Latch	Displayed when the tempertature of the inverter heat sink exceeds the specified value.
Over Current2	Latch	Displayed when the DC circuit in the inverter detects a specified level of excessive, short circuit current.
External Trip	Latch	Displayed when an external fault signal is provided by the multi-function terminal. Set one of the multi-function input terminals at IN-65-71 to 4 (External Trip) to enable external trip.
ВХ	Level	Displayed when the inverter output is blocked by a signal provided from the multi-function terminal. Set one of the multi-function input terminals at IN-65-71 to 5 (BX) to enable input block function.
H/W-Diag	Fatal	 Displayed when an error is detected in the memory (EEPRom), analog-digital converter output (ADC Off Set), or CPU watchdog (Watch Dog-1, Watch Dog-2). EEP Err: An error in reading/writing parameters due to keypad or memory (EEPRom) fault. ADC Off Set: An error in the current sensing circuit (U/V/W terminal, current sensor, etc.).

NICOpen	Latch	Insulated Gate Bipolar Transistor (IGBT).
Fan Trip	Latch	Displayed when an error is detected in the cooling fan. Set PRT-79 to 0 to activate fan trip (for models below 22 kW capacity).
Pre-PID Fail	Latch	Displayed when pre-PID is operating with functions set at APP-34-APP-36. A fault trip occurs when a controlled variable (PID feedback) is measured below the set value and the low feedback continues, as it is treated as a load fault.
Ext-Brake	Latch	Operates when the external brake signal is provided by the multi-function terminal. Occurs when the inverter output starting current remains below the set value at ADV-41. Set either OUT31 or OUT32 to 35 (BR Control).
Safety A(B) Err	Latch	Displayed when at least one of the two safety input signals is off.
Drotoction E	unctions	for Communication Options

Displayed when an error is detected in the temperature sensor of the

Description

LCD Display

Туре

LCD Display	Туре	Description
Lost Command	Level	Displayed when a frequency or operation command error is detected during inverter operation by controllers other than the keypad (e.g., using a terminal block and a communication mode). Activate by setting PRT-12 to any value other than 0.
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.
ParaWrite Trip	Latch	Displayed when communication fails during parameter writing. Occurs when using an LCD keypad due to a control cable fault or a bad connection.
Option Trip-1	Latch	Displayed when a communication error is detected between the inverter and the communication board. Occurs when the communication option card is installed.

7.1.2 Warning Messages

LCD Display	Description
Over Load	Displayed when the motor is overloaded. Operates when PRT-17 is set to 1. To operate, select 5. Set the digital output terminal or relay (OUT-31 or OUT-33) to 5 (Over Load) to receive overload warning output signals.
Under Load	Displayed when the motor is underloaded. Operates when PRT-25 is set to 1. Set the digital output terminal or relay (OUT-31 or OUT-33) to 7 (Under Load) to receive underload warning output signals.
INV Over Load	Displayed when the overload time equivalent to 60% of the inverter overheat protection (inverter IOLT) level, is accumulated. Set the digital output terminal or relay (OUT-31 or OUT-33) to 6 (IOL) to receive inverter overload warning output signals.
Lost Command	Lost command warning alarm occurs even with PRT-12 set to 0. The warning alarm occurs based on the condition set at PRT-13- 15. Set the digital output terminal or relay (OUT-31 or OUT-33) to 13 (Lost Command) to receive lost command warning output signals. If the communication settings and status are not suitable for P2P, a Lost Command alarm occurs.
Fan Warning	Displayed when an error is detected from the cooling fan while PRT-79 is set to 1. Set the digital output terminal or relay (OUT-31 or OUT-33) to 8 (Fan Warning) to receive fan warning output signals.
Fan Exchange	An alarm occurs when the value set at PRT-86 is less than the value set at PRT-87. To receive fan exchange output signals, set the digital output terminal or relay (OUT-31 or OUT-33) to 38 (Fan Exchange).
CAP Exchange	An alarm occurs when the value set at PRT-63 is less than the value set at PRT-62 (the value set at PRT-61 must be 2 (Pre Diag)). To receive CAP exchange signals, set the digital output terminal or relay (OUT-31 or OUT-33) to 36 (CAP Exchange).
DB Warn %ED	Displayed when the DB resistor usage rate exceeds the set value. Set the detection level at PRT-66.
Retry Tr Tune	Tr tune error warning alarm is activated when DRV-9 is set to 4. The warning alarm occurs when the motor's rotor time constant (Tr) is either too low or too high.

7.2 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.

Туре	Cause	Remedy
Over Load	The load is greater than the motor's rated	Ensure that the motor and inverter have
	capacity.	appropriate capacity ratings.
	The set value for the overload trip level	Increase the set value for the overload
	(PRT-21) is too low.	trip level.
Under Load	There is a motor-load connection problem.	Replace the motor and inverter with models with lower capacity.
	The set value for underload level (PRT-29, PRT-30) is less than the system's minimum load.	Reduce the set value for the underload level.
	Acc/Dec time is too short, compared to load inertia (GD2).	Increase Acc/Dec time.
	The inverter load is greater than the rated	Replace the inverter with a model that
	capacity.	has increased capacity.
Over Current1	The inverter supplied an output while the motor was idling.	Operate the inverter after the motor has stopped or use the speed search function (CON-60).
	The mechanical brake of the motor is operating too fast.	Check the mechanical brake.
	Deceleration time is too short for the load inertia (GD2).	Increase the acceleration time.
Over Voltage	A generative load occurs at the inverter output.	Use the braking unit.
	The input voltage is too high.	Determine if the input voltage is above the specified value.
Low Voltage	The input voltage is too low.	Determine if the input voltage is below the specificed 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 connected to the power source has a faulty connection.	Replace the magnetic contactor.
Low Voltage2	The input voltage has decreased during the	Determine if the input voltage is above
	operation.	the specified value.
	An input phase-loss has occurred.	Check the input wiring.
	The power supply magnetic contactor is faulty.	Replace the magnetic contractor.
Ground Trip	A ground fault has occurred in the inverter output wiring.	Check the output wiring.
	The motor insulation is damaged.	Replace the motor.
		-

Туре	Cause	Remedy
	The motor has overheated.	Reduce the load or operation frequency.
	The inverter load is greater than the rated	Replace the inverter with a model that
	capacity.	has increased capacity.
E-Thermal	The set value for electronic thermal	Set an appropriate electronic thermal
	protection is too low.	level.
	The inverter has been operated at low speed for an extended duration.	Replace the motor with a model that supplies extra power to the cooling fan.
	The magnetic contactor on the output side	Check the magnetic contactor on the
Output Phase	has a connection fault.	output side.
Open	The output wiring is faulty.	Check the output wiring.
	The magnetic contactor on the input side	Check the magnetic contactor on the
	has a connection fault.	input side.
Input Phase	The input wiring is faulty.	Check the input wiring.
Open		Replace the DC link capacitor. Contact
	The DC link capacitor needs to be replaced.	the retailer or the LSIS customer service
	The lead's anneal with an the material market	center.
I	The load is greater than the rated motor capacity.	Replace the motor and inverter with models that have increased capacity.
Inverter OLT	The torque boost level is too high.	Reduce the torque boost level.
	The torque boost lever is too riigh.	Determine if a foreign object is
	There is a problem with the cooling system.	obstructing the air inlet, outlet, or vent.
	The inverter cooling fan has been operated	
Over Heat	for an extended period.	Replace the cooling fan.
	The ambient temperature is too high.	Keep the ambient temperature below
	The ambient temperature is too migh.	50℃.
	Output wiring is short-circuited.	Check the output wiring.
Over Current2	There is a fault with the electronic	Do not operate the inverter. Contact the
	semiconductor (IGBT).	retailer or the LSIS customer service
		center. Keep the ambient temperature above -
	The ambient temperature is too low.	10°C.
NTC Open	There is a fault with the internal	Contact the retailer or the LSIS customer
	temperature sensor.	service center.
FAN Lock	A foreign object is obstructing the fan's air	Remove the foreign object from the air
	vent.	inlet or outlet.
	The cooling fan needs to be replaced.	Replace the cooling fan.
IP54 FAN Trip	The fan connector is not connected.	Connect the fan connector.
	The fan connector needs to be replaced.	Replace the fan connector.

7.3 Troubleshooting 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.

Туре	Cause	Remedy
Parameters	The inverter is in operation (driving	Stop the inverter to change to program
	mode).	mode and set the parameter.
	71	Check the correct parameter access
	The parameter access is incorrect.	level and set the parameter.
cannot be set.	The password is incorrect	Check the password, disable the
	The password is incorrect.	parameter lock and set the parameter.
	Low voltage is detected.	Check the power input to resolve the
		low voltage and set the parameter.
	The frequency command source is set	Check the frequency command source
	incorrectly.	setting.
	The operation command source is set incorrectly.	Check the operation command source setting.
	Power is not supplied to the terminal	Check the terminal connections R/S/T
	R/S/T.	and U/V/W.
	The charge lamp is turned off.	Turn on the inverter.
	The operation command is off.	Turn on the operation command (RUN).
	The operation command is on.	Unlock the motor or lower the load
	The motor is locked.	level.
	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	Check the wiring for the control circuit
The motor does	is incorrect.	terminal.
not rotate.	The input option for the frequency	Check the input option for the
	command is incorrect.	frequency command.
	The input voltage or current for the	Check the input voltage or current for
	frequency command is incorrect.	the frequency command.
	The PNP/NPN mode is selected incorrectly.	Check the PNP/NPN mode setting.
	· ·	Check the frequency command and
	The frequency command value is too low.	input a value above the minimum
		frequency.
	The [STOP/RESET] key is pressed.	Check that the stoppage is normal, if so
		resume operation normally.
	Motor torque is too low.	Change the operation modes (V/F, IM,
		and Sensorless). If the fault remains,
		replace the inverter with a model with
		increased capacity.

Туре	Cause	Remedy
The motor rotates in the opposite direction to the command.	The wiring for the motor output cable is incorrect.	Determine if the cable on the output side is wired correctly to the phase (U/V/W) of the motor.
	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.
The motor only	Reverse rotation prevention is selected.	Remove the reverse rotation prevention.
rotates in one direction.	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.
	The load is too heavy.	Reduce the load. Increase the Acc/Dec time. Check the motor parameters and set the correct values. Replace the motor and the inverter with models with appropriate capacity for the load.
T	The ambient temperature of the motor is too high.	Lower the ambient temperature of the motor.
The motor is overheating.	The phase-to-phase voltage of the motor is insufficient.	Use a motor that can withstand phase- to-phase voltages surges greater than the maximum surge voltage. Only use motors suitable for apllications with inverters.
		Connect the AC reactor to the inverter output (set the carrier frequency to 2 kHz).
	The motor fan has stopped or the fan is obstructed with debris.	Check the motor fan and remove any foreign objects.
The motor stops during acceleration or when connected to load.	The load is too high.	Reduce the load. Replace the motor and the inverter with models with capacity appropriate for the load.
	The frequency command value is low.	Set an appropriate value.
The motor does not accelerate. /The acceleration time is too long.	The load is too high.	Reduce the load and increase the acceleration time. Check the mechanical brake status.
	The acceleration time is too long.	Change the acceleration time.
	The combined values of the motor	Change the motor related parameters.

Туре	Cause	Remedy
	properties and the inverter parameter are incorrect.	
	The stall prevention level during acceleration is low.	Change the stall prevention level.
	The stall prevention level during operation is low.	Change the stall prevention level.
	Starting torque is insufficient.	Change to vector control operation mode. If the fault is still not corrected, replace the inverter with a model with increased capacity.
Motor speed	There is a high variance in load.	Replace the motor and inverter with models with increased capacity.
varies during	The input voltage varies.	Reduce input voltage variation.
operation.	Motor speed variations occur at a specific frequency.	Adjust the output frequency to avoid a resonance area.
The motor rotation is different from the setting.	The V/F pattern is set incorrectly.	Set a V/F pattern that is suitable for the motor specification.
The meeter	The deceleration time is set too long.	Change the setting accordingly.
The motor deceleration time is too long even with Dynamic Braking (DB)	The motor torque is insufficient.	If motor parameters are normal, it is likely to be a motor capacity fault. Replace the motor with a model with increased capacity.
resistor connected.	The load is higher than the internal torque limit determined by the rated current of the inverter.	Replace the inverter with a model with increased capacity.
Operation is	The carrier frequency is too high.	Reduce the carrier frequency.
difficult in underload applications.	Over-excitation has occurred due to an inaccurate V/F setting at low speed.	Reduce the torque boost value to avoid over-excitation.
While the inverter is in		Change the carrier frequency to the minimum value.
operation, a control unit malfunctions or noise occurs. When the inverter is operating, the earth leakage breaker is	Noise occurs due to switching inside the inverter.	Install a micro surge filter in the inverter output.
	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
activated.		than 10 Ω for 400 V inverters.

Туре	Cause	Remedy
		Check the capacity of the earth leakage breaker and make the appropriate connection, based on the rated current of the inverter.
		Lower the carrier frequency.
		Make the cable length between the inverter and the motor as short as possible.
The motor vibrates severely and does not	Phase-to-phase voltage of 3-phase power source is not balanced.	Check the input voltage and balance the voltage.
rotate normally.	30urce is not balanced.	Check and test the motor's insulation.
	Resonance occurs between the motor's natural frequency and the carrier frequency.	Slightly increase or decrease the carrier frequency.
The motor makes humming, or loud noises.	Resonance occurs between the motor's natural frequency and the inverter's output frequency.	Slightly increase or decrease the carrier frequency.
ioda noises.		Use the frequency jump function to avoid the frequency band where resonance occurs.
The motor	The frequency input command is an external, analog command.	In situations of noise inflow on the analog input side that results in command interference, change the input filter time constant (IN-07).
vibrates/hunts.	The wiring length between the inverter and the motor is too long.	Ensure that the total cable length between the inverter and the motor is less than 200m (50m for motors rated 3.7 kW or lower).
The motor does		Adjust the DC braking parameter.
not come to a complete stop when the	It is difficult to decelerate sufficiently, because DC braking is not operating normally.	Increase the set value for the DC braking current.
inverter output stops.		Increase the set value for the DC braking stopping time.
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 with increased capacity.
The cooling fan does not rotate.	The control parameter for the cooling fan is set incorrectly.	Check the control parameter setting for the cooling fan.

8 Maintenance

This chapter explains how to replace the cooling fan, the regular inspections to complete, and how to store and dispose of the product. An inverter is vulnerable to environmental conditions and faults also occur due to component wear and tear. To prevent breakdowns, please follow the maintenance recommendations in this section.

① Caution

- Before you inspect the product, read all safety instructions contained in this manual.
- Before you clean the product, ensure that the power is off.
- Clean the inverter with a dry cloth. Cleaning with wet cloths, water, solvents, or detergents may result in electric shock or damage to the product.

8.1 Regular Inspection Lists

8.1.1 Daily Inspections

Inspection area	Inspection item	Inspection details	Inspection method	Judgment standard	Inspection equipment
All	Ambient environment	Is the ambient temperature and humidity within the design range, and is there any dust or foreign objects present?	Refer to <u>1.3</u> <u>Installation</u> <u>Considerations</u> on page <u>4</u> .	No icing (ambient temperature: - 10 - +40) and no condensation (ambient humidity below 50%)	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 <u>9.1</u> <u>Input and</u> <u>Output</u> <u>Specification</u> on page <u>247</u> .	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 display value on the panel.	Check and manage specified values.	Voltmeter, ammeter, etc.
	All	Is there any abnormal vibration or noise?	Visual inspection	No alono moditu	
Motor		Is there any abnormal smell?	Check for overheating or damage.	No abnormality	-

8.1.2 Annual Inspections

Inspection	Inspection item	Inspection	Inspection	Judgment	Inspection
area		details	method	standard	equipment
Input/Output circuit	All	Megger test (between input/output terminals and and earth terminal)	Disconnect inverter and short R/S/T/U/V/W terminals, and then measure from each terminal to the ground terminal using a Megger.	Must be above 5 MΩ	DC 500 V Megger
		Is there anything loose in the device?	Tighten up all screws.	No	
		Is there any evidence of parts	Visual inspection	abnormality	
		overheating?	Пэрссион		
	Cable connections	Are there any corroded cables?	Visual inspection	No abnormality	-

Inspection	Inspection item	Inspection	Inspection	Judgment	Inspection	
area		details Is there any	method	standard	equipment	
		damage to				
		insulation?				
	Terminal block	Is there any damage?	Visual inspection	No abnormality	-	
	Smoothing condenser	Measure electrostatic capacity.	Measure with capacity meter.	Rated capacity over 85%	Capacity meter	
	Relay	Is there any chattering noise during operation?	Visual inspection	No abnormality	-	
		Is there any damage to the contacts?	Visual inspection	,		
		Is there any damage from resistance?	Visual inspection	No abnormality		
	Braking resistor	Check for disconnection.	Disconnect one side and measure with a tester.	Must be within ±10% of the rated value of the resistor.	Digital multimeter / anaog tester	
Control circuit Protection	Operation check	Check for output voltage imbalance while the inverter is in operation.	Measure voltage between the inverter output terminal U/V/ W.	Balance the voltage between phases: within 4V for 200 V series and within 8V for 400 V series.	Digital multimeter	
circuit		Is there an error in the display circuit after the sequence protection test?	Test the inverter ouput protection in both short and open circuit conditions.	Arisual Inspection Arisua	or DC voltmeter	
Cooling system	Cooling fan	Are any of the fan parts loose?	Check all connected parts and tighten all screws.	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.	

Bi-annual Inspections 8.1.3

Inspection area	Inspection item	Inspection details	Inspection method	Judgment standard	Inspection equipment
Motor	Insulation resistance	Megger test (between the input, output and earth terminals).	Disconnect the cables for terminals U/V/W and test the wiring.	Must be above 5 M Ω	DC 500 V Megger

① Caution

Do not run an insulation resistance test (Megger) on the control circuit as it may result in damage to the product.

8.2 Replacing Major Components

Refer to following for information on replacing major components.

Exchange Cycle for Major Components 8.2.1

Following table shows the cycles and information for major components.

Components	Exchange standard	Symptom	Action
Cooling fan	3 years	Spinning failure	Make inquiries to the A/S center and replace it with a new product.
Main circuit electrolytic condenser	3 years	Capacity reduction	Make inquiries to the A/S center and replace it with a new product.
Main circuit relay	-	Operation failure	Make inquiries to the A/S center.

Note

The life times of major components are based on the operating rated load consecutively. The lifetime may be different according to conditions and environment.

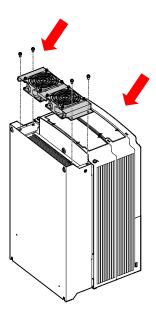
8.2.2 How to Replace the Cooling Fans

① Caution

Turn off the power when replacing cooling fans.

Replace the cooling fans following the steps below:

- 1 Refer to the illustration and remove the 4 bolts securing the fan bracket.
- 2 Remove the fan bracket and disconnect the fan connector.
- **3** Connect the new fan's connector to the inverter's fan connector.
- 4 Reinsert the 4 bolts and secure the fan bracket.



8.3 Storage and Disposal

8.3.1 Storage

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

- Store the product in the same environmental conditions as specified for operation (refer to 1.3 *Installation Considerations* on page 4).
- 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 moisture level below 70% in the package by including a desiccant, such as silica gel.

8.3.2 **Disposal**

When disposing of the product, categorize it as general industrial waste. Recyclable materials are included in the product, so recycle them whenever possible. The packing materials and all metal parts can be recycled. Although plastic can also be recycled, it can be incinerated under contolled conditions in some regions.

Caution

If the inverter has not been operated for a long time, capacitors lose their charging characteristics and are depleted. To prevent depletion, turn on the product once a year and allow the device to operate for 30-60 min. Run the device under no-load conditions.

9 Technical Specification

9.1 Input and Output Specification

3-Phase 400 V (30-75 kW)

Model □□□	□□\$100-4□□□		0300	0370	0450	0550	0750
Applied	HP		40	50	60	75	100
motor	kW		30	37	45	55	75
	Rated capacity	Heavy load	46	57	69	84	116
	[440Vac Input](kVA)	Normal load	55	67	78	106	126
	Rated current	Heavy load	61	75	91 110 107 142 47 57 55 73 Sensorless: 0-120 Hz)	152	
Rated	[3-Phase input] (A)	Normal load	75	91	107	142	169
output	Rated current	Heavy load	32	39	47	57	78
	[Single-Phase input] (A)	Normal load	39	47	55	75 55 84 106 110 142 57 73 0 Hz) 0 +10%) +10%) , input frequents 103 134 95/43	87
	Output frequer	ncy	0-400 Hz	(IM Sensor	less: 0-120		
	Output voltage	e(V)	3-phase 3	380-480 V			
	Working voltag	e (V)			C (-15% to - C(-5% to +1		
			50-60 Hz	(±5%)			
Rated input	Input frequency	y	(In case of 60Hz(±59	• .	ase input, ir	75 55 84 106 110 142 57 73 Hz) +10%) 0%) nput frequented at 103 134	ency is only
	Rated current	Heavy load	56	69	85	103	143
	(A)	Normal load	69	85	100	134	160
Weight (lb /k (Non EMC Fil	•		57/26 (55/25)	77/35 (75/34)	77/35 (75/34)	95/43	95/43

^{*}S100 inverters rated at 30 kW or more do not support I/O extensions or IP66 certification.

^{*}The 55-75 kW inverters do not have built-in EMC since they satisfy EMC standards even without it.

Note

Precautions for 1-phase input to 3-phase drive

- Please connect single-phase input to R(L1) and T(L3).
- AC or DC reactor is necessary to reduce DC ripple. Please select built-in reactor type for 30~75kW. For 0.4~22kW, external AC or DC reactor should be installed.
- Same peripheral devices (including a fuse and reactor) as 3-phase can be used for 1-phase as
- If phase open trip occurs, please turn off the input phase open protection(PRT-05).
- Protection for output current like OCT or IOLT is based on 3-phase input ratings which is larger than single-phase input. User should set the parameters that are relative to motor information(BAS-11~16), overload trip(PRT-17~22) and E-thermal functions(PRT-40~43)
- Performance of sensorless control could be unstable depending on DC ripple.
- The minimum input voltage must be larger than 228Vac for 240Vac supply and 456Vac for 480Vac supply to ensure motor voltage production of 207Vac and 415Vac, respectively.
- To minimize the effect of voltage deprivation, please choose 208Vac motor for 240Vac supply and 400Vac motor for 480Vac supply.

9.2 Product Specification Details

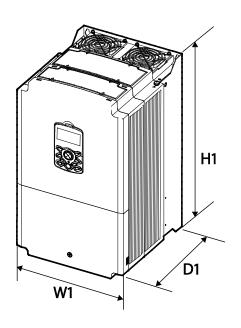
Items			Description				
	Control m	ethod	V/F control, slip compensation	on, sensorless vector			
	Frequency	settings	Digital command: 0.01 Hz				
	power res	olution	Analog command: 0.06 Hz (6	60 Hz standard)			
Control	Frequency accuracy		1% of maximum output freq	uency			
Control	V/F patter	n	Linear, square reduction, use	rV/F			
	Overload o	capacity	Heavy load rated current: 150 120% 1 min	0% 1 min, normal load rated current:			
	Torque bo	ost	Manual torque boost, autom	atic torque boost			
	Operation	type	Select key pad, terminal strip	, or communication operation			
	Frequency	settings	Analog type: -10-10 V, 0-10 V Digital type: key pad, pulse to				
	Operation	function	 PID control 3-wire operation Frequency limit Second function Anti-forward and reverse direction rotation Commercial transition Speed search Power braking Leakage reduction 	 Up-down operation DC braking Frequency jump Slip compensation Automatic restart Automatic tuning Energy buffering Flux braking Fire Mode 			
Operation	Input	Multi function terminal (7EA) P1-P7	 according to IN-65–IN-71 code Forward direction operations Reset Emergency stop Multi step speed frequency high/med/low DC braking during stop Frequency increase 3-wire Local/remote operation in transition Select acc/dec/stop 	Reverse direction operation External trip Jog operation Multi step acc/dechigh/med/low Second motor selection Frequency reduction Fix analog command frequency Transtion from PID to general operation			
	Pulse train Multi Output function open		0-32 kHz, Low Level: 0-2.5 V, I Fault output and inverter operation status output	Less than DC 24 V, 50 mA			

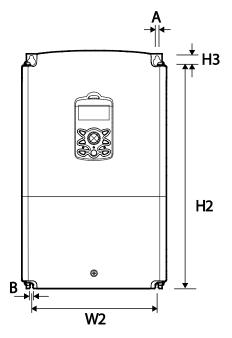
Items		Description			
	collector terminal				
	Multi function relay terminal	Less	than (N.O., N.C.) AC250 V 1A, than DC 30 V, 1A		
	Analog output	0-12Vdc (0-24 mA): Select frequer voltage, DC terminal voltage and			
	Pulse train	Maximum 32 kHz, 10-12V	Others		
Protection function	Trip Alarm Instantaneous blackout	Over current trip External signal trip ARM short circuit current trip Over heat trip Input imaging trip Ground trip Motor over heat trip I/O board link trip Parameter writing trip Emergency stop trip Command loss trip External memory error CPU watchdog trip Motor normal load trip Command loss trip alarm, overload inverter overload alarm, fan operarate alarm, number of corrections Heavy load less than 16 ms (norm continue operation (must be with rated output range) Heavy load more than 16 ms (norm continue operation)	on rotor tuning error al load less than 8 ms): in the rated input voltage and		
	Capling type	auto restart operation			
	Cooling type	Forced fan cooling structure IP 20 (standard), UL Open & Enclo	sed Type 1 (antion)		
	Protection structure	UL Enclosed Type 1 is satisfied by			
Structure/ working environme nt	Ambient temperature	Heavy load: -10-50°C (14-122°F), normal load: -10-40°C (14-104°F) No ice or frost should be present. Working under normal load at 50°C (122°F), it is recommended that less than 80% load is applied.			
	Ambient humidity	Relative humidity less than 90% RH (to avoid condensation forming)			

Items		Description
	Storage temperature.	-20°C-65°C (-4-149°F)
	Surrounding environment	Prevent contact with corrosive gases, inflammable gases, oil stains, dust, and other pollutants (Pollution Degree 3 Environment).
	Operation altitude/oscillation	No higher than 3280ft (1,000m). Less than 9.8 m/sec ² (0.6G).
	Pressure	70-106 kPa

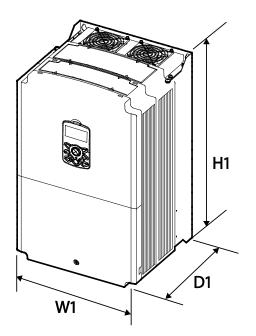
9.3 External Dimensions (IP 20 Type)

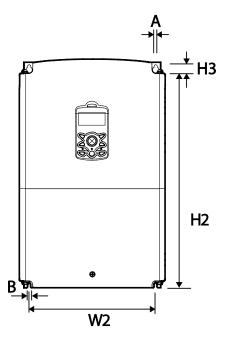
30 kW (3-Phase)



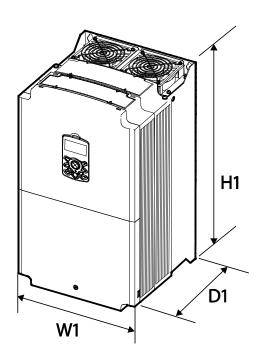


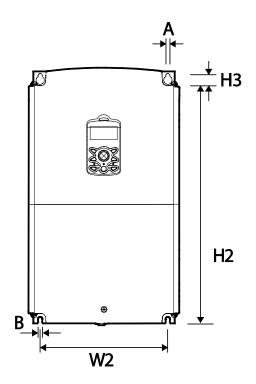
37-45 kW (3-Phase)





55-75 kW (3-Phase)





Items	W1	W2	H1	H2	H3	D1	A	В
0300S100-4	275 (10.8)	232	450 (17.7)	428.5	14	284	7	7
0370S100-4 0450S100-4	325	282	510 (20.1)	486.5	16	(11.2)	(0.28)	(0.28)
0550S100-4 0750S100-4	(12.8)	275	550 (21.7)	524.5	16	309 (12.2)	9	9

Units: mm (inches)

9.4 Peripheral Devices

Compatible Circuit Breaker, Leakage Breaker and Magnetic Contactor Models (manufactured by LSIS)

Product(kW)	Circuit Breaker			Leakage Breaker		Magnetic Contactor		
	Model	Current (A)	Model	Current (A)	Model	Current (A)	Model	Current (A)
30 kW-4	ABS103c	125	UTS150	125	EBS 103c	125	MC-100a	105
37 kW-4		150	013130	150		150	MC-130a	130
45 kW-4	ABS203c	175	LITCOEO	175	EBS203c	175	MC-150a	150
55 kW-4		225	UTS250	225		225	MC-185a	185
75 kW-4	ABS403c	300	UTS400	300	EBS 403c	300	MC-225a	225

9.5 Fuse and Reactor Specifications

Product	AC Input Fuse		AC Reactor		
(kW)	Current (A)	Voltage (V)	Inductance(mH)	Current(A)	
30 kW-4	125 A	600	0.29	69	
37 kW-4	125 A		0.24	85	
45 kW-4	160 A		0.20	100	
55 kW-4	200 4		0.15	134	
75 kW-4	200 A		0.13	160	

① Caution

Only use Class H or RK5, UL listed input fuses and UL listed circuit breakers. See the table above for the voltage and current ratings for fuses and circuit breakers.

Attention

Utiliser UNIQUEMENT des fusibles d'entrée homologués de Classe H ou RK5 UL et des disjoncteurs UL. Se reporter au tableau ci-dessus pour la tension et le courant nominal des fusibless et des disjoncteurs.

9.6 Terminal Screw Specification

Input/Output Terminal Screw Specification

Product (kW)	Terminal Screw Size	Screw Torque (Kgf·cm/Nm)
30~75 kW	M8	61.2~91.8/6.1~9.2

Control Circuit Terminal Screw Specification

Terminal	Terminal Screw Size	Screw Torque (Kgf·cm/Nm)
P1~P7/CM/VR/V1/I2/AO1/AO2/		
Q1/EG/24/TI/TO/SA,SB,SC/S+,S-	M2.6	0.4
,SG/A1,B1,C1/A2,C2		

① Caution

Apply the rated torque when tightening terminal screws. Loose screws may cause short circuits and malfunctions. Overtightening terminal screws may damage the terminals and cause short circuits and malfunctions. Use copper conductors only, rated at 600 V, 75℃ for power terminal wiring, and rated at 300 V, 75℃ for control terminal wiring.

① Attention

Appliquer des couples de marche aux vis des bornes. Des vis desserrées peuvent provoquer des courtscircuits 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 °C pour le câblage de la borne d'alimentation, et une valeur nominale de 300 V, 75 °C pour le câblage de la borne de commande.

pecification

9.7 Dynamic braking unit(DBU) and Resistors

9.7.1 Dynamic braking unit(DBU)

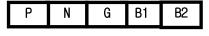
UL form	Capacity of applied motor	Braking unit	Terminal arrangement & Dimensions
111 4	30~37kW	SV370DBU-4U	
UL type (A type)	45~55kW	SV550DBU-4U	Refer to Group 1.
(A type)	75kW	SV750DBU-4U	
NI III.	30~37kW	SV037DBH-4	Defends Crause 2
Non UL type	45 751341	SV075DBH-4	Refer to Group 2.
(B type)	45~75kW	SV075DB-4	Refer to Group 3.
N. III.	20. 27144	LSLV0370DBU-4HN	Refer to Group 4.
Non UL type (C type)	30~37kW	LSLV0370DBU-4LN	Defends Crause F
	45~75kW	LSLV0750DBU-4LN	Refer to Group 5.

Note

- It is not necessary to use option type dynamic braking unit for \$100 below 22kW capacity because basically the dynamic braking unit is built in.
- You must refer to dynamic braking unit manual for usage recommended dynamic braking unit in the table above due to changeable table.

9.7.2 Terminal arrangement

Group 1:

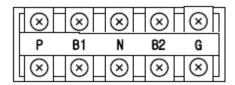


Group 2:



Terminals	Functions
G	Ground Terminal
B2	Terminal for connection with B2 of DBU
B1	Terminal for connection with B1 of DBU
N	Terminal for connection with N of Inverter
Р	Terminal for connection with P1 of Inverter

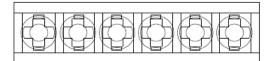
Group 3:



Terminals	Functions
G	Ground Terminal
B2	Terminal for connection with B2 of DBU
B1	Terminal for connection with B1 of DBU
N	Terminal for connection with N of Inverter
Р	Terminal for connection with P1 of Inverter

Group 4,5:

P(+) N(-)N.C B1 B2 Ε

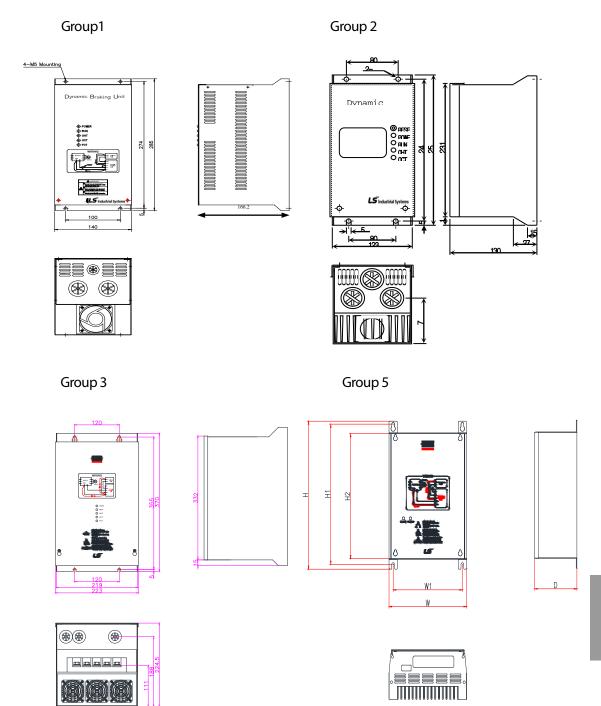


Terminals	Functions
P(+)	Terminal for connection with P of Inverter
N(-)	Terminal for connection with N of Inverter
B1	Terminal for connection with B1 of DBU
B2	Terminal for connection with B2 of DBU
N.C	Unused
E	Ground Terminal

Note

- You must refer to dynamic braking unit manual for choice the braking resistor to use the dynamic braking unit.
- For detailed information on DBU wiring, refer to <u>2.2 Cable Wiring</u>, <u>Step 7 Selecting the brake unit</u> on page<u>16.</u>

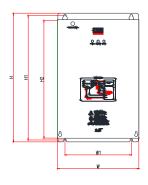
9.7.3 Dimensions



	Voltage	Capacity of applied	Dimer	imension (mm)			Hole position for installation (mm)		Weight	Hole size for
	(V)	motor(kW)	W	Н	H2	D	W1	H1	(kg)	installation(φ)
	440	30~37	37	192	2 76.4	125	215 4	1.56	M4	
		45~75	140	140 227.4		70.4	125	215.4		1.85

Group 4









Voltage (V)	Capacity of applied %ED		Dimension (mm)			Hole position for installation (mm)			Hole size for	
	motor(kW)	motor(kW)		W	Н	H2	D	W1	H1	(kg)
440	30~37	50	140	227.4	192	76.4	125	215.4	1.56	M4

9.7.4 Display Functions

DB Resistors connect with B1, B2 of DB Unit. DBU has 3 LEDs. Red LED which is located in middle displays supplying main power, one Green LED which is right side displays under breaking and another green LED which is left side displays Over Heat Trip(OHT).

Displays	Function description
POWER (Red LED)	POWER LED is turned On when main power is supplied. Generally, POWER LED is turn On while main power supplied because DBU is connected with inverter.
RUN (Green LED)	RUN LED is turned off while DBU is ON by regenerative energy of Motor.
OHT (Green LED)	Under Breaking, if the temperature is exceeded over setting value due to over heat of Heatsink, Cut the TURN ON signal of DBU and LED is turn on by working overheat protection function.

9.7.5 DB Resistors

Product(kW)	DB Unit	Resistor(Ω)	Capacity(W)	Reference
30kW	SV370DBU-4U	16.9	6,400	
37kW	SV370DBU-4U	16.9	6,400	100% braking
45kW	SV550DBU-4U	11.4	9,600	torque,
55kW	SV550DBU-4U	11.4	9,600	10%ED
75kW	SV750DBU-4U	8.4	12,800	

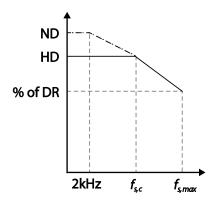
Note

- The resistance/rated capacity/breaking torque/%ED of DB Resistor are valid only for the DB unit of type A and the values of DB Resistor for type B and C refer to the manual of DB Unit..
- Rating Watt of DBU has to be doubled when %ED is doubled.

9.8 Continuous Rated Current Derating

Derating by Carrier Frequency

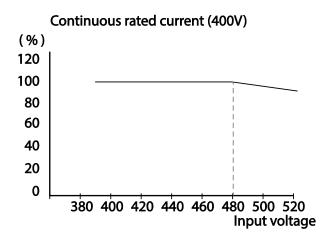
The continuous rated current of the inverter is limited based on the carrier frequency. Refer to the following graph.



Item	Unit	30 kW	37 kW	45 kW	55 kW	75 kW			
$f_{s,ND}$			2						
$f_{s,c}$	[kHz]		6 4						
f _{s, max}		10 7							
% of DR	[%]	70							

Derating by Input Voltage

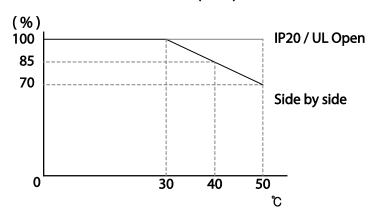
The continuous rated current of the inverter is limited based on the input voltage. Refer to the following graph.



Derating by Ambient Temperature and Installation Type

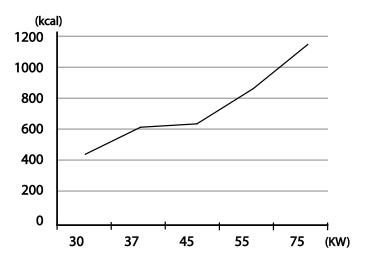
The constant-rated current of the inverter is limited based on the ambient temperature and installation type. Refer to the following graph.





9.9 Heat Emmission

The following graph shows the inverters' heat emission characteristics (by product capacity).



Heat emission data is based on operations with default carrier frequency settings, under normal operating conditions.

Product Warranty

Warranty Information

Fill in this warranty information form and keep this page for future reference or when warranty service may be required.

Product Name	LSIS Standard Inverter	Date of Installation
Model Name	LSLV-S100	Warranty Period
	Name (or company)	
Customer Info	Address	
	Contact Info.	
	Name	
Retailer Info	Address	
	Contact info.	

Warranty Period

The product warranty covers product malfunctions, under normal operating conditions, for 12 months from the date of installation. If the date of installation is unknown, the product warranty is valid for 18 months from the date of manufacturing. Please note that the product warranty terms may vary depending on purchase or installation contracts.

Warranty Service Information

During the product warranty period, warranty service (free of charge) is provided for product malfunctions caused under normal operating conditions. For warranty service, contact an official LSIS agent or service center.

Non-Warranty Service

A service fee will be incurred for malfunctions in the following cases:

- intentional abuse or negligence
- power supply problems or from other appliances being connected to the product
- acts of nature (fire, flood, earthquake, gas accidents etc.)
- modifications or repair by unauthorized persons
- missing authentic LSIS rating plates
- · expired warranty period

Visit Our Website

Visit us at *http://www.lsis.com* for detailed service information.



EC DECLARATION OF CONFORMITY

We, the undersigned,

Representative: LSIS Co., Ltd.

Address: LS Tower, 127, LS-ro, Dongan-gu,

Anyang-si, Gyeonggi-do,

Korea

LSIS Co., Ltd. Manufacturer:

> 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-S100 series

Trade Mark LSIS Co., Ltd.

Conforms with the essential requirements of the directives:

2014/35/EU Directive of the European Parliament and of the Council on the harmonisation 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

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

Based on the following specifications applied:

EN 61800-3:2004/A1:2012 EN 61800-5-1:2007

and therefore complies with the essential requirements and provisions of the 2014/35/CE and 2014/30/CE Directives.

Place: Cheonan, Chungnam, Korea

圣传記 2016.1.13

Mr. Sang Chun Moon / General Manager (Full name / Position)

EMI / RFI POWER LINE FILTERS

LSIS inverters. S100 series



RFI FILTERS

THE LS RANGE OF POWER LINE FILTERS FEP (Standard) SERIES, HAVE BEEN SPECIFICALLY DESIGNED WITH HIGH FREQUENCY LSIS INVERTERS, THE USE OF LS FILTERS, WITH THE INSTALLATION ADVICE OVERLEFA HELP TO ENSURE TROUBLE FREE USE ALONG SIDE SENSITIVE DEVICES AND COMPLIANCE TO CONDUCTED EMISSION AND IMMUNITY STANDARS TO EN 50081.

CAUTION

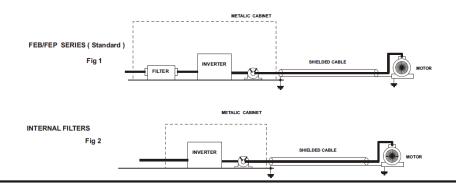
IN CASE OF A LEAKAGE CURRENT PROTECTIVE DEVICES IS USED ON POWER SUPPLY, IT MAY BE FAULT AT POWER-ON OR OFF. IN AVOID THIS CASE, THE SENSE CURRENT OF PROTECTIVE DEVICE SHOULD BE LARGER

RECOMMENDED INSTALLATION INSTRUCTIONS

To conform to the **EMC** directive, it is necessary that these instructions be followed as closely as possible. Follow the usual safety procedures when working with electrical equipment. All electrical connections to the filter, inverter and motor must be made by a qualified electrical technician.

- 1-) Check the filter rating label to ensure that the current, voltage rating and part number are correct.
- 2-) For best results the filter should be fitted as closely as possible to the incoming mains supply of the wiring enclousure, usually directly after the enclousures circuit breaker or supply switch.
- 3-) The back panel of the wiring cabinet of board should be prepared for the mounting dimensions of the filter. Care should be taken to remove any paint etc... from the mounting holes and face area of the panel to ensure the best possible earthing of the filter.
- 4-) Mount the filter securely.
- 5-) Connect the mains supply to the filter terminals marked **LINE**, connect any earth cables to the earth stud provided. Connect the filter terminals marked **LOAD** to the mains input of the inverter using short lengths of appropriate gauge cable.
- 6-) Connect the motor and fit the <u>ferrite core</u> (output chokes) as close to the inverter as possible. Armoured or screened cable should be used with the 3 phase conductors only threaded twice through the center of the ferrite core. The earth conductor should be securely earthed at both inverter and motor ends. The screen should be connected to the enclousure body via and earthed cable gland.
- 7-) Connect any control cables as instructed in the inverter instructions manual.

IT IS IMPORTANT THAT ALL LEAD LENGHTS ARE KEPT AS SHORT AS POSSIBLE AND THAT INCOMING MAINS AND OUTGOING MOTOR CABLES ARE KEPT WELL SEPARATED.



PR0065

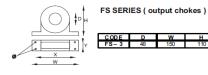
LSLV ser	ies /	Inte	rnal Filters
NVERTER	POWER	FIG.	OUTP UT CHOKES
THREE PHASE			
LSLV 03 00 S 10 0 - 4	30kW	2	FS-3
LSLV 0370 S 100-4	37kW	2	FS-3
LSLV 0450 S 10 0 - 4	45kW	2	FS-3

EN 55011 CLASS A

IEC/EN 61800-3 C3



Vector Motor Control Ibérica S.L. C/ Mar del Carib, 10 Pol. Ind. La Torre del Rector 08/130 Santa Perpètua de Mogoda (BARCELONA) ESPAÑA Tel. (+34) 935 748 206 Fax (+34) 935 748 248 info@wnc.es www.vmc.es





PR0065

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

CE

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	Edition	Changes
1	2014.02	First Release	-
2	2014.11	2 nd Edition	S/W Version up(V2.0)
3	2015.06	3 rd Edition	S/W Version up(V2.3)
4	2016.09	4 th Edition	S/W Version up(V2.5)

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