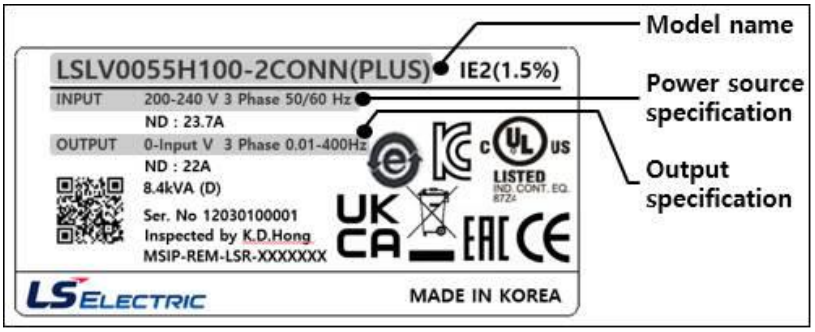
This operation manual is intended for users with basic knowledge of electricity and electric devices.
* LSLV-H100+ is the official name for the H100+ series inverters.
* The H100+ series software may be updated without prior notice for better performance. To check the latest software, visit our website at http://www.ls-electric.com.

Quick Start Reference

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.

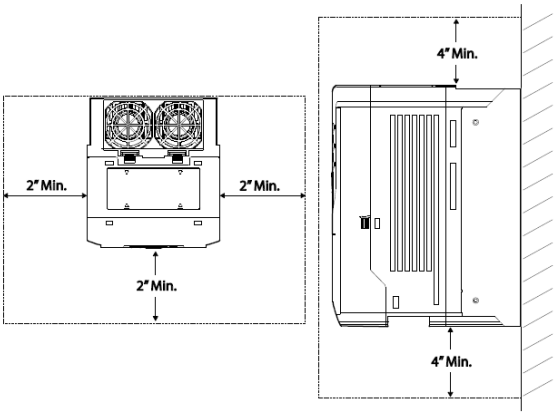
Verify & Identify the delivery

Verify that you have ordered and received the correct VFD by checking the nameplate information. Utilize the example name plate below to assist you with this.

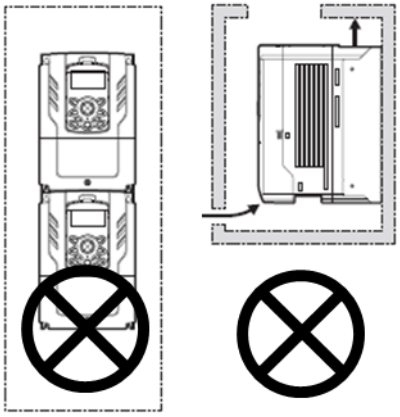


Mounting Instruction

Ensure that there is sufficient space to meet the clearance specifications, and that there are no obstacles impeding the cooling fan's air flow as shown below.
When installing multiple drives into the same enclosure panel (Side-by-side installation), mount the drives with the minimum clearance of 2 mm while removing optional top covers.



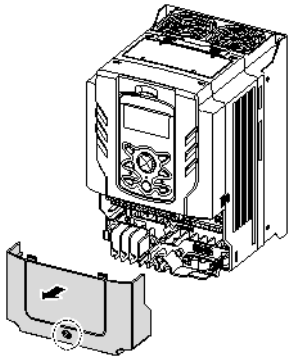
<installation space>



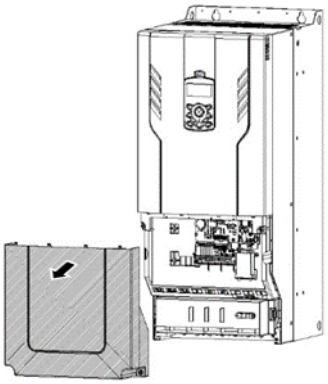
<Mounting precaution>

Install the drive in an environment that meets the conditions such as ambient temperature (-10℃ to 50℃), humidity (95% relative humidity or free of condensation), altitude (below 1,000m) and vibration (below 1G [9.8 m/sec2])

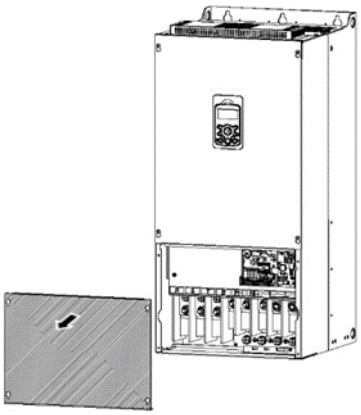
After mounting, and in order to move onto the wiring step, loosen the captive screw on the terminal cover. Squeeze the tabs and “hinge off” the cover. Squeeze tabs and slide up the wire guide to expose the power terminals. This wire guide can be disposed of if you have purchased a NEMA 1 conduit kit. For the larger H100’s remove the screws securing the metal cover.



0.75–90 kW Models



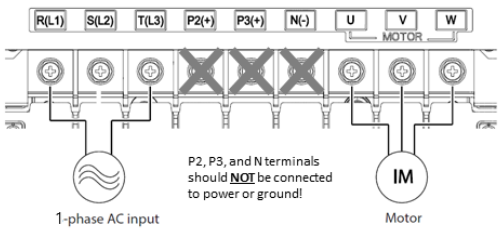
110–185 kW Models

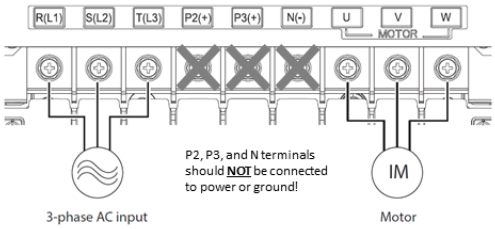


220–500 kW Models

Wiring the VFD : Power

The following figures show main circuit terminal arrangement on the drive.
WARNING! B1, B2 terminals are for the brake resistor. Do not connect B1, B2 terminals to earth ground.
WARNING! Power supply cables must be connected to R, S and T terminals. Connecting power cables to the U, V, and W terminals will cause internal damage to the drive.



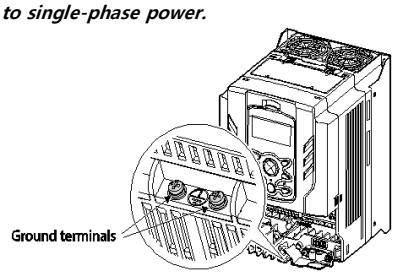


<Single Phase Input H100> ***<Three Phase Input H100>***

※ When using the single-phase input power, change BAS-06 from 0: 3-Phase to 1: single Phase.

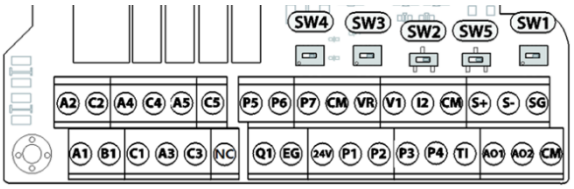
※ It is recommended to use terminal R/L1-T/L3 or S/L2-T/L3 to single-phase power.

Grounding
Chassis ground terminals can be found near the bottom on all chassis types and sizes.

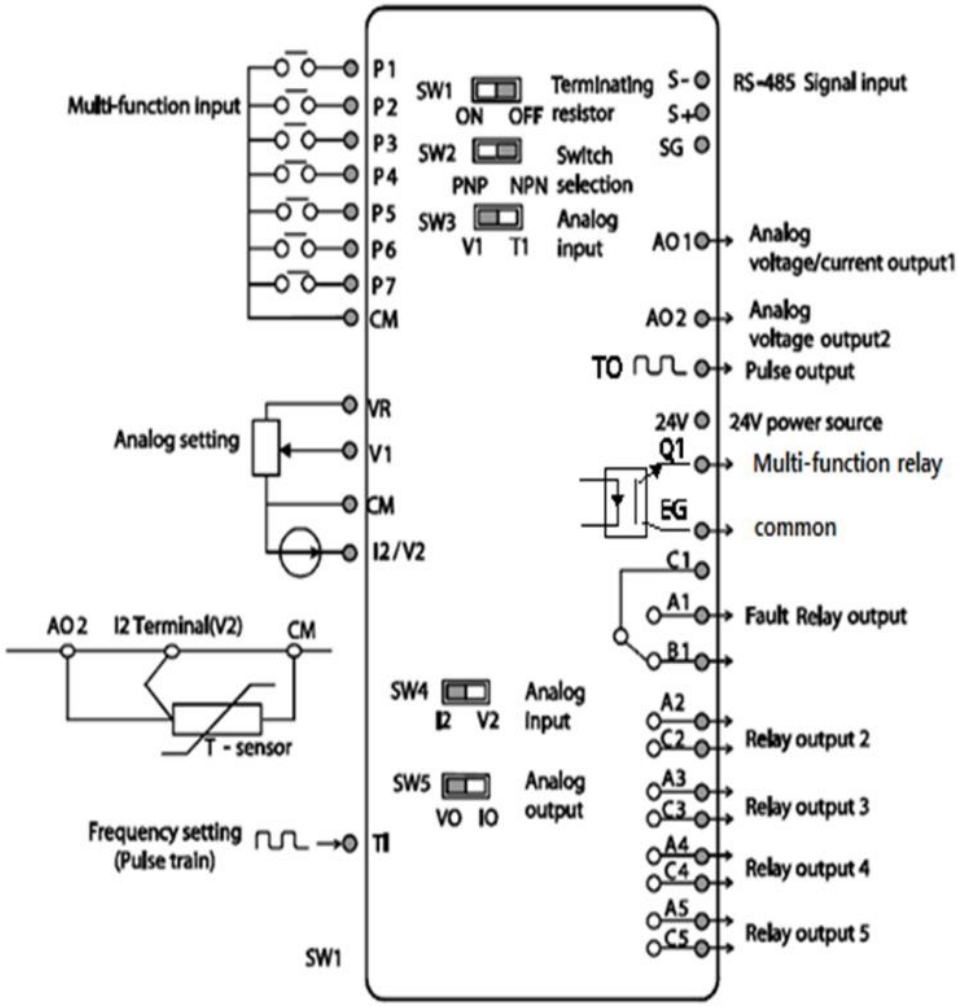


Wiring the VFD : Control

The figures below show the control circuit terminal arrangement on the drive.



Switch	Description
SW1	Terminating Resistor (Left: On, **Right: Off**)
SW2	Left: PNP, **Right: NPN**
SW3	**Left: V1**, Right: T1(PTC)
SW4	analog input (**Left: I2**, Right: V2)
SW5	analog output (**Left: VO**, Right: IO)

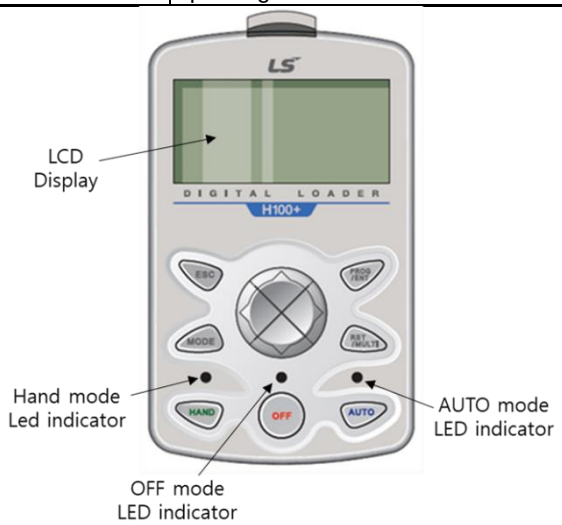


Function	Label	Name	Description
Multi-function terminal configuration	P1–P7	Multi-function Input 1-7	P1: Fx (IN-65) P2: Rx (IN-66) P3: BX (IN-67) P4: RST (IN-68) P5: Speed-L (IN-69) P6: Speed-M (IN-70) P7: Speed-H (IN-71)
	CM	Common terminal	
Analog input configuration	VR	Potentiometer power supply	Maximum Voltage Output: 12 V Maximum Current Output: 12 mA Potentiometer : 1–10k Ω
	V1	Voltage input for frequency reference	Unipolar: 0–10 V(12 V Max) Bipolar: -10–10 V(±12 V Max)
	V2/I2	Voltage/current input for frequency reference input	Input current: 0–20 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: 0–0.8 V, High Level: 3.5–12 V

Function	Label	Name	Description
Analog output	AO	Voltage/Current Output	Output voltage: 0–10 V Maximum output voltage/current: 12 V/10 mA Output current: 0–20 mA Maximum output current: 24 mA Factory default output: Frequency
Terminal Contacts	Q1	Multi-function (Open Collector) Pulse Output	DC 26 V, 50 mA or less Pulse output terminal Output frequency: 0–32 kHz Output voltage: 0–12 V
	EG	Common ground	Common ground contact for an open collector
	24	24 V power supply	Maximum output current: 100 mA
	A1/C1/B1	Fault relay output A,B contact	N.O.: AC250 V ≤2 A , DC 30 V ≤3 A N.C.: AC250 V ≤1 A , DC 30 V ≤ 1 A
	A2/C2-A5/C5	Multi-function relay output A contact	AC 250 V≤ 5 A, DC 30 V≤ 5 A
	S+/S-/SG	RS-485 signal line	

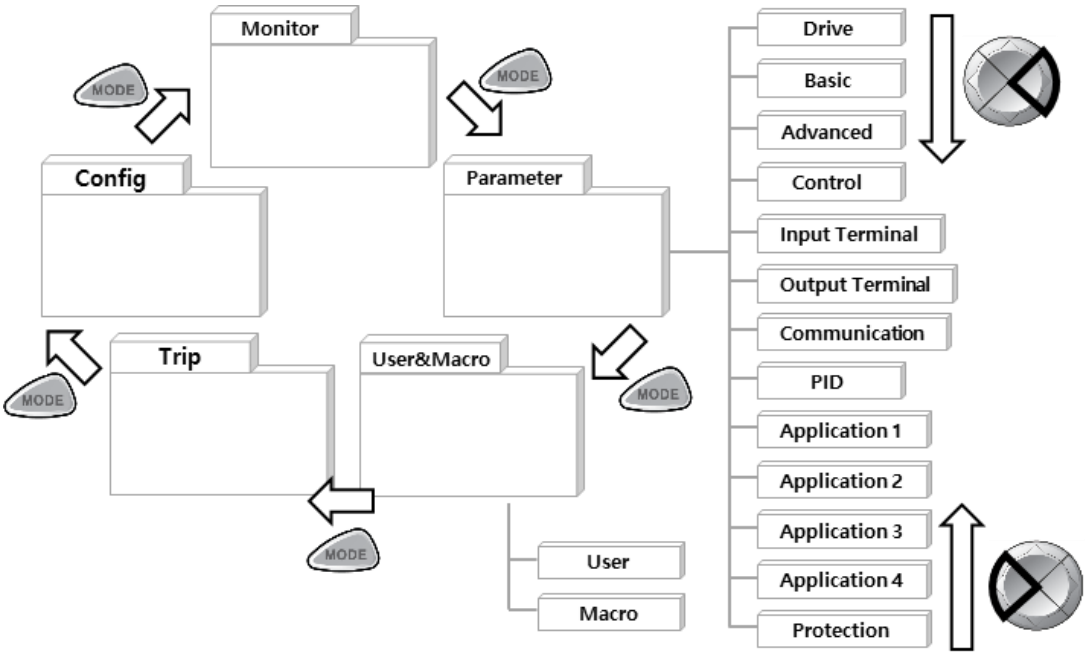
Keypad: Description

Key	Name	Description
	[MODE] Key	Used to switch between modes.
	[PROG / ENT] Key	Used to select, confirm, or save a parameter value.
	[Up] [Down] key	Switch between codes or increase or decrease parameter values.
	[Left] [Right] key	Switch between groups or move the cursor during parameter setup or modification.
	[RESET / MULTI] Key	Used to perform special functions, such as user code registration. (Factory Default Value – RESET function)
	[ESC] Key	Used to cancel an input during parameter setup.
	[HAND] Key	Used to switch to HAND (local/manual) operation mode.
	[OFF] Key	Used to switch to OFF (standby) mode or to reset the inverter faults.
	[AUTO] Key	Used to switch to AUTO (remote) operation mode.
	HAND LED	Turns on green (steady) during HAND mode operation.
	OFF LED	Turns on red (steady) while the inverter is in OFF mode (standby), and flashes then a fault trip occurs. The LED turns on red (steady) again when the fault trip condition is released.
	AUTO LED	Turns on green (steady) when the inverter operates in Auto mode, and flashes green when the inverter is in AUTO mode, but is not operating.



Keypad Navigation and Parameter Changes

Navigate and select different parameters by using the directional arrows on the keypad while in the PAR Mode.

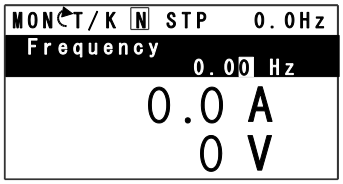


From the main screen, the [MODE] key will change the keypad to display the Parameter (PAR) mode. The PAR mode contains all parameters and monitors. These parameters and monitors are divided into intuitive groups. Pressing the LEFT or RIGHT arrows will move through the different parameter groups. While the UP and DOWN arrows will navigate through the different parameter code #'s in the selected group.

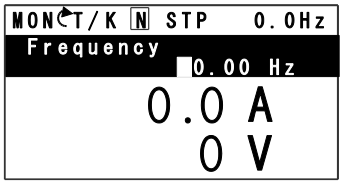
Any of the above parameters settings can be changed by pressing the [PROG/ENT] key, selecting the new setting with the arrows, and pressing [PROG/ENT] again to save.

Verify Motor Direction

This step explains how to check motor direction by running the motor at a low speed via the keypad in **HAND** mode. Verify that the power and motor wiring matches the previous step and covers are installed before applying power.
At first power up, the display will look like below. “0.0 Hz” represents the default HAND frequency reference.

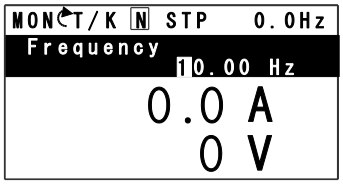


Press LEFT arrow 3 times so that the cursor is flashing to the left of “0.00”.



Press UP arrow so that 10.00 is displayed.

Press the Hand key to run the motor in the forward direction.

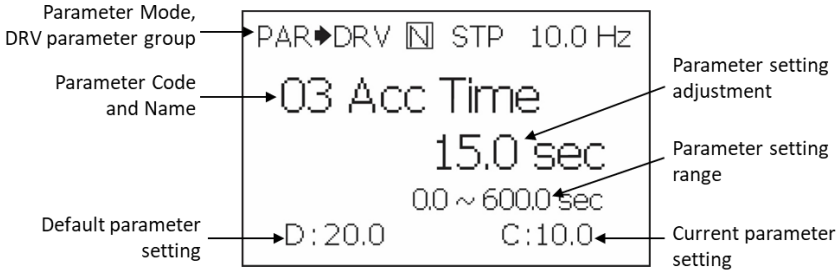


Checking Direction

Use the above mentioned steps to run the motor in the forward direction in HAND mode. The display will briefly show the output frequency of the VFD until it reaches 10Hz.
Look at the motor shaft to verify rotation is correct. Press the OFF key to STOP.
If motor direction is incorrect, stop the motor with the OFF key, and power down the VFD.
Wait at least 5 minutes to let the VFD capacitors discharge.
Swap any two output leads between the VFD and the motor. This will change motor direction.
Verify correct rotation via the previous steps.

Changing Acceleration Time - Example

1. Press the [MODE] key from the main display to access PAR Mode.
2. In the DRV group, press down to select DRV 03 (Acc Time).
3. Press the [PROG/ENT] key access the current setting.
4. Use the UP and DOWN arrows to increase and decrease the value.
5. Use the LEFT or RIGHT arrows to move the cursor over to select different digits.
6. Press the [PROG/ENT] key once the desired value is set. This saves the change.
7. DRV 03 will be displayed again indicating the parameter change has taken effect with the new value displayed.

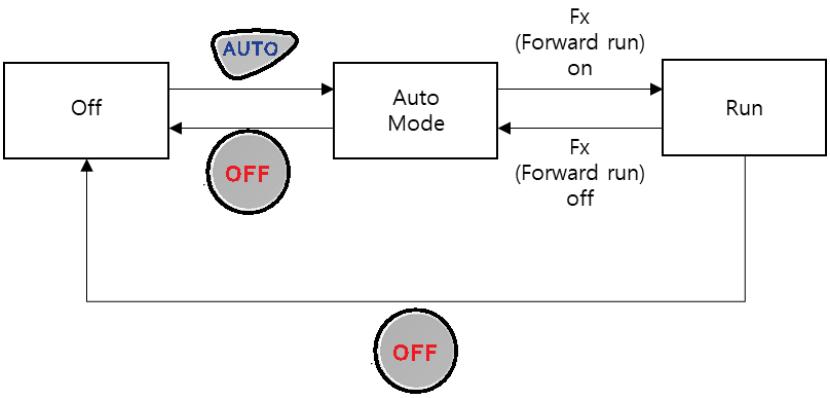


HAND / AUTO / OFF keys

The H100+ series inverters have two operation modes–the HAND and AUTO modes. HAND mode is used for local control using the keypad. AUTO mode is used for remote control using the terminal inputs or networks commands (the keypad may still be used in AUTO mode if the command source is set as 'keypad').

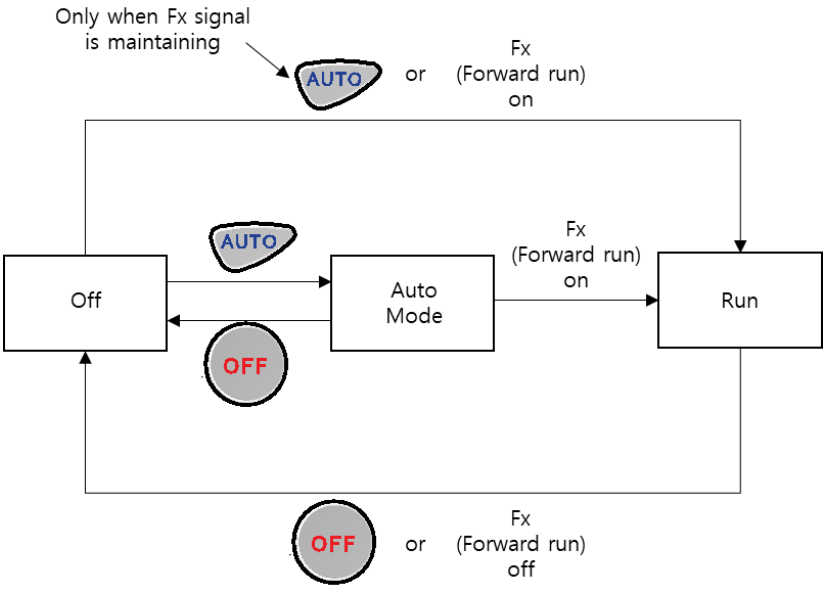
DRV-08: Auto Mode Selection (AUTO Mode Sel)

1) DRV-08 = 0 (Enabled)



If [DRV-08 AUTO Mode Sel] is set to "0 (Enabled)", the inverter starts to operate only when the operation command is input in AUTO mode.

2) DRV-08 = 1 (Disabled) – Factory default



If [DRV-08 AUTO Mode Sel] is set to "1 (Disabled)", the inverter automatically switches to AUTO mode and starts to operate when the operation command is input regardless of inverter's state of being in AUTO or OFF mode.

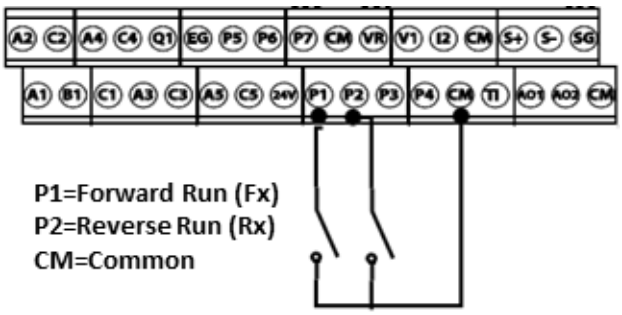
<table>
<tr><th>Codes / Functions</th><th>Description</th></tr>
<tr><td>DRV-01
Cmd Frequency</td><td>Frequency reference in AUTO mode when DRV-07 is set to' KeyPad'.</td></tr>
<tr><td>DRV-02
KeyPad Run Dir</td><td>Rotation direction of the keypad command in the HAND or AUTO mode.
<table>
<tr><td colspan="2">Settings</td><td>Description</td></tr>
<tr><td>0</td><td>Forward</td><td>Fx operation</td></tr>
<tr><td>1</td><td>Reverse</td><td>Rx operation</td></tr>
</table></td></tr>
<tr><td>DRV-05
KPD H.O.A Lock</td><td>To make HAND-OFF-AUTO enabled/disabled
<table>
<tr><td colspan="2">Settings</td><td>Description</td></tr>
<tr><td>0</td><td>Locked</td><td>To make HAND-OFF-AUTO disabled and turn Auto mode</td></tr>
<tr><td>1</td><td>During Run</td><td>If [DRV-06 cmd source] is Fx/Rx-1, Fx/Rx-2, int485 or fieldbus, Hand-off-auto is enabled only when Off</td></tr>
<tr><td>2</td><td>OFF Key Enable</td><td>Under the same conditions as During Run, only the OFF key is activated. (Factory Default)</td></tr>
<tr><td>3</td><td>Unlocked</td><td>To make HAND-OFF-AUTO enabled</td></tr>
</table></td></tr>
<tr><td>DRV-08 AUTO
Mode Sel</td><td>Set whether to use AUTO mode.
0. Enabled
1. Disabled (Factory default)</td></tr>
<tr><td>DRV-24 Hand Key
Sel</td><td>This function enables/disables the HAND key on the keypad.
<table>
<tr><td colspan="2">Settings</td><td>Description</td></tr>
<tr><td>0</td><td>None</td><td>Follow the settings of [DRV-05 KPD H.O.A Lock].</td></tr>
<tr><td>1</td><td>Disabled</td><td>Regardless of the setting of [DRV-05 KPD H.O.A Lock], the HAND key is disabled.</td></tr>
</table></td></tr>
<tr><td>DRV-25
HAND Cmd Freq</td><td>Frequency displayed at the monitor display item (Monitor Line-1) when the HAND key is pressed in other modes (default frequency reference for HAND mode).</td></tr>
<tr><td>DRV-26
Hand Ref Mode</td><td>Set Hand frequency reference source.
0. Hand Parameter
1. V1
2. V2
3. V3
4. I2
5. I3
6. Follow Auto</td></tr>
<tr><td>OUT-31–36
Relay 1–5</td><td>Set AUTO State (36) to ensure that the inverter is in AUTO mode.</td></tr>
<tr><td>OUT-31–36
Relay 1–5</td><td>Set HAND State (37) to ensure that the inverter is in HAND mode.</td></tr>
</table>

Control Wiring

This step shows common wiring examples for both the run command and frequency reference when operating in AUTO Mode. However, when DRV-08 Auto Mode Sel is set to “1. Disabled” (Factory default), it’s available to operate without trasffering to “AUTO Mode”.

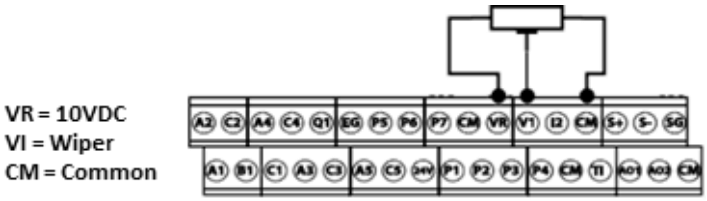
2-Wire Control

2-wire control consists of maintained run signals. This can be accomplished via toggle switches, relays, jumpers, etc. Default parameters support this operation.



Speed POT Wiring (0-10VDC)

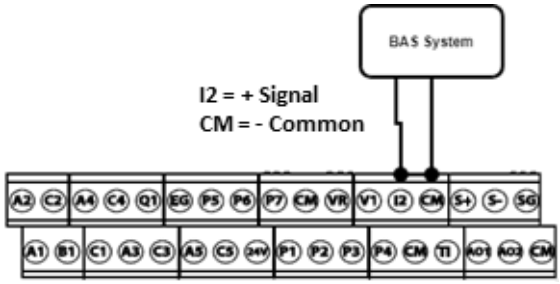
Controlling the VFD with an external speed POT can be accomplished by setting DRV7=2 V1 and wiring like below. For 0-10VDC signals from a BAS or Controller simply wire to V1 and CM.



BAS or Controller Wiring (4-20mA)

For speed control over a 4-20mA signal set DRV7=5. I2.

Important: Verify that SW4 dip switch on the terminal board to ‘I2’ (LEFT) for 4-20mA signal.



EZ Start

This Step provides details on EZ start steps.

<table>
<tr><th>Step</th><th>Parameter</th><th>Description</th></tr>
<tr><td>1</td><td>CNF-43: Select a macro.</td><td>0. Basic (Default)
1. Pressure Ctrl
2. Lead-Lag</td></tr>
<tr><td>2</td><td>DRV 32: Regional Set</td><td>0. US
1. International
2. KR</td></tr>
<tr><td>3</td><td>AP3-01 Now Date</td><td>Set Date</td></tr>
<tr><td>4</td><td>AP3-02 Now Time</td><td>Set Time</td></tr>
<tr><td>5</td><td>DRV-14 Motor Capacity</td><td>Set HP rating</td></tr>
<tr><td>6</td><td>BAS-10 60/50 Hz Sel</td><td>Set motor rated frequency</td></tr>
<tr><td>7</td><td>BAS-13 Rated Curr</td><td>Set motor rated current</td></tr>
<tr><td>8</td><td>BAS-15 Rated Volt</td><td>Set motor rated voltage</td></tr>
<tr><td>9</td><td>BAS-11 Pole Number</td><td>Set motor pole number.</td></tr>
<tr><td>10</td><td>BAS-19 AC Input Volt</td><td>Set input voltage.</td></tr>
<tr><td>11</td><td>DRV-06 Cmd Source</td><td>Cmd Source: Set command source.</td></tr>
<tr><td>12</td><td>DRV-07 Freq Ref Src</td><td>Set Frequency Reference source.</td></tr>
<tr><td>13</td><td>DRV-03 Accel Time</td><td>Sets the time to accelerate from 0 to maximum frequency</td></tr>
<tr><td>14</td><td>DRV-04 Decel Time</td><td>Sets the time to decelerate from maximum frequency to 0.</td></tr>
<tr><td>15</td><td>ADV-08 Stop mode</td><td>Stopping Method
0. Decel stop
1. DC-Brake
2. Coast stop
4. Power Braking</td></tr>
<tr><td>16</td><td>ADV-09 Run Prevent</td><td>Choose a direction to prevent
1. Forward Prev
2. Reverse Prev</td></tr>
<tr><td>17</td><td>PRT-05 Phase loss check</td><td>When open-phase protection is operating, input and output configurations are displayed differently. When the LCD segment is On, the corresponding bit is set to ‘Off’.
<table>
<tr><th colspan="2">Setting</th><th rowspan="2">Function</th></tr>
<tr><th>Bit 1</th><th>Bit 0</th></tr>
<tr><td></td><td>√</td><td>Output open-phase protection</td></tr>
<tr><td>√</td><td></td><td>Input open-phase protection</td></tr>
</table></td></tr>
</table>

<table>
<tr><th>Step</th><th>Parameter</th><th>Description</th></tr>
<tr><td>18</td><td>PRT-08 Select start at trip reset</td><td>Select start at trip reset
<table>
<tr><th colspan="8">Setting</th><th rowspan="2">Function</th></tr>
<tr><th>Bit 7</th><th>Bit 6</th><th>Bit 5</th><th>Bit 4</th><th>Bit 3</th><th>Bit 2</th><th>Bit 1</th><th>Bit 0</th></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>√</td><td>Standard Trips except the below</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td>√</td><td></td><td>Low Voltage Trip</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td>√</td><td></td><td></td><td>Low Feedback Trip</td></tr>
<tr><td></td><td></td><td></td><td></td><td>√</td><td></td><td></td><td></td><td>High Feedback Trip</td></tr>
<tr><td></td><td></td><td></td><td>√</td><td></td><td></td><td></td><td></td><td>SetPoint Timeout</td></tr>
<tr><td></td><td></td><td>√</td><td></td><td></td><td></td><td></td><td></td><td>Overcycle Trip</td></tr>
<tr><td></td><td>√</td><td></td><td></td><td></td><td></td><td></td><td></td><td>High Flow Trip</td></tr>
<tr><td>√</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>Accum Flow Trip</td></tr>
</table></td></tr>
<tr><td>19</td><td>PRT-09 Retry Number</td><td>Sets the number of restart trial when performing a trip reset.</td></tr>
<tr><td>20</td><td>PRT-20 OL Trip Select</td><td>0. None
1. Trip & Coast
2. Decel Stop</td></tr>
<tr><td>21</td><td>PRT-21 OL Trip Level</td><td rowspan="2">When the current supplied to the motor is greater than the preset value of the overload trip level (OL Trip Level) and continues to be supplied during the overload trip time (OL Trip Time), the inverter output is either blocked according to the preset mode from PRT-17 or slows to a stop after deceleration.</td></tr>
<tr><td>22</td><td>PRT-22 OL Trip Time</td></tr>
<tr><td>23</td><td>PRT-40 ETH Trip Sel</td><td>0. None
1. Trip & Coast
2. Decel Stop</td></tr>
<tr><td>24</td><td>PRT-41 Motor Cooling</td><td>0. Self-cool
1. Forced-cool</td></tr>
<tr><td>25</td><td>PRT-42 ETH 1 min</td><td>The amount of input current that can be continuously supplied to the motor for 1 minute, based on the motor-rated current (BAS-13).</td></tr>
<tr><td>26</td><td>PRT-43 ETH Cont</td><td>Sets the amount of current with the ETH function activated. The range below details the set values that can be used during continuous operation without the protection function</td></tr>
</table>

Basic Setup

The basic drive and motor parameters are shown on the below table. Set the parameters according to your specific application.

1. Motor Parameters

Set the below motor parameters based on the motor nameplate.

Group	No	Description	Default	Set Options
DRV	14	Motor Capacity	Depends on drive	Depends on drive
BAS	11	Poles	4	2 - 12
BAS	13	Motor Rated Current	Depends on drive	Depends on drive
BAS	15	Motor Voltage	Depends on drive	Depends on drive

▶ **Motor RPM to Poles chart**

RPM	3600	1800	1200
Poles	2	4	6

▶ **Example:**

If actual motor RPM is 3450, Set Motor Poles = 2. This is due to motor slip. In this example, the motor has 150 RPM of slip. (Slip=Synchronous speed-Rated Speed)

2. Commonly Set Parameters

Group	No	Description	Default	Set Options
DRV	1	Command Freq	0.00	0 – Max Freq
DRV	3	Acc Time	20	0 – 6000
DRV	4	Dec Time	30	1 – 6000
DRV	6	Run Command	1. Fx/Rx - 1	0. Keypad 1. Fx/Rx - 1 2. Fx/Rx - 2 3. Comm RS485 4. Field Bus
DRV	7	Freq Command	0. Keypad - 1	0. Keypad - 1 1. Keypad - 2 2. V1 4. V2 5. I2 6. Comm RS485 8. Field Bus 12. Pulse
BAS	19	Input Voltage	240/480	170 – 480V

3. Optional Parameters

To automatically start after a power loss, set ADV 10=Yes.

Enable phase loss protection by setting the dipswitches in PRT 05 both up.

Application Setup

This step shows how to set the pressure control.

1. Activate PID function

▶ **PID-01 PID Sel**

To enable PID operation, set [PID-01 PID Sel] to “Yes”

▶ **PID-02 PID Access Lev**

The Default Value for [PID-02 PID Access Lev] only allows access to the basic parameters in the PID group. The rest are hidden. When set to “Adanced”, all paramters are shown.

2. Unit Scaling

▶ **PID-50 PID Unit Sel**

Setting					
0	CUST	14	I	28	kg/h
1	%	15	kW	29	gl/s
2	PSI	16	HP	30	gl/m
3	˚F	17	mpm	31	gl/h
4	˚C	18	ft	32	ft/s
5	inWC	19	m/s	33	f3/s(ft3/min)
6	inM	20	m3/s(m 3/S)	34	f3/h (ft3/h)
7	Bar	21	m 3/m(m 3/min)	35	lb/s
8	mBar	22	m 3/h(m 3/h)	36	lb/m
9	Pa	23	l/s	37	lb/m
10	kPa	24	l/m	38	lb/h
11	Hz	25	l/h	39	ppm
12	Rpm	26	kg/s	40	pps
13	V	27	kg/m	41	Wb
14	I	29	gl/s		

▶ **PID-51 PID Unit Scale**

Adjusts the scale to fit the unit selected at PID-50 PID Unit Sel.

▶ **PID-52, 53 PID Unit 0 %, 100 %**

Sets the Unit 0% and Unit 100% values as the minimum and maximum values set at PID-50.

3. Setpoint, Feedback Scaling

▶ PID-10 PID Setpoint 1 Source

Setting			
0	Keypad	6	FieldBus
1	V1	7	-
2	-	8	Pulse
3	V2	9	V3
4	I2	10	I3
5	Int485		

▶ PID-11 PID Setpoint 1 Set

A setpoint value can be entered if the PID setpoint source (PID-10) is set to '0 (Keypad)'. And also PID setpoint can be set in Monitor screen when PID-10 is set to '0 (Keypad)'.

▶ PID-20 PID Fdb Source

Setting			
0	V1	5	FieldBus
1	-	6	-
2	V2	7	Pulse
3	I2	8	V3
4	Int485	9	I3

4. Sleep Mode

▶ PID-59 Sleep Level type

The following sleep level types can be selected:

Setting	
1	Frequency (Factory Default)
2	Output Current
3	PID Feedback Value
4	RPM
5	Flow Rate

▶ PID-62 PID Sleep 0 DT

▶ PID-63 PID Sleep 0 Lev

If the operating frequency stays below the frequencies set at PID-63 for the set times at PID-62, the VFD enters standby mode.

▶ PID-56 Pump Minimum Speed

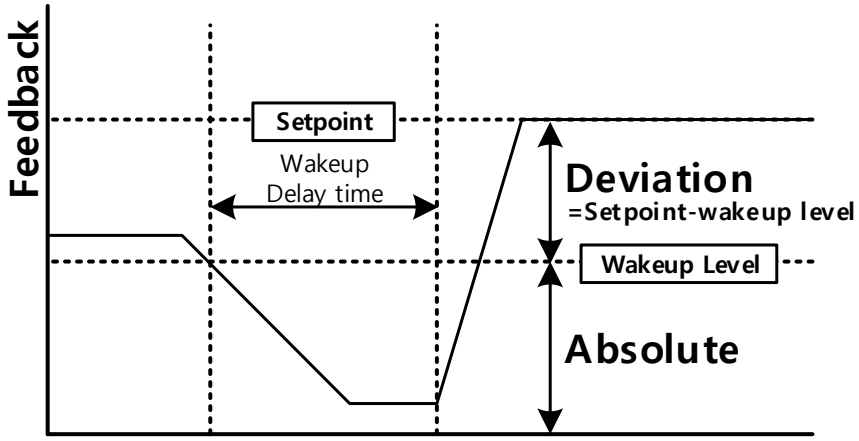
Pump minimum speed sets the low limit on the command frequency.Minimum Limit operates based on the greatest value of following:

- AP2 40 Thrust Frequency, PID 56 Pump Minimum Speed, ADV 25 Freq Limit Lo

4. Wakeup level

▶ **PID-57 WakeUpLev type**

0. Absolute or 1. Deviation (Factory default) can be selected for the Wake-up level



▶ **PID-64 PID WakeUp 0 DT**

▶ **PID-65 PID WakeUp 0Lev**

Sets the reference for PID operation in PID sleep mode. PID operation resumes when PID feedback variation (from the PID reference) exceeds the values set in PID-65 for more than the time set in PID-64.

5. Lost Feedback Detection Mode

Lost Feedback Detection shuts down the pump system when the feedback device failed.
The set values in [PRT-14] and [PRT-15] of frequency command parameters are also used for the operation of Lost Feedback Detection Time and Lost Feedback Preset Frequency

▶ **AP2-75 LostFbkMode**

Setting	
0	None
1	Warning
2	Trip & Coast
3	Lost Preset

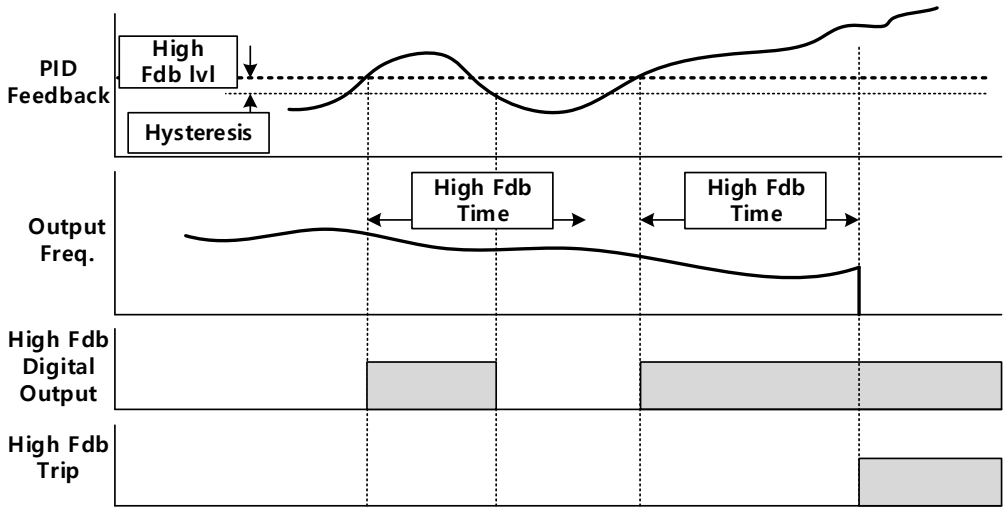
▶ **PRT-14 Lost Cmd Time**

▶ **PRT-15 Lost Preset Frequency**

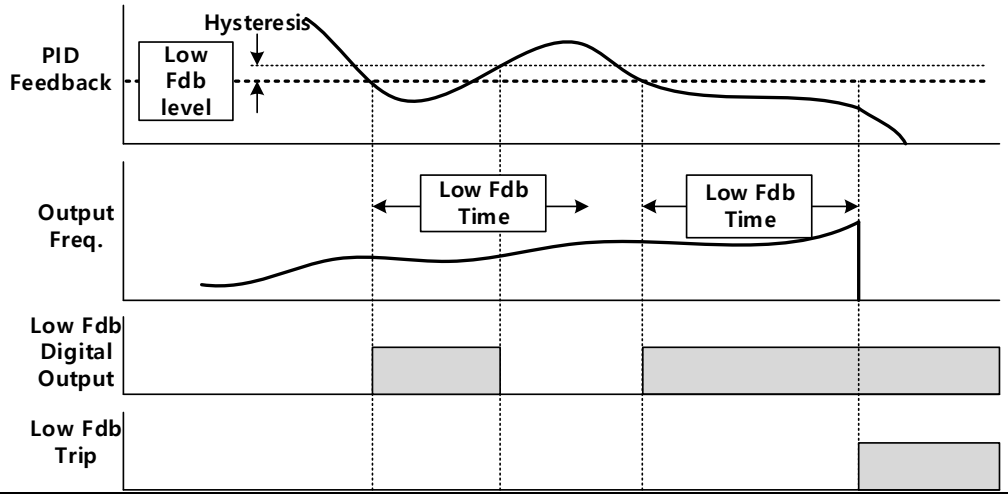
6. High/Low Feedback Detection

Low/High feedback detection detects whether PID feedback is higher than high feedback level or lower than low feedback level to trigger Warning or Trip&Coast stop.

- ▶ **AP2-48 High Feedback Detection Mode**
- ▶ **AP2-49 High Feedback Level Fault Delay Time**
- ▶ **AP2-50 High Feedback Level**



- ▶ **AP2-51 Low Feedback Mode**
- ▶ **AP2-52 Low Feedback Level Fault Delay Time**
- ▶ **AP2-53 Low Feedback Level**
- ▶ **AP2-54 Hysteresis Level**

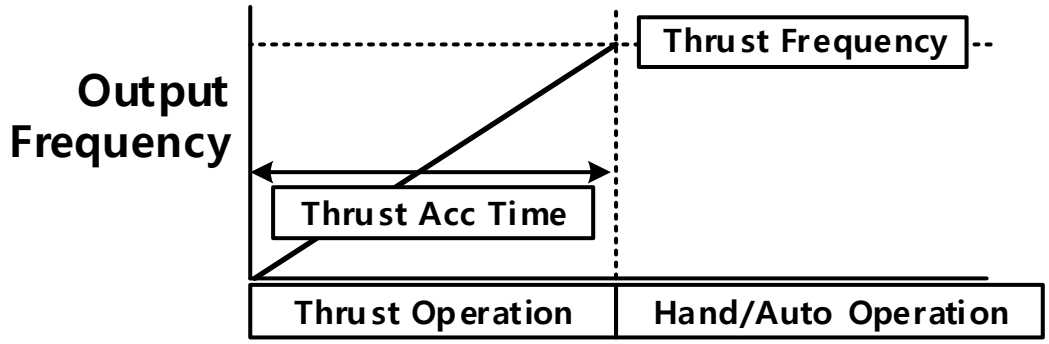


7. Thrust Bearing Control

Thrurst Bearing Control function changes acceleration and deceleration time based on a certain

frequency in order to protect the bearing of the submersible pump.

- **AP2-40 Thrust Frequency**
- **AP2-41 Thrust Bearing Acceleration Time**
- **AP2-42 Thrust Bearing Deceleration Time**



Macro – Pressure Control (MC1) Group

Macro Code	Code	LCD Display	Initial Value		Macro Code	Code	LCD Display	Initial Value	
0	-	Jump Code	1: CODE		1	DRV-3	Acc Time	0.75~90kW	10.0
								110~250kW	30.0
								315~500kW	50.0
2	DRV-4	Dec Time	0.75~90 kW	20.0	3	DRV-6	Cmd Source	1: Fx/Rx-1	
			110~250kW	60.0					
			315~500kW	100.0					
4	DRV-7	Freq Ref Src	0: Keypad-1		5	DRV-24	Hand Key Sel	0. None	
6	ADV-8	Stop Mode	-		7	DRV-14	Motor Capacity	-	
8	BAS-10	60/50 Hz Sel	-		9	BAS-11	Pole Number	-	
10	BAS-12	Rated Slip	-		11	BAS-13	Rated Curr	-	
12	BAS-15	Motor Volt	1: Yes		13	ADV-9	Run Prevent	2. Reverse Prev	
14	ADV-64	Fan Control	0. During Run		15	PID-1	PID Sel	1: Yes	
16	PID-10	PID SP 1 Src	0. Keypad		17	PID-11	PID SP 1 Set		
18	PID-20	PID Fdb Source	3. I2		19	PID-25	PID P-Gain 1	-	
20	PID-26	PID I-Time 1	-		21	PID-36	PID Out Inv	0. No	
22	PID-50	PID Unit Sel	2. PSI		23	PID-51	PID Unit Scale	1. x 10	

24	PID-53	PID Unit 100%	100.0	25	PID-54	RampPIRef AtRun	0. No
26	PID-55	PID Acc/Dec Tm	60.00	27	PID-56	Pump Min Speed	30.00
28	PID-57	WakeUp Lev type	1. Deviation	29	PID-59	Sleep Lev Type	1. Output Frequency
30	PID-62	PID Sleep 0 DT	10.0	31	PID-63	PID Sleep0Lev	0
32	PID-64	PID WakeUp 0 DT	10.0	33	PID-65	PID WakeUp0Lev	20.0
34	AP2-40	Thrust Freq	0.00	35	AP2-41	Thrust Acc Tm	1.0
36	AP2-42	Thrust Dec Tm	5.0	37	AP2-48	High Fdb Mode	2. Trip&Coast
38	AP2-49	High Fdb Time	5.0	39	AP2-50	High Fdb Level	95.0
40	AP2-51	Low Fdb Mode	2. Trip&Coast	41	AP2-52	Low Fdb Time	10.0
42	AP2-53	Low Fdb Level	0.0	43	PRT-8	RST Restart	00000011
44	PRT-9	Retry Number	5	45	PRT-11	Retry Delay	20
46	AP2-75	LostFbk Mode	1. Yes	47	PRT-14	Lost Cmd Time	1.0
48	PRT-15	Lost Preset F	0.00	49	PRT-66	NFC Bandwidth	0.00
50	PRT-67	NFC Det Time	10.0	51	PRT-68	NFC ReleaseLev	3.00

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

⚠ Danger

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.

⚠ 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.
- Supply earthing system: TT, TN, not suitable for corner-earthed systems

⚠ 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.

ⓘ 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. LSLV-H100 is suitable for use in a circuit capable of delivering not more than 100kA RMS at the drive's maximum rated voltage, depending on the selected MCCB. RMS symmetrical amperes for recommended MCCB are the following table.

Remarque

Le courant maximum de court-circuit présumé autorisé au connecteur d'alimentation électrique est défini dans la norme IEC 60439-1 comme égal à 100 kA. Selon le MCCB sélectionné, la série LSLV-H100 peut être utilisée sur des circuits pouvant fournir un courant RMS symétrique de 100 kA maximum en ampères à la tension nominale maximale du variateur. Le tableau suivant indique le MCCB recommandé selon le courant RMS symétrique en ampères.

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

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

Table of Contents

1 Preparing the Installation

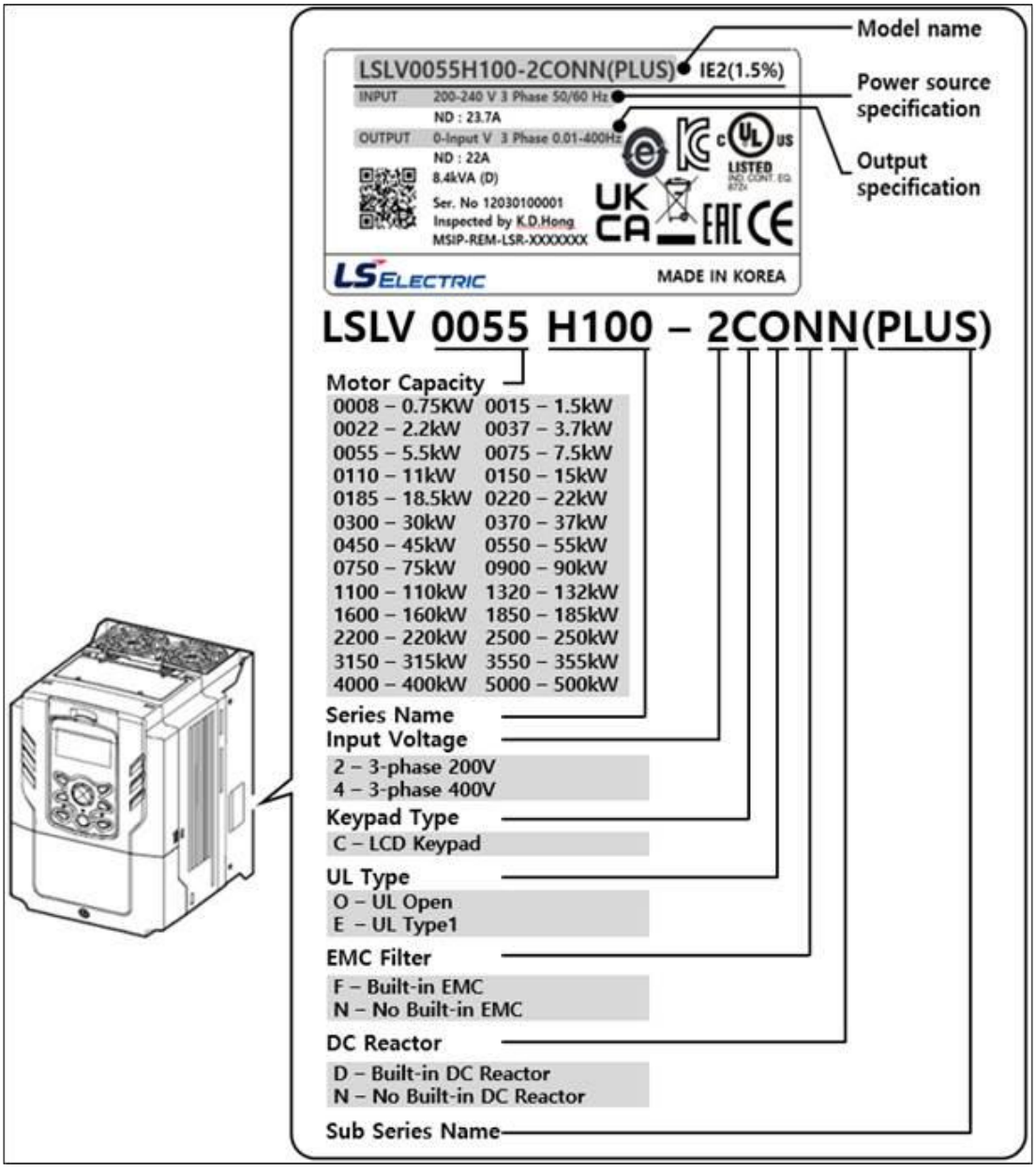
This chapter provides details on product identification, part names, correct installation and cable specifications. To install the inverter correctly and safely, carefully read and follow the instructions.

1.1 Product Identification

The H100+ 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. Check the rating plate before installing the product and make sure that the product meets your requirements. For more detailed product specifications, refer to *6.1 Input and Output Specifications* on page *170*.

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.



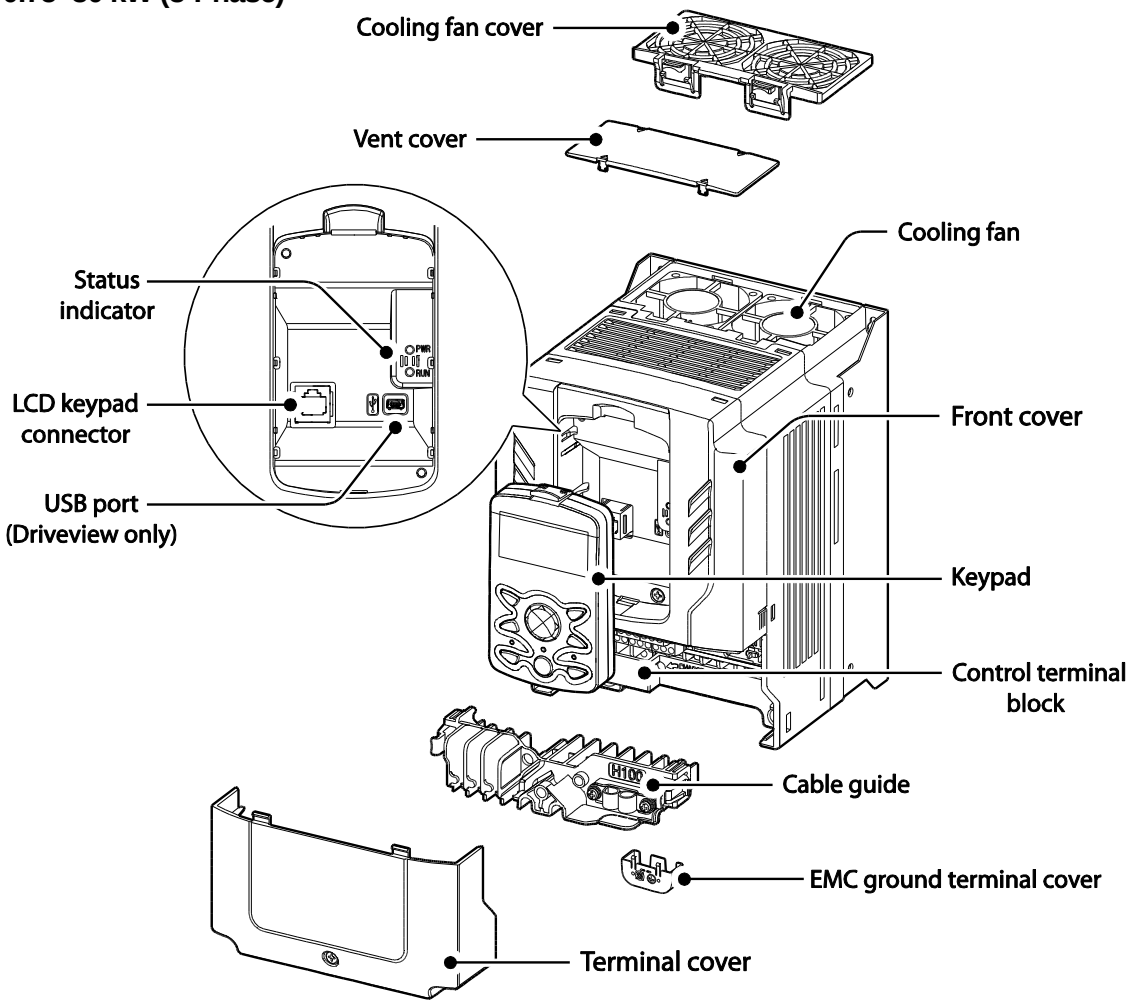
Note

The H100+ 75/90 kW, 400 V inverters satisfy the EMC standard EN61800-3 without installation of optional EMC filters.

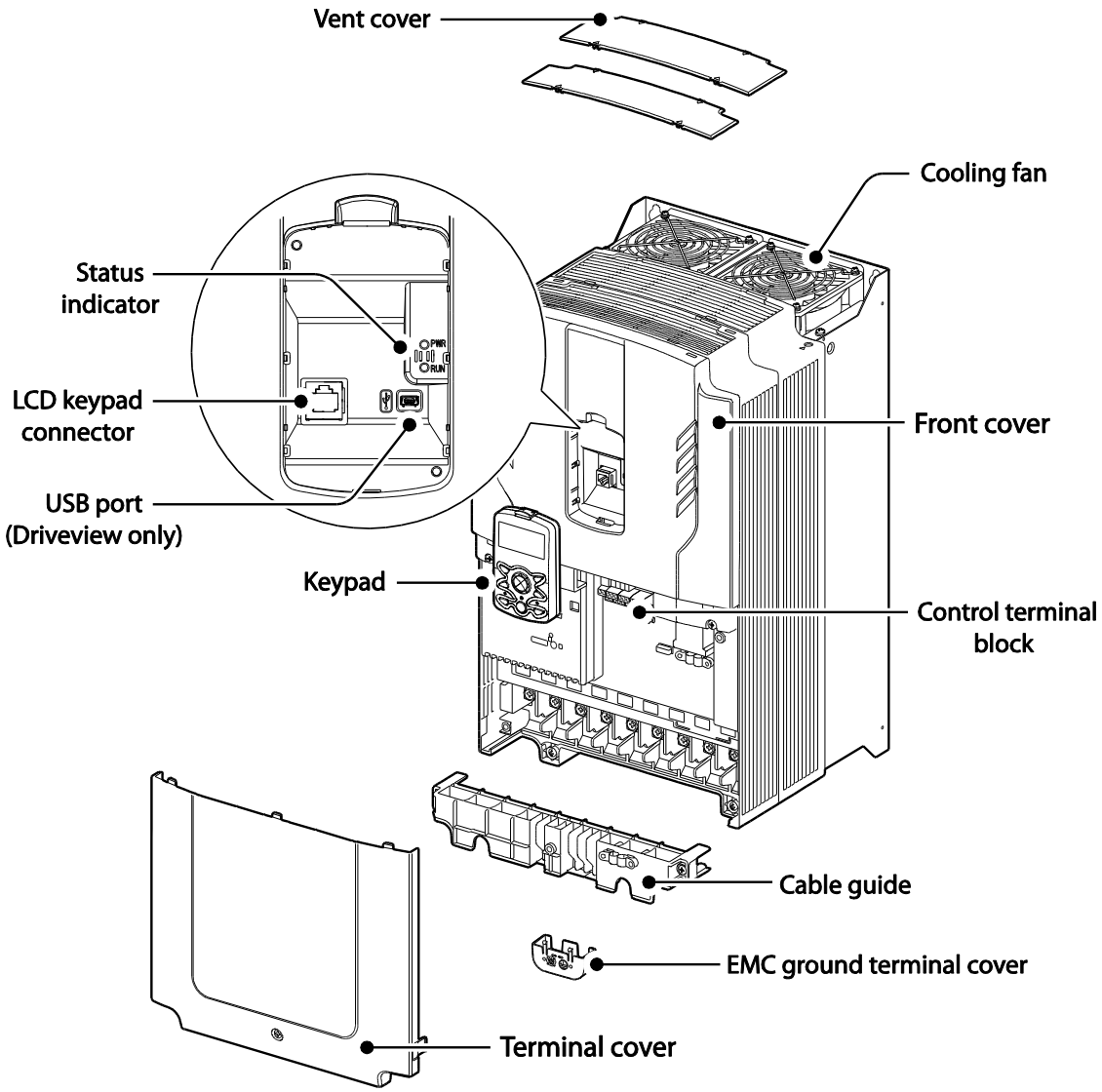
1.2 Part Names

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

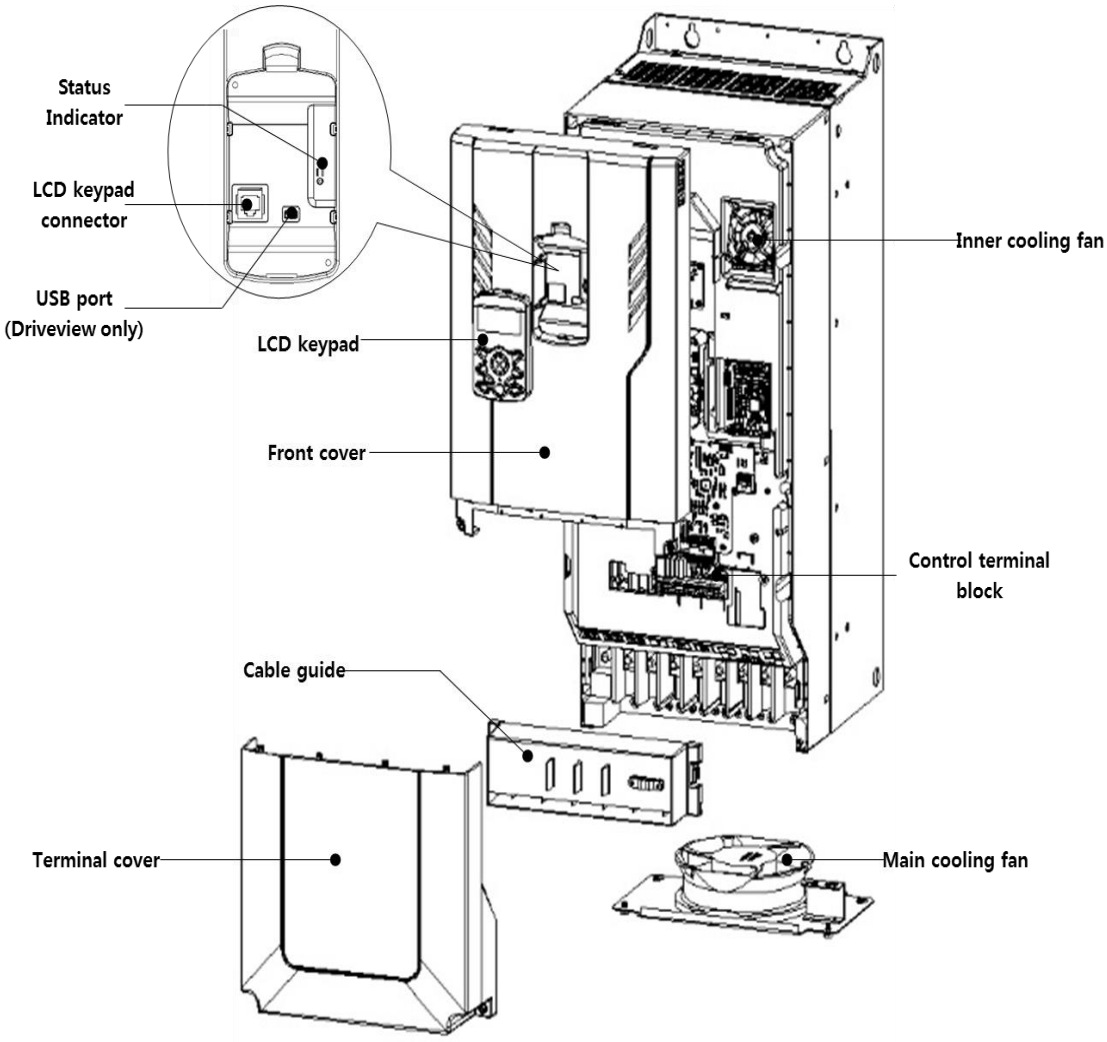
0.75–30 kW (3-Phase)



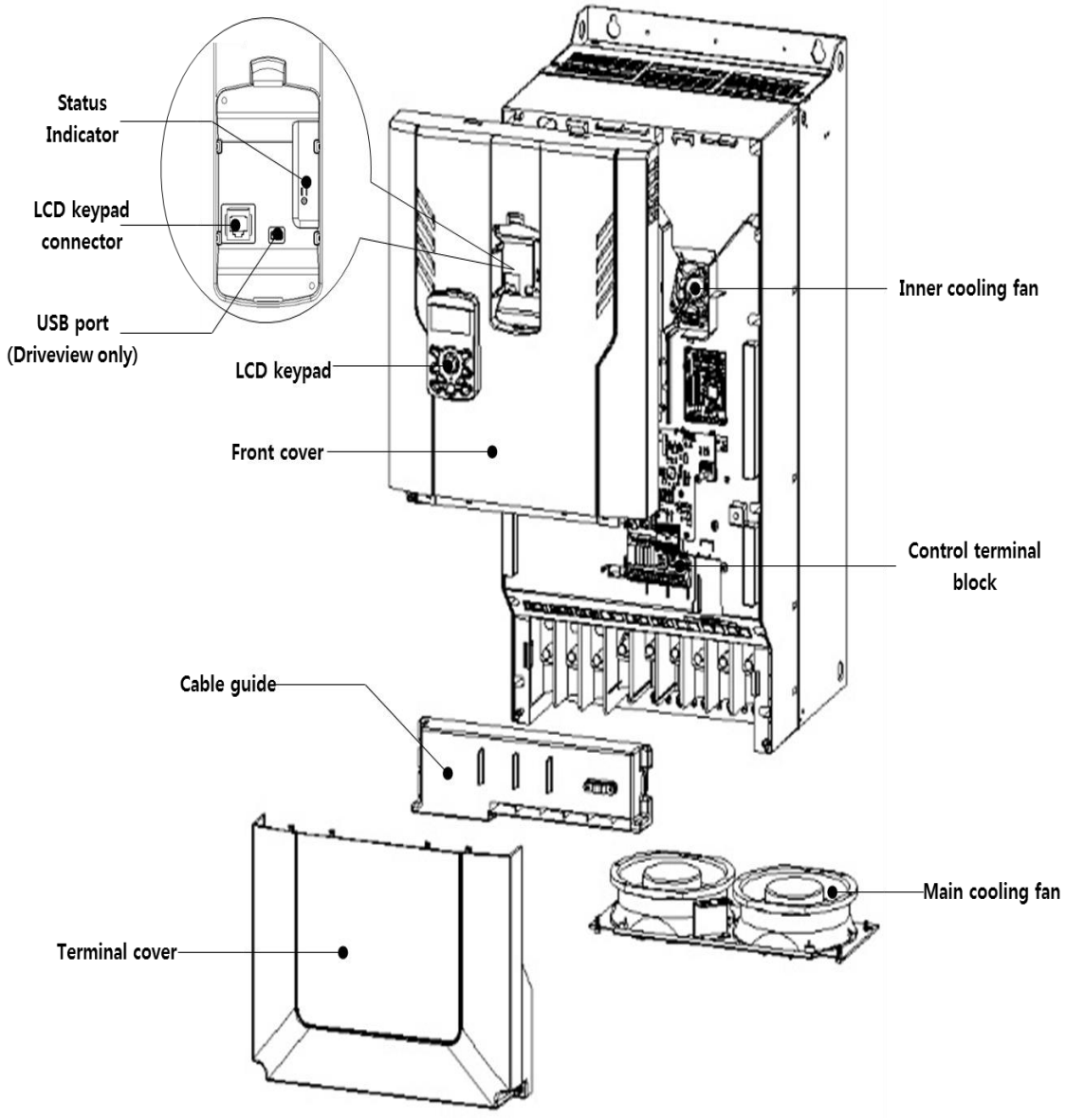
37–90 kW (3-Phase)



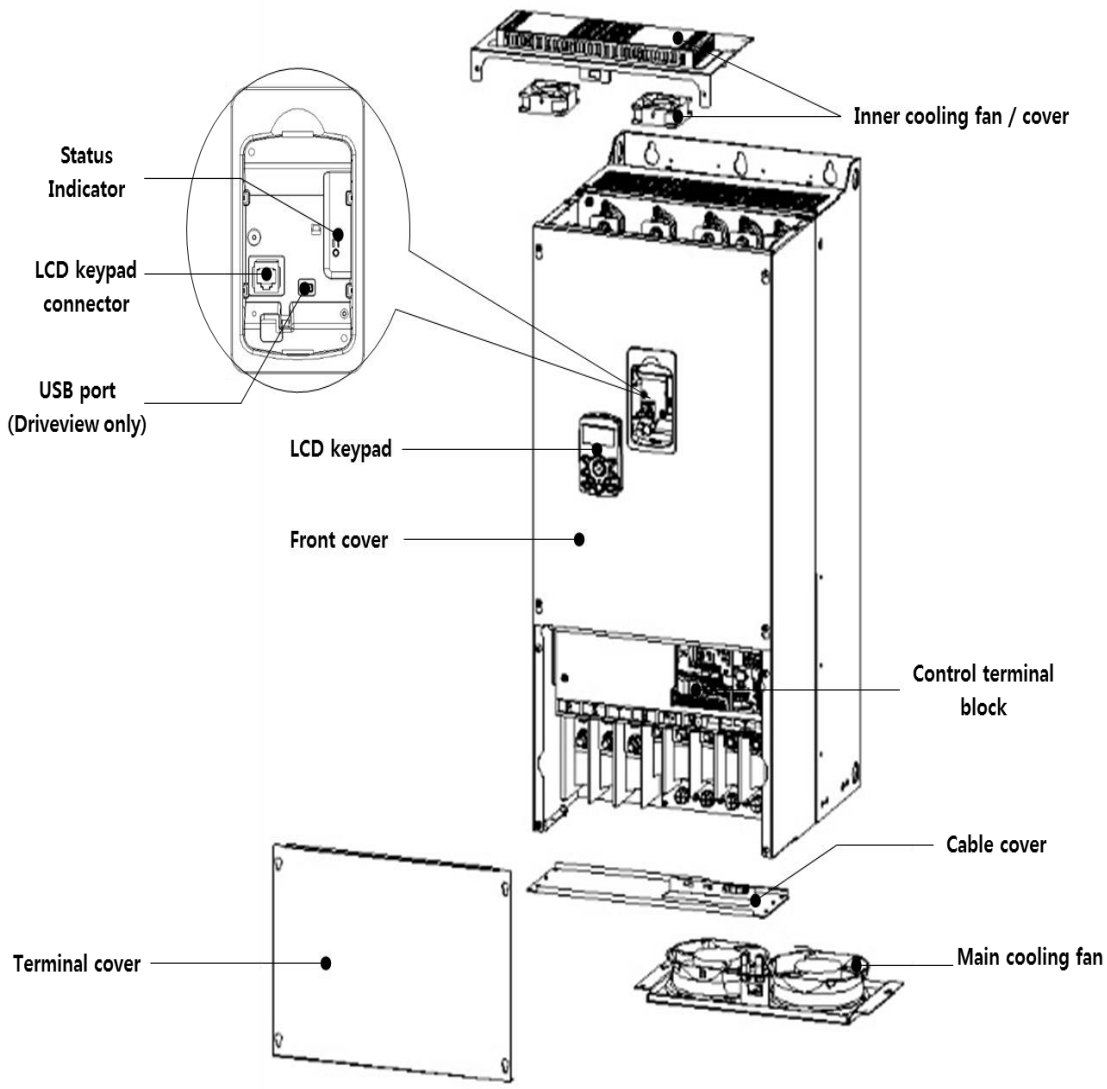
110–132 kW (3-Phase)



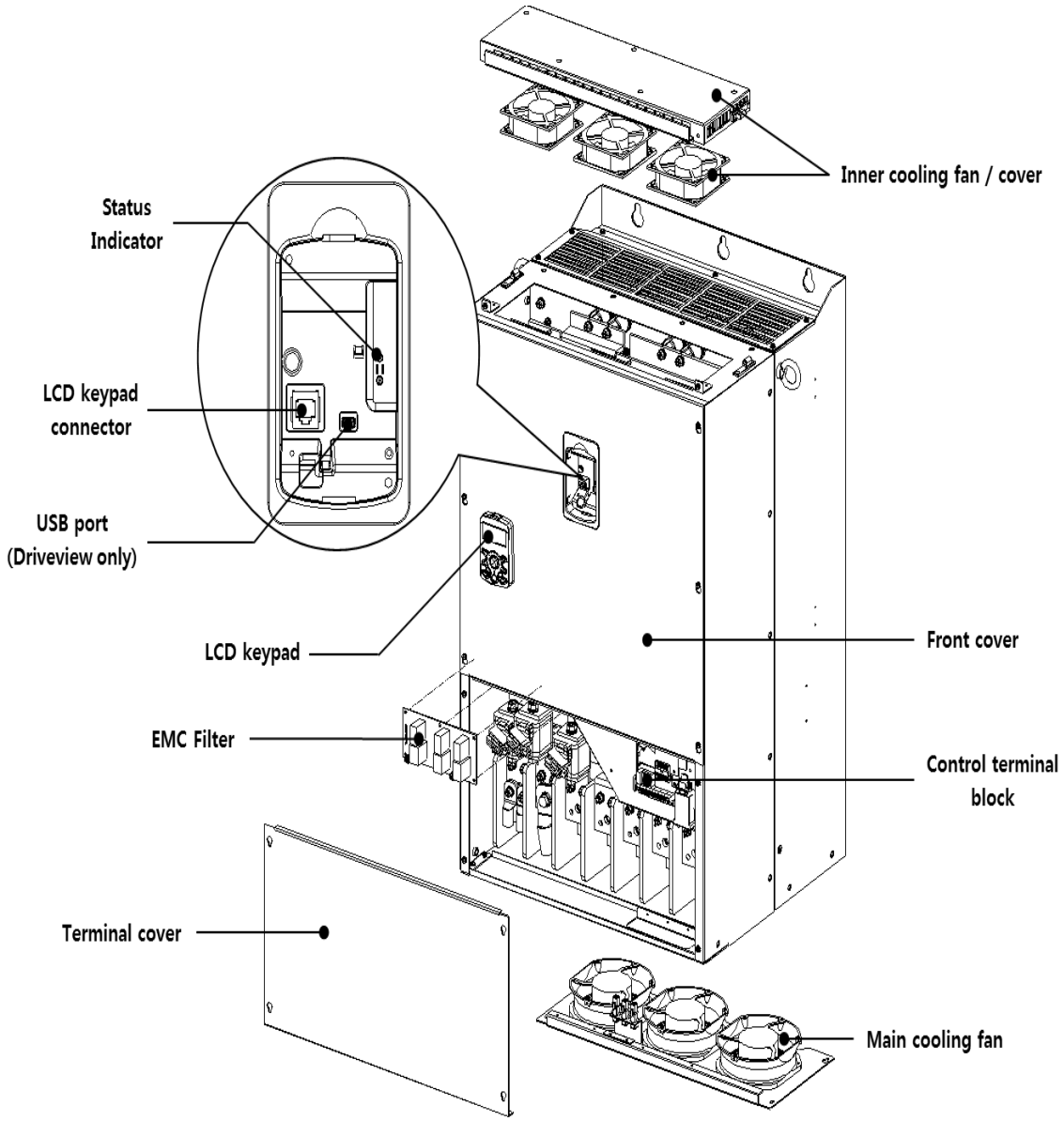
160–185 kW (3-Phase)



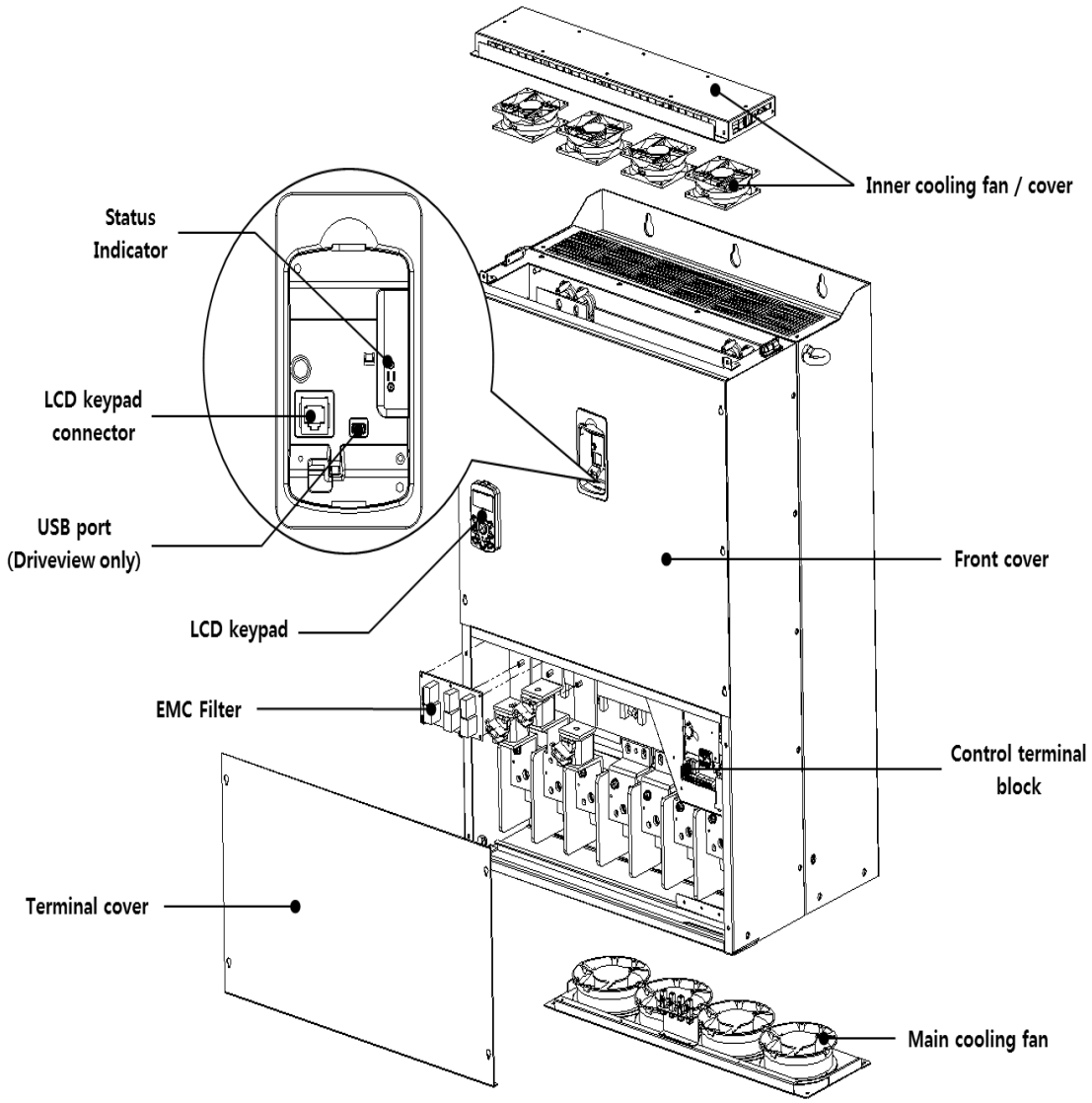
220–250 kW (3-Phase)



315–400 kW (3-Phase)



500 kW (3-Phase)

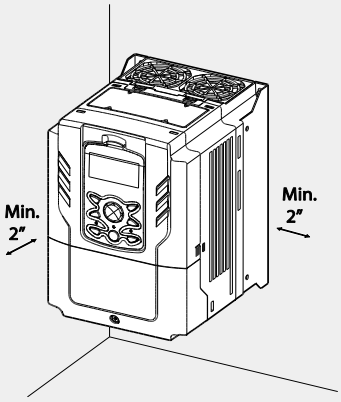


1.3 Installation Considerations

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*	-10 ℃–50 ℃ (40 ℃ and above, 2.5% / ℃ Current Derating search. 50 ℃ 75% of the rated current of the drive if possible)
Ambient Humidity	95% relative humidity (no condensation)
Storage Temperature	- 4–149 °F (-20–65 ℃)
Environmental Factors	An environment free from corrosive or flammable gases, oil residue or dust
Altitude	Maximum 3,280 ft (1,000m) above sea level for standard operation. After that the driver rated voltage and the rated output current derating by 1% for every extra 328 ft (100m) up to 13,123 ft (4,000m).
Vibration	less than 1.0 G (9.8m/sec^2)
Air Pressure	70 –106 kPa

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



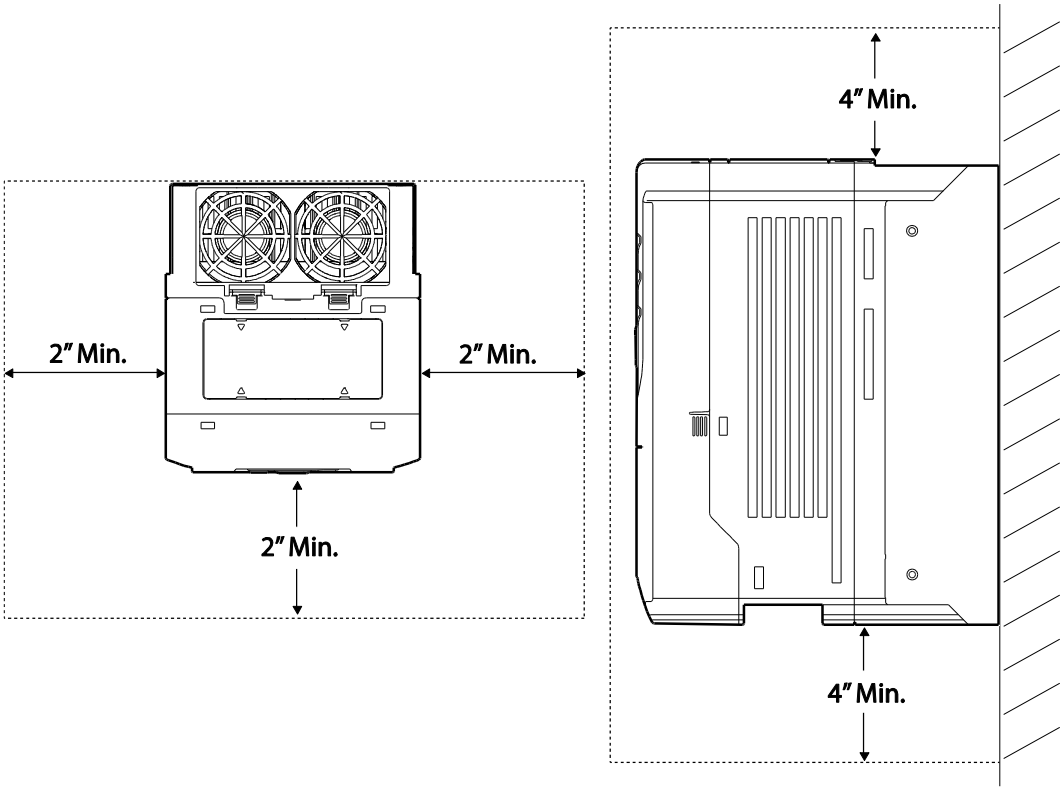
Caution

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

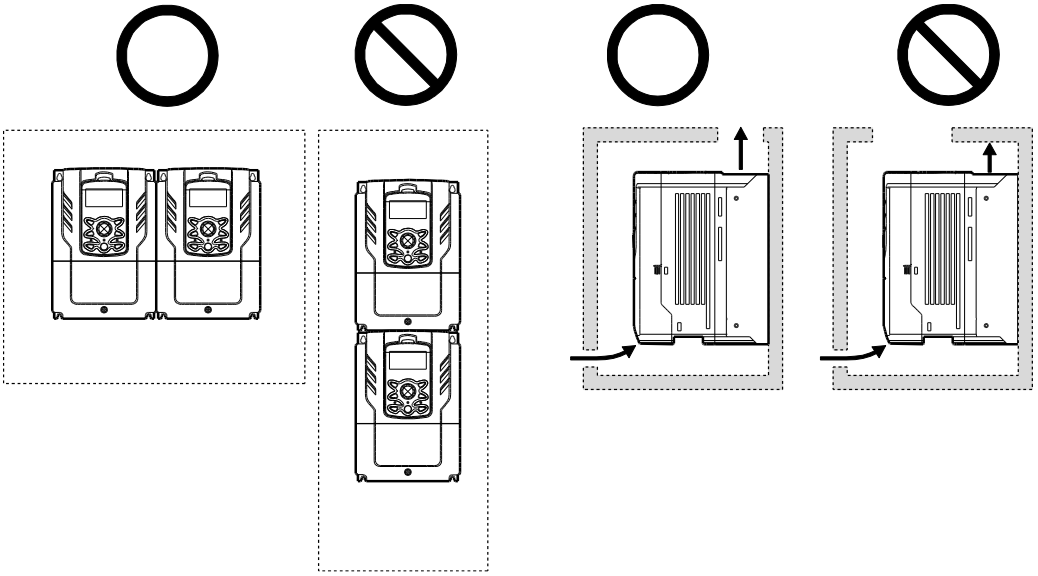
1.4 Selecting and Preparing a Site for Installation

When selecting an installation location consider the following points:

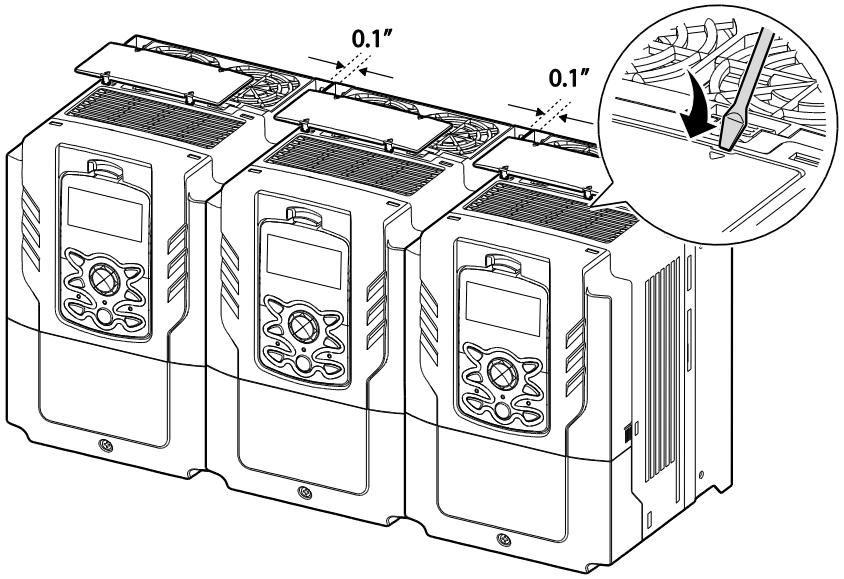
- The inverter must be installed on a wall that can support the inverter's weight.
- The location must be free from vibration. Vibration can adversely affect the operation of the inverter.
- The inverter can become very hot during operation. Install the inverter on a surface that is fire-resistant or 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.



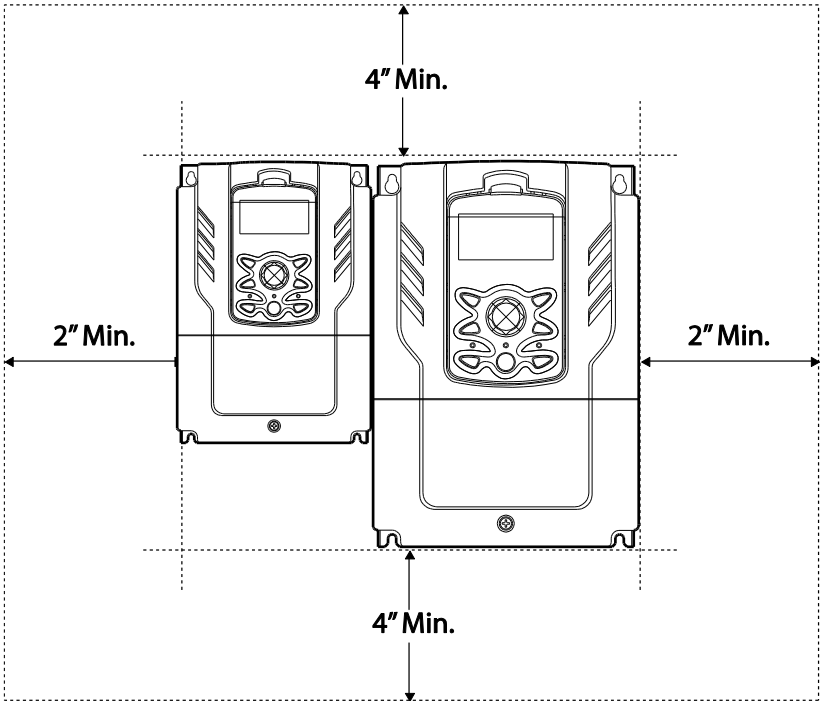
- If you are installing multiple inverters in one location, arrange them side-by-side and remove the vent covers. Use a flat head screwdriver to remove the vent covers. Only the H100+ inverters rated for up to 30 kW may be installed side-by-side.



Note

- The vent covers must be removed for side-by-side installations.
- Side-by-side installation cannot be used for the H100+ inverters rated for 37 kW and above.
- For the H100+ inverters rated for 37 kW and above, if the installation site satisfies the UL Open Type requirements and there is no danger of foreign objects getting inside the inverter and causing trouble, the vent cover may be removed to improve cooling efficiency.

- If you are installing multiple inverters of different ratings, provide sufficient clearance to meet the clearance specifications of the larger inverter.The H100+ inverters rated for up to 30 kW may be installed side-by-side.



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.

ⓘ 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 ℃ for control terminal wiring.
- The inverters in the range between 15 and 90 kW must be grounded conveniently with fixed connections.
- The inverters in the range between 5,5kW and 11kW must be grounded with and industrial connector according to IEC 60309.
- The minimum size of the protective earthing conductor shall comply with the local safety regulations for high protective earthing conductor current equipment.
- Only one conductor per terminal should be simultaneously connected

Ground Cable and Power Cable Specifications

Load (kW)		Ground Wire		Input/Output Power Wire			
		mm^2	AWG	mm^2		AWG	
				R/S/T	U/V/W	R/S/T	U/V/W
3-Phase 200 V	0.75	3.5	12	1.5	1.5	16	16
	1.5						
	2.2						
	3.7			2.5	2.5	14	14
	5.5	10	10	4	4	12	12
	7.5			6	6	10	10
	11			10	10	8	8
	15	14	6	16	16	6	6
	18.5			25	22	4	4
3-Phase 400 V	0.75	2	14	1.5	1.5	16	16
	1.5						
	2.2						

Load (kW)		Ground Wire		Input/Output Power Wire			
		mm²	AWG	mm²		AWG	
				R/S/T	U/V/W	R/S/T	U/V/W
	3.7						
	5.5	4	12	2.5	2.5	14	14
	7.5			4	2.5	12	14
	11			4	4	12	12
	15	16	9	6	6	10	10
	18.5			16	10	6	8
	22	14	6	16	10	6	8
	30			25	16	4	6
	37	25	4	25	25	4	4
	45			25	25	4	4
	55			50	50	1/0	1/0
	75	38	2	70	70	1/0	1/0
	90			70	70	1/0	1/0
	110	50X2	1X2	70X2	70X2	1/0 x2 300	1/0 x2 300
	132			95X2	95X2	2/0 x2 400	2/0 x2 400
	160	50X2 70X2	1/0 x2	95X2	95X2	4/0 x2	4/0 x2
	185	70x2 95x2	3/0 x2	120X2	120X2	250 x2	250 x2
	220	95x2	250x2	150X2	150X2	300 x2	300 x2
	250		300 x2	185X2	185X2	350 x2	350 x2
	315	60X4 150X2	2/0 x4,	120X4, 400X2	120X4, 400X2	250 x4 800 x2	250 x4 800 x2
	355	70X4 150X2	3/0 x4				
	400	95X4 200X2	4/0 x4				
	500	120X4 350X2	4/0 x4 750X2	185X4, 630X2	185X4, 630X2	350 x4 1500 x2	350 x4 1500 x2

* Lugs of the field wiring must be UL approved.

Signal (Control) Cable Specifications

Terminals	Wire thickness [1]	
	mm^2	AWG
P1–P7/CM/VR/V1/I2/24/TI	0.33–1.25	16–22
AO1/AO2/CM/Q1/EG	0.33–2.0	14–22
A1/B1/C1/A2/C2/A3/C3/A4/C4/A5/C5	0.33–2.0	14–22
S+,S-,SG	0.75	18

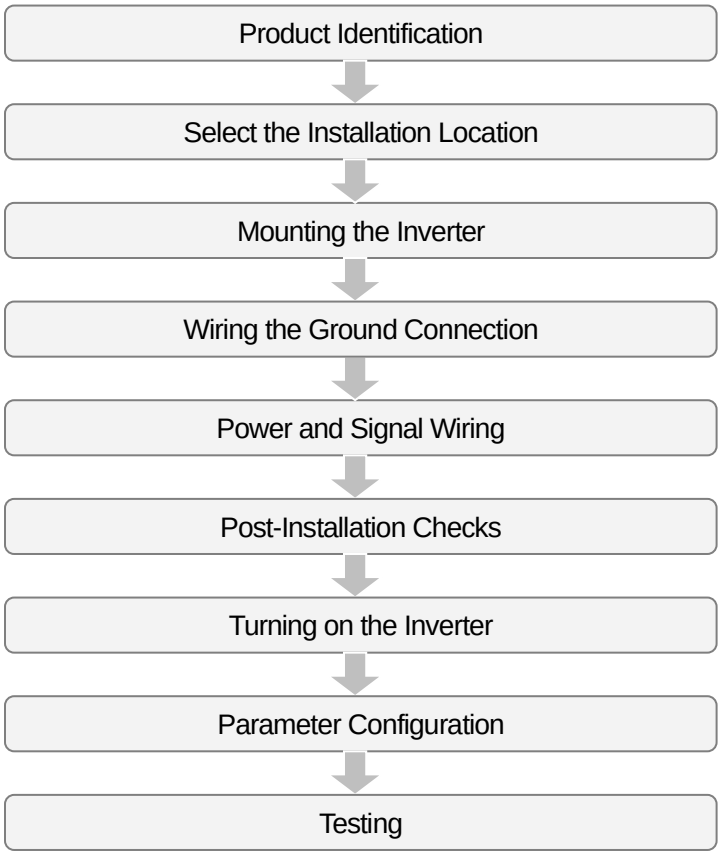
1) Use STP (shielded twisted-pair) cables for signal wiring.

2 Installing the Inverter

This chapter describes the physical and electrical installation of the H100+ series inverters, including mounting and wiring of the product. Refer to the flowchart and basic configuration diagram provided below to understand the procedures and installation instructions to be followed to install the product correctly.

Installation Flowchart

The following 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.

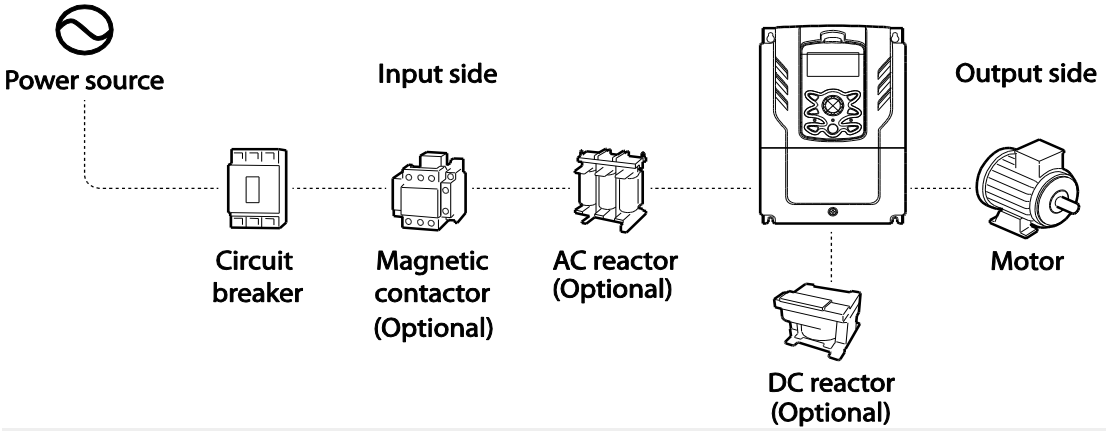


Basic configuration diagram

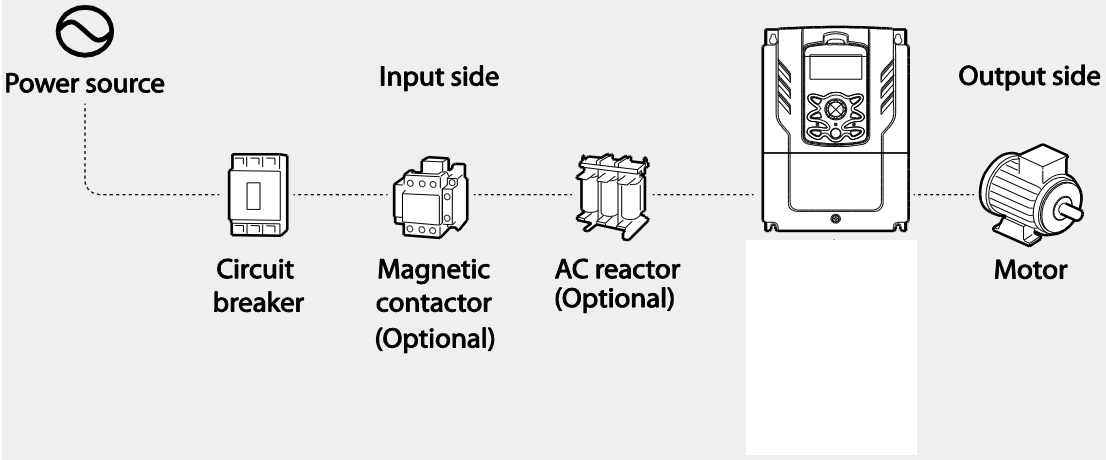
The reference diagram below shows a typical system configuration showing the inverter and peripheral devices.

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.

200[V] : 0.75~18.5kW, 400[V] : 0.75~30kW



400[V] : 37~500kW



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 32.8 ft (10 m) from the power source if the input power exceeds 600 kVA. Refer to *0*
- Fuse and Reactors Specifications on page *186* 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.

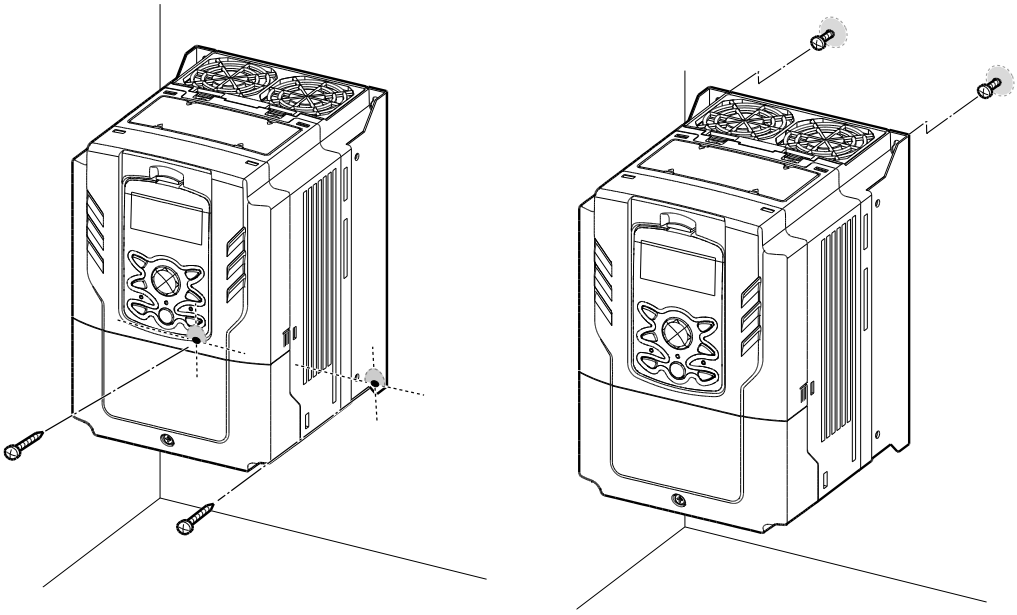
Select a wall or panel suitable to support the installation. Refer to *6.3 External Dimensions* on page *179* and check the inverter's mounting bracket dimensions.

1 Use a level to draw a horizontal line on the mounting surface, and then carefully mark the fixing points.

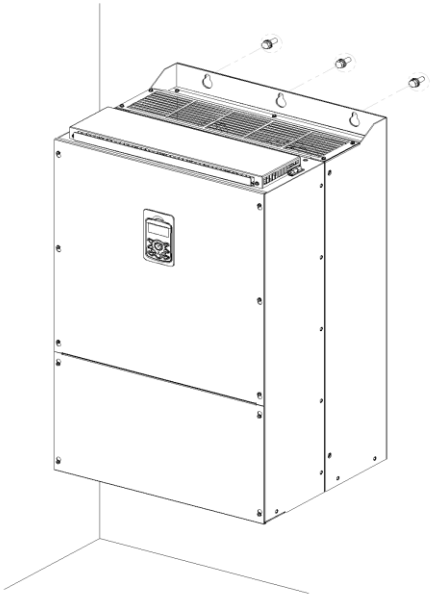
2 Drill the two upper mounting bolt holes, and then install the mounting bolts. Do not fully tighten the bolts at this time. Fully tighten the mounting bolts after the inverter has been mounted.

3 Mount the inverter on the wall or inside a panel using the two upper bolts, and then fully tighten the upper mounting bolts.

200[V] : 0.75~18.5kW, 400[V] : 0.75~185kW



400[V] : 220~500kW

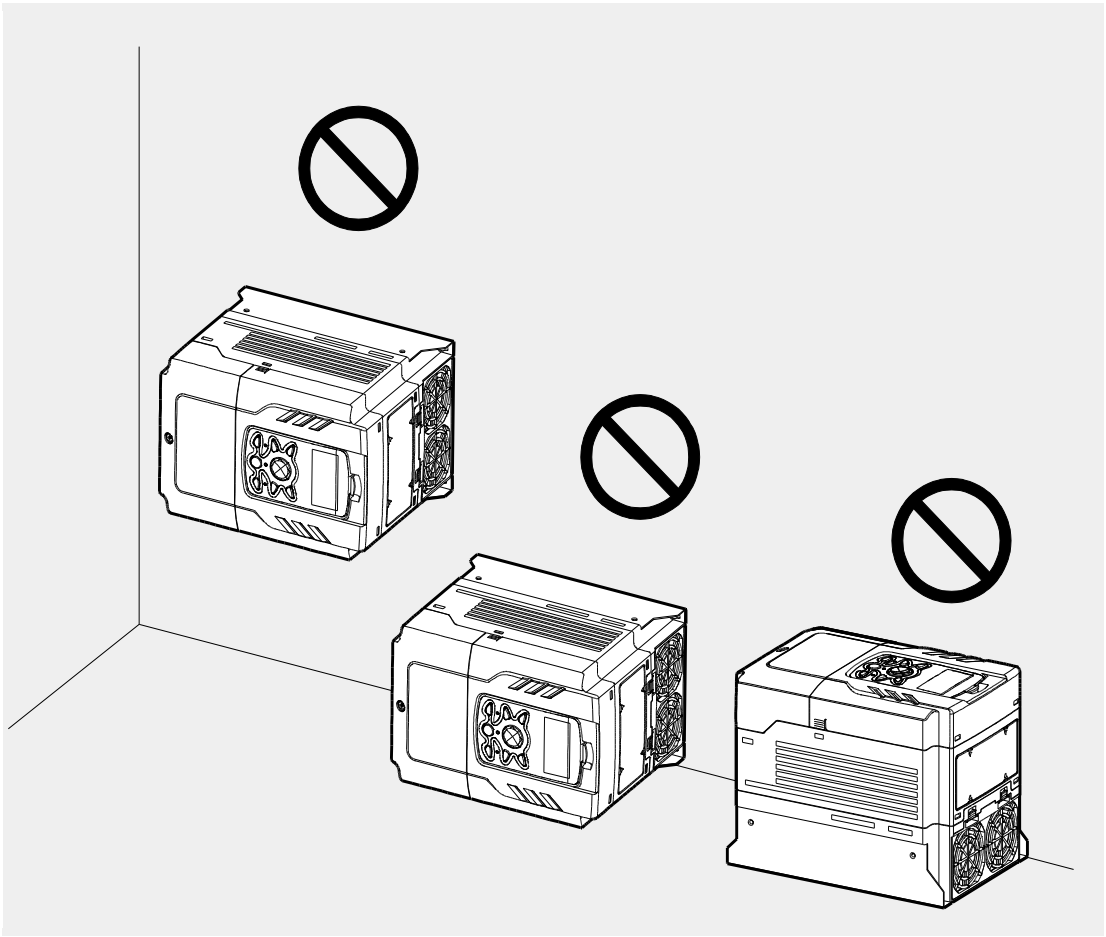


4 Install the two lower mounting bolts. Ensure that the inverter is placed flat on the mounting surface, and that the installation surface can securely support the weight of the inverter.

400[V] : 220~500kW

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 Enabling the RTC (Real-Time Clock) Battery

The H100+ series inverter comes from the factory with a CR2032 lithium-manganese battery pre-installed on the I/O PCB. The battery powers the inverter's built-in RTC. The battery is installed with a protective insulation strip to prevent battery discharge; remove this protective film before installing and using the inverter.

⚠ Caution

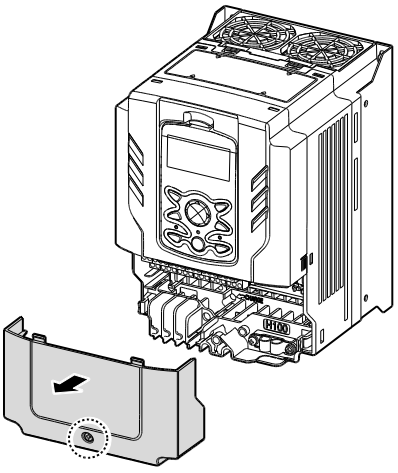
ESD (Electrostatic discharge) from the human body may damage sensitive electronic components on the PCB. Therefore, be extremely careful not to touch the PCB or the components on the PCB with bare hands while you work on the I/O PCB.

To prevent damage to the PCB from ESD, touch a metal object with your hands to discharge any electricity before working on the PCB, or wear an anti-static wrist strap and ground it on a metal object.

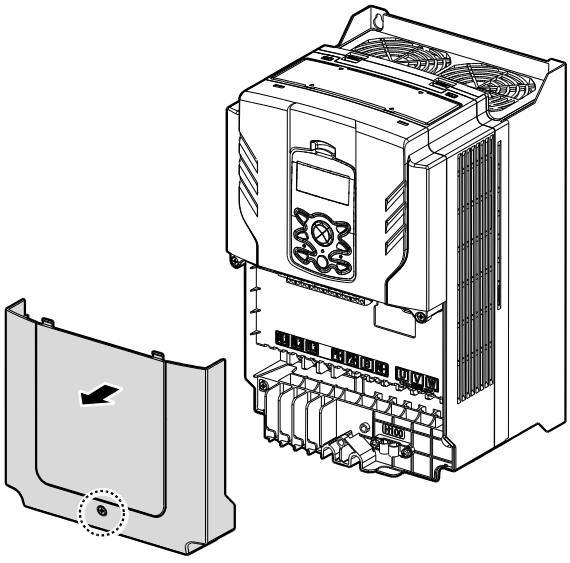
Follow the instructions below to remove the protective insulation strip and enable the RTC feature on the H100+ series inverters.

1 Turn off the inverter and make sure that DC link voltage has dropped to a safe level.

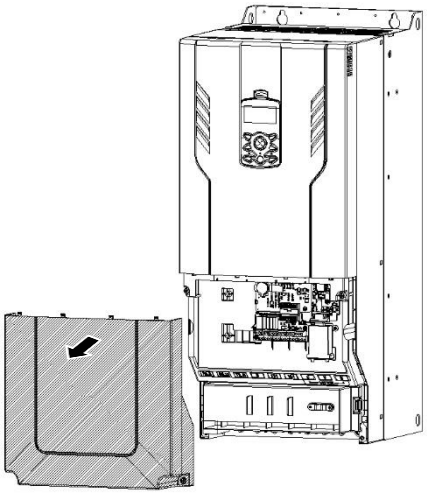
2 Loosen the screw on the power cover then remove the power cover.



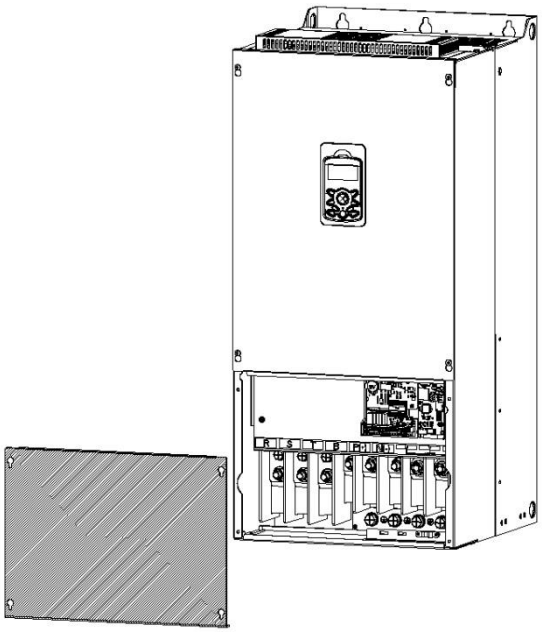
0.75–30 kW Models



37–90 kW Models

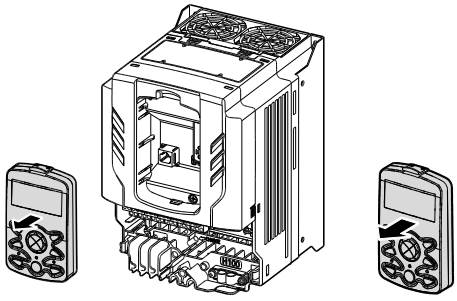


110~185kW Models

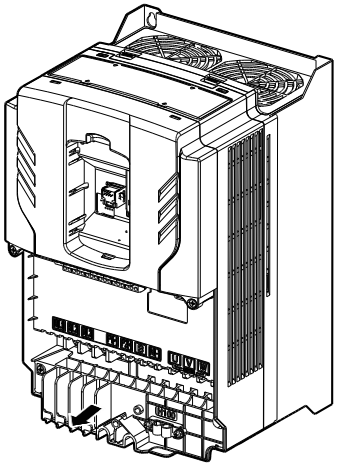


220~500kW Models

3 Remove the keypad from the inverter body.

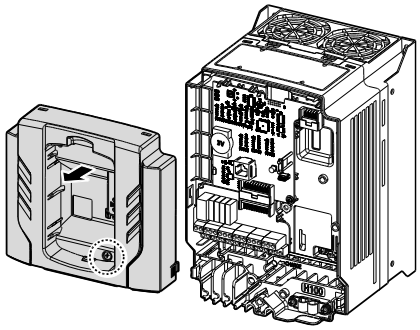


0.75–30 kW Models

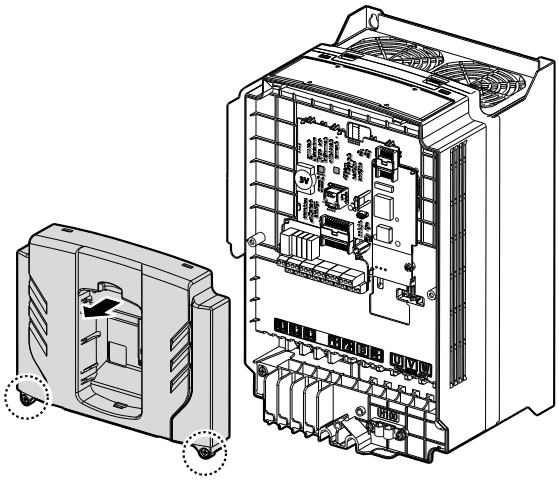


37–90 kW Models

4 Loosen the screws securing the front cover, and remove the front cover by lifting it. The main PCB is exposed.

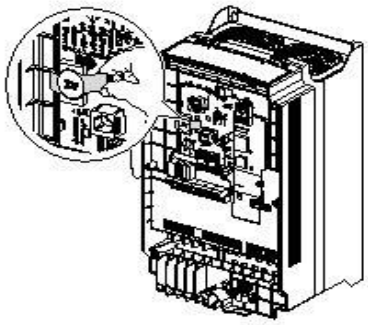


0.75–30 kW Models

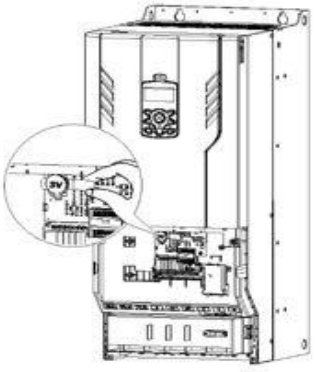


37–90 kW Models

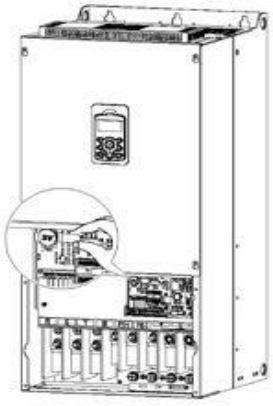
5 Locate the RTC battery holder on the I/O PCB, and remove the protective insulation strip by gently pulling it.



0.75-90kW Models



110-185kW Models



220-500kW Models

6 Reattach the front cover, the power cover, and the keypad back onto the inverter body

⚠ Caution

Ensure that the inverter is turned off and DC link voltage has dropped to a safe level before opening the terminal cover and installing the RTC battery.

2.3 Cable Wiring

Open the terminal cover, remove the cable guides, 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 clippings, 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 a short circuit or inverter failure. Refer to page *187*.
- Do not place heavy objects on top of electric cables. Heavy objects may damage the cable and result in electric shock.
- Use cables with the largest cross-sectional area, appropriate for power terminal wiring, to ensure that voltage drops do not exceed 2%.
- Use copper cables rated at 600 V, 75 ℃ for power terminal wiring.
- Use copper cables rated at 300 V, 75 ℃ for control terminal wiring.
- 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 terminal 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.
- The accessible connections and parts listed below are of protective class 0. It means that the protection of these circuits relies only upon basic insulation and becomes hazardous in the event of a failure of the basic insulation. Therefore, devices connected to these circuits must provide electrical-shock protection as if the device was connected to supply mains voltage. In addition, during installation these parts must be considered, in relation with electrical-shock, as supply mains voltage circuits.

  [Class 0 circuits]

  ➔ MULTI FUNCTION INPUT : P1-P7, CM

  ➔ ANALOG INPUT : VR, V1, I2, TI

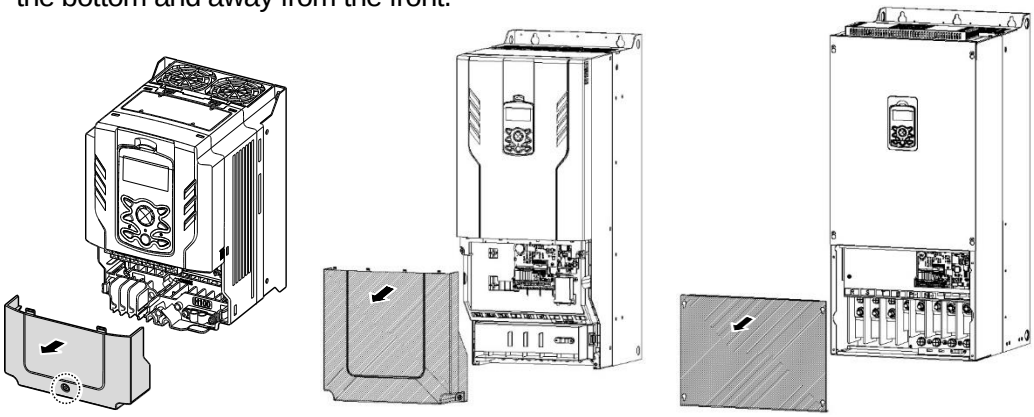
  ➔ ANALOG OUTPUT : AO1, AO2, TO

- CONTACT : Q1, EG, 24,A1, C1, B1, A2~5, C2~5, S+, S-, SG

Step 1 Terminal Cover and Cable Guide

The 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.

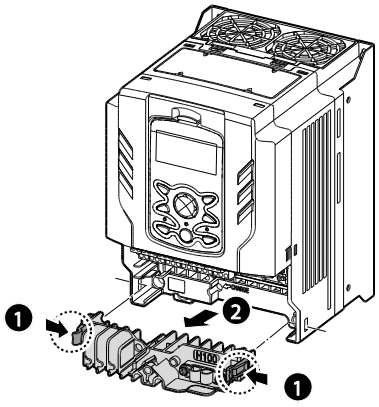
1 Loosen the bolt that secures the terminal cover. Then remove the cover by lifting it from the bottom and away from the front.



0.75–90 kW Models 110–185 kW Models 220–500 kW Models

2 Push and hold the levers on both sides of the cable guide (❶) and then remove the cable guide by pulling it directly away from the front of the inverter (❷). In some models (37~90kW) where the cable guide is secured by a bolt, remove the bolt first.

0.75~30 / 110~185 kW Models

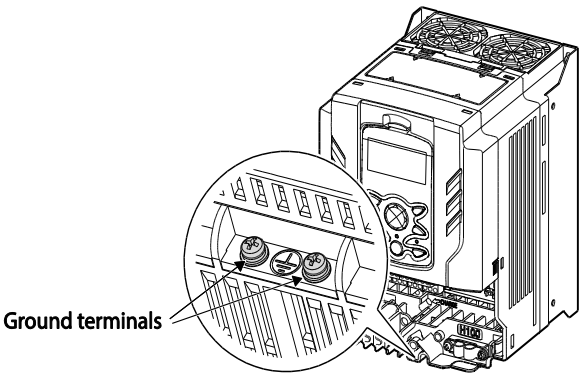


3 Connect the cables to the power terminals and the control terminals. For cable specifications, refer to *1.5 Cable Selection* on page *14*.

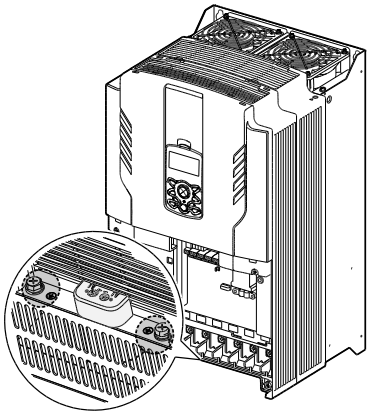
Step 2 Ground Connection

Remove the terminal cover(s) and cable guide. Then follow the instructions below to install the ground connection for the inverter.

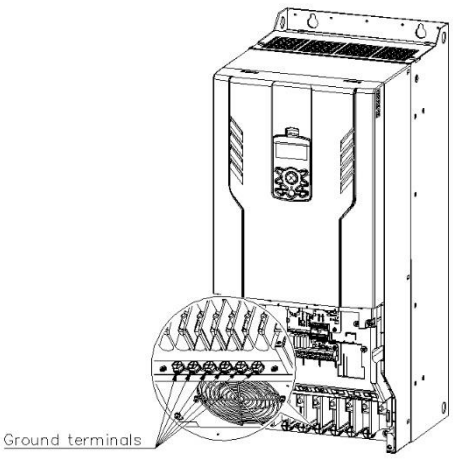
1 Locate the ground terminal and connect an appropriately rated ground cable to the terminals. Refer to *1.5 Cable Selection* on page *14* to find the appropriate cable specification for your installation.



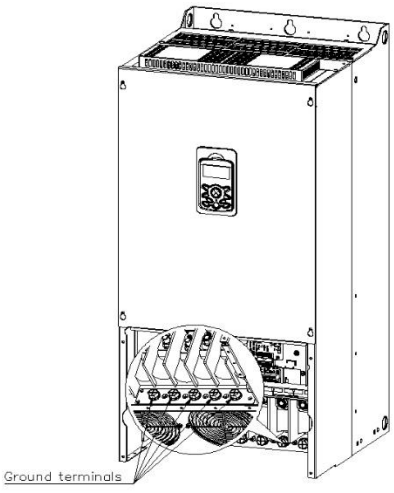
0.75–30 kW (3-Phase)



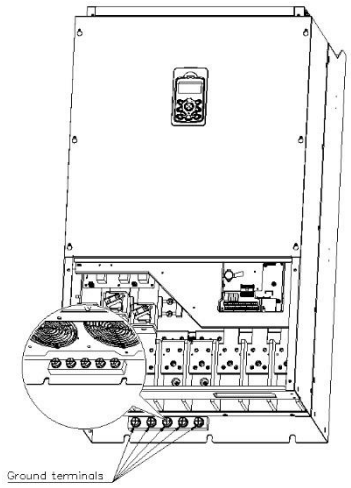
37–90 kW (3-Phase)



110~185kW (3-Phase)



220-250kW (3-Phase)



315~500kW (3-Phase)

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

Note

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

⚠ 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.
This product can cause a D.C current in the protective earthing conductor. If a RCD or monitoring (RCM) device is used for protection, only RCD or RCM of Type B is allowed on supply side of this product.

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 *1.5 Cable Selection* on page *14* before installing them.

⚠ Caution

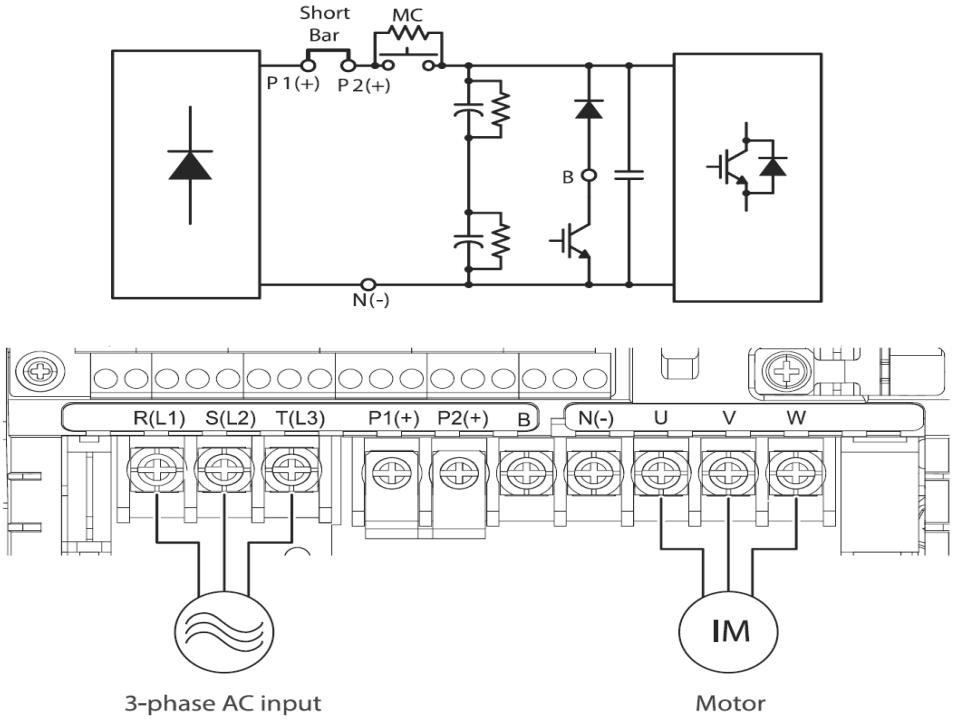
- Apply rated torques to the terminal screws. Loose screws may cause short circuits and malfunctions. Tightening the screw too much may damage the terminals and cause short circuits and malfunctions.

- Use copper wires only with 600 V, 75 ℃ rating for the power terminal wiring, and 300 V, 75 ℃ rating for the control terminal wiring.
- Power supply wirings must be connected to the R, S, and T terminals. Connecting them to the U, V, W terminals causes internal damages to the inverter. Motor should be connected to the U, V, and W Terminals. Arrangement of the phase sequence is not necessary.
- Equipment must only be fitted to the closed electric operating areas.

Attention

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

0.75–30 kW (3-

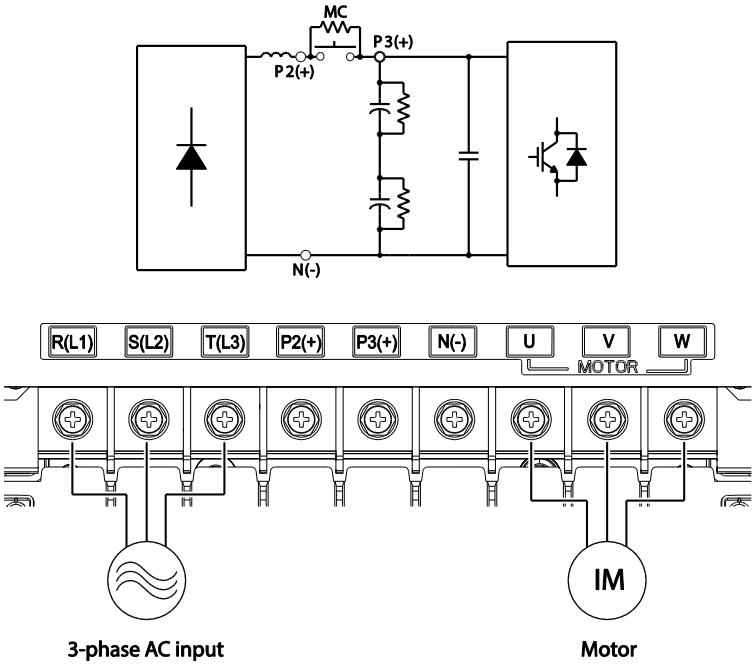


Phase)

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.
P1(+) / P2(+)	DC Reactor terminal	DC Reactor wiring connection. (When you use the DC Reactor, must remove short-bar)
P2(+) / B	Brake resistor terminals	Brake resistor wiring connection.
U / V / W	Motor output terminals	3-phase induction motor wiring connections.

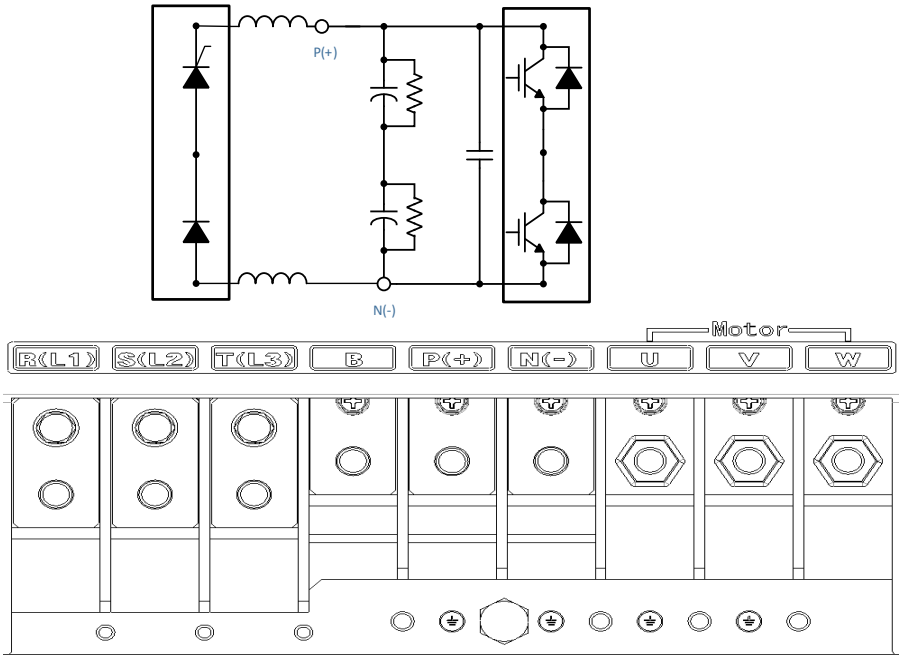
37–90 kW (3-Phase)



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 connections.

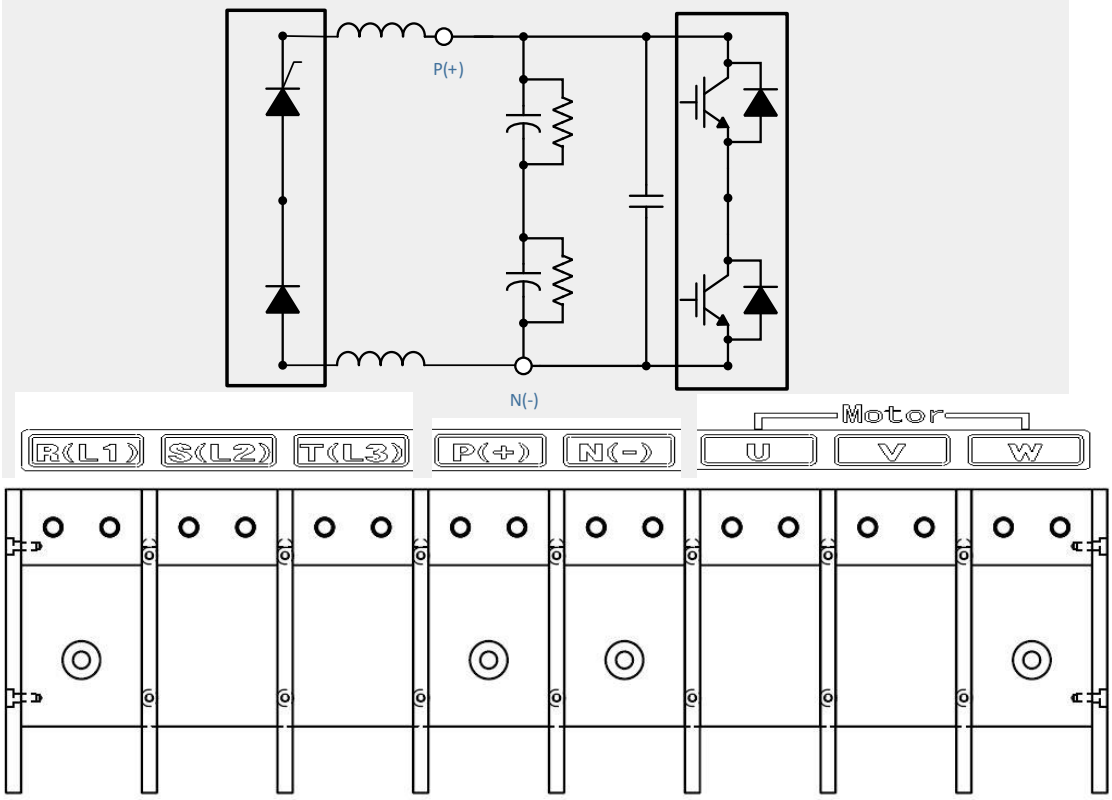
110–250kW (3-Phase)



Power Terminal Labels and Descriptions

Terminal Labels	Name	Description
R(L1) / S(L2) / T(L3)	AC power input terminal	Mains supply AC power connections.
B	-	It can not be used because it does not provide a braking module
P(+) / N(-)	DC link terminal (or Brake unit terminals)	DC voltage terminals. (or Brake unit wiring connection)
U / V / W	Motor output terminals	3-phase induction motor wiring connections.

315–500kW (3-Phase)



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

Note

- Apply a DC input to the P2 (+) and N (-) terminals to operate the inverter on DC voltage input.
- Use STP (Shielded Twisted Pair) cables to connect a remotely located motor with the inverter. Do not use 3 core cables.
- Make sure that the total cable length does not exceed 492 ft (150 m). For inverters < = 3.7 kW capacity, ensure that the total cable length does not exceed 165 ft (50 m).
- 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) = [√3 X cable resistance (mΩ/m) X cable length (m) X current (A)] / 1000
- Use cables with the largest possible cross-sectional area to ensure that voltage drop is minimized over long cable runs. Lowering the carrier frequency and installing a micro surge filter may also help to reduce voltage drop.

Distance	< 165 ft (50 m)	< 330 ft (100 m)	> 330 ft (100 m)
Allowed Carrier Frequency	<15 kHz	<5 kHz	<2.5 kHz

⚠ Warning

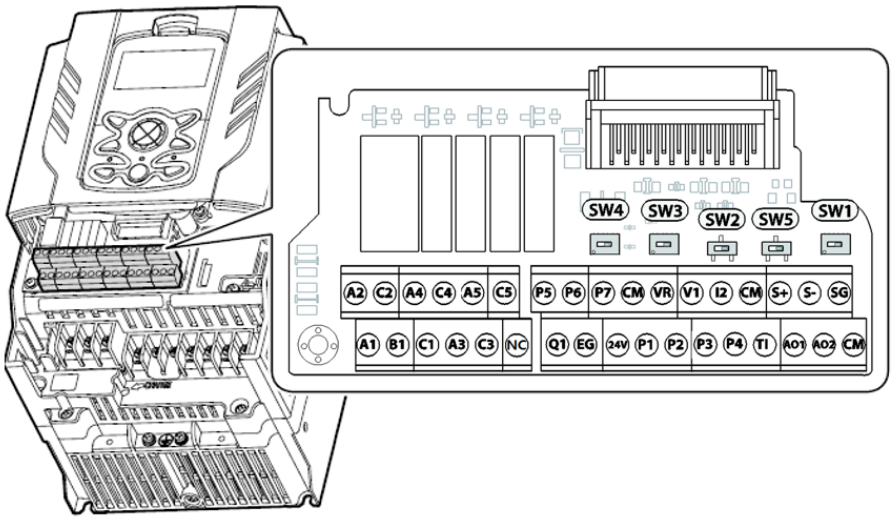
Do not connect power to the inverter until installation has been fully completed and the inverter is ready to be operated. Doing so may result in electric shock.

ⓘ 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.
- Connect the MC to the output of the inverter and avoid MC ON / OFF state during operation.
  (It may cause inverter trip and burn-out.)

Step 4 Control Terminal Wiring

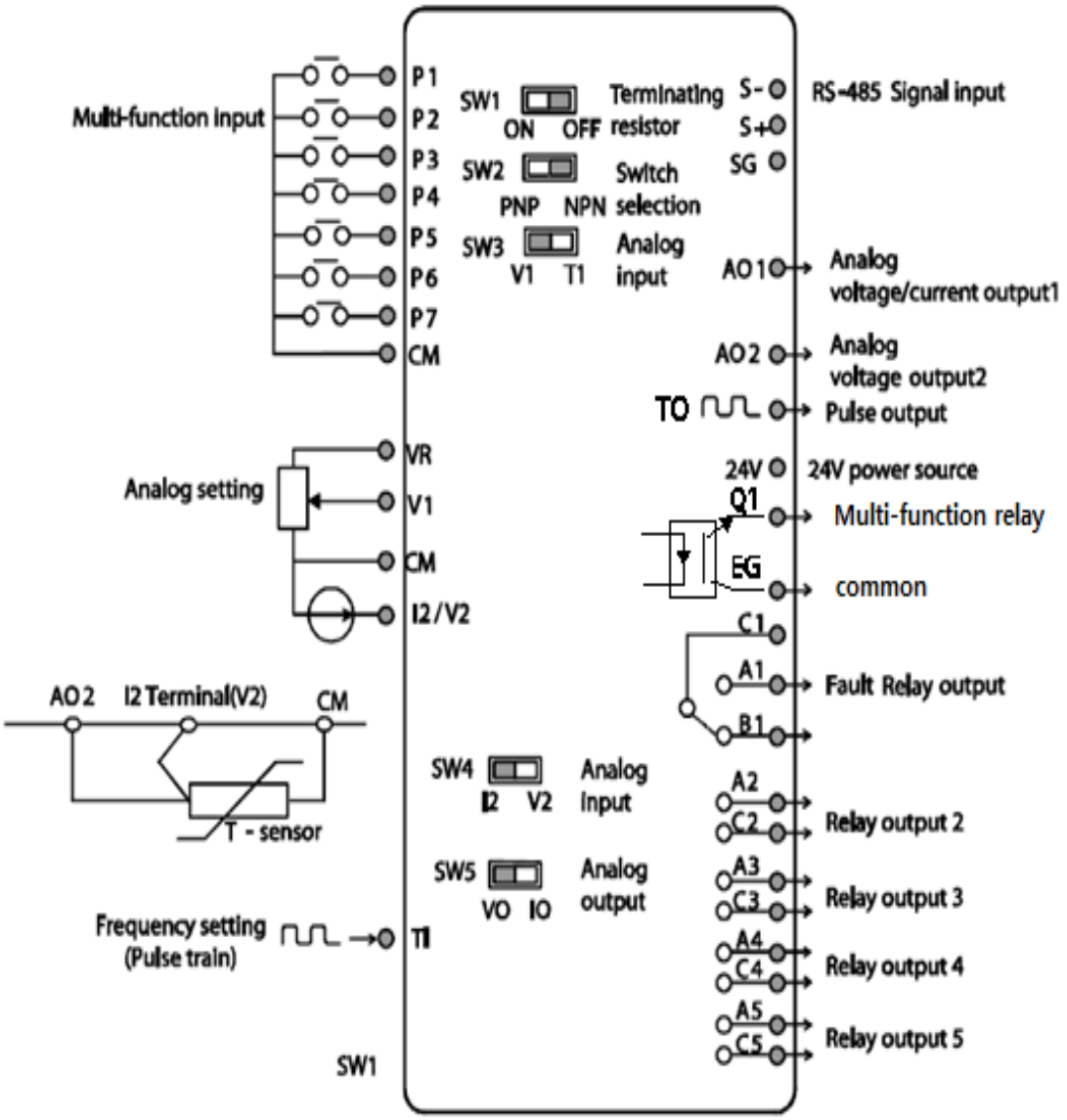
The illustrations below show the detailed layout of control wiring terminals and control board switches. Refer to the detailed information provided below and *1.5 Cable Selection* on page *14* before installing control terminal wiring and ensure that the cables used meet the required specifications.

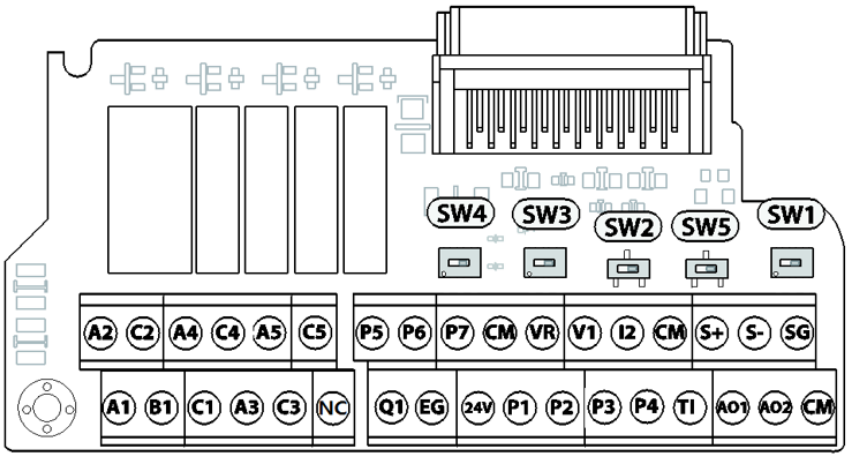


Switch Symbols and Description

Switch	Description	Factory Default
SW1	Terminating Resistor selection switch (Left: On, Right: Off)	Right: OFF
SW2	NPN/PNP mode selection switch (Left: PNP, Right: NPN)	Right: NPN
SW3	V1/T1 (PTC) mode selection switch (Left: V1, Right: T1)	Left: V1
SW4	analog voltage/current input terminal selection switch (Left: I2, Right: V2)	Left: I2
SW5	analog voltage/current output terminal selection switch (Left: VO, Right: IO)	Left: VO

Input and Output Control Terminal Block Wiring Diagram





Input Terminal Labels and Descriptions

Function	Label	Name	Description
Multi-function terminal configuration	P1–P5	Multi-function Input 1-7	Configurable for multi-function input terminals. Factory default terminals and setup are as follows : P1: Fx P2: Rx P3: BX P4: RST P5: Speed-L P6: Speed-M P7: Speed-H
	CM	Common Sequence	Common terminal for contact input and analog input / output terminals. All three CM terminals are the same circuit. Please use it where wiring is easy.
Analog input configuration	VR	Potentiometer power supply	Used to setup or modify a frequency reference via analog voltage or current input. Maximum Voltage Output: 12 V Maximum Current Output: 12 mA Potentiometer : 1–10k Ω
	V1	Voltage input for frequency reference	Used to setup or modify a frequency reference via analog voltage input terminal. Unipolar: 0–10 V(12 V Max)

Function	Label	Name	Description
			Bipolar: -10–10 V(±12 V Max)
	V2/I2	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 (SW4). Input current: 0–20 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: 0–0.8 V, High Level: 3.5–12 V

Output/Communication Terminal Labels and Descriptions

Function	Label	Name	Description
Analog output	AO	Voltage/Current Output	Used to send inverter output information to external devices: output frequency, output current, output voltage, or a DC voltage. Operate switch (SW5) 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 Maximum output current: 24 mA Factory default output: Frequency
Terminal Contacts	Q1	Multi-function (Open Collector) Pulse Output	Selects a multi-function output signal or pulse output, output frequency, output current, output voltage, DC voltage by selecting one of the outputs. DC 26 V, 50 mA or less Pulse output terminal Output frequency: 0–32 kHz Output voltage: 0–12 V
	EG	Common	Common ground contact for an open collector (with external power source)

Function	Label	Name	Description
	24	24 V power supply	-Maximum output current: 100 mA -Do not use this terminal for any purpose other than supplying power to a PNP mode circuit configuration (e.g. supplying power to other external devices).
	A1/C1/B1	Fault relay output A,B contact	Sends out alarm signals when the inverter's safety features are activated. (N.O.: AC250 V ≤2 A , DC 30 V ≤3 A N.C.: AC250 V ≤1 A , DC 30 V ≤ 1 A) Fault condition: A1 and C1 contacts are connected (B1 and C1 open connection) Normal operation: B1 and C1 contacts are connected (A1 and C1 open connection) Factory default: Frequency
	A2/C2 A3/C3 A4/C4 A5/C5	Multi-function relay output A contact	Defined in the inverter signal features such as output via the multi-function output terminal. (AC 250 V≤ 5 A, DC 30 V≤ 5 A).
	S+/S-/SG	RS-485 signal line	Used to send or receive RS-485 signals..

Note

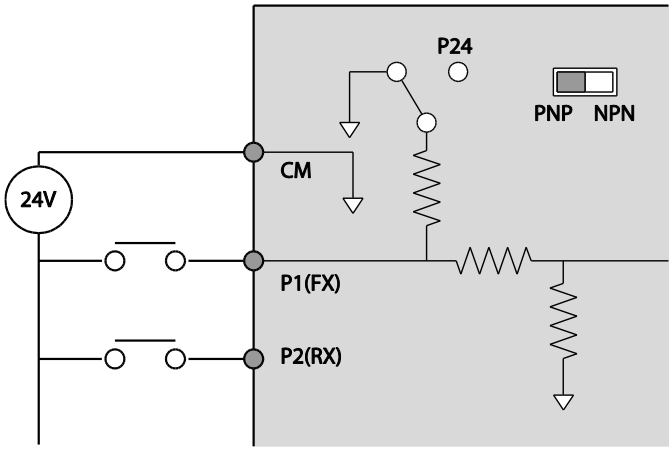
- While making wiring connections at the control terminals ensure that the total cable length does not exceed 165 ft (50 m).
- Ensure that the length of any safety related wiring does not exceed 100 ft (30 m).
- Ensure that the cable length between the keypad and the inverter does not exceed 10 ft (3.04 m). Cable connections longer than 10 ft (3.04 m) 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 terminal cover.

Step 5 PNP/NPN Mode Selection

The H100+ 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 (SW2) on the control board. Refer to the following information for detailed applications.

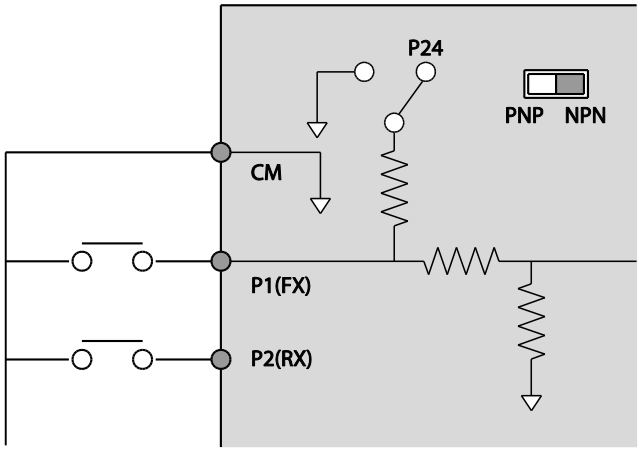
PNP Mode (Source)

Select PNP using the PNP/NPN selection switch (SW2). Note that the factory default setting is NPN mode. CM is the common ground terminal for all analog inputs at the terminal, and P24 is 24 V internal source. If you are using an external 24 V source, build a circuit that connects the external source (-) and the CM terminal.



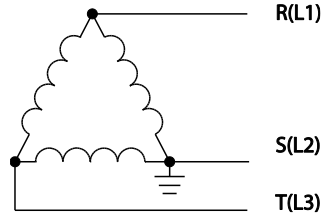
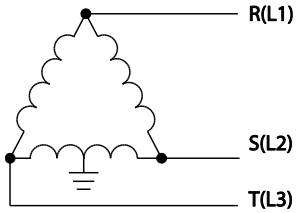
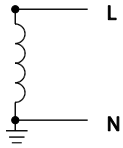
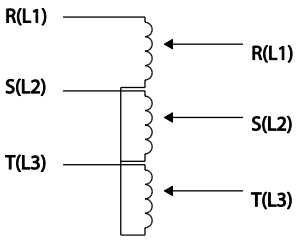
NPN Mode (Sink)

Select NPN using the PNP/NPN selection switch (SW2). Note that the factory default setting is NPN mode. CM is the common ground terminal for all analog inputs at the terminal, and P24 is 24 V internal source.



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

H100+, 400 V 0.75–55 kW, 110~500kW(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.

Asymmetrical Grounding Connection			
One phase of a delta connection is grounded (TN Systems)		Intermediate grounding point on one phase of a delta connection (TN Systems)	
The end of a single phase is grounded (TN Systems)		A 3-phase connection without grounding (TN Systems)	

⚠ Danger

- Do not activate the EMC filter if the inverter uses a power source with an asymmetrical grounding structure (corner-earthed systems), 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.

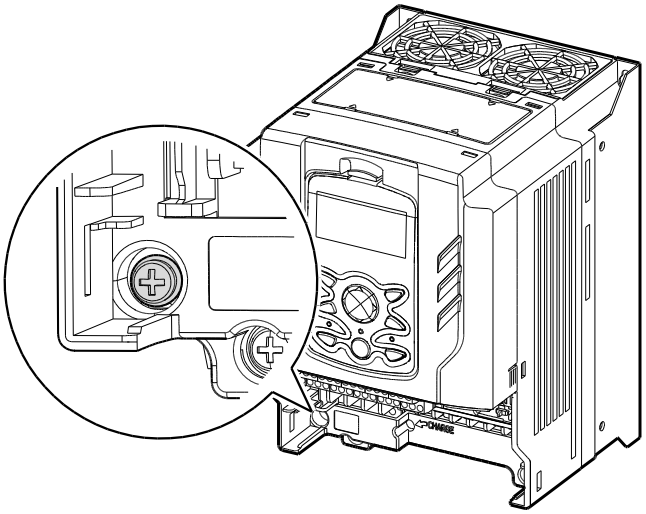
Before using the inverter, confirm the power supply's grounding system. Disable the EMC filter if the power source has an asymmetrical grounding connection.

Disabling the Built-in EMC Filter for 0.75–30 kW (3–Phase) Inverters

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.

If the EMC filter is required in the future, reverse the steps and replace the plastic bolt with the metal bolt to enable the EMC filter.

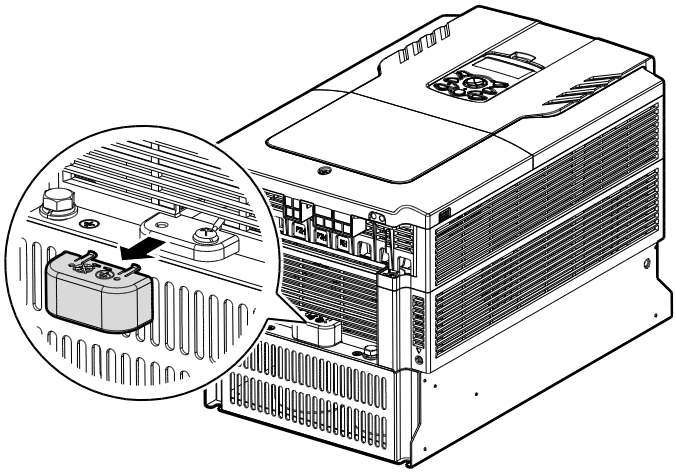
Steel bolt	Plastic bolt
	
EMC ON	EMC OFF



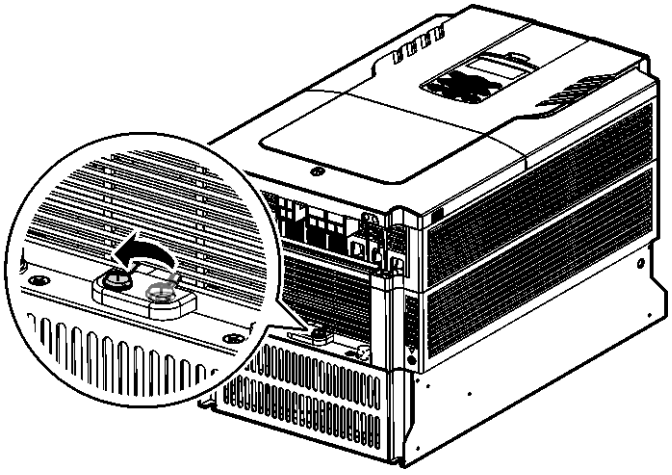
Disabling the Built-in EMC Filter for 37–55 kW (3–Phase) Inverters

Follow the instructions listed below to disable the EMC filters for the H100+ inverters rated for 37–55 kW.

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



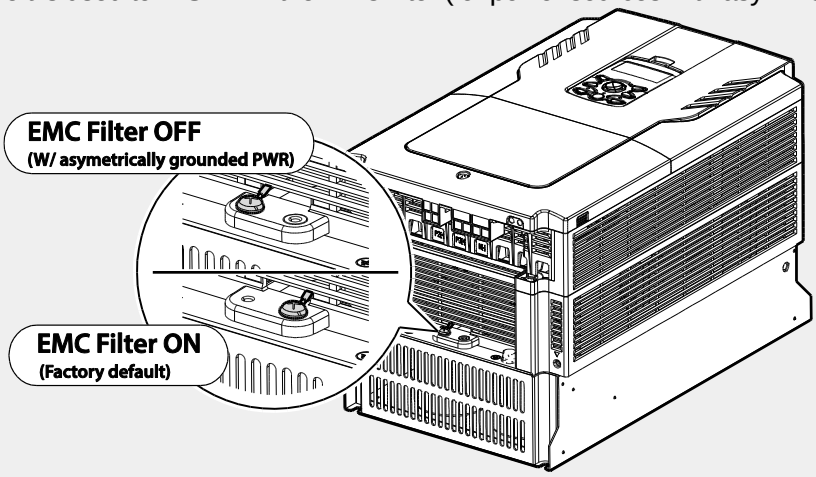
2 Remove the EMC ground cable from the right terminal (EMC filter-ON / factory default), and connect it to the left terminal (EMC filter-OFF / for power sources with asymmetrical grounding).



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).

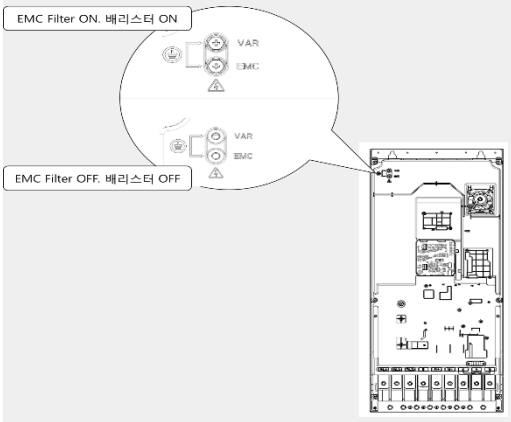


Disabling the Built-in EMC Filter for 110–500 kW (3–Phase) Inverters

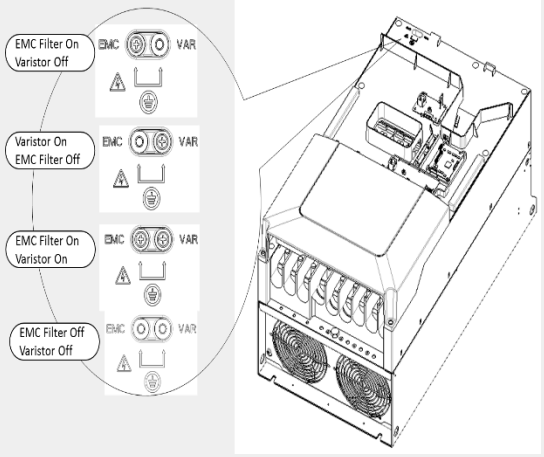
Follow the instructions listed below to disable the EMC filters for the H100+ inverters rated for 110–500 kW.

1. Remove the front cover located at the top 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).

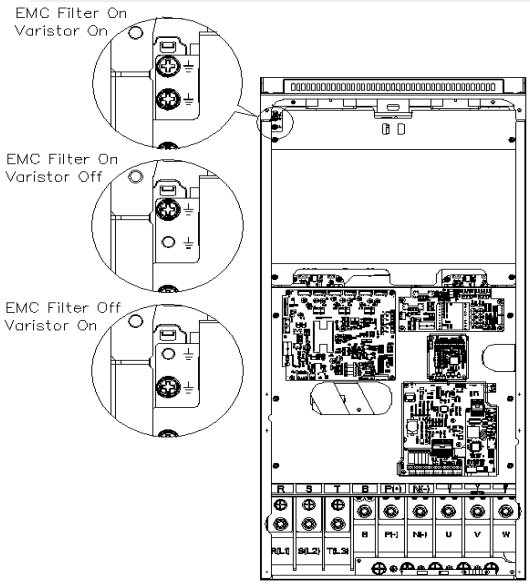
110–132 kW (3-Phase)



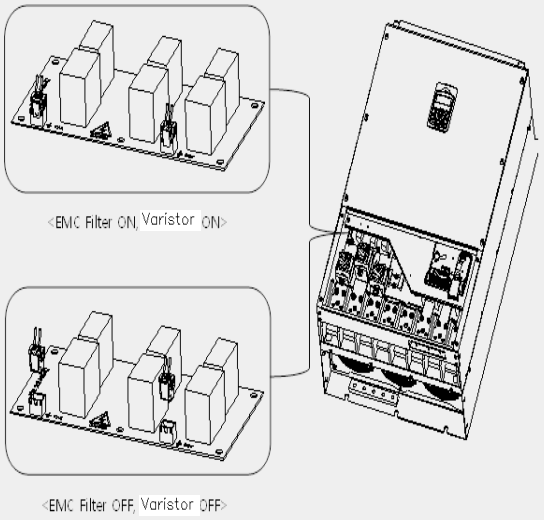
160–185 kW (3-Phase)



220–250 kW (3-Phase)



315~500 kW(3-Phase)



Step 7 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.

2.4 Test Run

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

1 Turn on the power supply to the inverter. Ensure that the keypad display light is on.

2 Select the command source.

3 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 (SW4) 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 (SW4) set to 'current', and does the reference change according to the input current?

4 Set the acceleration and deceleration time.

5 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

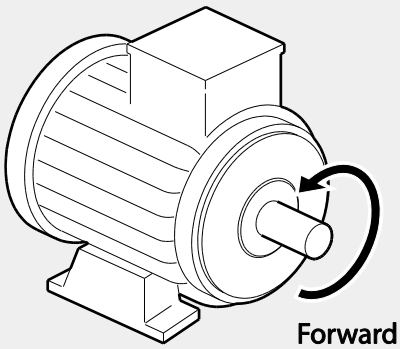
If the forward command (Fx) is on, the motor should rotate counterclockwise when viewed from the load side of the motor. If the motor rotates in the reverse direction, switch the cables at the U and V terminals.

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 DRV-07 to '1 (Keypad)'.
2. Set a frequency reference.
3. If the inverter is in OFF mode, press the [AUTO] key twice on the keypad to operate the inverter in the forward (Fx) direction.
4. If the inver ter is operating in AUTO mode, press the [AUTO] key once on the keypad to operate the inverter in the forward (Fx) direction.
5. Observe the motor's rotation from the load side and ensure that the motor rotates counterclockwise (forward).



Forward operation

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 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.

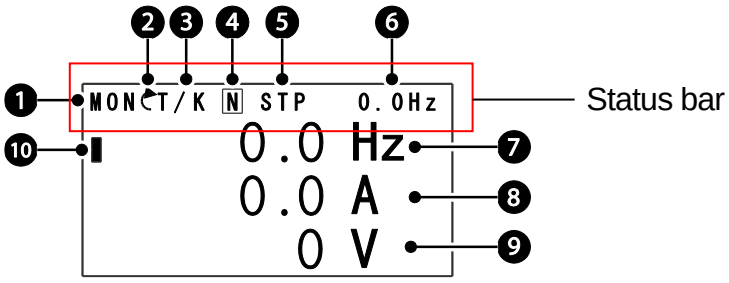
3.1.1 Operation Keys

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

Key	Name	Description
	[MODE] Key	Used to switch between modes.
	[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.
	[RST / MULTI] Key	Used to perform special functions, such as user code registration. (Factory Default Value – RESET function)
	[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.
	[HAND] Key	Used to switch to HAND (local/manual) operation mode.
	[OFF] Key	Used to switch to OFF (standby) mode or to reset the inverter faults.
	[AUTO] Key	Used to switch to AUTO (remote) operation mode.

3.1.2 About the Display

Monitor mode display

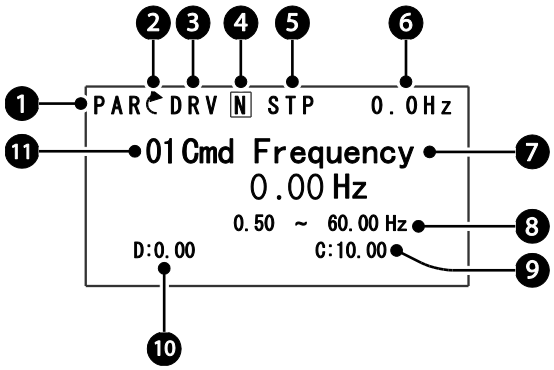


The following table lists display icons and their names/functions.

No.	Name	Description
1	Operation mode	Displays one of the following inverter modes: Mon: Monitor mode PAR: Parameter mode U&M: User defined and Macro mode TRP: Trip mode CNF: Config mode
2	Rotational direction	Displays the motor's rotational direction: - Fx or Rx.
3	Command Source / Frequency reference	Displays a combination of a command source and a frequency reference. Command source K: Keypad O: Optional Fieldbus module A: Application option E: Time event R: Built-in RS-485 communication T: Terminal block Frequency reference source K: Keypad V: V1 terminal X: I2 terminal P: Pulse terminal U: Up operation frequency (Up-down operation) D: Down operation frequency (Up-down operation) S: Stop operation frequency (Up-down operation) O: Optional Fieldbus module J: Jog frequency R: Built-in RS-485 frequency 1–7: Multi-step frequency

No.	Name	Description
4	Multi-function key (UserGrp SelKey) configuration	The multi function key (the [MULTI] key) on the keypad is used to register or delete User group parameters in Parameter mode.
5	Operating status	Displays one of the following operation states: STP: Stop FWD: Forward operation REV: Reverse operation ↻: Forward command given ↺: Reverse command given DC: DC output WAN: Warning STL: Stall SPS: Speed search OSS: S/W over current protection is on OSH: H/W overcurrent protection TUN: Auto tuning PHT: Pre-heat FIR: Fire mode operation SLP: Sleep mode operation LTS: Load tuning CAP: Capacity diagnostics PCL: Pump clean
6	Status display item	Status bar display item
7	Monitor mode item 1	Monitor mode display item 1
8	Monitor mode item 2	Monitor mode display item 2
9	Monitor mode item 3	Monitor mode display item 3
10	Monitor mode cursor	Used to highlight currently selected items.

Parameter edit mode display



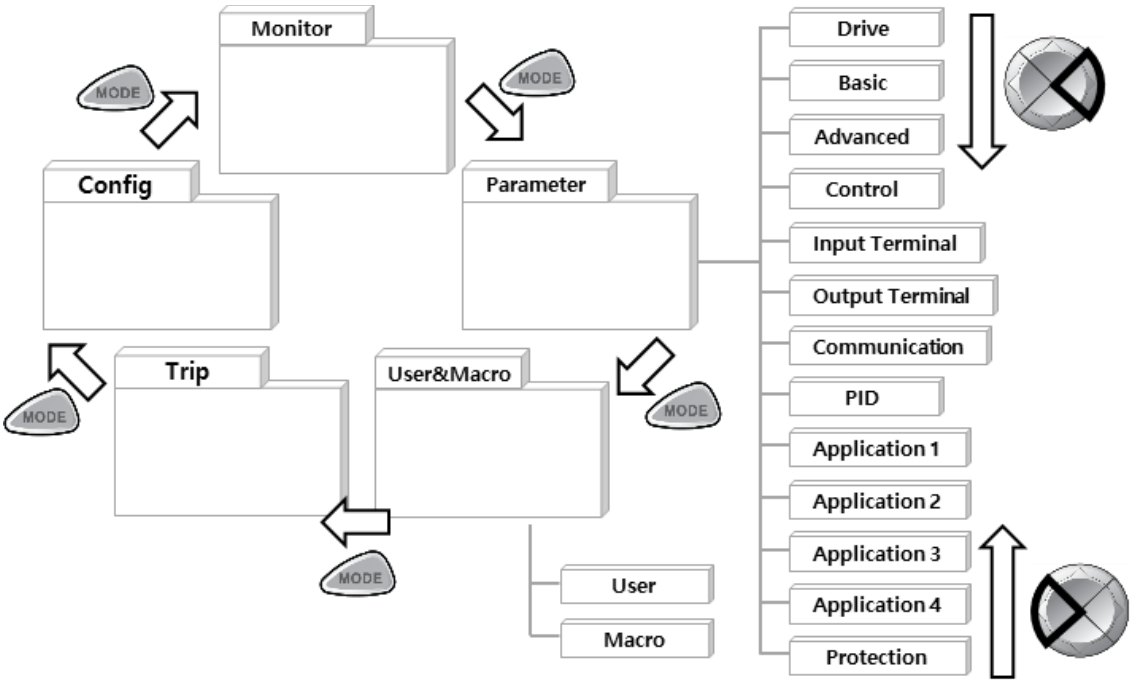
The following table lists display icons and their names/functions.

No.	Name	Description
1	Operation mode	Displays one of the following inverter modes: Mon: Monitor mode PAR: Parameter mode U&M: User defined and Macro mode TRP: Trip mode CNF: Config mode
2	Rotational direction	Displays the motor's rotational direction: - Fx or Rx.
3	Parameter group	Displays one of the following parameter group names: DRV: Drive group BAS: Basic group ADV: Advanced group CON: Control group IN: Input terminal group OUT: Output terminal group COM: Communication group PID: PID group AP1: Application 1 group AP2: Application 2 group AP3: Application 3 group AP4: Application 4 group PRT: Protection group
4	Multi-function key (UserGrp SelKey)configuration	Used to register or delete User group parameters in Parameter mode. (factory default – RESET function)

No.	Name	Description
5	Operating status	Displays one of the following operation states: STP: Stop FWD: Forward operation REV: Reverse operation ↻: Forward command given ↺: Reverse command given DC: DC output WAN: Warning STL: Stall SPS: Speed search OSS: S/W over current protection is on OSH: H/W overcurrent protection TUN: Auto tuning PHT: Pre-heat FIR: Fire mode operation SLP: Sleep mode operation LTS: Load tuning CAP: Capacity diagnostics PCL: Pump clean
6	Display item	Displays the value of a monitor display item selected at CNF-20 (Anytime Para).
7	Parameter value	Displays the parameter value of currently selected code.
8	Setting range	Displays the value range for the selected parameter.
9	Set value	Displays the currently set value for the code.
10	Default	Displays the factory default value for the code.
11	Code no. and name	Displays the number and name of the currently selected code.

3.1.3 Display Modes

The H100+ inverter uses 5 modes to monitor or configure different functions. The parameters in Parameter mode and User & Macro mode are divided into smaller groups of relevant functions.



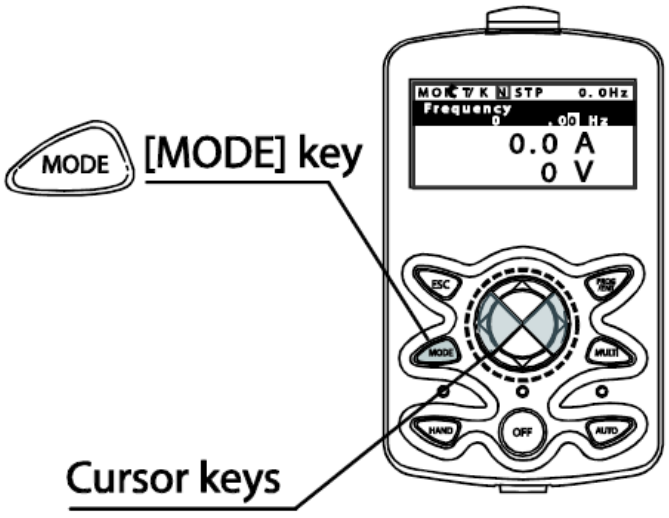


Table of Display Modes

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.
User & Macro mode	U&M	Used to define User groups and Macro groups. These user-definable groups allow specific functions of the inverter to be grouped and managed in separate groups. This mode is not displayed when you navigate through the modes if no user groups or Macro groups have been defined.
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 jog operation, motor capacity evaluation, and torque boost.
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	COM	Configures the USB-related features and communication features for the RS-485, Modbus-RTU, LS Bus, Metasys N2, and BACnet. Optional communication module related features may be configured as well, if one is installed.
PID process	PID	Configures the PID control-related features.
Application 1	AP1	Configures the Sleep Boost, SoftFill, and Multiple motor control (MMC) features related to the PID control.
Application 2	AP2	Configures the HVAC features by setting the features such as load tuning, pump cleaning, and pay back counter.
Application 3	AP3	Configures the time event-related features.
Application 4	AP4	Configures the time flow monitoring and PI aux control features.
Protection	PRT	Configures motor and inverter protection features.

User & Macro Mode

Function Group Name	Keypad Display	Description
User	USR	Used to put the frequently accessed function parameters together into a group. User parameter groups can be configured using the multi-function key on the keypad.
Macro	MCx	Provides different factory-preset groups of functions based on the type of load. Groups MC1, MC2, or MC3 is displayed when the user selects the type of desired load. Macro groups can be selected in CNF mode.

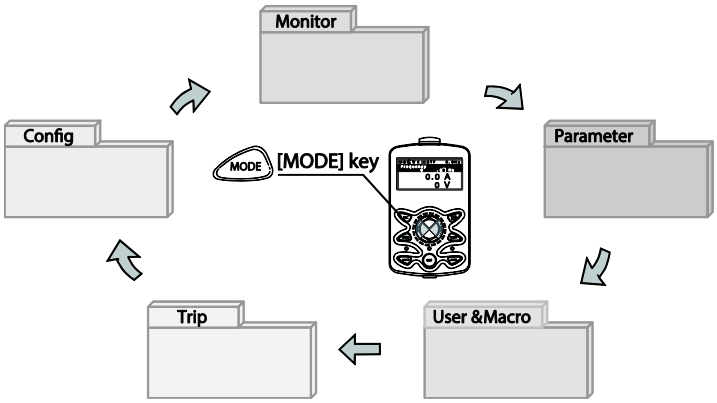
3.2 Learning to Use the Keypad

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. 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 & Macro mode and Trip mode are not displayed when all the inverter settings are set to the factory default (User & Macro 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).



3.2.2 Operation Modes

The inverter is operable only when it is in HAND or AUTO mode. HAND mode is for local control using the keypad, while AUTO mode is for remote control via communication. On the other hand, the inverter stops operating when it is in OFF mode. Select one of the modes (HAND / AUTO / OFF) to operate the inverter or stop the operation.

Follow the examples below to learn how to switch between operation modes.

Operating the Inverter in HAND mode

1 Turn on the inverter. The inverter enters OFF mode and the OFF LED turns on.

2 Move to Parameter mode and set DRV-07 (frequency reference) to '0 (keypad)'.

3 Press the [HAND] key to enter HAND mode (local control mode). HAND mode LED turns on (the OFF LED turns off) and the inverter begins to operate.

4 Press the [OFF] key to stop the inverter operation. The inverter stops operating and the OFF LED turns on.

Operating the inverter in AUTO Mode

1 In OFF mode (when the OFF LED is on), move to Parameter mode and configure the command source at DRV-07 (frequency reference source).

2 Press the [AUTO] key to enter AUTO mode. In AUTO mode, the inverter operates based on the input from the command source set at DRV-07. For example, if DRV-07 (frequency reference source) is set to '0 (Keypad)', the frequency reference is set, and the run command is set to 'ON', the inverter starts operating as soon as the [AUTO] key on the keypad is pressed.

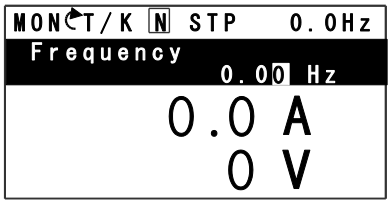
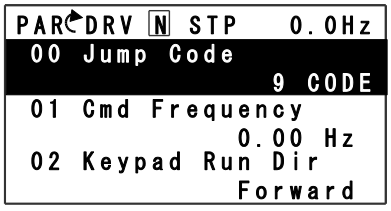
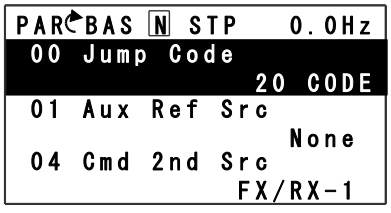
3 Press the [Auto] key again to stop the inverter operation using the keypad. In AUTO mode, the inverter begins or stops operating when the [AUTO] key is pressed.

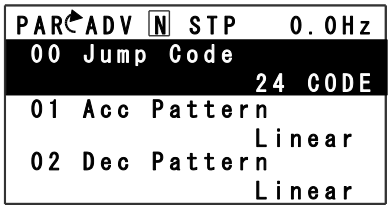
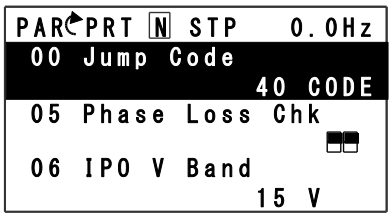
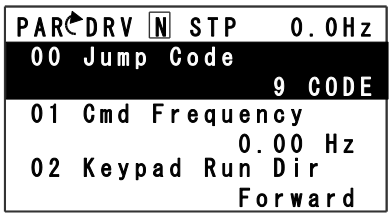
Note

- You can stop the inverter operation by pressing the [OFF] key when the command source is set to 'Keypad.' In this case, however, the inverter enters OFF mode from AUTO mode.
- If the network communication is set as the command source, the inverter is operable only in AUTO mode. For example, if the run command is set to 'ON' via the network communication and the inverter is in OFF mode, the [AUTO] key must be pressed to start the inverter operation.
- The inverter is operable only in HAND and AUTO modes, but the Fire mode functions operate even when the inverter is in OFF mode.

3.2.3 Switching between Groups in Parameter Display Mode

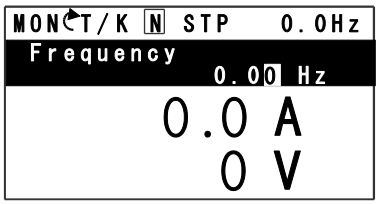
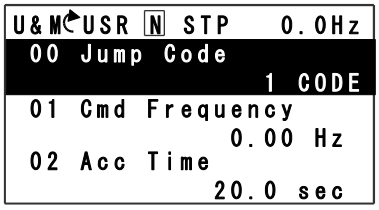
After entering Parameter mode from Monitor mode, press the [Right] key to move to the next code. Press the [Left] key to go back to the previous code.

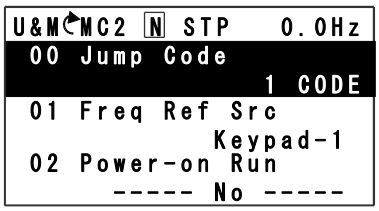
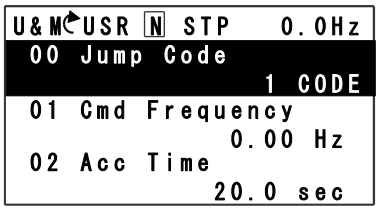
	The keypad OFF LED is turned OFF, and the keypad displays Monitor mode. • Press the [Mode] key to change the mode.
	Parameter mode is displayed. • The Drive group is currently selected. • Press the [Right] key.
	• The Basic group is selected. • Press the [Right] key.

	• The Advanced group is selected. • Press the [Right] key 9 times.
	• The Protection group is selected. • Press the [Right] key.
	• The Drive group is selected again.

3.2.4 Switching between Groups in User & Macro Mode

User & Macro mode is accessible only when the user codes are registered or when the macro features are selected. After registering the user codes, or selecting a macro group, follow the examples below to access the User & Macro group.

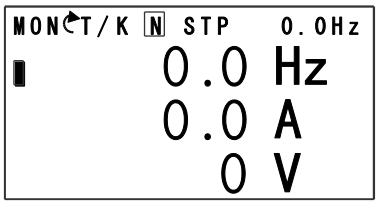
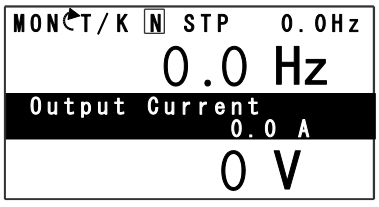
	• Monitor mode is displayed on the keypad. • Press the [MODE] key twice.
	• User (USR) group in User & Macro mode is displayed. • Press the [Right] key.

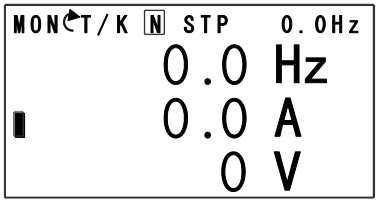
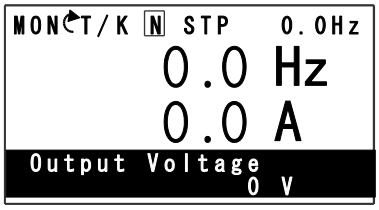
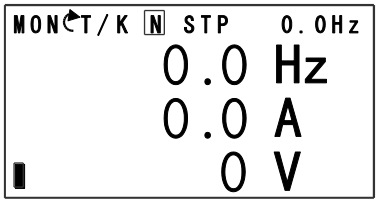
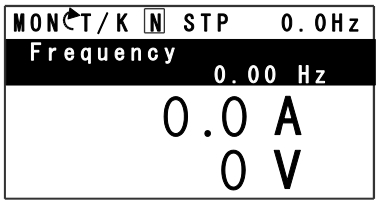
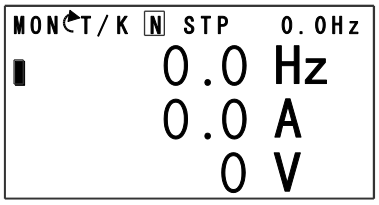
	• The Macro (MC2) group in User & Macro mode is displayed. • Press the [Right] key.
	• User (USR) group in User & Macro mode is displayed again.

3.2.5 Navigating through the Codes (Functions)

Code Navigation in Monitor mode

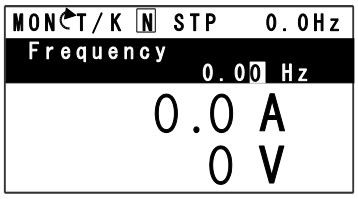
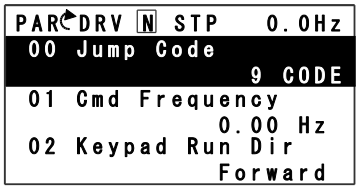
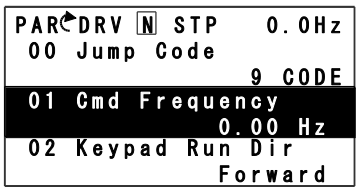
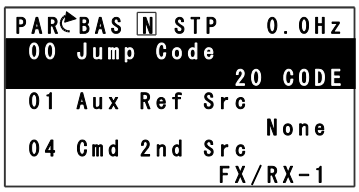
The display items in Monitor mode are available only when the inverter is in AUTO mode. In Monitor mode, press the [Up] or [Down] key to move the cursor up or down. Different values, such as the operating frequency, the output current, or voltage are displayed according to the cursor position. The cursor does not move up or down in HAND mode or in OFF mode.

	• In AUTO mode, the cursor appears to the left of the frequency information. • Press the [Down] 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 [Down] 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 [Up] key twice.
	• Information about the first item in Monitor mode (Frequency) is displayed. • Wait for 2 seconds until the information on the display disappears.
	• Information about the first item in Monitor mode (Frequency) disappears and the cursor appears to the left of the first item. • Press the [Up] or [Down] key to move to a desired item and view the information.

Code Navigation in Parameter mode

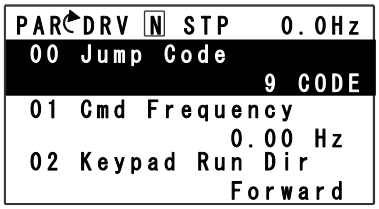
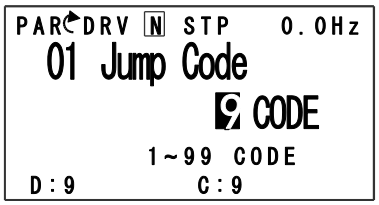
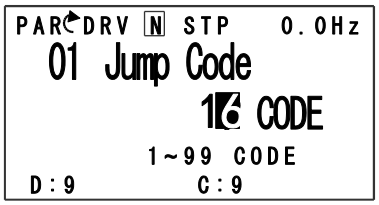
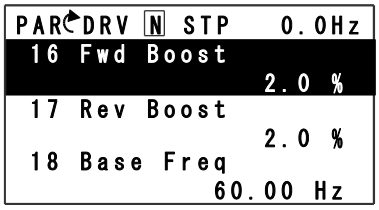
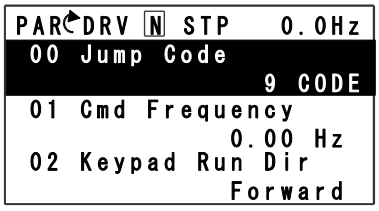
The following examples show you how to move through codes in different function groups (Drive group and Basic group) in Parameter mode. In Parameter mode, press the [Up] or [Down] key to move to the desired functions.

	• Display turns on when the inverter is powered on. Monitoring mode is displayed. • Press the [MODE] key.
	• Drive group (DRV) in Parameter mode is displayed. The first code in the Drive group (DRV 00 Jump Code) is currently selected. • If any other group is displayed, press the [MODE] key until the Drive group is displayed, or press the [ESC] key.
	• Press the [Down] key to move to the second code (DRV 01) of the Drive group. • Press the [Right] key to move to the next function group.
	• The Basic group (BAS) is displayed. • Press the [Up] or [Down] key to move to the desired codes and configure the inverter functions.

3.2.6 Navigating Directly to Different Codes

Parameter mode, User & Macro 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.

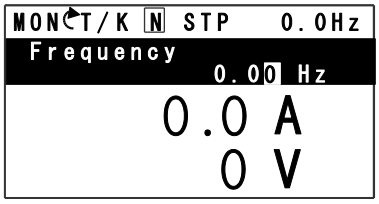
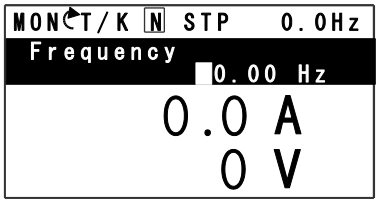
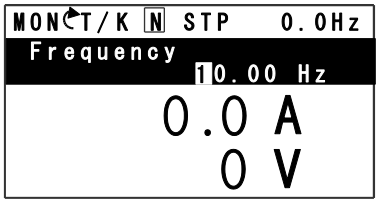
The following example shows how to navigate directly to code DRV- 09 from the initial code (DRV-00 Jump Code) in the Drive group.

	• The Drive group (DRV) is displayed in Parameter mode. Make sure that the fist code in the Drive group (DRV 00 Jump Code) is currently selected. • Press the [PROG/ENT] key.
	• The Code input screen is displayed and the cursor flashes. A flashing cursor indicates that it is waiting for user input. • Press the [Up] key to increase the number to 16, and then press the [PROG/ENT] key to jump to code DRV-16.
	• DRV-16 (Fwd boost) is displayed. • Press the [MODE] key to view the options available and use the [Up] or [Down] key to move to a desired option.
	• Press the [PROG/ENT] key to save the selection. • The setting is saved and the code is displayed again.
	• Press the ESC key to go back to the initial code of the Drive group (DRV-00).

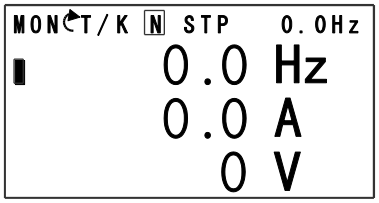
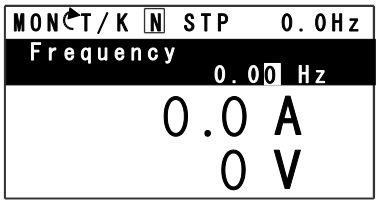
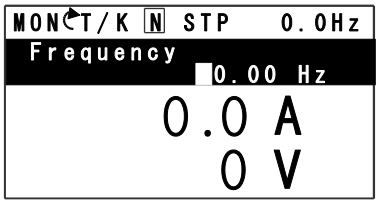
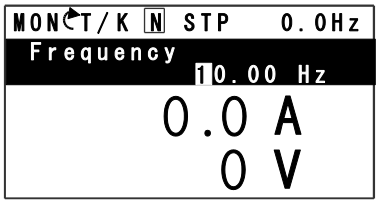
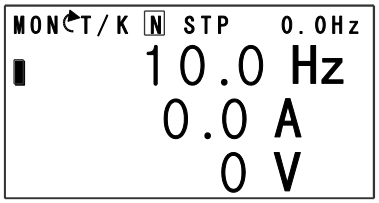
3.2.7 Parameter Settings available in Monitor Mode

The H100+ inverter allows basic parameters, such as the frequency reference, to be modified in Monitor mode. When the inverter is in Hand or OFF mode, the frequency reference can be entered directly from the monitor screen. When the inverter is in AUTO mode, press the [PROG/ENT] key to access the input screen for a frequency reference.

Parameter setting in HAND/OFF mode

	• Ensure that the cursor is at the frequency reference item. If not, move the cursor to the frequency reference item. • When the cursor is at the frequency reference item, detailed information is displayed and the cursor flashes at the input line. A flashing cursor indicates that it is waiting for user input.
	• Press the [Left] or [Right] key to change places.
	• Press the [Up] or [Down] keys to increase or decrease the numbers, and then press the [Prog/ENT] key to save the change.

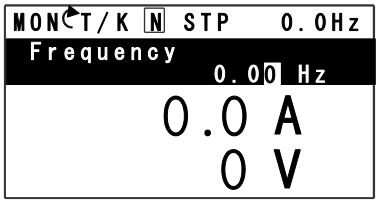
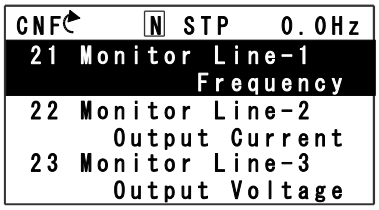
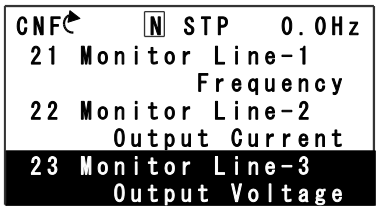
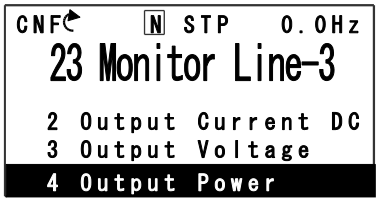
Parameter setting in AUTO mode

	• Ensure that the cursor is at the frequency reference item. If not, move the cursor to the frequency reference item. • While the cursor is at the frequency reference monitor item, press the [PROG/ENT] key to edit the frequency reference.
	• Detailed information is displayed and the cursor flashes at the input line. A flashing cursor indicates that it is waiting for user input.
	• Press the [Left] or [Right] key to move the cursor.
	• Press the [Up] or [Down] key to increase or decrease the numbers. • When you are done changing the frequency reference, press [PROG/ENT] key to finish setting the parameters.
	• The newly entered frequency reference is displayed.

3.2.8 Setting the Monitor Display Items

In Monitor mode, 3 different items may be monitored at once. Certain monitor items, such as the frequency reference, are selectable. The display items to be displayed on the screen can be selected by the user in the Config (CNF) mode. However, in HAND mode or in OFF mode, the first display item is permanently fixed as the frequency reference. On the top-right corner of the keypad display's status bar, another frequency item is displayed. This item refers to the frequency reference when the inverter is not operating and the output frequency when the inverter is operating.

The following example shows how to configure the display items in HAND mode.

	• Monitor mode is displayed on the keypad. The output frequency, output current, and output voltage are displayed (factory default).
	• Go to the Config (CNF) mode. In the Config mode, codes CNF-21–23 are used to select the three monitoring display items. The currently selected display item and its setting are highlighted.
	• To view the available display items and change the setting for the third monitoring display item, press the [Down] key to move to CNF-23 and press the [PROG/ENT] key. • The currently selected display item for CNF-23 (Monitor Line–3) is 'Output Voltage.'
	• Press the [Up] or [Down] key to view the available display items. • Move to '4 Output Power' and press the [PROG/ENT] key to change the setting.

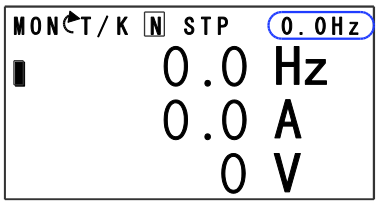
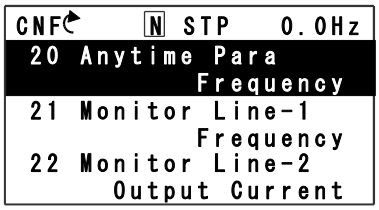
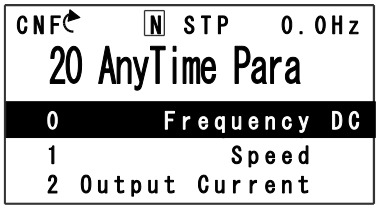
	• Press the [MODE] key to go back to Monitor mode. The third display item has been changed to the inverter output power (kW).

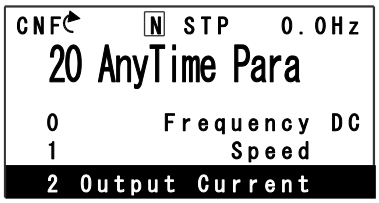
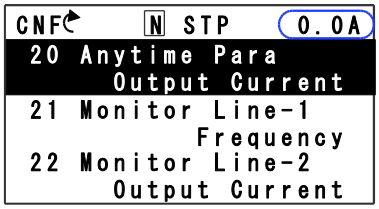
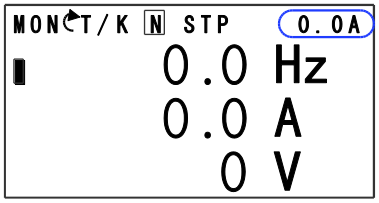
3.2.9 Selecting the Status Bar Display Items

On the top-right corner of the display, there is a monitoring display item. This monitoring item is displayed as long as the inverter is turned on, regardless of the mode the inverter is operating in. Configure this monitoring item to display the type of information that suits your needs.

This item can be configured only when the inverter is operating in AUTO mode. In HAND or OFF mode, this monitoring item displays frequency reference only.

The following example shows how to configure this monitoring item in AUTO mode.

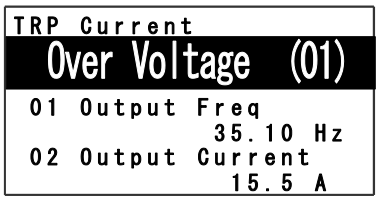
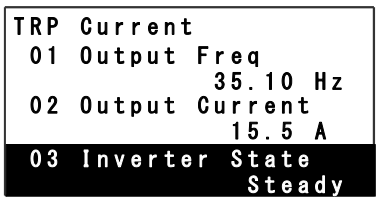
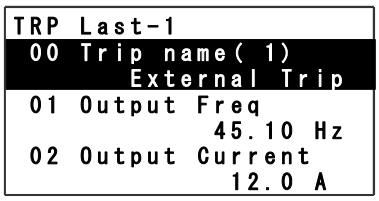
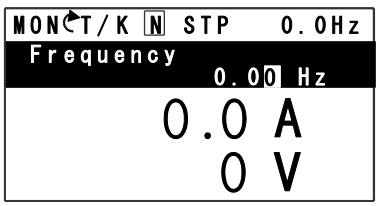
	• Monitor mode is displayed. • On the top-right edge of the display, the frequency reference is displayed (factory default).
	• Enter Config mode and go to CNF-20 to select the items to display.
	• Press the [PROG/ENT] key. The currently selected item is highlighted.

	• Press the [Down] key twice to move to '2 (Output Current)', and then press the [PROG/ENT] key to select it.
	• The currently selected item is highlighted at CNF- 20 (the display item is changed from 'Frequency' to 'Output Current').
	• Press the [MODE] key to return to Monitor mode.

3.3 Fault Monitoring

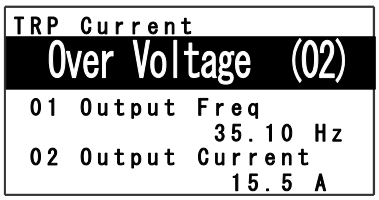
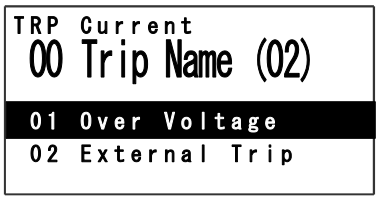
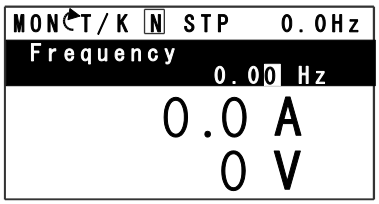
3.3.1 Monitoring Faults during Inverter Operation

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

	• If a fault trip occurs during inverter operation, the inverter enters Trip mode automatically and displays the type of fault trip that occurred.
	• Press the [Down] key to view the information on the inverter at the time of fault, including the output frequency, output current, and operation type.
	• If there were any fault trips that occurred previously, press the [Right] key to display the fault trip information at the times of previous fault trips.
	• When the inverter is reset and the fault trip is released, the keypad display returns to the screen it was at when the fault trip occurred.

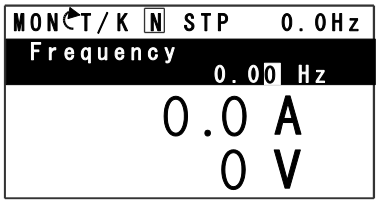
3.3.2 Monitoring Multiple Fault Trips

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

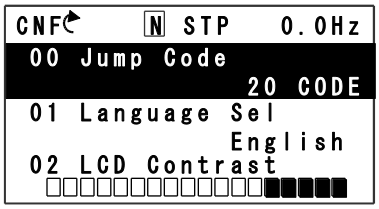
	• If multiple fault trips occur at the same time, the number of fault trips occurred is displayed on the right side of the fault trip type. • Press the [PROG/ENT] key to view the list of all the fault trips.
	• The list of all the fault trips is displayed. • Press the [Down] key to view the types of fault trips that occurred. • Press the [Right] key to display the fault trip information.
	• When the inverter is reset and the fault trip is released, the keypad display returns to the screen it was at when the fault trip occurred.

3.4 Parameter Initialization

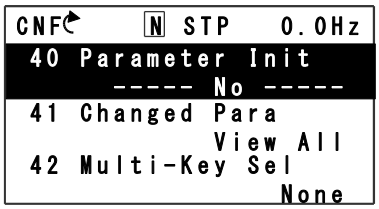
The following example demonstrates how to revert all the parameter settings back to the factory default (Parameter Initialization). Parameter initialization may be performed for separate groups in Parameter mode as well.



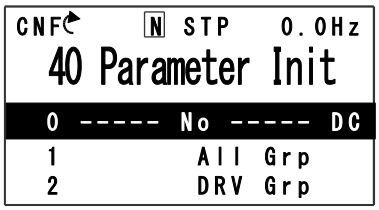
- Monitor mode is displayed.



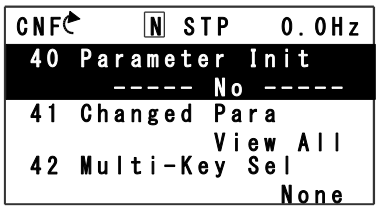
- Press the [MODE] key to move to the Config (CNF) mode.



- Press the [Down] key to go to CNF-40 (Parameter Init).
- Press the [PROG/ENT] key to configure the parameter initialization options.



- In the list of options, select '1(All Grp),' and then press the [PROG/ENT] key to perform parameter initialization.



- The parameter initialization option is displayed again when the initialization is complete.

4 Table of Functions

This chapter lists all the function settings for the H100+ series inverter. Use the references listed in this document to set the parameters. If an entered set value is out of range, the messages that will be displayed on the keypad are also provided in this chapter. In these situations, the [ENT] key will not operate to program the inverter.

4.1 Drive Group (DRV)

Data in the following table will be displayed only when the related code has been selected.

***O: Write-enabled during operation, Δ: Write-enabled when operation stops, X: Write-disabled**

Code (Comm. Address)	Name	LCD Display	Setting Range		Initial value		Property*
DRV-00 (-)	Jump Code	Jump Code	1–99		-		X
DRV-01 (0h1101)	Target frequency	Cmd Frequency	0.00, Low Freq– High Freq		0.00		O
DRV-02 (0h1102)	Keypad run direction	Keypad Run Dir	0	Reverse	1		O
			1	Forward			
DRV-03 (0h1103)	Acceleration time	Acc Time	0.0–600.0 (sec)		20.0	0.75~90kW	O
					60.0	110~250kW	
					100.0	315~500kW	
DRV-04 (0h1104)	Deceleration time	Dec Time	0.0–600.0 (sec)		30.0	0.75~90kW	O
					90.0	110~250kW	
					150.0	315~500kW	
DRV-05 (0h1105)	HAND-OFF-AUTO Key Lock	KPD H.O.A Lock	0	Locked	2: OFF key Enable		Δ
			1	During Run			
			2	OFF key Enable			
			3	Unlocked			
DRV-06 (0h1106)	Command source	Cmd Source	0	Keypad	1: Fx/Rx-1		Δ
			1	Fx/Rx-1			

Code (Comm. Address)	Name	LCD Display	Setting Range		Initial value	Property*
			2	Fx/Rx-2		
			3	Int 485		
			4	Field Bus		
			5	Time Event		
DRV-07 (0h1107)	Frequency reference source	Freq Ref Src	0	Keypad-1	0: Keypad-1	Δ
			1	Keypad-2		
			2	V1		
			4	V2		
			5	I2		
			6	Int 485		
			7	FieldBus		
			9	Pulse		
			10[1]	V3		
			11	I3		
DRV-08 (0h1108)	AUTO mode selection	AUTO Mode Sel	0	Enabled	1: Disabled	Δ
			1	Disabled		
DRV-09 (0h1109)	Control mode	Control Mode	0	V/F	0: V/F	Δ
			1	Slip Compen		
DRV-11 (0h110B)	Jog frequency	Jog Frequency	0.00, Low Freq–High Freq		10.00	O
DRV-12 (0h110C)	Jog run acceleration time	Jog Acc Time	0.0–600.0 (sec)		20.0	O
DRV-13 (0h110D)	Jog run deceleration time	Jog Dec Time	0.0–600.0 (sec)		30.0	O
DRV-14			0	0.2 Kw(0.3HP)		Δ

[1] "10(V3)~11(I3)" of DRV-07 are available when Extension IO option is equipped. Refer to Extension IO option manual for more detailed information.

Code (Comm. Address)	Name	LCD Display	Setting Range		Initial value	Property*
(0h110E)	Motor capacity	Motor Capacity	1	0.4 kW(0.5HP)	Dependent on motor setting	
			2	0.75 kW(1.0HP)		
			3	1.1 kW(1.5HP)		
			4	1.5 kW(2.0HP)		
			5	2.2 kW(3.0HP)		
			6	3.0 kW(4.0HP)		
			7	3.7 kW(5.0HP)		
			8	4.0 kW(5.5HP)		
			9	5.5 kW(7.5HP)		
			10	7.5 kW(10.0HP)		
			11	11.0 kW(15.0HP)		
			12	15.0 kW(20.0HP)		
			13	18.5 kW(25.0HP)		
			14	22.0 kW(30.0HP)		
			15	30.0 kW(40.0HP)		
			16	37.0 kW(50.0HP)		
			17	45.0 kW(60.0HP)		
			18	55.0 kW(75.0HP)		
			19	75.0kW(100.0HP)		
			20	90.0kW(125.0HP)		
			21	110.0kW(150.0HP)		
			22	132.0kW(220.0HP)		
			23	160.0kW(250.0HP)		
			24	185.0kW(300.0HP)		
			25	220.0kW(350.0HP)		

Code (Comm. Address)	Name	LCD Display	Setting Range		Initial value		Property*
			26	250.0kW(400.0HP)			
			27	315.0kW(500.0HP)			
			28	355.0kW(550.0HP)			
			29	400.0kW(650.0HP)			
			30	500.0kW(800.0HP)			
DRV-15 (0h110F)	Torque boost options	Torque Boost	0	Manual	0: Manual		Δ
			1	Auto 1			
			2	Auto 2			
DRV-16[2] (0h1110)	Forward Torque boost	Fwd Boost	0.0–15.0 (%)		2.0	0.75~90kW	Δ
					1.0	110~500kW	
DRV-17 (0h1111)	Reverse Torque boost	Rev Boost	0.0–15.0 (%)		2.0	0.75~90kW	Δ
					1.0	110~500kW	
DRV-18 (0h1112)	Base frequency	Base Freq	30.00–400.00 (Hz)		60.00		Δ
DRV-19 (0h1113)	Start frequency	Start Freq	0.01–10.00 (Hz)		0.50		Δ
DRV-20 (0h1114)	Maximum frequency	Max Freq	40.00-400.00 (Hz)		60.00		Δ
DRV-21 (0h1115)	Select speed unit	Hz/Rpm Sel	0	Hz Display	0: Hz Display		O
			1	RPM Display			
DRV-22 (0h1116)	Auto torque boost filter gain	ATB Filt Gain	1~9999		10		O
DRV-23 (0h1117)	Auto torque boost voltage gain	ATB Volt Gain	0.0~300.0 (%)		100.0		O

[2] DRV-16–17 are displayed when DRV-15 is set to “0 (Manual)”.

Code (Comm. Address)	Name	LCD Display	Setting Range		Initial value	Property*
DRV-24 (0h1118)	HAND key selection	Hand Key Sel	0	None	0: None	Δ
			1	Disabled		
DRV-25 (0h1119)	Hand mode operation frequency	HAND Cmd Freq	0.00, Low Freq- High Freq		0.00	O
DRV-26 (0h111A)	Hand mode operation Frequency reference source	HAND Ref Mode	0	HAND Parameter	0: HAND Parameter	Δ
			1	V1		
			2	V2		
			3	V3		
			4	I2		
			5	I3		
			6	Follow AUTO		
DRV-30 (0h111E)	kW/HP unit selection	kW/HP Unit Sel	0	kW	1:HP	O
			1	HP		
DRV-31 (0h111F)	PopUp easy start	PopUp EzStart	0	No	0: No	Δ
			1	Yes		
DRV-32 (0h1120)	Regional setting	Regional Set	0	US	0: US	Δ
			1	International		
			2	KR		
DRV-91 (0h115B)	Smart Copy	SmartCopy	0	None	0: None	Δ
			1	SmartDownload		
			3	SmartUpload		
DRV-96 (0h1160)	Display the main software version	Inv S/W Ver	-		-	X
DRV-97 (0h1161)	Display the debug version	Inv Debug Ver	-		-	X

Code (Comm. Address)	Name	LCD Display	Setting Range	Initial value	Property*
DRV-98 (0h1162)	Display I/O,S/W Version 1	I/O S/W Ver 1	-	-	X
DRV-99 (0h1163)	Display I/O,S/W Version 2	I/O S/W Ver 2	-	-	X

4.2 Basic Function Group (BAS)

Data in the following table will be displayed only when the related code has been selected.

*O: Write-enabled during operation, Δ: Write-enabled when operation stops, X: Write-disabled

Code (Comm. Address)	Name	LCD Display	Setting Range		Initial value	Property*
BAS-00 (-)	Jump Code	Jump Code	1-99		-	X
BAS-01 (0h1201)	Auxiliary reference source	Aux Ref Src	0	None	0: None	Δ
			1	V1		
			3	V2		
			4	I2		
			6	Pulse		
			7	Int 485		
			8	FieldBus		
			10	EPID1 Output		
			11	EPID1 Fdb Val		
			12[3]	V3		
			13	I3		
BAS-02[4] (0h1202)	Auxiliary command calculation type	Aux Calc Type	0	M+(G*A)	0: M+(G*A)	Δ
			1	M* (G*A)		
			2	M/(G*A)		
			3	M+[M*(G*A)]		
			4	M+G*2 *(A-50)		
			5	M*[G*2*(A-50)		
			6	M/[G*2*(A-50)]		
			7	M+M*G*2*(A-50)		

[3] "12(V3)~13(I3)" of BAS-01 are available when Extension IO option is equipped. Refer to Extension IO option manual for more detailed information.
[4] BAS-02–03 are displayed when BAS-01 is not "0 (None)".

Code (Comm. Address)	Name	LCD Display	Setting Range		Initial value	Property*
BAS-03 (0h1203)	Auxiliary command gain	Aux Ref Gain	-200.0-200.0 (%)		100.0	O
BAS-04 (0h1204)	Second command source	Cmd 2nd Src	0	Keypad	1: Fx/Rx-1	Δ
			1	Fx/Rx-1		
			2	Fx/Rx-2		
			3	Int 485		
			4	FieldBus		
			5	Time Event		
BAS-05 (0h1205)	Second frequency source	Freq 2nd Src	0	Keypad-1	0: Keypad-1	O
			1	Keypad-2		
			2	V1		
			4	V2		
			5	I2		
			6	Int 485		
			7	FieldBus		
			9	Pulse		
			10[5]	V3		
			11	I3		
BAS-06 (0h1206)	Input Phase	Input Phase	0	3 Phase	0: 3 Phase	Δ
			1	Singe Phase		
BAS-07 (0h1207)	V/F pattern options	V/F Pattern	0	Linear	0: Linear	Δ
			1	Square		
			2	User V/F		
			3	Square 2		
BAS-08			0	Max Freq	0: Max Freq	Δ

[5] "10(V3)~11(I3)" of BAS-05 are available when Extension IO option is equipped. Refer to Extension IO option manual for more detailed information.

Code (Comm. Address)	Name	LCD Display	Setting Range		Initial value	Property*
(0h1208)	Acc/Dec standard frequency	Ramp T Mode	1	Delta Freq		
BAS-09 (0h1209)	Time scale settings	Time Scale	0	0.01 sec	1: 0.1 sec	Δ
			1	0.1 sec		
			2	1 sec		
BAS-10 (0h120A)	Input power frequency	60/50 Hz Sel	0	60 Hz	0: 60 Hz	Δ
			1	50 Hz		
BAS-11 (0h120B)	Number of motor poles	Pole Number	2-48		Dependent on motor setting	Δ
BAS-12 (0h120C)	Rated slip speed	Rated Slip	0-3000 (RPM)			Δ
BAS-13 (0h120D)	Motor rated current	Rated Curr	0.0-1000.0 (A)			Δ
BAS-14 (0h120E)	Motor no-load current	NoloadCurr	0.0-1000.0 (A)			Δ
BAS-15 (0h120F)	Motor rated voltage	Rated Volt	170~264V	0.75~18.5kW	0	Δ
			320~528V	0.75~90kW		
			320~550V	110~500kW		
BAS-16 (0h1210)	Motor efficiency	Efficiency	70-100 (%)		Dependent on motor setting	Δ
BAS-18 (0h1212)	Trim power display	Trim Power %	70-130 (%)		100	O
BAS-19 (0h1213)	Input power voltage	AC Input Volt	170~264V	0.75~18.5kW	240 V	O
			320~528V	0.75~90kW	480 V	
			320~550V	110~500kW		
BAS-20 (-)	Auto Tuning	Auto Tuning	0	None	0: None	Δ
			1	All (Rotation type)		
			2	All (Static type)		
			3	Rs+ Lsigma (Rotation type)		

Code (Comm. Address)	Name	LCD Display	Setting Range	Initial value	Property*
BAS-21 (-)	Stator resistor	Rs	0.000-9.999 (Ω)	Dependent on motor setting	Δ
BAS-22 (-)	Leakage inductance	Lsigma	0.00-99.99 (mH)		Δ
BAS-41[6] (0h1229)	User frequency1	User Freq 1	0.00 - Maximum frequency (Hz)	15.00	Δ
BAS-42 (0h122A)	User voltage1	User Volt 1	0–100 (%)	25	Δ
BAS-43 (0h122B)	User frequency2	User Freq 2	0.00-Maximum frequency (Hz)	30.00	Δ
BAS-44 (0h122C)	User voltage2	User Volt 2	0-100 (%)	50	Δ
BAS-45 (0h122D)	User frequency3	User Freq 3	0.00 - Maximum frequency (Hz)	45.00	Δ
BAS-46 (0h122E)	User voltage3	User Volt 3	0-100 (%)	75	Δ
BAS-47 (0h122F)	User frequency4	User Freq 4	0.00 - Maximum frequency (Hz)	60.00	Δ
BAS-48 (0h1230)	User voltage4	User Volt 4	0-100 (%)	100	Δ
BAS-50[7] (0h1232)	Multi-step speed frequency1	Step Freq-1	Low Freq- High Freq	10.00	O
BAS-51 (0h1233)	Multi-step speed frequency2	Step Freq-2	Low Freq- High Freq	20.00	O
BAS-52 (0h1234)	Multi-step speed frequency3	Step Freq-3	Low Freq- High Freq	30.00	O
BAS-53 (0h1235)	Multi-step speed frequency4	Step Freq-4	Low Freq- High Freq	40.00	O

[6]BAS-41–48 are displayed when BAS-07 or M2-25 is set to “2 (User V/F)”.

[7]BAS-50–56 are displayed whenIN-65-71 is set to “Speed–L/M/H”.

Code (Comm. Address)	Name	LCD Display	Setting Range	Initial value	Property*
BAS-54 (0h1236)	Multi-step speed frequency5	Step Freq-5	Low Freq- High Freq	50.00	O
BAS-55 (0h1237)	Multi-step speed frequency6	Step Freq-6	Low Freq- High Freq	60.00	O
BAS-56 (0h1238)	Multi-step speed frequency7	Step Freq-7	Low Freq-High Freq	60.00	O
BAS-70 (0h1246)	Multi-step acceleration time1	Acc Time-1	0.0-600.0 (sec)	20.0	O
BAS-71 (0h1247)	Multi-step deceleration time1	Dec Time-1	0.0-600.0 (sec)	20.0	O
BAS-72[8] (0h1248)	Multi-step acceleration time2	Acc Time-2	0.0-600.0 (sec)	30.0	O
BAS-73 (0h1249)	Multi-step deceleration time2	Dec Time-2	0.0-600.0 (sec)	30.0	O
BAS-74 (0h124A)	Multi-step acceleration time3	Acc Time-3	0.0-600.0 (sec)	40.0	O
BAS-75 (0h124B)	Multi-step deceleration time3	Dec Time-3	0.0-600.0 (sec)	40.0	O
BAS-76 (0h124C)	Multi-step acceleration time4	Acc Time-4	0.0-600.0 (sec)	50.0	O
BAS-77 (0h124D)	Multi-step deceleration time4	Dec Time-4	0.0-600.0 (sec)	50.0	O

[8] BAS-72–83 are displayed when IN-65–71is set to “Xcel-L/M/H”

Code (Comm. Address)	Name	LCD Display	Setting Range	Initial value	Property*
BAS-78 (0h124E)	Multi-step acceleration time5	Acc Time-5	0.0-600.0 (sec)	40.0	O
BAS-79 (0h124F)	Multi-step deceleration time5	Dec Time-5	0.0-600.0 (sec)	40.0	O
BAS-80 (0h1250)	Multi-step acceleration time6	Acc Time-6	0.0-600.0 (sec)	30.0	O
BAS-81 (0h1251)	Multi-step deceleration time6	Dec Time-6	0.0-600.0 (sec)	30.0	O
BAS-82 (0h1252)	Multi-step acceleration time7	Acc Time-7	0.0-600.0 (sec)	20.0	O
BAS-83 (0h1253)	Multi-step deceleration time7	Dec Time-7	0.0-600.0 (sec)	20.0	O

4.3 Expanded Function Group (ADV)

Data in the following table will be displayed only when the related code has been selected.

*O: Write-enabled during operation, Δ: Write-enabled when operation stops, X: Write-disabled

Code (Comm. Address)	Name	LCD Display	Setting Range		Initial Value	Property*
ADV-00 (-)	Jump Code	Jump Code	1-99		-	X
ADV-01 (0h1301)	Acceleration pattern	Acc Pattern	0	Linear	0: Linear	Δ
			1	S-curve		
ADV-02 (0h1302)	Deceleration pattern	Dec Pattern	0	Linear	0: Linear	Δ
			1	S-curve		

Code (Comm. Address)	Name	LCD Display	Setting Range		Initial Value	Property*
ADV-03[9] (0h1303)	S-curve acceleration start point gradient	Acc S Start	1–100 (%)		40	Δ
ADV-04 (0h1304)	S-curve acceleration end point gradient	Acc S End	1–100 (%)		40	Δ
ADV-05[10] (0h1305)	S-curve deceleration start point gradient	Dec S Start	1–100 (%)		40	Δ
ADV-06 (0h1306)	S-curve deceleration end point gradient	Dec S End	1–100 (%)		40	Δ
ADV-07 (0h1307)	Start Mode	Start Mode	0	Acc	0: Acc	Δ
			1	DC-Start		
ADV-08 (0h1308)	Stop Mode	Stop Mode	0	Dec	0: Decel Stop	Δ
			1	DC-Brake		
			2	Coast Stop		
			4	Power Braking		
ADV-09 (0h1309)	Selection of prohibited rotation direction	Run Prevent	0	None	0: None	Δ
			1	Forward Prev		
			2	Reverse Prev		
ADV-10 (0h130A)	Starting with power on	Power-on Run	0	No	0: No	O
			1	Yes		
ADV-11[11] (0h130B)	Power-on run delay time	Power-On Delay	0.0 -6000.0 (sec)		0.0	O

[9]ADV-03–04 are displayed when ADV-01 is set to “1 (S-curve)”
[10]ADV-05–06 are displayed when ADV-02 is set to “1 (S-curve)”
[11]ADV-11 is displayed when ADV-10 is set to “1 (YES)”

Code (Comm. Address)	Name	LCD Display	Setting Range	Initial Value	Property*
ADV-12[12] (0h130C)	DC braking time at startup	DC-Start Time	0.00-60.00 (sec)	0.00	Δ
ADV-13 (0h130D)	Amount of applied DC	DC Inj Level	0–200 (%)	50	Δ
ADV-14[13] (0h130E)	Output blocking time before DC braking	DC-Block Time	0.00- 60.00 (sec)	0.00 (0.75~ 90kW) 2.00 (110~ 500kW)	Δ
ADV-15 (0h130F)	DC braking time	DC-Brake Time	0.00- 60.00 (sec)	1.00	Δ
ADV-16 (0h1310)	DC braking rate	DC-Brake Level	0–200 (%)	50	Δ
ADV-17 (0h1311)	DC braking frequency	DC-Brake Freq	Startfrequency -60 Hz	5.00	Δ
ADV-18 (0h1312)	Keypad power-on run enable	KPD Pwr-on Run	0 No 1 Yes	0: No	O
ADV-19 (0h1313)	Keypad power-on run delay time	KPD Pwr-on Dly	0.0~6000.0 (sec)	0.0	O
ADV-20 (0h1314)	Dwell frequency on acceleration	Acc Dwell Freq	Start frequency-Maximum frequency (Hz)	5.00	Δ
ADV-21 (0h1315)	Dwell operation time on acceleration	Acc Dwell Time	0.0-60.0 (sec)	0.0	Δ
ADV-22 (0h1316)	Dwell frequency on deceleration	Dec Dwell Freq	Start frequency-Maximum frequency (Hz)	5.00	Δ
ADV-23 (0h1317)	Dwell operation time	Dec Dwell Time	0.0-60.0 (sec)	0.0	Δ

[12]ADV-12 is displayed when ADV-07 is set to “1 (DC-Start)”
[13]ADV-14 is displayed when ADV-08 is set to “1 (DC-Brake)”

Code (Comm. Address)	Name	LCD Display	Setting Range		Initial Value	Property*
	on deceleration					
ADV-24 (0h1318)	Frequency limit	Freq Limit	0	No	0: No	Δ
			1	Yes		
ADV-25 (0h1319)	Frequency lower limit value	Freq Limit Lo	0.00-Upper limit frequency (Hz)		0.50	Δ
ADV-26 (0h131A)	Frequency upper limit value	Freq Limit Hi	Lower limit frequency-Maximum frequency (Hz)		Max freq	Δ
ADV-27 (0h131B)	Frequency jump	Jump Freq	0	No	0: No	Δ
			1	Yes		
ADV-28[14] (0h131C)	Jump frequency lower limit1	Jump Lo 1	0.00-Jump frequency upper limit1 (Hz)		10.00	O
ADV-29 (0h131D)	Jump frequency upper limit1	Jump Hi 1	Jump frequency lower limit1-Maximum frequency (Hz)		15.00	O
ADV-30 (0h131E)	Jump frequency lower limit2	Jump Lo 2	0.00-Jump frequency upper limit2 (Hz)		20.00	O
ADV-31 (0h131F)	Jump frequency upper limit2	Jump Hi 2	Jump frequency lower limit2-Maximum frequency (Hz)		25.00	O
ADV-32 (0h1320)	Jump frequency lower limit3	Jump Lo 3	0.00-Jump frequency upper limit3 (Hz)		30.00	O
ADV-33 (0h1321)	Jump frequency upper limit3	Jump Hi 3	Jump frequency lower limit3-Maximum frequency (Hz)		35.00	O

[14]ADV-28–33 are displayed when ADV-27 is set to “1 (Yes)”.

Code (Comm. Address)	Name	LCD Display	Setting Range		Initial Value	Property*
ADV-41 (-)	Brake release current	BR Rls Curr	0.0~180.0 [%]		50.0	X
ADV-42 (-)	Brake release delay time	BR Rls Dly	1.00~10.0.0 [sec]		1.00	X
ADV-44 (-)	Brake release forward frequency	BR Rls Fwd Fr	0.00~Max. freq. (Hz)		1.00	X
ADV-45 (-)	Brake release reverse frequency	BR Rls Rev Fr	0.00~Max. freq. (Hz)		1.00	X
ADV-46 (-)	Brake release engage delay time	BR Eng Dly	0.0~100.0 (sec)		1.0	X
ADV-47 (-)	Brake release engage frequency	BR Eng Fr	0.00~Max. freq. (Hz)		2.00	X
ADV-50 (0h1332)	Energy saving operation	E-Save Mode	0	None	0: None	Δ
			1	Manual		
			2	Auto		
ADV-51[15] (0h1333)	Energy saving level	Energy Save	0–30 (%)		0	O
ADV-52 (0h1334)	Energy saving point search time	E-Save Det T	0.0-100.0 (sec)		20.0	O
ADV-60 (0h133C)	Acc/Dec time transition frequency	Xcel Change Fr	0.00-Maximum frequency (Hz)		0.00	Δ
ADV-64 (0h1340)	Cooling fan control	Fan Control	0	During Run	2: Temp Control	O
			1	Always ON		
			2	Temp Control		
ADV-65		U/D Save Mode	0	No	0: No	O

[15]ADV-51 is displayed when ADV-50 is set to “1 (Manual)”.
ADV-52 is displayed when ADV-50 is set to “2 (Auto)”.

Code (Comm. Address)	Name	LCD Display	Setting Range		Initial Value	Property*
(0h1341)	Up/Down operation frequency save		1	Yes		
ADV-66 (0h1342)	Output contact On/Off control options	On/Off Ctrl Src	0	None	0: None	O
			1	V1		
			3	V2		
			4	I2		
			6	Pulse		
			7[16]	V3		
			8	I3		
ADV-67 (0h1343)	Output contact On level	On-Ctrl Level	Output contact off level- 100.00%		90.00	Δ
ADV-68 (0h1344)	Output contact Off level	Off-Ctrl Level	-100.00- outputcontact on level (%)		10.00	Δ
ADV-70 (0h1346)	Safe operation selection	Run En Mode	0	Always Enable	0: Always Enable	Δ
			1	DI Dependent		
ADV-71[17] (0h1347)	Safe operation stop options	Run Dis Stop	0	Trip&Coast	0: Trip&Coast	Δ
			1	Q-Stop		
			2	Q-Stop Resume		
ADV-72 (0h1348)	Safe operation deceleration time	Q-Stop Time	0.0-600.0 (sec)		5.0	O
ADV-74 (0h134A)	Selection of regeneration	RegenAvdSel	0	No	0: No	Δ

[16] "10(V3)~11(I3)" of ADV-66 are available when Extension IO option is equipped. Refer to Extension IO option manual for more detailed information.
[17]ADV-71–72 are displayed when ADV-70 is set to "1 (DI Dependent)".

Code (Comm. Address)	Name	LCD Display	Setting Range		Initial Value	Property*
	evasion function for press		1	Yes		
ADV-75 (0h134B)	Voltage level of regeneration evasion motion for press	RegenAvd Level	200 V: 300-400 V		350	Δ
			400 V: 600-800 V		700	
ADV-76[18] (0h134C)	Compensation frequency limit of regeneration evasion for press	CompFreq Limit	0.00-10.00 Hz		1.00	Δ
ADV-77 (0h134D)	Regeneration evasion for press P-Gain	RegenAvdPgain	0.0-100.0%		50.0	O
ADV-78 (0h134E)	Regeneration evasion for press I gain	RegenAvdIgain	20–30000 (msec)		500	O
ADV-87 (0h1357)	Overmodulation mode selection	OVM Mode Sel	0	No	1: Yes	Δ
			1	Yes		

[18]ADV-76–78 are displayed when ADV-74 is set to “1 (Yes)”.

4.4 Control Function Group (CON)

Data in the following table will be displayed only when the related code has been selected.

*O: Write-enabled during operation, Δ: Write-enabled when operation stops, X: Write-disabled

Code (Comm. Address)	Name	LCD Display	Setting Range		Initial Value		Property*
CON-00 (-)	Jump Code	Jump Code	1-99				X
CON-04 (0h1404)	Carrier frequency	Carrier Freq	1.0~15.0 (kHz)		0.75~30 kW		O
			1.0~10.0 (kHz)		37~55 kW	3.0	
			1.0~7.0 (kHz)		75/ 90 kW		
			1.0~5.0 (kHz)		110~355 kW	2.0	
			1.0~4.0 (kHz)		400~500 kW	1.5	
CON-05 (0h1405)	Switching mode	PWM Mode	0	Normal PWM	0: Normal PWM		Δ
			1	Low leakage PWM			
CON-13 (0h140D)	Anti-hunting regulator mode	AHR Sel	0	No	1 : Yes		Δ
			1	Yes			
CON-14 (0h140E)	Anti-hunting regulator P-Gain	AHR P-Gain	0-32767		1000		O
CON-15 (0h140F)	Anti-hunting regulator start frequency	AHR Low Freq	0.00-AHR High Freq		0.50		O
CON-16 (0h1410)	Anti-hunting regulator end frequency	AHR High Freq	AHR Low Freq-400.00		400.00		O
CON-17 (0h1411)	Anti-hunting regulator compensation voltage limit rate	AHR limit	0-20		2		O

Code (Comm. Address)	Name	LCD Display	Setting Range		Initial Value		Property*
CON-70 (0h1446)	Speed search mode selection	SS Mode	0	Flying Start-1	0: Flying Start-1		Δ
			1	Flying Start-2			
CON-71 (0h1447)	Speed search operation selection	Speed Search	Bit	0000- 1111	0000		Δ
			Bit 0	Speed search on acceleration			
			Bit 1	Restart after trips (other than LV trip)			
			Bit 2	Restart after instantaneous interruption			
			Bit 3	Power-on run			
CON-72[19] (0h1448)	Speed search reference current	SS Sup-Current	50–120 (%)		0.75~250kW	90	O
					315~500kW	80	
CON-73[20] (0h1449)	Speed search proportional gain	SS P-Gain	0-9999		Flying Start-1 : 100		O
					Flying Start-2 : Dependent on motor setting		
CON-74 (0h144A)	Speed search integral gain	SS I-Gain	0-9999		Flying Start-1 : 200		O
					Flying Start-2 : Dependent on motor setting		
CON-75 (0h144B)	Output block time before speed search	SS Block Time	0.0-60.0 (sec)		1.0		Δ

[19]CON-72 is displayed after Flying Start-1 and when any CON-71 bit is set to “1”.
[20]CON-73–75 are displayed when any CON-71bit is set to “1”.

Code (Comm. Address)	Name	LCD Display	Setting Range		Initial Value		Property*
CON-77 (0h144D)	Energy buffering selection	KEB Select	0	No	0: No		Δ
			1	Yes			
CON-78[21] (0h144E)	Energy buffering start level	KEB Start Lev	110.0-140.0 (%)		125.0	0.75~90kW	Δ
					115.0	110~500kW	
CON-79 (0h144F)	Energy buffering stop level	KEB Stop Lev	KEB Start Lev * 125.0-145.0 (%)		130.0	0.75~90kW	Δ
					125.0	110~500kW	
CON-80 (0h1450)	Energy buffering slip gain	KEB Slip Gain buffering slip gain	0-20000		300		O
CON-81 (0h1451)	Energy buffering P-Gain	KEB P Gain	0-20000		1000		O
CON-82 (0h1452)	Energy buffering I gain	KEB I Gain	1-20000		500		O
CON-83 (0h1453)	Energy buffering acceleration time	KEB Acc Time	0.0-600.0		10.0	0.75~90kW	O
					30.0	110~500kW	

4.5 Input Terminal Group (IN)

Data in the following table will be displayed only when the related code has been selected.

[21]CON-78–83 are displayed when CON-77 is set to “1 (Yes)”.

*O: Write-enabled during operation, Δ: Write-enabled when operation stops, X: Write-disabled

Code (Comm. Address)	Name	LCD Display	Setting Range		Initial Value	Property*
IN-00 (-)	Jump Code	Jump Code	1-99		-	X
IN-01 (0h1501)	Frequency at maximum analog input	Freq at 100%	Start frequency-Maximum frequency (Hz)		Maximum frequency	O
IN-05[22] (0h1505)	V1 input voltage display	V1 Monitor(V)	-		0.00	X
IN-06 (0h1506)	V1 input polarity selection	V1 Polarity	0	Unipolar	0: Unipolar	Δ
			1	Bipolar		
IN-07 (0h1507)	Time constant of V1 input filter	V1 Filter	0–10000 (ms)		10	O
IN-08 (0h1508)	V1 minimum input voltage	V1 Volt x1	0.00-10.00 (V)		0.00	O
IN-09 (0h1509)	Output at V1 minimum voltage (%)	V1 Perc y1	0.00-100.00 (%)		0.00	O
IN-10 (0h150A)	V1 maximum input voltage (%)	V1 Volt x2	0.00-12.00 (V)		10.00	O
IN-11 (0h150B)	Output at V1 maximum voltage (%)	V1 Perc y2	0.00-100.00 (%)		100.00	O
IN-12[23] (0h150C)	V1 input at minimum voltage (%)	V1 –Volt x1”	-10.00- 0.00 (V)		0.00	O
IN-13 (0h150D)	Output at V1 minimum voltage (%)	V1 –Perc y1”	-100.00-0.00 (%)		0.00	O

[22]“IN-05” setting range can be changed according to the “IN-06” settings.
[23]IN-12–17 are displayed when IN-06 is set to “1 (Bipolar)”.

Code (Comm. Address)	Name	LCD Display	Setting Range		Initial Value	Property*
IN-14 (0h150E)	V1 maximum input voltage (%)	V1 –Volt x2”	-12.00- 0.00 (V)		-10.00	O
IN-15 (0h150F)	Output at V1 maximum voltage (%)	V1 –Perc y2”	-100.00-0.00 (%)		-100.00	O
IN-16 (0h1510)	V2 rotation direction change	V1 Inverting	0	No	0: No	O
			1	Yes		
IN-17 (0h1511)	V1quantization change	V1 Quantizing	0.00[24], 0.04-10.00 (%)		0.04	O
IN-20[25] (0h1514)	Temperature monitor	T1 Monitor	-		0.00	X
IN-35[26] (0h1523)	V2 input rate monitor	V2 Monitor (V)	0.00-12.00 (V)		0.00	O
IN-37 (0h1525)	V2 input filter time	V2 Filter	0-10000 (msec)		10	O
IN-38 (0h1526)	V2 minimum input voltage	V2 Volt x1	0.00-10.00 (V)		0.00	O
IN-39 (0h1527)	Output at V2 minimum voltage (%)	V2 Perc y1	0.00-100.00 (%)		0.00	O
IN-40 (0h1528)	V2 maximum input voltage	V2 Volt x2	0.00-10.00 (V)		10.00	O
IN-41 (0h1529)	Output at V2 maximum voltage (%)	V2 Perc y2	0.00-100.00 (%)		100.00	O
IN-46 (0h152E)	V2 Rotation direction options	V2 Inverting	0	No	0: No	O
			1	Yes		

[24]* Quantizing is disabled if “0” is selected.

[25]IN-20 is displayed when the analog current/voltage input circuit selection switch (SW3) is selected on T1.

[26]IN-35–47 are displayed when the analog current/voltage input circuit selection switch (SW4) is selected on V2.

Code (Comm. Address)	Name	LCD Display	Setting Range		Initial Value	Property*
IN-47 (0h152F)	V2 Quantizing level	V2 Quantizing	0.00[27], 0.04- 10.00 (%)		0.04	O
IN-50[28] (0h1532)	I2 input monitor	I2 Monitor (mA)	-		0.00	X
IN-52 (0h1534)	I2 input filter time	I2 Filter	0–10000 (msec)		10	O
IN-53 (0h1535)	I2 minimum input power supply	I2 Curr x1	0.00-20.00 (mA)		4.00	O
IN-54 (0h1536)	Output at I2 minimum current (%)	I2 Perc y1	0.00-100.00 (%)		0.00	O
IN-55 (0h1537)	I2 maximum input current	I2 Curr x2	I2 Curr x1 - 24.00 (mA)		20.00	O
IN-56 (0h1538)	Output at I2 maximum current (%)	I2 Perc y2	0.00-100.00 (%)		100.00	O
IN-57 (0h1539)	I2 rotation direction options	I2 Inverting	0	No	0: No	O
			1	Yes		
IN-58 (0h153A)	I2 Quantizing level	I2 Quantizing	0.00[29] 0.04-10.00 (%)		0.04	O
IN-65 (0h1541)	P1 Px terminal configuration	P1 Define	0	None	1: Fx	Δ
			1	Fx		
IN-66 (0h1542)	P2 Px terminal configuration	P2 Define	2	Rx	2: Rx	Δ
IN-67 (0h1543)	P3 Px terminal configuration	P3 Define	3	RST	5: BX	Δ
IN-68 (0h1544)	P4 Px terminal configuration	P4 Define	4	External Trip	3: RST	Δ

[27]* Quantizing is disabled if “0” is selected.

[28]IN-50–62 are displayed when the analog current/voltage input circuit selection switch (SW5) is selected on I2.

[29]* Quantizing is disabled if “0” is selected.

Code (Comm. Address)	Name	LCD Display	Setting Range		Initial Value	Property*
IN-69 (0h1545)	P5 Px terminal configuration	P5 Define	5	BX	7: Sp-L	Δ
IN-70 (0h1546)	P6 Px terminal configuration	P6 Define	6	JOG	8: Sp-M	Δ
IN-71 (0h1547)	P7 Px terminal configuration	P7 Define	7	Speed-L	9: Sp-H	Δ
IN-72 (0h1548)	P8 Px terminal configuration	P8 Define	8	Speed-M	0: None	Δ
IN-73 (0h1549)	P9 Px terminal configuration	P9 Define	9	Speed-H	0: None	Δ
			11	XCEL-L		
			12	XCEL-M		
			13	XCEL-H		
			14	XCEL Stop		
			15	RUN Enable		
			16	3-Wire		
			17	2nd Source		
			18	Exchange		
			19	Up		
			20	Down		
			22	U/D Clear		
			23	Analog Hold		
			24	I-Term Clear		
			25	PID Openloop		
			26	PID Gain2		
			27	PID Ref Change		
			28	Pre Excite		
			29	Timer In		
			31	dis Aux Ref		
			32	FWD JOG		

Code (Comm. Address)	Name	LCD Display	Setting Range		Initial Value	Property*
			33	REV JOG		
			34	Fire Mode		
			35	Time Event En		
			36	Pre Heat		
			37	Damper Open		
			38	PumpClean		
			39	Fire Mode		
			40	PID Step Ref L		
			41	PID Step Ref M		
			42	PID Step Ref H		
			43	Interlock1		
			44	Interlock2		
			45	Interlock3		
			46	Interlock4		
			47	Interlock5		
			48[30]	Interlock6		
			49	Interlock7		
			50	Interlock8		
			51	Hand State		
IN-83 (0h1553)	DI On Delay Selection	DI On DelayEn	000 0000 ~ 111 1111		111 1111	Δ
IN-84 (0h1554)	DI Off Delay Selection	DI Off DelayEn	000 0000 ~ 111 1111		111 1111	Δ
IN-85 (0h1555)	Multi-function input terminal On filter	DI On Delay	0–10000 (msec)		10	O

[30] "48(Interlock6)~50(Interlock8)" of IN-65~71 are available when Extension IO option is equipped. Refer to Extension IO option manual for more detailed information

Code (Comm. Address)	Name	LCD Display	Setting Range		Initial Value	Property*
IN-86 (0h1556)	Multi-function input terminal Off filter	DI Off Delay	0–10000 (msec)		3	O
IN-87 (0h1557)	Multi-function input terminal selection	DI NC/NO Sel	000 0000 – 111 1111		000 0000	Δ
			0	A Terminal (NO)		
			1	B Terminal (NC)		
IN-89 (0h1559)	Multi-step command delay time	InCheck Time	1–5000 (msec)		1	Δ
IN-90 (0h155A)	Multi-function input terminal status	DI Status	-		000 0000	X
IN-91 (0h155B)	Pulse input amount display	TI Monitor	-		0.00	X
IN-92 (0h155C)	TI minimum input pulse	TI Filter	0–9999 (msec)		10	O
IN-93 (0h155D)	TI minimum input pulse	TI Pls x1	0 - TI Pls x2		0.00	O
IN-94 (0h153E)	Output at TI minimum pulse (%)	TI Perc y1	0.00-100.00 (%)		0.00	O
IN-95 (0h155F)	TI maximum input pulse	TI Pls x2	TI Pls x1-32.00		32.00	O
IN-96 (0h1560)	Output at TI maximum pulse (%)	TI Perc y2	0.00-100.00 (%)		100.00	O
IN-97 (0h1561)	TI rotation direction change	TI Inverting	0	No	0: No	O
			1	Yes		
IN-98 (0h1562)	TI quantization level	TI Quantizing	0.00[31], 0.04-10.00 (%)		0.04	O

[31] Quantizing is disabled if "0" is selected.

4.6 Output Terminal Block Function Group (OUT)

Data in the following table will be displayed only when the related code has been selected.

*O: Write-enabled during operation, Δ: Write-enabled when operation stops, X: Write-disabled

Code (Comm. Address)	Name	LCD Display	Parameter Setting		Initial Value	Property*
OUT-00 (-)	Jump Code	Jump Code	1-99		-	X
OUT-01 (0h1601)	Analog output1	AO1 Mode	0	Frequency	0: Frequency	O
			1	Output Current		
			2	Output Voltage		
			3	DCLink Voltage		
			4	Output Power		
			7	Target Freq		
			8	Ramp Freq		
			9	PID Ref Value		
			10	PID Fdb Value		
			11	PID Output		
			12	Constant		
			13	PIAux Setpoint		
			14	PIAux Fbk Mon		
			15	PI Aux Output		
OUT-02 (0h1602)	Analog output1 gain	AO1 Gain	-1000.0-1000.0 (%)		100.0	O
OUT-03 (0h1603)	Analog output1 bias	AO1 Bias	-100.0-100.0 (%)		0.0	O
OUT-04 (0h1604)	Analog output1 filter	AO1 Filter	0–10000 (msec)		5	O
OUT-05 (0h1605)	Analog constant output1	AO1 Const %	0.0-100.0 (%)		0.0	O

Code (Comm. Address)	Name	LCD Display	Parameter Setting		Initial Value	Property*
OUT-06 (0h1606)	Analog output1 monitor	AO1 Monitor	-		0.0	X
OUT-07 (0h1607)	Analog output2	AO2 Mode	Identical to the OUT-02 AO1 Mode selected range		0: Frequency	O
OUT-08 (0h1608)	Analog output2 gain	AO2 Gain	-1000.0-1000.0 (%)		100.0	O
OUT-09 (0h1609)	Analog output2 bias	AO2 Bias	-100.0-100.0 (%)		0.0	O
OUT-10 (0h160A)	Analog output2 filter	AO2 Filter	0–10000 (msec)		5	O
OUT-11 (0h160B)	Analog constant output2	AO2 Const %	0.0-100.0 (%)		0.0	O
OUT-12 (0h160C)	Analog output2 monitor	AO2 Monitor	-		0.0	X
OUT-30 (0h161E)	Fault output item	Trip OutMode	bit	000-111	010	O
			Bit 0	Low voltage		
			Bit 1	Any faults other than low voltage		
			Bit 2	Automatic restart final failure		
OUT-31 (0h161F)	Multi-function relay1	Relay 1	0	None	23:Trip	O
			1	FDT-1		
			2	FDT-2		
			3	FDT-3		
			4	FDT-4		
			5	Over Load		
			6	IOL		
			7	Under Load		

Code (Comm. Address)	Name	LCD Display	Parameter Setting		Initial Value	Property*
			8	Fan Warning		
			9	Stall		
			10	Over Voltage		
			11	Low Voltage		
			12	Over Heat		
			13	Lost Command		
			14	Run		
			15	Stop		
			16	Steady		
			17	Inverter Line		
			18	Comm Line		
			19	Speed Search		
			20	Ready		
			21	MMC		
			22	Timer Out		
			23	Trip		
			24	Lost Keypad		
			25	DB Warn%ED		
			26	On/Off Control		
			27	Fire Mode		
			28	Pipe Broken		
			29	Damper Err		
			30	Lubrication		
			31	Pump Clean		
			32	Level Detect		
			33	Damper Control		
			34	CAP.Warning		
			35	Fan Exchange		
			36	AUTO State		

Code (Comm. Address)	Name	LCD Display	Parameter Setting		Initial Value	Property*
			37	Hand State		
			38	TO		
			39	Except Date		
			40	KEB Operating		
			41	BrokenBelt		
			42	BR Control		
			43	High Fdb Level		
			44	Low Fdb Level		
			45	Diff Fdb Level		
OUT-32 (0h1620)	Multi-function relay2	Relay 2	46	Low Flow Level	14: RUN	O
OUT-33 (0h1621)	Multi-function relay3	Relay 3	47	High Flow Level	0: None	O
OUT-34 (0h1622)	Multi-function relay4	Relay 4	48	Accum Level	0: None	O
OUT-35 (0h1623)	Multi-function relay5	Relay 5	49	Low Lev Detect	0: None	O
OUT-36 (0h1624)	Multi-function 1 item	Q1 Define	50	High Lev Detect	0: None	O
OUT-37 (0h1625)	Multi-function relay6	Relay 6	51	Current Limit	0: None	O
OUT-38 (0h1626)	Multi-function relay7	Relay 7	52	SetPnt Timeout	0: None	O
OUT-39 (0h1627)	Multi-function relay8	Relay 8	53	Pump Trip	0: None	O
OUT-41 (0h1629)	Multi-function output monitor	DO Status	-		00 0000	X
OUT-50 (0h1632)	Multi-function output On delay	DO On Delay	0.00-100.00 (sec)		0.00	O

Code (Comm. Address)	Name	LCD Display	Parameter Setting		Initial Value	Property*
OUT-51 (0h1633)	Multi-function output Off delay	DO Off Delay	0.00-100.00 (sec)		0.00	O
OUT-52 (0h1634)	Multi-function output contact selection	DO NC/NO Sel	Q1,Relay5-Relay1 (00 0000 – 11 1111)		00 0000	Δ
			0	A contact (NO)		
			1	B contact (NC)		
OUT-53 (0h1635)	Fault output On delay	TripOutOnDly	0.00-100.00 (sec)		0.00	O
OUT-54 (0h1636)	Fault output Off delay	TripOutOffDly	0.00-100.00 (sec)		0.00	O
OUT-55 (0h1637)	Timer On delay	TimerOn Delay	0.00-100.00 (sec)		0.00	O
OUT-56 (0h1638)	Timer Off delay	TimerOff Delay	0.00-100.00 (sec)		0.00	O
OUT-57 (0h1639)	Detected frequency	FDT Frequency	0.00-Maximum frequency (Hz)		30.00	O
OUT-58 (0h163A)	Detected frequency band	FDT Band	0.00-Maximum frequency (Hz)		10.00	O
OUT-61 (0h163D)	Pulse output item	TO Mode	0	Frequency	0: Frequency	O
			1	Output Current		
			2	Output Voltage		
			3	DCLink Voltage		
			4	Output Power		
			7	Target Freq		
			8	Ramp Freq		
			9	PID Ref Value		
			10	PID Fdb Value		
			11	PID Output		
			12	Constant		
			13	EPID1 Output		

Code (Comm. Address)	Name	LCD Display	Parameter Setting		Initial Value	Property*
			14	EPID1 RefVal		
			15	EPID1 FdbVal		
			16	EPID2 Output		
			17	EPID2 RefVal		
			18	EPID2 FdbVal		
OUT-62 (0h163E)	Pulse output gain	TO Gain	-1000.0-1000.0 (%)		100.0	O
OUT-63 (0h163F)	Pulse output bias	TO Bias	-100.0-100.0 (%)		0.0	O
OUT-64 (0h1640)	Pulse output filter	TO Filter	0–10000 (msec)		5	O
OUT-65 (0h1641)	Pulse output constant output 2	TO Const %	0.0-100.0 (%)		0.0	O
OUT-66 (0h1642)	Pulse output monitor	TO Monitor	-		0.0	X
OUT-91 (0h165B)	Digital/analog 0 function define	D/A 0 Define	0~100		30	O
OUT-92 (0h165C)	Digital/analog 0 function shift	D/A 0 Shift	-12~-12		0	O
OUT-93 (0h165D)	Digital/analog 1 function define	D/A 1 Define	0~100		31	O
OUT-94 (0h165E)	Digital/analog 1 function shift	D/A 1 Shift	-12~-12		0	O
OUT-95 (0h165F)	Digital/analog 02function define	D/A 2 Define	0~100		29	O
OUT-96 (0h1660)	Digital/analog 2 function shift	D/A 2 Shift	-12~-12		0	O

Code (Comm. Address)	Name	LCD Display	Parameter Setting	Initial Value	Property*
OUT-97 (0h1661)	Digital/analog 3 function define	D/A 3 Define	0~100	5	O
OUT-98 (0h1662)	Digital/analog 03function shift	D/A 3 Shift	-12~-12	0	O

4.7 Communication Function Group (COM)

Data in the following table will be displayed only when the related code has been selected.

*O: Write-enabled during operation, Δ: Write-enabled when operation stops, X: Write-disabled

Code (Comm. Address)	Name	LCD Display	Parameter Setting		Initial Value	Property*
COM-00 (-)	Jump Code	Jump Code	1-99		-	X
COM-01 (0h1701)	Built-in communication inverter ID	Int485 St ID	1-MaxComID[32]		1	O
COM-02 (0h1702)	Built-in communication protocol	Int485 Proto	0	ModBus RTU	0: ModBusRTU	O
			2	LS Inv 485		
			4	BACnet		
			5	Metasys-N2		
			6[33]	ModBus Master		

[32] If AP1-40 is set to “4(Serve Drv)”, MaxComID is “8”, and if COM-02 is set to “4(BACnet), MaxComID is “127”. Otherwise MaxComID is “250”.

[33] COM-02 is automatically set to “6(Modbus Master)” when AP1-40 is set to “2 or 3”. Otherwise a user can set the parameter value at user”s choice.

Code (Comm. Address)	Name	LCD Display	Parameter Setting		Initial Value	Property*
COM-03 (0h1703)	Built-in communication speed	Int485 BaudR	0	1200 bps	3: 9600 bps	O
			1	2400 bps		
			2	4800 bps		
			3	9600 bps		
			4	19200 bps		
			5	38400 bps		
			6	56 Kbps		
			7	76.8 kbps		
			8	115.2 Kbps[34]		
COM-04 (0h1704)	Built-in communication frame setting	Int485 Mode	0	D8/PN/S1	0: D8/PN/S1	O
			1	D8/PN/S2		
			2	D8/PE/S1		
			3	D8/PO/S1		
COM-05 (0h1705)	Transmission delay after reception	Resp Delay	0-1000 (msec)		5	O
COM-06[35] (0h1706)	Communication option S/W version	FBus S/W Ver	-		-	O
COM-07 (0h1707)	Communication option inverter ID	FBus ID	0-255		1	O
COM-08 (0h1708)	FIELD BUS communication speed	FBUS BaudRate	0	9600 bps	0: 9600 bps	O
			1	19200 bps		
			2	38400 bps		
			3	56 kbps		

[34]115,200 bps
[35]COM-06–09 are displayed only when a communication option card is installed. Please refer to the communication option manual for details.

Code (Comm. Address)	Name	LCD Display	Parameter Setting		Initial Value	Property*
			4	76.8kbps		
			5	112 kbps		
			6	125 kbps		
			7	250 kbps		
			8	500 kbps		
			10	1 Mbps		
			12	5 Mbps		
			14	10 Mbps		
COM-09 (0h1709)	Communication option LED status	FieldBus LED	-		-	O
COM-28 (0h171C)	USB Protocol	USB Protocol	0	Modbus RTU	2: LS Inv 485	O
			2	LS Inv 485		
COM-30 (0h171E)	Number of output parameters	ParaStatus Num	0-8		3	O
COM-31 (0h171F)	Output Communication address1	Para Status-1	0000-FFFF Hex		000A	O
COM-32 (0h1720)	Output Communication address2	Para Status-2	0000-FFFF Hex		000E	O
COM-33 (0h1721)	Output Communication address3	Para Status-3	0000-FFFF Hex		000F	O
COM-34 (0h1722)	Output Communication address4	Para Status-4	0000-FFFF Hex		0000	O
COM-35 (0h1723)	Output Communication address5	Para Status-5	0000-FFFF Hex		0000	O
COM-36 (0h1724)	Output Communication address6	Para Status-6	0000-FFFF Hex		0000	O

Code (Comm. Address)	Name	LCD Display	Parameter Setting		Initial Value	Property*
COM-37 (0h1725)	Output Communication address7	Para Status-7	0000-FFFF Hex		0000	O
COM-38 (0h1726)	Output Communication address8	Para Status-8	0000-FFFF Hex		0000	O
COM-50 (0h1732)	Number of input parameters	Para Ctrl Num	0-8		2	O
COM-51 (0h1733)	Input Communication address1	Para Control-1	0000-FFFF Hex		0005	O
COM-52 (0h1734)	Input Communication address2	Para Control-2	0000-FFFF Hex		0006	O
COM-53 (0h1735)	Input Communication address3	Para Control-3	0000-FFFF Hex		0000	O
COM-54 (0h1736)	Input Communication address 4	Para Control-4	0000-FFFF Hex		0000	O
COM-55 (0h1737)	Input Communication address 5	Para Control-5	0000-FFFF Hex		0000	O
COM-56 (0h1738)	Input Communication address 6	Para Control-6	0000-FFFF Hex		0000	O
COM-57 (0h1739)	Input Communication address 7	Para Control-7	0000-FFFF Hex		0000	O
COM-58 (0h173A)	Input Communication address 8	Para Control-8	0000-FFFF Hex		0000	O
COM-70 (0h1746)	Communication multi-function input 1	Virtual DI 1	0	None	0: None	O

Code (Comm. Address)	Name	LCD Display	Parameter Setting		Initial Value	Property*
COM-71 (0h1747)	Communication multi-function input 2	Virtual DI 2	1	Fx	0: None	O
COM-72 (0h1748)	Communication multi-function input 3	Virtual DI 3	2	Rx	0: None	O
COM-73 (0h1749)	Communication multi-function input 4	Virtual DI 4	3	RST	0: None	O
COM-74 (0h174A)	Communication multi-function input 5	Virtual DI 5	4	External Trip	0: None	O
COM-75 (0h174B)	Communication multi-function input 6	Virtual DI 6	5	BX	0: None	O
COM-76 (0h174C)	Communication multi-function input 7	Virtual DI 7	6	JOG	0: None	O
COM-77 (0h174D)	Communication multi-function input 8	Virtual DI 8	7	Speed-L	0: None	O
			8	Speed-M		
			9	Speed-H		
			11	XCEL-L		
			12	XCEL-M		
			13	XCEL-H		
			14	XCEL-Stop		
			15	Run Enable		
			16	3-wire		
			17	2nd source		
			18	Exchange		
			19	Up		
			20	Down		
			22	U/D Clear		

Code (Comm. Address)	Name	LCD Display	Parameter Setting		Initial Value	Property*
			23	Analog Hold		
			24	I-Term Clear		
			25	PID Openloop		
			26	PID Gain 2		
			27	PID Ref Change		
			28	Pre Excite		
			29	Timer In		
			31	dis Aux Ref		
			32	FWD JOG		
			33	REV JOG		
			34	Fire Mode		
			35	Time Event En		
			36	Pre Heat		
			37	Damper Open		
			38	PumpClean		
			39	Fire Mode		
			40	PID Step Ref L		
			41	PID Step Ref M		
			42	PID Step Ref H		
			43	Interlock1		
			44	Interlock2		
			45	Interlock3		
			46	Interlock4		

Code (Comm. Address)	Name	LCD Display	Parameter Setting		Initial Value	Property*
			47	Interlock5		
			48[36]	Interlock6		
			49	Interlock7		
			50	Interlock8		
			51	Hand State		
COM-82[37] (0h1752)	Communication multi-function input monitoring	Virt DI Status	-		0000 0000	X
COM-83 (0h1753)	BACnet maximum master number	BAC Max Master	1~127		127	O
COM-84 (0h1754)	BACnet device number1	BAC Dev Inst1	0~4194		237	O
COM-85 (0h1755)	BACnet device number2	BAC Dev Inst2	0-999		0	O
COM-86 (0h1756)	BACnet password	BAC PassWord	0-32767		0	O
COM-94 (-)	Communication update	Comm Update	0	No	0 : No	Δ
			1	Yes		
COM-96 (0h1760)	Communication operation auto resume	Power On Resume	0	No	0: No	O
			1	Yes		

[36] "48(Interlock6)~50(Interlock8)" of IN-65~71 are available when Extension IO option is equipped. Refer to Extension IO option manual for more detailed information

[37] COM-86,20,21,22,23 parameters have been changed to COM-82,83,84,85,86. Applied from SW1.22 version

4.8 PID Function Group(PID)

Data in the following table will be displayed only when the related code has been selected.
Unit MAX = PID Unit100% (PID-53)
Unit Min = (2xPID Unit 0%(PID-52)-PID Unit 100%)
Unit Default = (PID Unit 100%-PID Unit 0%)/2
Unit Band = Unit 100%-Unit 0%
The Default Value for “PID-02 PID Access Lev” only allows access to the basic parameters in the PID group. The rest are hidden. When set to “Adanced” all paramters are shown.

*O: Write-enabled during operation, Δ: Write-enabled when operation stops, X: Write-disabled

Code (Comm. Address)	Name	LCD Display	Parameter Setting		Initial Value	Property*
PID-00 (-)	Jump Code	Jump Code	1–99		50	O
PID-01 (0h1801)	PID mode selection	PID Sel	0	No	0: No	Δ
			1	Yes		
PID-02 (0h1802)	PID Access Level	PID Access Lev	0	Basic	0: Basic	O
			1	Advanced		
PID-03 (0h1803)	PID output monitor	PID Output	-		0.00	X
PID-04 (0h1804)	PID Setpoit monitor	Setpoint Value	-		0.00	X
PID-05 (0h1805)	PID feedback monitor	Feedback Value	-		0.00	X
PID-06 (0h1806)	PID error monitor value	Err Value	-		0.00	X
PID-10 (0h180A)	PID Setpoint 1 source selection	PID SP 1 Src	0	KeyPad	0: Keypad	Δ
			1	V1		
			3	V2		
			4	I2		
			5	Int485		
			6	Fieldbus		
			8	Pulse		

Code (Comm. Address)	Name	LCD Display	Parameter Setting		Initial Value	Property*
			9[38]	V3		
			10	I3		
PID-11 (0h180B)	PID Setpoint 1 keypad value	PID SP 1 Set	Unit Min–Unit Max		Unit Default	O
PID-12 (0h180C)	PID Setpoint 1 auxiliary source selection	PIDSP1AuxSrc	0	None	0: None	Δ
			1	V1		
			3	V2		
			4	I2		
			6	Pulse		
			7	Int 485		
			8	FieldBus		
			10 [39]	V3		
			11	I3		
PID-13 (0h180D)	PID Setpoint 1 auxiliary mode selection	PID SP1AuxMod	0	M+(G*A)	0: M+(G*A)	O
			1	M*(G*A)		
			2	M/(G*A)		
			3	M+(M*(G*A))		
			4	M+G*2*(A-50)		
			5	M*(G*2*(A-50))		
			6	M/(G*2*(A-50))		
			7	M+M*G*2*(A-50)		
			8	(M-A)^2		
			9	M^2+A^2		
			10	MAX(M,A)		

[38] "10(V3)~11(I3)" of PID-10 are available when Extension IO option is equipped. Refer to Extension IO option manual for more detailed information.

[39] "12(V3)~13(I3)" of PID-12 are available when Extension IO option is equipped. Refer to Extension IO option manual for more detailed information.

Code (Comm. Address)	Name	LCD Display	Parameter Setting		Initial Value	Property*
			11	MIN(M,A)		
			12	(M + A)/2		
			13	Root(M+A)		
PID-14 (0h180E)	PID reference auxiliary gain	PID SP1 Aux G	-200.0–200.0 (%)		0.0	O
PID-15 (0h180F)	PID Setpoint 2 auxiliary source selection	PID SP 2 Src	0	Keypad	0: KeyPad	Δ
			1	V1		
			3	V2		
			4	I2		
			5	Int 485		
			6	Fieldbus		
			8	Pulse		
			9[40]	V3		
			10	I3		
PID-16 (0h1810)	PID Setpoint 2 keypad setting	PID SP 2 Set	Unit Min–Unit Max		Unit Default	O
PID-17 (0h1811)	PID Setpoint 2 auxiliary source selection	PID SP2AuxSrc	0	None	0: None	Δ
			1	V1		
			3	V2		
			4	I2		
			6	Pulse		
			7	Int 485		
			8	FieldBus		
			10	EPID1 Output		
			11	EPID1 Fdb Val		
			12[41]	V3		

[40] "10(V3)~11(I3)" of PID-15 are available when Extension IO option is equipped. Refer to Extension IO option manual for more detailed information.
[41] "12(V3)~13(I3)" of PID-17 are available when Extension IO option is equipped. Refer to

Code (Comm. Address)	Name	LCD Display	Parameter Setting		Initial Value	Property*
			13	I3		
PID-18 (0h1812)	PID Setpoint 2 auxiliary mode selection	PID SP2AuxMod	0	M+(G*A)	0: M+(G*A)	O
			1	M*(G*A)		
			2	M/(G*A)		
			3	M+(M*(G*A))		
			4	M+G*2*(A-50)		
			5	M*(G*2*(A-50))		
			6	M/(G*2*(A-50))		
			7	M+M*G*2*(A-50)		
			8	(M-A)^2		
			9	M^2+A^2		
			10	MAX(M,A)		
			11	MIN(M,A)		
			12	(M + A)/2		
			13	Root(M+A)		
PID-19 (0h1813)	PID Setpoint 2 auxiliary gain	PID SP2 Aux G	-200.0–200.0 (%)		0.0	O
PID-20 (0h1814)	PID feedback selection	PIDFdb Source	0	V1	0: V1	Δ
			2	V2		
			3	I2		
			4	Int 485		
			5	FieldBus		
			7	Pulse		
			8[42]	V3		
			9	I3		

Extension IO option manual for more detailed information.

[42] "10(V3)~11(I3)" of PID-20 are available when Extension IO option is equipped. Refer to Extension IO option manual for more detailed information.

Code (Comm. Address)	Name	LCD Display	Parameter Setting		Initial Value	Property*
PID-21 (0h1815)	PID feedback auxiliary source selection	PID Fdb Aux Src	0	None	0: None	Δ
			1	V1		
			3	V2		
			4	I2		
			6	Pulse		
			7	Int 485		
			8	FieldBus		
			10 [43]	V3		
			11	I3		
PID-22 (0h1816)	PID feedback auxiliary mode selection	PID FdbAuxMod	0	M+(G*A)	0: M+(G*A)	O
			1	M*(G*A)		
			2	M/(G*A)		
			3	M+(M*(G*A))		
			4	M+G*2*(A-50)		
			5	M*(G*2*(A-50))		
			6	M/(G*2*(A-50))		
			7	M+M*G*2*(A-50)		
			8	(M-A)^2		
			9	M^2+A^2		
			10	MAX(M,A)		
			11	MIN(M,A)		
			12	(M+A)/2		
			13	Root(M+A)		
PID-23 (0h1817)	PID feedback auxiliary gain	PID Fdb Aux G	-200.0–200.0 (%)		0.0	O

[43] “12(V3)~13(I3)” of PID-21 are available when Extension IO option is equipped. Refer to Extension IO option manual for more detailed information.

Code (Comm. Address)	Name	LCD Display	Parameter Setting		Initial Value	Property*
PID-24 (0h1818)	PID feed back band	PID Fdb Band	0.00 – Unit Band		0.00	O
PID-25 (0h1819)	PID controller proportional gain 1	PID P-Gain 1	0.00–300.00 (%)		100.00	O
PID-26 (0h181A)	PID contro ller integral time 1	PID I-Time 1	0.0–200.0 (sec)		2.0	O
PID-27 (0h181B)	PID controller differential time 1	PID D-Time 1	0.00–1.00 (sec)		0.00	O
PID-28 (0h181C)	PID controller feed forward gain	PID FF-Gain	0.0–1000.0 (%)		0.0	O
PID-29 (0h181D)	PID output filter	PID Out LPF	0.00–10.00 (sec)		0.00	O
PID-30 (0h181E)	PID output upper limit	PID Limit Hi	PID Limit Lo–100.00		100.00	O
PID-31 (0h181F)	PID output lower limit	PID Limit Lo	-100.00–PID Limit Hi		0.00	O
PID-32 (0h1820)	PID controller proportional gain 2	PID P-Gain 2	0.00–300.00 (%)		50.0	O
PID-33 (0h1821)	PID controller integral time 2	PID I-Time 2	0.0–200.0 (sec)		10.0	O
PID-34 (0h1822)	PID controller differential time 2	PID D-Time 2	0.00–1.00 (sec)		0.00	O
PID-35 (0h1823)	PID output mode	PID Out Mode	0	PID Output	2 : PID or Main	O
			1	PID+ Main Freq		
			2	PID or Main		
PID-36 (0h1824)	PID output inverse	PID Out Inv	0	No	0: No	Δ
			1	Yes		
PID-37 (0h1825)	PID output scale	PID Out Scale	0.1–1000.0 (%)		100.0	Δ

Code (Comm. Address)	Name	LCD Display	Parameter Setting	Initial Value	Property*
PID-38 (0h1826)	PID input limit	PID Input Limit	0.00~100.00 (%)	100.00	O
PID-39 (0h1827)	PID integral gain limit	PID I Limit	-100.00~100.00	100.00	O
PID-40 (0h1828)	PID multi-step Setpoint setting 1	PID Step SP 1	Unit Min–Unit Max	Unit Default	O
PID-41 (0h1829)	PID multi-step Setpoint setting 2	PID Step SP 2	Unit Min–Unit Max	Unit Default	O
PID-42 (0h182A)	PID multi-step Setpoint setting 3	PID Step SP 3	Unit Min–Unit Max	Unit Default	O
PID-43 (0h182B)	PID multi-step Setpoint setting 4	PID Step SP 4	Unit Min–Unit Max	Unit Default	O
PID-44 (0h182C)	PID multi-step Setpoint setting 5	PID Step SP 5	Unit Min–Unit Max	Unit Default	O
PID-45 (0h182D)	PID multi-step Setpoint setting 6	PID Step SP 6	Unit Min–Unit Max	Unit Default	O
PID-46 (0h182E)	PID multi-step Setpoint setting 7	PID Step SP 7	Unit Min–Unit Max	Unit Default	O
PID-50 (0h1832)	PID controller unit selection	PID Unit Sel	Refer to the Unit List 0 CUST 1 % 2 PSI 3 ˚F 4 ˚C 5 inWC 6 inM 7 mBar	1: %	O

Code (Comm. Address)	Name	LCD Display	Parameter Setting		Initial Value	Property*
			8	Bar		
			9	Pa		
			10	kPa		
			11	Hz		
			12	rpm		
			13	V		
			14	A		
			15	kW		
			16	HP		
			17	mpm		
			18	ft		
			19	m/s		
			20	m3/s		
			21	m3/m		
			22	m 3/h		
			23	l/s		
			24	l/m		
			25	l/h		
			26	kg/s		
			27	kg/m		
			28	kg/h		
			29	gl/s		
			30	gl/m		
			31	gl/h		
			32	ft/s		
			33	f3/s		
			34	f3/m		
			35	f3/h		
			36	lb/s		

Code (Comm. Address)	Name	LCD Display	Parameter Setting		Initial Value	Property*
			37	lb/m		
			38	lb/h		
			39	ppm		
			40	pps		
			41	Wb		
PID-51 (0h1833)	PID unit scale	PID Unit Scale	0	x100	1: x 10	O
			1	x10		
			2	x1		
			3	x 0.1		
			4	x0.01		
PID-52 (0h1834)	PID control 0% setting figure	PID Unit 0%	X100	-30000–Unit Max	Range varies depending on PID-50 setting	O
			X10	-3000.0–Unit Max		
			X1	-300.00–Unit Max		
			X0.1	-30.000–Unit Max		
			X0.01	-3.0000–Unit Max		
PID-53 (0h1835)	PID control 100% setting figure	PID Unit 100%	X100	Unit Min –30000	Range differs depending on PID-50 setting	O
			X10	Unit Min –3000.0		
			X1	Unit Min –300.00		
			X0.1	Unit Min –30.000		
			X0.01	Unit Min –3.0000		
PID-54 (0h1836)	PID acceleration/d	RampPIRef AtRun	0	No	0	Δ
			1	Yes		

Code (Comm. Address)	Name	LCD Display	Parameter Setting		Initial Value	Property*
	eceleration time enable					
PID-55 (0h1837)	PID accelration/deceleration time	PID Acc/Dec Tm	0.00~600.00 (sec)		0.00	O
PID-56 (0h1838)	Pump minimum speed	Pump Min Speed	0.00~600.00 (Hz)		0.00	Δ
PID-57 (0h1839)	Wakeup level type	WakeUpLev type	0	Absolute	1	Δ
			1	Deviation		
PID-58 (0h183A)	Sleep activation level	Sleep Act Lev	0.00~600.00 (Hz)		0.00	O
PID-59 (0h183B)	Sleep Level type	Sleep Lev Type	0	Disabled	1	O
			1	Otuput Freq		
			2	Output Current		
			3	Feedback Value		
			4	Output RPM		
			5	Flow Rate Mon		
PID-60 (0h183C)	Sleep boost setting	Sleep Bst Set	0~30000		0	O
PID-61 (0h183D)	Sleep boost frequency	Sleep Bst Freq	0.00~400.00 (Hz)		0.00	O
PID-62 (0h183E)	PID sleep 0 delay time	PID Sleep 0 DT	0.0~6000.0 (sec)		10.0	O
PID-63 (0h183F)	PID sleep 0 level	PID Sleep0Lev	0~30000		0	O
PID-64 (0h1840)	PID wakeup 0 delay time	PID WakeUp0 DT	0.0~6000.0 (sec)		10.0	O
PID-65 (0h1841)	PID wakeup 0 level	PID WakeUp0Lev	0~60000		2000	O
PID-66 (0h1842)	PID sleep 1 delay time	PID Sleep 1 DT	0.0~6000.0 (sec)		10.0	O

Code (Comm. Address)	Name	LCD Display	Parameter Setting	Initial Value	Property*
PID-67 (0h1843)	PID sleep 1 level	PID Sleep1Lev	0~30000	0	O
PID-68 (0h1844)	PID wakeup 1 delay time	PID WakeUp1 DT	0.0~6000.0 (sec)	10.0	O
PID-69 (0h1845)	PID wakeup 1 level	PID WakeUp1Lev	0~60000	2000	O
PID-70 (0h1846)	PID sleep 2 delay time	PID Sleep 2 DT	0.0~6000.0 (sec)	10.0	O
PID-71 (0h1847)	PID sleep 2 level	PID Sleep2Lev	0~30000	0	O
PID-72 (0h1848)	PID wakeup 2 delay time	PID WakeUp2 DT	0.0~6000.0 (sec)	10.0	O
PID-73 (0h1849)	PID wakeup 2 level	PID WakeUp2Lev	0~60000	2000	O
PID-74 (0h184A)	PID sleep 3 delay time	PID Sleep 3 DT	0.0~6000.0 (sec)	10.0	O
PID-75 (0h184B)	PID sleep 3 level	PID Sleep3Lev	0~30000	0	O
PID-76 (0h184C)	PID wakeup 3 delay time	PID WakeUp3 DT	0.0~6000.0 (sec)	10.0	O
PID-77 (0h184D)	PID wakeup 3 level	PID WakeUp3Lev	0~60000	2000	O
PID-78 (0h184E)	PID sleep 4 delay time	PID Sleep 4 DT	0.0~6000.0 (sec)	10.0	O
PID-79 (0h184F)	PID sleep 4 level	PID Sleep4Lev	0~30000	0	O
PID-80 (0h1850)	PID wakeup 4 delay time	PID WakeUp4 DT	0.0~6000.0 (sec)	10.0	O
PID-81 (0h1851)	PID wakeup 4 level	PID WakeUp4Lev	0~60000	2000	O
PID-82 (0h1852)	PID sleep 5 delay time	PID Sleep 5 DT	0.0~6000.0 (sec)	10.0	O
PID-83 (0h1853)	PID sleep 5 level	PID Sleep5Lev	0~30000	0	O

Code (Comm. Address)	Name	LCD Display	Parameter Setting		Initial Value	Property*
PID-84 (0h1854)	PID wakeup 5 delay time	PID WakeUp5 DT	0.0~6000.0 (sec)		10.0	O
PID-85 (0h1855)	PID wakeup 5 level	PID WakeUp5Lev	0~60000		2000	O
PID-86 (0h1856)	PID sleep 6 delay time	PID Sleep 6 DT	0.0~6000.0 (sec)		10.0	O
PID-87 (0h1857)	PID sleep 6 level	PID Sleep6Lev	0~30000		0	O
PID-88 (0h1858)	PID wakeup 6 delay time	PID WakeUp6 DT	0.0~6000.0 (sec)		10.0	O
PID-89 (0h1859)	PID wakeup 6 level	PID WakeUp6Lev	0~60000		2000	O
PID-90 (0h185A)	PID sleep 7 delay time	PID Sleep 7 DT	0.0~6000.0 (sec)		10.0	O
PID-91 (0h185B)	PID sleep 7 level	PID Sleep7Lev	0~30000		0	O
PID-92 (0h185C)	PID wakeup 7 delay time	PID WakeUp7 DT	0.0~6000.0 (sec)		10.0	O
PID-93 (0h185D)	PID wakeup 7 level	PID WakeUp7Lev	0~60000		2000	O
PID-95 (0h185F)	Disable Wake-up	Disable WakeUp	0	No	0	Δ
			1	Yes		

4.9 Application 1 Function Group (AP1)

Data in the following table will be displayed only when the related code has been selected.

*O: Write-enabled during operation, Δ: Write-enabled when operation stops, X: Write-disabled

Code (Comm. Address)	Name	LCD Display	Setting Range	Initial Value	Property*
AP1-00	Jump Code	Jump Code	1–99	20	O

Code (Comm. Address)	Name	LCD Display	Setting Range		Initial Value	Property*
(-)						
AP1-20 (0h1914)	Soft Fill function options	Soft Fill Sel	0	No	0: No	O
			1	Yes		
AP1-21 (0h1915)	Pre- PID operation frequency	Pre-PID Freq	Low Freq–High Freq		30.00	O
AP1-22 (0h1916)	Pre- PID delay time	Pre-PID Delay	0.0–600.0 (sec)		60.0	O
AP1-23 (0h1917)	Soft Fill escape value	Soft Fill Set	Unit Min–Unit Max		20.00	O
AP1-24 (0h1918)	Soft Fill reference increasing value	Fill Step Set	0.00–Unit Band		2.00	O
AP1-25 (0h1919)	Soft Fill reference increasing cycle	Fill Step Time	0–9999 (sec)		20	O
AP1-26 (0h191A)	Soft Fill changing amount	Fill Fdb Diff	0.00–Unit Band		0.00	O
AP1-30 (0h191E)	Flow Comp function options	Flow Comp Sel	0	No	0: No	O
			1	Yes		
AP1-31 (0h191F)	Max Comp amount	Max Comp Value	0.00–Unit Band		0.00	O
AP1-40[44] (0h1928)	Lead Lag selection	Lead Lag Sel	0	None	0: None	Δ
			1	Contactor Lag		
			2	Follower Lead		
			3	Fixed Lag		
			4	Network Fdk		
AP1-41[45]	Bypass selection	Regul Bypass	0	No	0: No	Δ

[44] Set PID-1 to “YES” to configure AP1-40.

[45] Set AP1-40 to “ Single Ctrl “ to configure AP1-41.

Code (Comm. Address)	Name	LCD Display	Setting Range	Initial Value	Property*
(0h1929)			1 Yes		
AP1-42 (0h192A)	Total number of motor	* of Pumps	1–5	5	Δ
AP1-43 (0h192B)	First priority motor number	Run Priority	1–5	1	Δ
AP1-44 (0h192C)	Number of auxiliary motor in operation	Lag Pump Run	-	0	X
AP1-45 (0h192D)	Operation priority display 1	Curr. Prty1	-	0000	X
AP1-46 (0h192E)	Operation priority display 2	Curr. Prty2	-	0000	X
AP1-47 (0h192F)	LeadLag Status	LeadLag Status	-	0: Trip	X
AP1-48 (0h1930)	Auxiliary motor options for inverter stop	Lag Stop Sel	0 No 1 Yes	1: Yes	O
AP1-49 (0h1931)	Auxiliary motor stop order.	ALT Sequence	0 FILO 1 FIFO 2 Op time Order	0: FILO	Δ
AP1-50 (0h1932)	Server drive staging pressure	Stage Pres. Dv	0~60000	500	O
AP1-51 (0h1933)	Main motor acceleration time when the number of auxiliary motors is reduced	Aux Acc Time	0.0–600.0 (sec)	2.0	O
AP1-52 (0h1934)	Main motor acceleration time when the number	Aux Dec Time	0.0–600.0 (sec)	2.0	O

Code (Comm. Address)	Name	LCD Display	Setting Range	Initial Value	Property*
	of auxiliary motors is increased				
AP1-53 (0h1935)	Auxiliary motors start delay time	Stage DT	0.0–3600.0 (sec)	5.0	O
AP1-54 (0h1936)	Auxiliary motors stop delay time	Aux Stop DT	0.0–3600.0 (sec)	5.0	O
AP1-55 (0h1937)	Auto change mode selection	Auto Ch Mode	0 None 1 AUX Exchange 2 Main Exchange	1: AUX Exchange	Δ
AP1-56 (0h1938)	Alternative interval setting	Alternate Time	00: 00–99: 00	72: 00	O
AP1-57 (0h1939)	Alternate operating dondition	Alternate Level	Low Freq–High Freq	20.00	O
AP1-58 (0h193A)	Timer display	Auto Op Time	-	0:00	X
AP1-59 (0h193B)	Pressure deviation level for destaging	Destage Pres.	0~60000	500	O
AP1-60[46] (0h193C)	Target frequency of Aux motor during Multi Master	Lag Freq	Low Freq ~ High Freq	60.00	O
AP1-61 (0h193D)	#1 auxiliary motor start frequency	Stage Freq 1	Low Freq–High Freq	45.00	O
AP1-62 (0h193E)	#2 auxiliary motor start frequency	Stage Freq 2	Low Freq–High Freq	45.00	O
AP1-63 (0h193F)	#3 auxiliary motor start frequency	Stage Freq 3	Low Freq–High Freq	45.00	O
AP1-64 (0h1940)	#4 auxiliary motor start frequency	Stage Freq 4	Low Freq–High Freq	45.00	O

[46] API-60 only appears when AP1-40 MMC Sel is set to “2” or “3”.

Code (Comm. Address)	Name	LCD Display	Setting Range	Initial Value	Property*
AP1-65 (0h1941)	#5 auxiliary motor start frequency	Stage Freq 5	Low Freq– High Freq	45.00	O
AP1-66 (0h1942)	#6 auxiliary motor start frequency	Stage Freq 6	Low Freq– High Freq	45.00	O
AP1-67 (0h1943)	#7 auxiliary motor start frequency	Stage Freq 7	Low Freq– High Freq	45.00	O
AP1-68 (0h1944)	#8 auxiliary motor start frequency	Stage Freq 8	Low Freq– High Freq	45.00	O
AP1-70 (0h1946)	#1 auxiliary motor stop frequency	Destage Freq 1	Low Freq– High Freq	40.00	O
AP1-71 (0h1947)	#2 auxiliary motor stop frequency	Destage Freq 2	Low Freq– High Freq	40.00	O
AP1-72 (0h1948)	#3 auxiliary motor stop frequency	Destage Freq 3	Low Freq– High Freq	40.00	O
AP1-73 (0h1949)	#4 auxiliary motor stop frequency	Destage Freq 4	Low Freq– High Freq	40.00	O
AP1-74 (0h194A)	#5 auxiliary motor stop frequency	Destage Freq 5	Low Freq– High Freq	40.00	O
AP1-75 (0h194B)	#6 auxiliary motor stop frequency	Destage Freq 6	Low Freq– High Freq	40.00	O
AP1-76 (0h194C)	#7 auxiliary motor stop frequency	Destage Freq 7	Low Freq– High Freq	40.00	O
AP1-77 (0h194D)	#8 auxiliary motor stop frequency	Destage Freq 8	Low Freq– High Freq	40.00	O
AP1-78 (0h194E)	PID related parameter sharing	Data Share	0 None	1: Auto	Δ

Code (Comm. Address)	Name	LCD Display	Setting Range		Initial Value	Property*
			1	Auto		
			2	Manual		
AP1-79 (Oh194F)	Determine communication error action	All CommErr	0	No	0: No	O
			1	Yes		
AP1-80 (0h1950)	#1 auxiliary motor"s reference compensation	Aux1 Ref Comp	0.00–Unit Band		0.00	O
AP1-81 (0h1951)	#2 auxiliary motor reference compensation	Aux2 Ref Comp	0.00–Unit Band		0.00	O
AP1-82 (0h1952)	#3 auxiliary motor reference compensation	Aux3 Ref Comp	0.00–Unit Band		0.00	O
AP1-83 (0h1953)	#4 auxiliary motor reference compensation	Aux4 Ref Comp	0.00–Unit Band		0.00	O
AP1-84 (0h1954)	#5 auxiliary motor reference compensation	Aux5 Ref Comp	0.00–Unit Band		0.00	O
AP1-85 (0h1955)	#6 auxiliary motor reference compensation	Aux6 Ref Comp	0.00–Unit Band		0.00	O
AP1-86 (0h1956)	#7 auxiliary motor reference compensation	Aux7 Ref Comp	0.00–Unit Band		0.00	O
AP1-87 (0h1957)	#8 auxiliary motor reference compensation	Aux8 Ref Comp	0.00–Unit Band		0.00	O
AP1-88 (0h1958)	Jockey Pump	Jockey Pump	0	NO	0: No	Δ
			1	YES		

Code (Comm. Address)	Name	LCD Display	Setting Range		Initial Value	Property*
AP1-89 (0h1959)	Jockey Pump Delay Time	Jockey Dly T	0.0~60.0		20.0	O
AP1-90 (0h195A)	Interlock operation	Ext. Mrt OL	0	NO	0: No	Δ
			1	YES		
AP1-91 (0h195B)	The delay time when exchanging the main motor	Ext. Mrt OL T	0.1–360.0 (Sec)		5.0	O
AP1-94 (0h195E)	Total number of drives used in lead-lag	* of Drives	1~8		5	Δ
AP1-95[47] (0h195F)	Motor selection for running time display	Run Time Monitor	0	Pump 1	0: Pump 1	O
			1	Pump 2		
			2	Pump 3		
			3	Pump 4		
			4	Pump 5		
			5	Pump 6		
			6	Pump 7		
			7	Pump 8		

[47] AP1-95~98 is available when MMC and Master Follower functions are performed.

Code (Comm. Address)	Name	LCD Display	Setting Range		Initial Value	Property*
AP1-96 (0h1960)	Running time(Day) display	Pump Run Time Day	0 – 65535		0	O
AP1-97 (0h1961)	Running time(hour:minute) display	Pump Run Time Min	00:00 - 23:59		00:00	O
AP1-98 (0h1962)	Clear running time for lag motors	Pump Run time Clear	0	None	0: None	O
			1	All		
			2	Pump 1		
			3	Pump 2		
			4	Pump 3		
			5	Pump 4		
			6	Pump 5		
			7	Pump 6		
			8	Pump 7		
			9	Pump 8		
AP1-99 (0h1963)	Alternation selection at sleep	Alter at sleep	0	No	0: No	O
			1	Yes		

4.10 Application 2 Function Group (AP2)

Data in the following table will be displayed only when the related code has been selected.

*O: Write-enabled during operation, Δ: Write-enabled when operation stops, X: Write-disabled

Code (Comm. Address)	Name	LCD Display	Setting Range		Initial Value	Property*
AP2-00 (-)	Jump Code	Jump Code	1–99		-	X
AP2-01[48] (0h1A01)	Load curve Tuning	Load Tune	0	No	No	Δ
			1	Yes		
AP2-02 (0h1A02)	Low Freq load curve	Load Fit Lfreq	Base Freq*15% –Load Fit HFreq		30.00	Δ
AP2-03 (0h1A03)	Low Freq current	Load Fit LCurr	0.0–80.0 (%)		40.0	Δ
AP2-04 (0h1A04)	Low Freq power total	Load Fit LPwr	0.0–80.0 (%)		30.0	Δ
AP2-08 (0h1A08)	High Freq load curve	Load Fit Hfreq	Load Fit LFreq– HighFreq		51.00	Δ
AP2-09 (0h1A09)	High Freq current.	Load Fit HCurr	Load Fit LCurr – 200.0 (%)		80.0	Δ
AP2-10 (0h1A0A)	High Freq total power	Load Fit HPwr	Load Fit LPwr – 200.0 (%)		80.0	Δ
AP2-11 (0h1A0B)	Current load curve	Load Curve Cur	-		0.0	X
AP2-12 (0h1A0C)	Power load curve	Load Curve Pwr	-		0.0	X

[48] Set the operation mode to AUTO to configure AP2-01.

Code (Comm. Address)	Name	LCD Display	Setting Range		Initial Value	Property*
AP2-15 (0h1A0F)	Pump clean setting1	Pump Clean Mode1	0	None	0: None	O
			1	DI Dependent		
			2	Output Power		
			3	Output Current		
AP2-16 (0h1A10)	Pump clean setting2	Pump Clean Mode2	0	None	0: None	Δ
			1	Start		
			2	Stop		
			3	Start and Stop		
AP2-17 (0h1A11)	Pump clean load setting	PC Curve Rate	0.1–200.0 (%)		100.0	O
AP2-18 (0h1A12)	Pump clean reference band	PC Curve Band	0.0–100.0 (%)		5.0	O
AP2-19 (0h1A13)	Pump clean operation delay time	PC Curve DT	0.0–6000.0 (sec)		60.0	O
AP2-20 (0h1A14)	Pump clean start delay time	PC Start DT	0.0–6000.0 (sec)		10.0	O
AP2-21 (0h1A15)	0 speed operating time at Fx/Rx switching	PC Step DT	0.1–6000.0 (sec)		5.0	O
AP2-22 (0h1A16)	Pump clean Acc time	PC Acc Time	0.0–600.0 (sec)		10.0	O
AP2-23 (0h1A17)	Pump clean Dec time	PC Dec Time	0.0–600.0 (sec)		10.0	O
AP2-24 (0h1A18)	Forward step maintaining time	FwdSteadyTime	0.0–600.0 (sec)		10.0	O
AP2-25 (0h1A19)	Forward step maintaining frequency	FwdSteadyFreq	0.00, Low Freq–High Freq		30.00	O

Code (Comm. Address)	Name	LCD Display	Setting Range	Initial Value	Property*
AP2-26 (0h1A1A)	Reverse step running time	Rev SteadyTime	0.0–600.0 (sec)	10.0	O
AP2-27 (0h1A1B)	Reverse step running frequency	Rev SteadyFreq	0.00, Low Freq–High Freq	30.00	O
AP2-28 (0h1A1C)	Pump clean number of Fx/Rx steps	PC Num of Steps	1–10	2	O
AP2-29 (0h1A1D)	Pump clean function cycle monitoring	Repeat Num Mon	-	0	X
AP2-30 (0h1A1E)	Number of pump clean repetitions	Repeat Num Set	0–10	2	O
AP2-31 (0h1A1F)	Operation after pump clean end	PC End Mode	0 Stop 1 Run	0:Stop	Δ
AP2-32 (0h1A20)	Pump clean continuous limit time	PC Limit Time	6–60 (min)	10	O
AP2-33 (0h1A21)	Pump clean continuous limit numbers	PC Limit Num	0–10	3	O
AP2-38 (0h1A26)	Dec valve operation frequency	Dec Valve Freq	Low Freq–High Freq	40.00	O
AP2-39 (0h1A27)	Dev valve dec time	Dev Valve Time	0.0–6000.0 (sec)	0.0	O
AP2-40 (0h1A28)	Thrust frequency	Thrust Freq	0.00–High Freq	0.00	Δ
AP2-41 (0h1A29)	Thrust accelrataion time	Thrust Acc Tm	0.0–600.0 (sec)	1.0	O
AP2-42 (0h1A2A)	Thrust deceleration time	Thrust Dec Tm	0.0–600.0 (sec)	5.0	O
AP2-43 (0h1A2B)	Damper check time	Damper Check T	0.0~600.0 (sec)	5.0	O

Code (Comm. Address)	Name	LCD Display	Setting Range	Initial Value	Property*
AP2-44 (0h1A2C)	Lubrication operation time	Lub Op Time	0.0~600.0 (sec)	5.0	O
AP2-45 (0h1A2D)	Damper check time	Damper check T	0.0 – 600.0 (sec)	5.0	O
AP2-46 (0h1A2E)	Lubrication operation time	Lub Op Time	0.0–600.0 (sec)	5.0	O
AP2-47 (0h1A2F)	DC injection delay time	DC Inj Delay T	0.0–600.0 (sec)	60.0	O
AP2-48 (0h1A30)	High feedback detection mode	High Fdb Mode	0 None 1 Warning 2 Trip & Coast	0: None	O
AP2-49 (0h1A31)	High feedback level fault delay time	High Fdb Time	0.0–1200.0 (sec)	5.0	O
AP2-50 (0h1A32)	High feedback detection level	High Fdb Level	- PID Unit Max–PID Unit Max	PID Unit 100%*0.95	O
AP2-51 (0h1A33)	Low feedback detection mode	Low Fdb Mode	0 None 1 Warning 2 Trip & Coast	0: None	O
AP2-52 (0h1A34)	Low feedback level fault delay time	Low Fdb Time	0.1–120.0 (sec)	10.0	O
AP2-53 (0h1A35)	Low feedback detection level	Low Fdb Level	- PID Unit Max–PID Unit Max	0	O
AP2-54 (0h1A36)	Hysteresis level	Hysteresis Lev	- PID Unit Max–PID Unit Max	0	O
AP2-55 (0h1A37)	Setpoint timeout selection	SP Timeout Sel	0 None 1 Warning 2 Trip & Coast	0: None	O
AP2-56 (0h1A38)	Setpoint timeout delay time	SP Timeout DT	0.0–6000.0 (sec)	10.0	O

Code (Comm. Address)	Name	LCD Display	Setting Range		Initial Value	Property*
AP2-57 (0h1A39)	Setpoint timeout maximum difference level	SP Timeout Lev	0–PID Unit 100%		0	O
AP2-60 (0h1A3C)	Differential level detection mode	Diff Fdb Mode	0	None	0: None	O
			1	Warning		
			2	Trip & Coast		
AP2-61 (0h1A3D)	Differential level detection source	Diff Fdb Src	0	V1	0: V1	Δ
			2	V2		
			3	I2		
			4	Int485		
			5	Fieldbus		
			7	Pulse		
			8	V3		
			9	I3		
AP2-62 (0h1A3E)	Differential level detection time	Diff Fdb Time	0.0–1200.0 (sec)		10.0	O
AP2-63 (0h1A3F)	Differential level feedback level	Diff Fdb Level	0–30000		3000	O
AP2-64 (0h1A40)	Differential feedback value monitor	Diff Fdb Value	-		0	X
AP2-65 (0h1A41)	Maximum allowable number of cycles	Over Cycle Cnt	0–10		0	O
AP2-66 (0h1A42)	Mximum cycling protection time	Max Cycle Time	0–3600 (sec)		300	O
AP2-67 (0h1A43)	Over cycle protection mode	OverCycle Mode	0	None	0: None	O
			1	Warning		
			2	Trip & Coast		
AP2-70 (0h1A46)	Output current limit control selection	Curr Lim Sel	0	No	0: No	Δ
			1	Yes		

Code (Comm. Address)	Name	LCD Display	Setting Range	Initial Value	Property*
AP2-71 (0h1A47)	Output current limit level	Current Limit	0.0–1000.0 (A)	0.0	Δ
AP2-72 (0h1A48)	Current limit control proportional gain	CurrLim P-gain	0.00–300.00 (%)	100.00	Δ
AP2-73 (0h1A49)	Current limit control integral time	CurrLim I-time	0.0–200.0 (sec)	2.0	Δ
AP2-74 (0h1A4A)	Current limit control filter time	CurrLim Filter	0.00–10.00 (sec)	1.00	Δ
AP2-75 (0h1A4B)	Lost Feedback Mode	Lost Fdb Mode	0 None 1 Warning 2 Trip & Coast 3 Lost Preset	0. None	O

4.11 Application 3 Function Group (AP3)

Data in the following table will be displayed only when the related code has been selected.

*O: Write-enabled during operation, Δ: Write-enabled when operation stops, X: Write-disabled

Code (Comm. Address)	Name	LCD Display	Setting Range	Initial Value	Property*
AP3-00 (-)	Jump code	Jump Code	1–99	-	X
AP3-01 (0h1B01)	Current date	Now Date	01/01/2000 ~ 12/31/2099 (Date)	01/01/2000	O
AP3-02 (0h1B02)	Current time	Now Time	0: 00–23: 59 (min)	0: 00	O
AP3-03 (0h1B03)	Current day	Now Weekday	0000000–1111111 (Bit)	0000001	O

Code (Comm. Address)	Name	LCD Display	Setting Range	Initial Value	Property*
AP3-04 (0h1B04)	Summer Time Start date	Summer T Start	01/01 ~ Summer T Stop	04/01	O
AP3-05 (0h1B05)	Summer Time Finish date	Summer T Stop	Summer T Start ~12/31(Date)	11/31	O
AP3-06[49] (0h1B06)	Date display format	Date Format	0 YYYY/MM/DD 1 MM/DD/YYYY 2 DD/MM/YYYY	MM/DD/YYYY	O
AP3-10 (0h1B0A)	Period connection status	Period Status	-	0000 0000 0000	X
AP3-11 (0h1B0B)	Time Period1 Start time configuration	Period1 Start T	0: 00–24: 00 (min)	24: 00	O
AP3-12 (0h1B0C)	Time Period1 End time configuration	Period1 Stop T	Period1 Start T – 24: 00 (min)	24: 00	O
AP3-13 (0h1B0D)	Time Period1 Day of the week configuration	Period1 Day	000 0000 – 111 1111 (Bit)	000 0000	O
AP3-14 (0h1B0E)	Time Period2 Start time configuration	Period2 Start T	0: 00–24: 00 (min)	24: 00	O
AP3-15 (0h1B0F)	Time Period2 End time configuration	Period2 Stop T	Period2 Start T – 24: 00 (min)	24: 00	O
AP3-16 (0h1B10)	Time Period2 Day of the week configuration	Period2 Day	000 0000 – 111 1111 (Bit)	000 0000	O
AP3-17 (0h1B11)	Time Period3 Start time configuration	Period3 Start T	0: 00–24: 00 (min)	24: 00	O
AP3-18 (0h1B12)	Time Period3 End time configuration	Period3 Stop T	Period3 Start T – 24: 00 (min)	24: 00	O

[49] The date format can be changed according to the AP3-06 settings.

Code (Comm. Address)	Name	LCD Display	Setting Range	Initial Value	Property*
AP3-19 (0h1B13)	Time Period3 Day of the week configuration	Period3 Day	000 0000 – 111 1111 (Bit)	000 0000	O
AP3-20 (0h1B14)	Time Period4 Start time configuration	Period4 Start T	0: 00–24: 00 (min)	24: 00	O
AP3-21 (0h1B15)	Time Period4 End time configuration	Period4 Stop T	Period4 Start T – 24: 00 (min)	24: 00	O
AP3-22 (0h1B16)	Time Period Day of the week configuration	Period4 Day	000 0000 – 111 1111 (Bit)	000 0000	O
AP3-30 (0h1B1E)	Except1 Date Start time configuration	Except1 Start T	0: 00–24: 00 (min)	24: 00	O
AP3-31 (0h1B1F)	Except1 Date End time configuration	Except1 Stop T	Except1 StartT – 24: 00 (min)	24: 00	O
AP3-32 (0h1B20)	Except1 Date configuration	Except1Date	01/01–12/31 (Date)	01/01	O
AP3-33 (0h1B21)	Except2 Date Start time configuration	Except2 Start T	0: 00–24: 00 (min)	24: 00	O
AP3-34 (0h1B22)	Except2 Date Stop time configuration	Except2 Stop T	Except2 StartT – 24: 00 (min)	24: 00	O
AP3-35 (0h1B23)	Except2 Date configuration	Except2Date	01/01–12/31 (Date)	01/01	O
AP3-36 (0h1B24)	Except3 Date Start time configuration	Except3 Start T	0: 00–24: 00 (min)	24: 00	O
AP3-37 (0h1B25)	Except3 Date End time configuration	Except3 Stop T	Except3 StartT – 24: 00 (min)	24: 00	O
AP3-38 (0h1B26)	Except3 Date configuration	Except3Date	01/01–12/31 (Date)	01/01	O

Code (Comm. Address)	Name	LCD Display	Setting Range	Initial Value	Property*
AP3-39 (0h1B27)	Except4 Date Start time configuration	Except4 Start T	0: 00–24: 00 (min)	24: 00	O
AP3-40 (0h1B28)	Except4 Date End time configuration	Except4 Stop T	Except4 StartT – 24: 00 (min)	24: 00	O
AP3-41 (0h1B29)	Except4 Date configuration	Except4Date	01/01–12/31 (Date)	01/01	O
AP3-42 (0h1B2A)	Except5 Date Start time configuration	Except5 Start T	0: 00–24: 00 (min)	24: 00	O
AP3-43 (0h1B2B)	Except5 Date End time configuration	Except5 Stop T	Except5 StartT – 24: 00 (min)	24: 00	O
AP3-44 (0h1B2C)	Except5 Date configuration	Except5 Date	01/01–12/31 (Date)	01/01	O
AP3-45 (0h1B2D)	Except6 Date Start time configuration	Except6 Start T	0: 00–24: 00 (min)	24: 00	O
AP3-46 (0h1B2E)	Except6 Date End time configuration	Except6 Stop T	Except6 StartT – 24: 00 (min)	24: 00	O
AP3-47 (0h1B2F)	Except6 Date configuration	Except6 Date	01/01–12/31 (Date)	01/01	O
AP3-48 (0h1B30)	Except7 Date Start time configuration	Except7 Start T	0: 00–24: 00 (min)	24: 00	O
AP3-49 (0h1B31)	Except7 Date End time configuration	Except7 Stop T	Except7 StartT – 24: 00 (min)	24: 00	O
AP3-50 (0h1B32)	Except7 Date configuration	Except7 Date	01/01–12/31 (Date)	01/01	O
AP3-51 (0h1B33)	Except8 Date Start time configuration	Except8 Start T	0: 00–24: 00 (min)	24: 00	O

Code (Comm. Address)	Name	LCD Display	Setting Range		Initial Value	Property*
AP3-52 (0h1B34)	Except8 Date End time configuration	Except8 Stop T	Except8 StartT – 24: 00 (min)		24: 00	O
AP3-53 (0h1B35)	Except8 Date configuration	Except8 Date	01/01–12/31 (Date)		01/01	O
AP3-70 (0h1B46)	Time Event function configuration	Time Event En	0	No	0: NO	Δ
			1	Yes		
AP3-71 (0h1B47)	Time Event configuration status	T-Event Status	-		0000 0000	X
AP3-72 (0h1B48)	Time Event 1 connection status	T-Event1 Period	0000 0000 0000 – 1111 1111 1111		0000 0000 0000	Δ
AP3-73 (0h1B49)	Time Event 1 functions	T-Event1 Define	0	None	0: None	Δ
			1	Fx		
			2	Rx		
			3	Speed-L		
			4	Speed-M		
			5	Speed-H		
			7	Xcel-L		
			8	Xcel-M		
			9	Xcel-H		
			10	Xcel Stop		
			11	Run Enable		
			12	Exchange		
			13	Analog Hold		
			14	I-Term Clear		
			15	PID Openloop		
			16	PID Gain 2		
			17	PID Ref Change		

Code (Comm. Address)	Name	LCD Display	Setting Range		Initial Value	Property*
			18	Timer In		
			19	dis Aux Ref		
			20	Pre Heat		
			21	Sleep Wake Chg		
			22	PID Step Ref L		
			23	PID Step Ref M		
			24	PID Step Ref H		
AP3-74 (0h1B4A)	Time Event 2 connection configuration	T-Event2 Period	0000 0000 0000 – 1111 1111 1111		0000 0000 0000	Δ
AP3-75 (0h1B4B)	Time Event 2 functions	T-Event2 Define	Identical to the setting range for AP3-73		0: None	Δ
AP3-76 (0h1B4C)	Time Event 3 connection configuration	T-Event2 Period	0000 0000 0000 – 1111 1111 1111		0000 0000 0000	Δ
AP3-77 (0h1B4D)	Time Event 3 functions	T-Event3 Define	Identical to the setting range for AP3-73		0: None	Δ
AP3-78 (0h1B4E)	Time Event 4 connection configuration	T-Event4 Period	0000 0000 0000 – 1111 1111 1111		0000 0000 0000	Δ
AP3-79 (0h1B4F)	Time Event 4 functions	T-Event4 Define	Identical to the setting range for AP3-73		0: None	Δ
AP3-80 (0h1B50)	Time Event 5 connection configuration	T-Event5 Period	0000 0000 0000 – 1111 1111 1111		0000 0000 0000	Δ

Code (Comm. Address)	Name	LCD Display	Setting Range	Initial Value	Property*
AP3-81 (0h1B51)	Time Event 5 functions	T-Event5 Define	Identical to the setting range for AP3-73	0: None	Δ
AP3-82 (0h1B52)	Time Event 6 connection configuration	T-Event6 Period	0000 0000 0000 – 1111 1111 1111	0000 0000 0000	Δ
AP3-83 (0h1B53)	Time Event 6 functions	T-Event6 Define	Identical to the setting range for AP3-73	0: None	Δ
AP3-84 (0h1B54)	Time Event 7 connection configuration	T-Event7 Period	0000 0000 0000 – 1111 1111 1111	0000 0000 0000	Δ
AP3-85 (0h1B55)	Time Event 7 functions	T-Event7 Define	Same setting range for AP3-73	0: None	Δ
AP3-86 (0h1B56)	Time Event 8 connection configuration	T-Event8 Period	0000 0000 0000 – 1111 1111 1111	0000 0000 0000	Δ
AP3-87 (0h1B57)	Time Event 8 functions	T-Event8 Define	Same setting range as AP3-73	0: None	Δ

4.12 Application 4 Function Group (AP4)

Data in the following table will be displayed only when the related code has been selected.

*O: Write-enabled during operation, Δ: Write-enabled when operation stops, X: Write-disabled

Code (Comm. Address)	Name	LCD Display	Setting Range		Initial Value	Property*
AP4-00 (-)	Jump code	Jump Code	1–99		-	X
			0	None	0: None	

Code (Comm. Address)	Name	LCD Display	Setting Range		Initial Value	Property*
AP4-01 (0h1C01)	PI auxiliary control selection	PI Aux Sel	1	Suction (PSI)		Δ
			2	Vacuum (Hg)		
			3	Water Lvl (ft)		
			4	Custom_ Normal		
			5	Custom_ Inverse		
AP4-02 (0h1C02)	PI auxiliary control feedback unit 100%	PIAux Unit 100%	5.0–3000.0		100.0	O
AP4-03 (0h1C03)	PI auxiliary control feedback source	PI Aux Fbk Src	0	V1	3: I2	Δ
			2	V2		
			3	I2		
			4	Int485		
			5	Fieldbus		
			7	Pulse		
			8	V3		
			9	I3		
AP4-04 (0h1C04)	PI auxiliary control setpoint	PIAux Setpoint	0.0~ PIAuxUnit 100%		20.0	O
AP4-05 (0h1C05)	PI auxiliary control feedback vlaue monitor	PIAuxFbk Mon	-		0.0	X
AP4-06 (0h1C06)	PI auxiliary control sleep level	PIAux Sleep Lev	0.0–1200.0		10.0	O
AP4-07 (0h1C07)	PI auxiliary control sleep delay time	PIAux Sleep DT	0–3600 (sec)		5	O
AP4-08 (0h1C08)	PI auxiliary control wake-up level	PIAux Wake Lev	0.0–3000.0		30.0	O
AP4-09 (0h1C09)	PI auxiliary control wake-up delay time	PIAux Wake DT	0–3600 (sec)		1	O

Code (Comm. Address)	Name	LCD Display	Setting Range	Initial Value	Property*
AP4-10 (0h1C0A)	PI auxiliary control activation level	PI Aux Act Lev	0.0–3600.0	0.0	O
AP4-11 (0h1C0B)	PI auxiliary control activation/deactivation delay	PI Aux Act DT	0–3600 (sec)	2	O
AP4-12 (0h1C0C)	PI auxiliary control minimum speed	PI Aux Min Spd	0.00–400.00 (Hz)	0.50	O
AP4-13 (0h1C0D)	PI auxiliary control low level detection	Low Lev Detect	0.0– PIAuxUnit 100%	0.0	O
AP4-14 (0h1C0E)	PI auxiliary control low level detection time	Low Lev Det Tm	0.0–6000.0 (sec)	0.1	O
AP4-15 (0h1C0F)	PI auxiliary control low level detection selection	LowLev Det Sel	0 None 1 Warning 2 Trip & Coast 3 RST Restart	0: None	O
AP4-16 (0h1C10)	PI auxiliary control low level detection restart time	Low Lev RST Tm	0.0–3000.0 (Min)	5.0	O
AP4-17 (0h1C11)	PI auxiliary control high level detection	HighLev Detect	0.0– PIAuxUnit 100%	0.0	O
AP4-18 (0h1C12)	PI auxiliary control high level detection time	HighLev Det Tm	0.0–6000.0 (sec)	0.1	O
AP4-19 (0h1C13)	PI auxiliary control high level detection selection	HighLevDet Sel	0 None 1 Warning 2 Trip & Coast 3 RST Restart	1: Warning	O
AP4-20 (0h1C14)	PI auxiliary control high level detection restart time	HighLev RST Tm	0.0–3000.0 (Min)	5.0	O

Code (Comm. Address)	Name	LCD Display	Setting Range		Initial Value	Property*
AP4-23 (0h1C17)	PI auxiliary control proportional gain	PI Aux P-Gain	0.00–650.00 (%)		100.00	O
AP4-24 (0h1C18)	PI auxiliary control Integral gain	PI Aux I-Time	0.0–200.0 (sec)		2.0	O
AP4-25 (0h1C19)	PI auxiliary speed control selection	PIAux Spd Ctrl	0	No	1: Yes	O
			1	Yes		
AP4-26 (0h1C1A)	PI auxiliary control unit scale	PIAuxUnitScale	0	x 100	1: x10	O
			1	x 10		
			2	x 1		
			3	x 0.1		
			4	x 0.01		
AP4-27 (0h1C1B)	PI auxiliary control unit selection	PIAux Unit Sel	0	CUST	2: PSI	O
			1	%		
			2	PSI		
			3	F		
			4	C		
			5	in WC		
			6	in M		
			7	mBar		
			8	Bar		
			9	Pa		
			10	kPa		
			11	Hz		
			12	Rpm		
			13	V		
			14	A		
			15	kW		
			16	Hp		
			17	Mpm		

Code (Comm. Address)	Name	LCD Display	Setting Range		Initial Value	Property*
			18	Ft		
			19	m/s		
			20	m3/s		
			21	m3/m		
			22	m3/h		
			23	l/s		
			24	l/m		
			25	l/h		
			26	kg/s		
			27	kg/m		
			28	kg/h		
			29	gl/s		
			30	gl/m		
			31	gl/h		
			32	ft/s		
			33	f3/s		
			34	f3/m		
			35	f3/h		
			36	lb/s		
			37	lb/m		
			38	lb/h		
			39	ppm		
			40	pps		
			41	Wb		
AP4-30 (0h1C1E)	Flow Control Selection	Flow Control	0	No	0: No	Δ
			1	Yes		
			2	AccumRst→ Yes		
AP4-31			0	V1	0: V1	O

Code (Comm. Address)	Name	LCD Display	Setting Range		Initial Value	Property*
(0h1C1F)	Flow Meter Source Selection	Flow Meter Src	2	V2		
			3	I2		
			4	Int485		
			5	Fieldbus		
			7	Pulse		
			8	V3		
			9	I3		
AP4-32 (0h1C20)	Flow rate monitor	Flow Rate Mon	-		0.00	X
AP4-33 (0h1C21)	Turbine Input Scaling	Turbine Scale	0–32000		0	O
AP4-34 (0h1C22)	Flow Unit 0%	Flow Unit 0%	0–30000		0	O
AP4-35 (0h1C23)	Flow Unit 100%	Flow Unit 100%	0–30000		10000	O
AP4-36 (0h1C24)	Flow Unit Selection	Flow Unit Sel	0	gl/m	0: gl/m	O
			1	gl/h		
			2	f3/m		
			3	m3/h		
AP4-37 (0h1C25)	Flow Decimal Scale	Flow Dec Scale	0	x 100	2: x1	O
			1	x 10		
			2	x 1		
			3	x 0.1		
			4	x 0.01		
AP4-38 (0h1C26)	Accumulation Level -Millions	AccumLvMillion	0–65535		0	O
AP4-39 (0h1C27)	Accumulation Level -Thousands	AccumLvThou	0–999		0	
AP4-40 (0h1C28)	Accumulation Level -Ones	AccumLvOnes	0–9999		0	O

Code (Comm. Address)	Name	LCD Display	Setting Range	Initial Value	Property*
AP4-41 (0h1C29)	Accumulation Level –Decimal	AccumLvDecimal	0.00–1.00	0.00	O
AP4-42 (0h1C2A)	Low Flow Level	Low Flow Level	0–60000	0	O
AP4-43 (0h1C2B)	Low Fow Detection Delay Time	Low Flow DT	0–6000 (sec)	10	O
AP4-44 (0h1C2C)	Low Flow Selection	Low Flow Sel	0 None 1 Warning 2 Trip & Coast 3 RST Restart	0: None	O
AP4-45 (0h1C2D)	Low Flow Start Delay Time	LowFlow St DT	0.0–3600.0 (Min)	0.0	O
AP4-46 (0h1C2E)	Low Flow Start Delay OFF time	StartDlyOff Tm	0–6000 (sec)	5	O
AP4-47 (0h1C2F)	High Flow Level	High Flow Lev	0–30000	0	O
AP4-48 (0h1C30)	High Flow Detection Delay Time	High Flow DT	0–6000 (Sec)	10	O
AP4-49 (0h1C31)	High Flow Selection	High Flow Sel	0 None 1 Warning 2 Trip & Coast	0: None	O
AP4-50 (0h1C32)	Set Accumulation Level Millions	SetAccumLvM	0–65535	0	O

Code (Comm. Address)	Name	LCD Display	Setting Range		Initial Value	Property*
AP4-51 (0h1C33)	Set Accumulation Level Thousands	SetAccumLv K	0–999		0	O
AP4-52 (0h1C34)	Set Accumulation Level Ones	SetAccumLv One	0–999		0	O
AP4-53 (0h1C35)	Set Accumulation Level Decimal	SetAccumLv Dec	0.00–1.00		0.00	O
AP4-54 (0h1C36)	Accumulation Flow Selection	Accum Flow Sel	0	None	0: None	O
			1	Warning		
			2	Trip & Coast		
			3	Trip& RstAccum		
AP4-55 (0h1C37)	Flow Limit Selection	Flow Limit Sel	0	Disabled	0: Disabled	O
			1	High		
			2	Low		
AP4-56 (0h1C38)	Flow Limit Level	Flow Limit Lev	0–60000		0	O
AP4-57 (0h1C39)	Flow Limit P-Gain	FlowLim P-Gain	0.00–250.0		1.00	O
AP4-58 (0h1C3A)	Flow Limit I-Gain	FlowLim I-time	0.00–100.00 (sec)		1.00	O
AP4-59 (0h1C3B)	Flow Limit Delay Time	Flow Lim DT	0–6000 (sec)		10	O
AP4-60 (0h1C3C)	Low Flow RST Restart Time	LowFlow RST Tm	0.0–6000.0 (Min)		3.0	O

4.13 Protection Function Group (PRT)

Data in the following table will be displayed only when the related code has been selected.

*O: Write-enabled during operation, Δ: Write-enabled when operation stops, X: Write-disabled

Code (Comm. Address)	Name	LCD Display	Setting Range		Initial Value		Property*
PRT-00 (-)	Jump Code	Jump Code	1–99		-		X
PRT-01 (0h1D01)	Backspin time	Backspin Time	0~6000.0 (sec)		0.0		O
PRT-02 (0h1D02)	Load duty	Load Duty	0	Normal Duty	0: Normal Duty		X
			1	Heavy Duty			
PRT-03 (0h1D03)	Input/output open-phase protection	Phase Loss Chk	Bit	00–11	00		Δ
			Bit0	Output open phase			
			Bit1	Input open phase			
PRT-04 (0h1D04)	Input voltage range during open-phase	IPO V Band	1–100 (V)		15		O
PRT-07 (0h1D07)	Deceleration time at fault trip	Trip Dec Time	0.0–600.0 (sec)		3.0	0.75~ 90kW	O
					90.0	110~ 500kW	
PRT-08 (0h1D08)	Selection of startup on trip reset	RST Restart	Bit	00000000–11111111	00000000		O
			Bit 0	Standard Trips except the below			
			Bit 1	Low Voltage Trip			
			Bit 2	Low Feedback Trip			

Code (Comm. Address)	Name	LCD Display	Setting Range		Initial Value	Property*
			Bit 3	High Feedback Trip		
			Bit 4	SetPoint Timeout		
			Bit 5	Overcycle Trip		
			Bit 6	High Flow Trip		
			Bit 7	Accum Flow Trip		
PRT-09 (0h1D09)	Number of automatic restarts	Retry Number	0–10		0	O
PRT-10 (0h1D0A)	Automatic restart delay time	Rtry Num Count	-		0	X
PRT-11 (0h1D0B)	Automatic restart delay time	Retry Delay	0.1~600.0 (sec)		5.0	O
PRT-12 (0h1D0C)	Lost keypad mode	Lost KPD Mode	0	None	0:None	O
			1	Warning		
			2	Trip&Coast		
			3	Decel Stop		
PRT-13 (0h1D0D)	Speed command loss operation mode	Lost Cmd Mode	0	None	0: None	O
			1	Trip&Coast		
			2	Decel Stop		
			3	Hold Input		
			4	Hold Output		
			5	Lost Preset		
PRT-14[50] (0h1D0E)	Time to determine speed command loss	Lost Cmd Time	0.1–120.0 (sec)		1.0	O

[50]PRT-13–15 are displayed when PRT-12 is not set to “0 (NONE)”.

Code (Comm. Address)	Name	LCD Display	Setting Range		Initial Value	Property*
PRT-15 (0h1D0F)	Operation frequency at speed command loss	Lost Preset F	0.00, Low Freq–High Freq		0.00	O
PRT-16 (0h1D10)	Analog input loss decision level	AI Lost Level	0	Half of x1	0: Half of x1	O
			1	Below x1		
PRT-17 (0h1D11)	Overload warning selection	OL Warn Select	0	No	0: No	O
			1	Yes		
PRT-18 (0h1D12)	Overload warning level	OL Warn Level	30–OL Trip Level(%)		110	O
PRT-19 (0h1D13)	Overload warning time	OL Warn Time	0.0–30.0 (sec)		10.0	O
PRT-20 (0h1D14)	Motion at overload trip	OL Trip Select	0	None	1: Trip&Coast	O
			1	Trip&Coast		
			2	Decel Stop		
PRT-21 (0h1D15)	Overload trip level	OL Trip Level	30–150 (%)		120	O
PRT-22 (0h1D16)	Overload trip time	OL Trip Time	0.0–60.0 (sec)		60.0	O
PRT-23 (0h1D17)	Under load detection Source	UL Source	0	Output Current	0: Output Current	Δ
			1	Output Power		
PRT-24 (0h1D18)	Under load detection band	UL Band	0.0–100.0 (%)		10.0	Δ
PRT-25 (0h1D19)	Under load warning selection	UL Warn Sel	0	No	0: No	O
			1	Yes		
PRT-26 (0h1D1A)	Under load warning time	UL Warn Time	0.0–600.0 (sec)		10.0	O
PRT-27			0	None	0: None	O

Code (Comm. Address)	Name	LCD Display	Setting Range		Initial Value	Property*
(0h1D1B)	Under load trip selection	UL Trip Sel	1	Trip&Coast		
			2	Decel Stop		
PRT-28 (0h1D1C)	Under load trip timer	UL Trip Time	0.0–600.0 (sec)		30.0	O
PRT-29 (0h1D1D)	Under load trip Retry Number	UL Retry Num	0~10		2	O
PRT-30 (0h1D1E)	Under load trip delay time	UL Retry Dly	0.0~6000.0 (sec)		10.0	O
PRT-31 (0h1D1F)	Operation on no motor trip	No Motor Trip	0	None	0: None	O
			1	Trip&Coast		
PRT-32 (0h1D20)	No motor trip current level	No Motor Level	1–100 (%)		5	O
PRT-33 (0h1D21)	No motor detection time	No Motor Time	0.1–10.0 (sec)		3.0	O
PRT-34 (0h1D22)	Operation at motor overheat detection	Thermal-T Sel	0	None	0: None	O
			1	Trip&Coast		
			2	Decel Stop		
PRT-35 (0h1D23)	Thermal sensor input	Thermal In Src	0	Thermal In	0: Thermal In	O
			1	V2		
PRT-36 (0h1D24)	Thermal sensor fault level	Thermal-T Lev	0.0–100.0 (%)		50.0	O
PRT-37 (0h1D25)	Thermal sensor fault range	Thermal-T Area	0	Low	0: Low	O
			1	High		
PRT-38[51] (0h1D26)	Motor overheat detection sensor	Thermal Monitor	-		-	X
PRT-40 (0h1D28)	Electronic thermal prevention fault trip selection	ETH Trip Sel	0	None	0: None	O
			1	Trip&Coast		
			2	Decel Stop		

[51]PRT-38 is displayed when PRT-34 is not set to “0 (NONE)”.

Code (Comm. Address)	Name	LCD Display	Setting Range		Initial Value	Property*
PRT-41 (0h1D29)	Motor cooling fan type	Motor Cooling	0	Self-cool	0: Self-cool	O
			1	Forced-cool		
PRT-42 (0h1D2A)	Electronic thermal one minute rating	ETH 1 min	ETH Cont–150 (%)		120	O
PRT-43 (0h1D2B)	Electronic thermal prevention continuous rating	ETH Cont	50–120 (%)		100	O
PRT-44 (0h1D2C)	Fire mode password	Fire Mode PW	0~9999		3473	O
PRT-45[52] (0h1D2D)	Fire mode setting	Fire Mode Sel	0	None	0: None	O
			1	Fire Mode		
			2	Test Mode		
PRT-46[53] (0h1D2E)	Fire mode direction setting	Fire Mode Dir	0	Reverse	1: Forward	O
			1	Forward		
PRT-47[54] (0h1D2F)	Fire mode frequency setting	Fire Mode Freq	0.00–max Freq		60.00	O
PRT-48 (0h1D30)	Number of fire mode operations	Fire Mode Cnt	-		0	X
PRT-50			bit	0000–1111	0100	Δ

[52] PRT-45 can only be set when PRT-44 is in Fire mode. To change the mode in PRT-44, create a new password for PRT-44.

[53] PRT-46–47 are displayed when PRT-45 is not set to “0 (NONE)”.

[54] When Fire mode is set at PRT-45, PRT-46 is automatically set to forward, and the frequency set at PRT-47 cannot be edited. When PRT-45 is set to Test mode, PRT-46 and PRT-47 settings are editable.

Code (Comm. Address)	Name	LCD Display	Setting Range		Initial Value	Property*
(0h1D32)	Stall prevention and flux braking	Stall Prevent	Bit 0	At acceleration		
			Bit 1	At constant speed		
			Bit 2	At deceleration		
			Bit 3	Flux braking		
PRT-51 (0h1D33)	Stall frequency 1	Stall Freq 1	Start frequency-Stall frequency2 (Hz)		60.00	O
PRT-52 (0h1D34)	Stall level 1	Stall Level 1	30-150 (%)		130	Δ
PRT-53 (0h1D35)	Stall frequency 2	Stall Freq 2	Stall frequency1-Stall frequency3 (Hz)		60.00	O
PRT-54 (0h1D36)	Stall level 2	Stall Level 2	30-150 (%)		130	Δ
PRT-55 (0h1D37)	Stall frequency 3	Stall Freq 3	Stall frequency2-Stall frequency 4 (Hz)		60.00	O
PRT-56 (0h1D38)	Stall level 3	Stall Level 3	30–150 (%)		130	Δ
PRT-57 (0h1D39)	Stall frequency 4	Stall Freq 4	Stall frequency3-Maximum frequency (Hz)		60.00	O
PRT-58 (0h1D3A)	Stall level 4	Stall Level 4	30–150 (%)		130	Δ
PRT-59 (0h1D3B)	Flux braking gain	Flux Brake Kp	0.75-90kW	0–150 (%)	0	O
			110-500kW	0–10 (%)		
PRT-60 (0h1D3C)	Pipe break detection setting	PipeBrokenSel	0	None	0: None	O
			1	Warning		
			2	Trip&Coast		

Code (Comm. Address)	Name	LCD Display	Setting Range		Initial Value	Property*
			3	Decel Stop		
PRT-61 (0h1D3D)	Pipe break detection variation	PipeBroken Lev	0.0–100.0 (%)		97.5	O
PRT-62 (0h1D3E)	Pipe break detection time	PipeBroken DT	0.0–6000.0 (Sec)		10.0	O
PRT-63 (0h1D3F)	Braking resistor configuration	DB Warn %ED	0–30 (%)		0	O
PRT-66 (0h1D42)	No-flow-control bandwidth	NFC Bandwidth	0.00~4.00 (%)		0.00	O
PRT-67 (0h1D43)	No-flow-control detection time	NFC Det Time	1.0~60.0 (sec)		10.0	O
PRT-68 (0h1D44)	No-flow-control release level	NFC Release Lev	0~1000		300	O
PRT-69 (0h1D45)	No-flow-control timer	NFC Timer	-		1.0	X
PRT-70 (0h1D46)	Level detect mode selection	LDT Sel	0	None	0: None	O
			1	Warning		
			2	Trip&Coast		
			3	Decel Stop		
			4	RST Restart		
PRT-71 (0h1D47)	Level detect range setting	LDT Area Sel	0	Below Level	0: Below Level	O
			1	Above Level		
PRT-72 (0h1D48)	Level detect source	LDT Source	0	Output Current	0: Output Current	O
			1	DC Link Voltage		
			2	Output Voltage		

Code (Comm. Address)	Name	LCD Display	Setting Range		Initial Value	Property*
			3	kW		
			4	HP		
			5	V1		
			6	V2		
			7	I2		
			8	Setpoint Value		
			9	Feedback Value		
			10	Torque Out LPF		
			11	V3		
			12	I3		
PRT-73 (0h1D49)	Level detect delay time	LDT DlyTime	0–9999 (sec)		2	O
PRT-74 (0h1D4A)	Level detect standard set value	LDT Level	Source setting		Source setting	O
PRT-75 (0h1D4B)	Level detect band width	LDT Band width	Source setting		Source setting	O
PRT-76 (0h1D4C)	Level detect frequency	LDT Freq	0.00–High Freq (Hz)		20.00	O
PRT-77 (0h1D4D)	Level detect trip restart time	LDT Restart DT	0.0–3000.0 (Min)		60.0	O
PRT-79 (0h1D4F)	Cooling fan fault selection	Fan Trip Mode	0	Trip	1: Warning	O
			1	Warning		
PRT-80 (0h1D50)	Operation mode on optional card trip	Opt Trip Mode	0	None	1: Trip&Coast	O
			1	Trip&Coast		

Code (Comm. Address)	Name	LCD Display	Setting Range		Initial Value	Property*
			2	Decel Stop		
PRT-81 (0h1D51)	Low voltage trip decision delay time	LVT Delay	0.0–60.0 (sec)		0.0	Δ
PRT-82 (0h1D52)	Low voltage trip decision during operation	LV2 Trip Sel	0	No	0: No	Δ
			1	Yes		
PRT-83 (0h1D53)	Remaining capacitor life diagnosis level	CAP.DiagPerc	10–100 (%)		0	O
PRT-84[55] (0h1D54)	Capacitor life diagnosis mode	CAP. Diag	0	None	0: None	Δ
			1	Cap.Diag 1		
			2	Cap.Diag 2		
			3	Cap.Init		
PRT-85 (0h1D55)	Capacitor life diagnosis level 1	CAP. Level1	50.0–95.0 (%)		0.0	Δ
PRT-86[56] (0h1D56)	Capacitor life diagnosis level 2	CAP. Level2	-		-	X
PRT-87 (0h1D57)	Fan accumulated operating time operation %	Fan Time Perc	-		0.0	X
PRT-88 (0h1D58)	Fan replacement alarm level	Fan Exchange	0.0–100.0 (%)		0.0	O
PRT-90 (0h1D5A)	Low battery voltage setting	Low Battery	0	None	0:None	O
			1	Warning		

[55] PRT-84 is displayed when PRT-83 is set to more than “0(%)”. PRT- 84 can only be set in Auto-State.

[56] PRT-86 is read only.

Code (Comm. Address)	Name	LCD Display	Setting Range		Initial Value	Property*
PRT-91 (0h1D5B)	Setting the function of Broken belt	Broken Belt Sel	0	None	0:None	Δ
			1	Warning		
			2	Trip&Coast		
PRT-92 (0h1D5C)	Operating the frequency of Broken belt	Broken Belt Freq	15.00~MzxFreq		15.00	Δ
PRT-93 (0h1D5D)	Motor torque current	Current Trq	-		0.0	X
PRT-94 (0h1D5E)	Torque current of operating Broken belt	Broken Belt Trq	0.0~100.0%		10.0	Δ
PRT-95 (0 h1D5F)	Delay of operating Broken belt	Broken Belt Dly	0~600.0[sec]		10.0	Δ

4.14 Option Module Function Group (APO)

Data in the following table will be displayed only when the related code has been selected.

*O: Write-enabled during operation, Δ: Write-enabled when operation stops, X: Write-disabled

Code (Comm. Address)	Name	LCD Display	Setting Range	Initial Value	Property*
APO-00 (-)	Jump code	Jump Code	1–99	14	O
APO-01 (0h1E01)	V3 input rate monitor	V3 Monitor[V]	-	0.00	X
APO-02 (0h1E02)	V3 input filter time	V3 Filter	0~10000 (msec)	10	O

Code (Comm. Address)	Name	LCD Display	Setting Range		Initial Value	Property*
APO-03 (0h1E03)	V3 minimum input voltage	V3 Volt x1	0.00~12.00 (V)		0.00	O
APO-04 (0h1E04)	Output at V3 minimum voltage (%)	V3 Perc y1	0.00~100.00 (%)		0.00	O
APO-05 (0h1E05)	V3 maximum input voltage	V3 Volt x2	0.00~12.00 (V)		10.00	O
APO-06 (0h1E06)	Output at V3 maximum voltage (%)	V3 Perc y2	0.00~100.00 (%)		100.00	O
APO-07 (0h1E07)	V3 Rotation direction options	V3 Inverting	0	No	0: No	O
			1	Yes		
APO-08 (0h1E08)	V3 Quantizing level	V3 Quantizing	0.04~10.00 (%)		0.04	O
APO-10 (0h1E0A)	I3 input monitor	I3 Monitor[mA]	-		0.00	X
APO-11 (0h1E0B)	I3 input filter time	I3 Filter	0~10000		10	O
APO-12 (0h1E0C)	I3 minimum input power supply	I3 Curr x1	4.00~20.00 (mA)		4.00	O
APO-13 (0h1E0D)	Output at I3 minimum current (%)	I3 Perc y1	0.00~100.00 (%)		0.00	O
APO-14 (0h1E0E)	I3 maximum input current	I3 Curr x2	0.00~24.00 (mA)		20.00	O
APO-15 (0h1E0F)	Output at I3 maximum current (%)	I3 Perc y2	0.00~100.00 (%)		100.00	O
APO-16 (0h1E10)	I3 rotation direction options	I3 Inverting	0	No	0: No	O
			1	Yes		
APO-17 (0h1E11)	I2 Quantizing level	I3 Quantizing	0.04~10.00 (%)		0.04	O

Code (Comm. Address)	Name	LCD Display	Setting Range		Initial Value	Property*
APO-30 (0h1E1E)	Analog output3	AO3 Mode	0	Frequency	0: Frequency	O
			1	Output Current		
			2	Output Voltage		
			3	DC Link Voltage		
			4	Output Power		
			7	Target Freq		
			8	Ramp Freq		
			9	Setpoint Value		
			10	Feedback Value		
			11	PID Output		
			12	Constant		
APO-31 (0h1E1F)	AO3 Gain	AO3 Gain	-1000.0~1000.0		100.0	O
APO-32 (0h1E20)	AO3 Bias	AO3 Bias	-100.0~100.0 (%)		0.0	O
APO-33 (0h1E21)	AO3 Filter	AO3Filter	0~10000 (msec)		5	O
APO-34 (0h1E22)	AO3 Const %	AO3Const	0.0~100.0 (%)		0.0	O
APO-35 (0h1E23)	AO3 Monitor	AO3Monitor	-		0.00	X

5 Troubleshooting

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

5.1 Trip and Warning

When the inverter detects a fault, it stops the operation (trips) or sends out a warning signal. When a trip or warning occurs, the keypad displays the information briefly. 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 keypad displays the higher priority fault information. In the keypad, fault trips with higher priority are displayed first. Use the [Up], [Down], [Left] or [Right] cursor key on the keypad to view the fault trip information. 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 inverter is still in a fault condition after powering it on again, please contact the supplier or the LS ELECTRIC customer service center.

5.1.1 Fault Trips

Protection Functions for Output Current and Input Voltage

LCD Display	Type	Description
Over Load	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’.
Under Load	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 180% 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.
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

LCD Display	Type	Description
		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 120% for 1 min and 140% for 5 sec.
No Motor Trip	Latch	Displayed when the motor is not connected during inverter operation. Operates when PRT-31 is set to '1'.

Protection Functions Using Abnormal Internal Circuit Conditions and External Signals

LCD Display	Type	Description
Over Heat	Latch	Displayed when the temperature 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.
BX	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).

LCD Display	Type	Description
		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.).
NTC Open	Latch	Displayed when an error is detected in the temperature sensor of the 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).
InFan Trip	Latch	It occurs when an abnormality is detected in the cooling fan inside the inverter with inverter capacity of 110 kW to 500 kW. Selecting PRT - 79 code to 0 will work.
Thermal Trip	Latch	Triggered when the input temperature is higher than the temperature set by the user.
Lost KeyPad	Latch	Triggered when a communication error occurs between the keypad and the inverter, when the keypad is the command source, and PRT-11 (Lost KPD Mode) is set to any other value than '0'.
Fuse Open	Latch	If an input stage fuse breaks with an inverter of 315 kW or more, a fault will occur.

General Fault Trips

LCD Display	Type	Description
Damper Err	Latch	Triggered when the damper open signal or run command signal is longer than the value set at AP2-45 (Damper Check T) during a fan operation.
MMC Interlock	Latch	Triggered when AP1-55 is set to '2' and all auxiliary motors are interlocked during an MMC operation.

LCD Display	Type	Description
CleanRPTErr	Latch	Triggered when the pump clean operation is operated frequently. The conditions may be modified with theAP2-36–AP2-37 settings.
Pipe Broken	Latch	Triggered when a pipe is broken during the pump operation. Set PRT-60.
Level Detect	Latch	Triggered when the inverter output current or power is lower or higher than the values set by the user. Set the values at PRT-71–PRT-77.
Broken Belt	Latch	Triggered when PRT-91 is set to Free Run
Low Feedback Level	Latch	Low/High feedback detection detects whether PID feedback is higher than high feedback level or lower than low feedback level to trigger Trip&Coast stop. Set AP2-48-AP2-54
High Feedback Level	Latch	
Setpoint Timeout	Latch	Setpoint timeout monitors PID feedback, and when the difference between PID feedback and PID setpoint becomes too large, this function triggers Trip. Set AP2-55-AP2-57
Over Cycle Count	Latch	Over-Cycling Protection counts the number of Sleep & Wake-up cycle to protect from too frequent Sleep & Wake-up.
High Flow	Latch	Triggered when a High/Low Flow condition is detected during flow monitoring.
Low Flow	Latch	
Accumulation Flow	Latch	Triggered when accumulation is reached to setting value.
Pump trip	Latch	Triggered when any of low/High feedback, SetPnt Timeout, Over cycle trip occur.
Low Level Detection (PI Aux)	Latch	Triggered when a High/Low level at Auxiliary is detected during PI Aux operation.
High Level Detection (PI Aux)	Latch	

Option Protection

LCD Display	Type	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

LCD Display	Type	Description
		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.
TB Trip	Latch	It occurs when the control terminal block (Terminal Bolck) is disconnected or the contact state is bad.
ParaWrite Trip	Latch	Displayed when communication fails during parameter writing. Occurs 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.

5.1.2 Warning Message

LCD Display	Description
Over Load	Displayed when a motor is overloaded. Set PRT-17 to ‘1’ to enable. Set OUT-31–35 or OUT-36 to ‘5 (Over Load)’ to receive the overload warning output signals.
Under Load	Displayed when the motor is underloaded. Set PRT-25 is to ‘1’. Set the digital output terminal or relay (OUT-31–35 or OUT-36) to’ 7 (Under Load)’ to receive the 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 terminals or relay (OUT-31–35 or OUT-36) to ‘6 (IOL)’ to receive the 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 terminals or relay (OUT-31–35 or OUT-36) to ‘13 (Lost Command)’ to receive the lost command warning output signals.
Fan Warning	Displayed when an error is detected from the cooling fan while PRT-79 is set to’1’. Set the digital output terminals or relay (OUT-31–35 or OUT-36) to ‘8 (Fan Warning)’ to receive the fan warning output signals.
DB Warn %ED	Displayed when the DB resistor usage rate exceeds the set value. Set the detection level at PRT-66.
Fire Mode	When there is a fire, Fire Mode forces the inverter to ignore certain fault trips and continue to operate. Set the digital output terminals or relay (OUT-31–35 or OUT-36) to ‘27 (Fire Mode)’ to receive the fire mode

LCD Display	Description
	warning output signals.
Pipe Broken	Displayed when a pipe is broken during pump operation. Set the digital output terminals or relay (OUT-31–35 or OUT-36) to '28 (Pipe Broken)' to receive the pipe break warning output signals.
Lost Keypad	Displayed when a communication error occurs between the keypad and the inverter, when PRT-11 (Lost KPD Mode) is set to any other value than '0', and a run command is given from the keypad. Set the digital output terminals or relay (OUT-31–35 or OUT-36) to '24 (Lost KPD)' to receive the lost keypad warning output signals.
Level Detect	Displayed during a level detect state. Set PRT-70 to '1 (warning)' to enable.
CAP. Warning	Displayed when capacitor life expectancy level goes below the level set by the user. Set the digital output terminals or relay (OUT-31–35 or OUT-36) to '34 (CAPWarning)' to receive the capacitor life warning output signals.
Fan ExChange	Displayed when the cooling fans need replacing. Set the digital output terminals or relay (OUT-31–35 or OUT-36) to '35 (FanExChange)' to receive the fan replacement warning output signals.
Low Battery	Displayed when the RTC battery voltage drops to or below 2 V. To receive a warning output signal, set PRT-90 (Low Battery) to 'Yes'.
Broken Belt	Displayed when PRT-91 is set to warning and the inverter becomes on the condition of broken belt.
Load Tune	Displayed when the values of 'AP2-03 and AP2-04' are more than the values of 'AP2-09 and AP2-10' and the function of load tuning is not normal.
PareWrite Fail	Displayed when the function of smart copier is not normal.
Rs Tune Err	Displayed when the function of Rs tuning is not normal . For example, auto tuning is performed without wiring the motor.
Lsig Tune Err	Displayed when the function of Lsigma tuning is not normal . For example, auto tuning is performed without wiring the motor.
KPD H.O.A Lock	If [DRV-05 KPD H.O.A Lock] sets HAND-OFF-AUTO disabled, it lasts one second when HAND-OFF-AUTO key is pressed using user keypad
InFan Warning	It occurs when an abnormality is detected in the cooling fan inside the inverter with inverter capacity of 110 kW to 500 kW.
Sleep	Indicates that PID operation standby (Sleep) mode is in place.

6 Technical Specification

6.1 Input and Output Specifications

Three Phase 200 V (0.75–3.7 kW)

Model H100 XXXX–2 (PLUS)				0008	0015	0022	0037
Applied Motor	Heavy Duty		HP	0.5	1.0	2.0	3.0
			kW	0.4	0.75	1.5	2.2
	Normal Duty		HP	1.0	2.0	3.0	5.0
			kW	0.75	1.5	2.2	3.7
Rated output	Rated Capacity (kVA)			1.9	3.0	4.5	6.1
	Rated Current (A)	Three-Phase	HD	2.5	5.0	8.0	11.0
			ND	5	8	12	16
		Single-Phase(ND)		2.9	4.4	6.4	8.4
	Output Frequency			0–400 Hz			
	Output Voltage (V)			3-Phase 200–240 V			
Rated input	Working Voltage (V)		Three-Phase	3-Phase 200–240 VAC (-15%–+10%)			
			Single-Phase	1-Phase 240 VAC (-5%–+10%)			
	Input Frequency		Three-Phase	50–60 Hz (±5%)			
			Single-Phase	50–60 Hz (±5%)			
	Rated Current (A)		HD	2.4	4.9	8.4	11.8
			ND	4.9	8.4	12.9	17.5
Weight (kg)				3.3	3.3	3.3	3.3

- The standard motor capacity is based on a standard 4-pole motor.
- The standard used for 200 V inverters is based on a 220 V supply voltage, and 400 V inverters are based on a 440 V supply voltage.
- The rated output current is limited based on the carrier frequency set at CON-04.

Three Phase 200 V (5.5–18.5 kW)

Model H100 XXXX–2 (PLUS)				0055	0075	0110	0150	0185
Applied Motor	Heavy Duty		HP	5	7.5	10	15	20
			kW	3.7	5.5	7.5	11	15
	Normal Duty		HP	7.5	10	15	20	25
			kW	5.5	7.5	11	15	18.5
Rated output	Rated Capacity (kVA)			8.4	11.4	16.0	21.3	26.3
	Rated Current (A)	Three-Phase	HD	17	24	32	46	60
			ND	22	30	42	56	69
		Single-Phase(ND)		11	16	23	30	37
	Output Frequency			0–400 Hz				
	Output Voltage (V)			3-Phase 200–240 V				
Rated input	Working Voltage (V)		Three-Phase	3-Phase 200–240 VAC (-15%–+10%)				
			Single-Phase	1-Phase 240 VAC (-5%–+10%)				
	Input Frequency		Three-Phase	50–60 Hz (±5%)				
			Single-Phase	50–60 Hz (±5%)				
	Rated Current (A)		HD	18.5	26.2	35.4	51.4	67.6
			ND	23.7	32.7	46.4	62.3	77.2
Weight (kg)				3.3	3.3	3.3	4.6	7.1

- The standard motor capacity is based on a standard 4-pole motor.
- The standard used for 200 V inverters is based on a 220 V supply voltage, and 400 V inverters are based on a 440 V supply voltage.
- The rated output current is limited based on the carrier frequency set at CON-04.

Three Phase 400 V (0.75–3.7 kW)

Model H100 XXXX–4 (PLUS)				0008	0015	0022	0037
Applied Motor	Heavy Duty		HP	0.5	1.0	2.0	3.0
			kW	0.4	0.75	1.5	2.2
	Normal Duty		HP	1.0	2.0	3.0	5.0
			kW	0.75	1.5	2.2	3.7
Rated output	Rated Capacity (kVA)			1.9	3.0	4.5	6.1
	Rated Current (A)	Three-Phase	HD	1.3	2.5	4	5.5
			ND	2.5	4	6	8
		Single-Phase(ND)		1.6	2.4	3.5	4.6
	Output Frequency			0–400 Hz			
	Output Voltage (V)			3-Phase 380–480 V			
Rated input	Working Voltage (V)		Three-Phase	3-Phase 380–480 VAC (-15%–+10%)			
			Single-Phase	1-Phase 480 VAC (-5%–+10%)			
	Input Frequency		Three-Phase	50–60 Hz (±5%)			
			Single-Phase	50–60 Hz (±5%)			
	Rated Current (A)		HD	1.3	2.4	4.2	5.9
			ND	2.4	4.2	6.5	8.7
Weight (kg)				3.3	3.3	3.3	3.3

- The standard motor capacity is based on a standard 4-pole motor.
- The standard used for 200 V inverters is based on a 220 V supply voltage, and 400 V inverters are based on a 440 V supply voltage.
- The rated output current is limited based on the carrier frequency set at CON-04.

Three Phase 400 V (5.5–22 kW)

Model H100 XXXX–4 (PLUS)				0055	0075	0110	0150	0185	0220
Applied Motor	Heavy Duty		HP	5.0	7.5	10	15	20	25
			kW	3.7	5.5	7.5	11	15	18.5
	Normal Duty		HP	7.5	10	15	20	25	30
			kW	5.5	7.5	11	15	18.5	22
Rated output	Rated Capacity(kVA)			9.1	12.2	18.3	23.0	29.0	34.3
	Rated Current (A)	Three-Phase	HD	8	12	15	22	28	35
			ND	12	16	24	30	38	45
		Single-Phase(ND)		6.8	9.2	14	17	22	26
	Output Frequency			0–400 Hz					
	Output Voltage(V)			3-Phase 380–480 V					
Rated input	Working Voltage(V)		Three-Phase	3-Phase 380–480 VAC (-15%–+10%)					
			Single-Phase	1-Phase 480 VAC (-5%–+10%)					
	Input Frequency		Three-Phase	50–60 Hz (±5%)					
			Single-Phase	50–60 Hz (±5%)					
	Rated Current(A)		HD	8.7	13.1	16.6	24.6	31.5	39.4
			ND	12.2	17.5	26.5	33.4	42.5	50.7
Weight(kg)				3.3	3.3	3.4	4.6	4.8	7.5

- The standard motor capacity is based on a standard 4-pole motor.
- The standard used for 200 V inverters is based on a 220 V supply voltage, and 400 V inverters are based on a 440 V supply voltage.
- The rated output current is limited based on the carrier frequency set at CON-04.

Three Phase 400 V (30.0–90.0 kW)

Model H100 XXXX–4 (PLUS)				0300	0370	0450	0550	0750	0900
Applied Motor	Heavy Duty		HP	30	40	50	60	75	100
			kW	22	30	37	45	55	75
	Normal Duty		HP	40	50	60	75	100	125
			kW	30	37	45	55	75	90
Rated output	Rated Capacity (kVA)			46.5	57.1	69.4	82.0	108.2	128.8
	Rated Current (A)	Three-Phase	HD	41	55	67	81	106	136
			ND	61	75	91	107	142	169
		Single-Phase(ND)		36	39	47	55	73	86
	Output Frequency			0–400 Hz					
	Output Voltage (V)			3-Phase 380–480 V					
Rated input	Working Voltage (V)		Three-Phase	3-Phase 380–480 VAC (-15%–+10%)					
			Single-Phase	1-Phase 480 VAC (-5%–+10%)					
	Input Frequency		Three-Phase	50–60 Hz (±5%)					
			Single-Phase	50–60 Hz (±5%)					
	Rated Current (A)		HD	46.7	52.3	64.5	78.0	100.9	134.1
			ND	69.1	69.3	84.6	100.1	133.6	160.0
Weight (kg)				7.5	26	35	35	43	43

- The standard motor capacity is based on a standard 4-pole motor.
- The standard used for 200 V inverters is based on a 220 V supply voltage, and 400 V inverters are based on a 440 V supply voltage.
- The rated output current is limited based on the carrier frequency set at CON-04.

Three Phase 400 V (110.0–500.0 kW)

Model H100 XXXX–4 (PLUS)			1100	1320	1600	1850	2200	2500	3150	3550	4000	5000
Applied Motor	Heavy Duty	HP	125	150	200	250	250	300	400	450	500	650
		kW	90	110	132	160	185	220	250	315	355	400
	Normal Duty	HP	150	200	250	300	350	400	500	550	650	800
		kW	110	132	160	185	220	250	315	355	400	500
Rated output	Rated Capacity (kVA)		170	201	248	282	329	367	467	520	587	733
	Rated Current (A)	HD	169	195	255	303	345	375	478	541	591	740
		ND	223	264	325	370	432	481	613	683	770	962
	Output Frequency		0–400 Hz									
	Output Voltage (V)		3-Phase 380–500 V									
Rated input	Working Voltage (V)	Three Phase	3-Phase 380–500VAC (-15%–+10%)									
	Input Frequency	Three Phase	50–60 Hz (±5%)									
	Rated Current (A)	HD	159.5	186.2	243.4	291.0	331.3	360.1	461.7	522.5	570.8	714.7
		ND	215.1	254.6	315.3	358.9	419.1	469.3	598.1	666.4	751.3	938.6
Weight (kg)			55.8	55.8	74.7	74.7	120.0	120.0	185.5	185.5	185.5	265

- The standard motor capacity is based on a standard 4-pole motor and is based on 3-phase
- The standard used for 200 V inverters is based on a 220 V supply voltage, and 400 V inverters are based on a 440 V supply voltage.
- The rated output current is limited based on the carrier frequency set at CON-04.

6.2 Product Specification Details

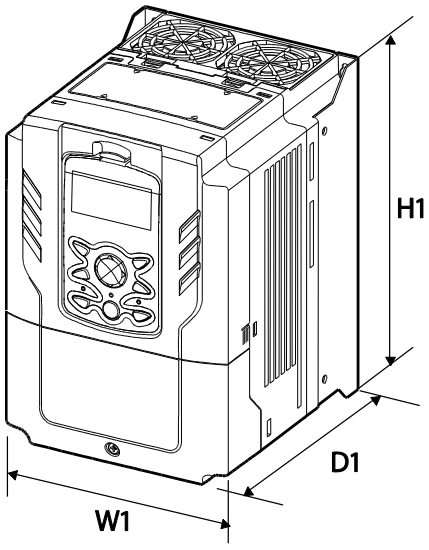
Items			Description	
Control	Control method		V/F control, Slip compensation.	
	Frequency settings power resolution		Digital command: 0.01 Hz Analog command: 0.06 Hz (60 Hz standard)	
	Frequency accuracy		1% of maximum output frequency.	
	V/F pattern		Linear, square reduction, user V/F.	
	Overload capacity		0.75~90kW	Normal Duty 120% 1 min., Heavy Duty 150% 1 min.
			110~500kW	Normal Duty 110% 1 min., Heavy Duty 150% 1 min.
	Torque boost		Manual torque boost, automatic torque boost.	
Operation	Operation type		Select key pad, terminal strip, or communication operation.	
	Frequency settings		Analog type: -10–10 V, 0–10 V, 0–20 mA Digital type: key pad, pulse train input	
	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 Energy Saving
	Input	Multi function terminal (7EA) P1-P7	Select PNP (Source) or NPN (Sink) mode. Functions can be set according to IN-65- IN-71 codes and parameter settings.	
			Forward direction operation Reset Emergency stop Multi step speed frequency-	Reverse direction operation External trip Jog operation Multi step acc/dec-high/med/low Second motor selection Frequency reduction

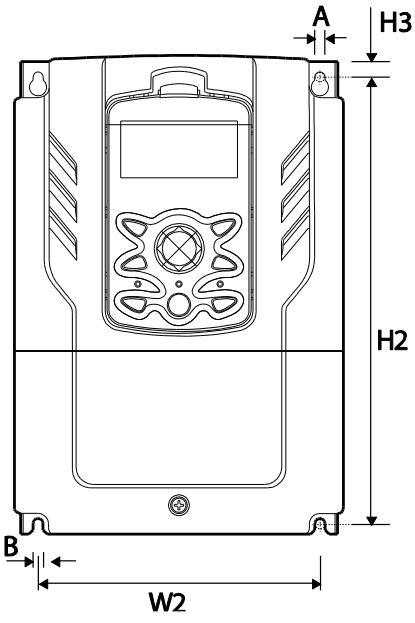
Items			Description	
			high/med/low DC braking during stop 3-wire	Fix analog command frequency Transtion from PID to general operation Pre Heat Pump Cleaning RTC(Time Event) MMC Interlock Select acc/dec/stop Frequency increase
		Pulse train	0–32 kHz, Low Level: 0–0.8 V, High Level: 3.5–12 V	
	Output	Multi function open collector terminal	Fault output and inverter operation status output	Less than DC 26 V, 50 mA
		Fault signal relay terminal		N.O.: Less than AC 250 V 2A, DC 30 V, 3A N.C.: Less than AC 250 V 1A, DC 30 V 1A
		Multi function relay terminal		Less than AC 250 V, 5 A Less than DC 30 V, 5 A
		Analog output	0–12 Vdc(0–20 mA): Select frequency, output current, output voltage, DC terminal voltage, and others.	
		Pulse train	Maximum 32 kHz, 0–12 V	
Protection function	Trip		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 No motor trip Parameter writing trip Emergency stop trip	Over voltage trip Temperature sensor trip Inverter over heat Option trip Output imaging trip Inverter overload trip Fan trip Low voltage trip during operation Low voltage trip Analog input error Motor overload trip Pipe broken trip Keypad command lost trip Damper trip Level Detect trip MMC Interlock trip PumpCleannig trip

Items		Description		
				External memory error CPU watchdog trip Motor under load trip Command loss trip
	Alarm	Command loss trip alarm, overload alarm, normal load alarm, inverter overload alarm, fan operation alarm, resistance braking rate alarm, Capacitor life alarm, Pump Clean alarm, Fire Mode Alarm, LDT Alarm.		
	Instantaneous blackout	Less than 8 ms: Continue Operation (must be within the rated input voltage and rated output range) More than 8 ms: Auto restart operation		
Structure/ working environment	Cooling type	Forced fan cooling structure		
	Protection structure	IP 20(0.75~185kW), IP 00(220~500kW) UL Open & Enclosed Type 1 (option) (UL Enclosed Type 1 is satisfied by conduit installation option.)		
	Ambient temperature	Normal Duty	-10℃–50℃ (2.5% current derating is applied above 40℃) No ice or frost should be present. Working under normal load at 50 ℃ (122 °F), it is recommended that less than 75% load is applied.	
		Heavy Duty	0.75~90kW	-10℃–50℃ without derating
			110~500kW	Same as Normal Duty
	Ambient humidity	Relative humidity less than 95% RH (to avoid condensation forming)		
	Storage temperature.	-20 °C-65 °C (-4–149 °F)		
	Surrounding environment	Prevent contact with corrosive gases, inflammable gases, oil stains, dust, and other pollutants. (0.75~500kW Pollution Degree 2 Environment)		
	Operation altitude	Maximum 3,280 ft (1,000m) above sea level for standard operation. After that the driver rated voltage and the rated output current derating by 1% for every extra 328 ft (100m) up to 13,123 ft (4,000m).		
	Operation oscillation	Less than 1.0 G (9.8 m/sec^2).		
	Pressure	70-106 kPa		

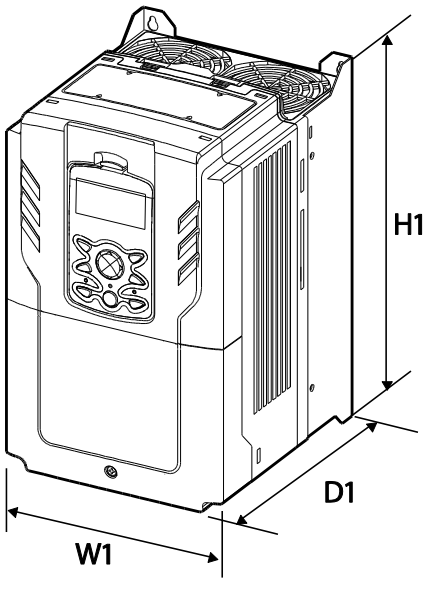
6.3 External Dimensions

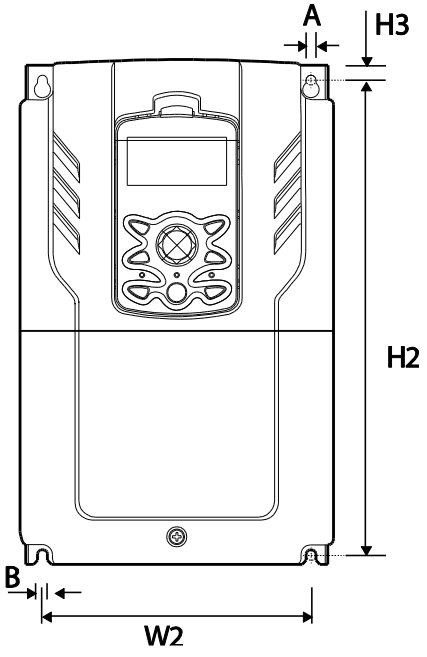
0.75–30 kW (3-phase)



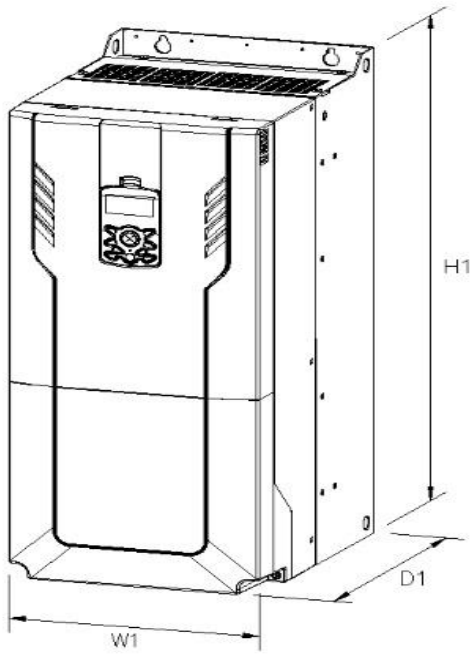


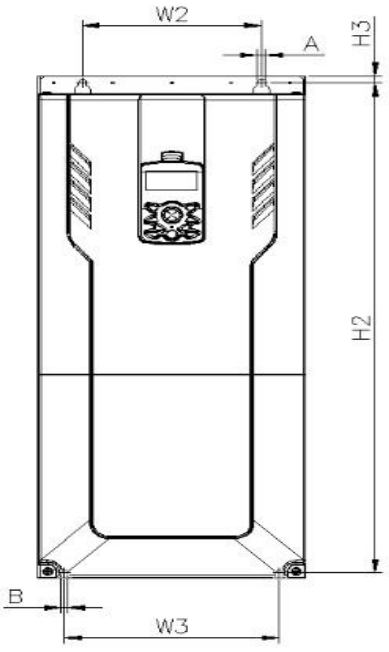
37–90 kW (3-phase)



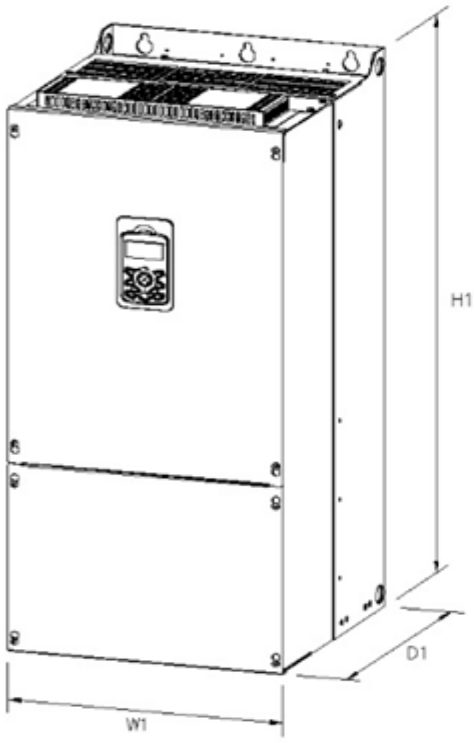


110–185 kW (3-phase)





220–500 kW (3-phase)



Units: mm

Items		W1	W2	W3	H1	H2	H3	D1	A	B	Φ
3-phase 200 V	0008H100-2	160	137	-	232	216.5	10.5	181	5	5	-
	0015H100-2	160	137	-	232	216.5	10.5	181	5	5	-
	0022H100-2	160	137	-	232	216.5	10.5	181	5	5	-
	0037H100-2	160	137	-	232	216.5	10.5	181	5	5	-
	0055H100-2	160	137	-	232	216.5	10.5	181	5	5	-
	0075H100-2	160	137	-	232	216.5	10.5	181	5	5	-
	0110H100-2	160	137	-	232	216.5	10.5	181	5	5	-
	0150H100-2	180	157	-	290	273.7	11.3	205.3	5	5	-
	0185H100-2	220	193.8	-	350	331	13	223.2	6	6	-
3-phase 400 V	0008H100-4	160	137	-	232	216.5	10.5	181	5	5	-
	0015H100-4	160	137	-	232	216.5	10.5	181	5	5	-
	0022H100-4	160	137	-	232	216.5	10.5	181	5	5	-
	0037H100-4	160	137	-	232	216.5	10.5	181	5	5	-
	0055H100-4	160	137	-	232	216.5	10.5	181	5	5	-
	0075H100-4	160	137	-	232	216.5	10.5	181	5	5	-
	0110H100-4	160	137	-	232	216.5	10.5	181	5	5	-
	0150H100-4	180	157	-	290	273.7	11.3	205.3	5	5	-
	0185H100-4	180	157	-	290	273.7	11.3	205.3	5	5	-
	0220H100-4	220	193.8	-	350	331	13	223.2	6	6	-
	0300H100-4	220	193.8	-	350	331	13	223.2	6	6	-
	0370H100-4	275	232	-	450	428.5	14	284	7	7	-
	0450H100-4	325	282	-	510	486.5	16	284	7	7	-
	0550H100-4	325	282	-	510	486.5	16	284	7	7	-
	0750H100-4	325	275	-	550	524.5	16	309	9	9	-
	0900H100-4	325	275	-	550	524.5	16	309	9	9	-
	1100H100-4	300	200	240	706	688.5	9.5	386	9	9	-
	1320H100-4	300	200	240	706	688.5	9.5	386	9	9	-
	1600H100-4	380	300	300	705	685.5	9.5	396	9	9	-
	1850H100-4	380	300	300	705	685.5	9.5	396	9	9	-
	2200H100-4	440	320	-	922.3	895.5	15.5	440	11	11	-

Items		W1	W2	W3	H1	H2	H3	D1	A	B	Φ
	2500H100-4	440	320	-	922.3	895.5	15.5	440	11	11	-
	3150H100-4	600	420	-	1000	972	15	500	14	14	-
	3550H100-4	600	420	-	1000	972	15	500	14	14	-
	4000H100-4	600	420	-	1000	972	15	500	14	14	-
	5000H100-4	776	500	-	1054	1021	20	500	14	14	-

Units : inches

Items		W1	W2	W3	H1	H2	H3	D1	A	B	Φ
3-phase 200 V	0008H100-2	6.30	5.39	-	9.13	8.52	0.41	7.13	0.20	0.20	-
	0015H100-2	6.30	5.39	-	9.13	8.52	0.41	7.13	0.20	0.20	-
	0022H100-2	6.30	5.39	-	9.13	8.52	0.41	7.13	0.20	0.20	-
	0037H100-2	6.30	5.39	-	9.13	8.52	0.41	7.13	0.20	0.20	-
	0055H100-2	6.30	5.39	-	9.13	8.52	0.41	7.13	0.20	0.20	-
	0075H100-2	6.30	5.39	-	9.13	8.52	0.41	7.13	0.20	0.20	-
	0110H100-2	6.30	5.39	-	9.13	8.52	0.41	7.13	0.20	0.20	-
	0150H100-2	7.09	6.18	-	11.42	10.78	0.45	8.08	0.20	0.20	-
	0185H100-2	8.66	7.63	-	13.78	13.03	0.51	8.79	0.24	0.24	-
3-Phase 400 V	0008H100-4	6.30	5.39	-	9.13	8.52	0.41	7.13	0.20	0.20	-
	0015H100-4	6.30	5.39	-	9.13	8.52	0.41	7.13	0.20	0.20	-
	0022H100-4	6.30	5.39	-	9.13	8.52	0.41	7.13	0.20	0.20	-
	0037H100-4	6.30	5.39	-	9.13	8.52	0.41	7.13	0.20	0.20	-
	0055H100-4	6.30	5.39	-	9.13	8.52	0.41	7.13	0.20	0.20	-
	0075H100-4	6.30	5.39	-	9.13	8.52	0.41	7.13	0.20	0.20	-
	0110H100-4	6.30	5.39	-	9.13	8.52	0.41	7.13	0.20	0.20	-
	0150H100-4	7.09	6.18	-	11.42	10.78	0.45	8.08	0.20	0.20	-
	0185H100-4	7.09	6.18	-	11.42	10.78	0.45	8.08	0.20	0.20	-
	0220H100-4	8.66	7.63	-	13.78	13.03	0.51	8.79	0.24	0.24	-
	0300H100-4	8.66	7.63	-	13.78	13.03	0.51	8.79	0.24	0.24	-
	0370H100-4	10.83	9.13	-	17.72	16.87	0.55	11.18	0.28	0.28	-
	0450H100-4	12.80	11.10	-	20.08	19.15	0.63	11.18	0.28	0.28	-

Items		W1	W2	W3	H1	H2	H3	D1	A	B	Φ
	0550H100-4	12.80	11.10	-	20.08	19.15	0.63	11.18	0.28	0.28	-
	0750H100-4	12.80	10.83	-	21.65	20.65	0.63	12.17	0.35	0.35	-
	0900H100-4	12.80	10.83	-	21.65	20.65	0.63	12.17	0.35	0.35	-
	1100H100-4	11.81	7.87	9.45	27.80	27.11	0.37	15.20	0.35	0.35	-
	1320H100-4	11.81	7.87	9.45	27.80	27.11	0.37	15.20	0.35	0.35	-
	1600H100-4	14.96	11.81	11.81	27.76	26.99	0.37	15.59	0.35	0.35	-
	1850H100-4	14.96	11.81	11.81	27.76	26.99	0.37	15.59	0.35	0.35	-
	2200H100-4	17.32	12.60	-	36.31	35.26	0.61	17.32	0.43	0.43	-
	2500H100-4	17.32	12.60	-	36.31	35.26	0.61	17.32	0.43	0.43	-
	3150H100-4	23.62	16.54	-	39.37	38.27	0.59	19.69	0.55	0.55	-
	3550H100-4	23.62	16.54	-	39.37	38.27	0.59	19.69	0.55	0.55	-
	4000H100-4	23.62	16.54	-	39.37	38.27	0.59	19.69	0.55	0.55	-
	5000H100-4	30.55	19.69	-	41.50	40.20	0.79	19.69	0.55	0.55	-

6.4 Peripheral Devices

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

⚠ Warning

- **Install appropriate branch circuit protection based on required local codes and the user manual.**
- The device is suitable for use on a circuit capable of delivering not more than 100kA, 240Vac maximum(200V class) and 480 Vac maximum(400V class) when protected by branch circuit protection devices specified in this manual.

Product (kW)		Circuit Breaker				Leakage Breaker		Magnetic Contactor	
		UL unapplied		UL applied		UL unapplied[note1)]		UL applied[note2)]	
		Model	Rated Current	Model	Rated Current	Model	Rated Current	Model	Rated Current
3-Phase	0.75	ABS33c	15	MMS32H	8	EBS33c	15	MC-9a	11
	1.5		15		13		15	MC-18a	18

Product (kW)		Circuit Breaker				Leakage Breaker		Magnetic Contactor	
		UL unapplied		UL applied		UL unapplied[note1]		UL applied[note2]	
		Model	Rated Current	Model	Rated Current	Model	Rated Current	Model	Rated Current
200 V	2.2		30		22		30	MC-32a	32
	3.7		30		26		30	MC-32a	32
	5.5	ABS53c	50		40	EBS53c	50	MC-50a	55
	7.5	ABS63c	60	MMS63H	50	EBS63c	60	MC-65a	65
	11	ABS103c	100		75	EBS103c	100	MC-85a	85
	15		100	MMS100H	100			MC-130a	130
	18.5	ABS103c	100		100	EBS103c	100	MC-130a	130
3-Phase 400 V	0.75	ABS33c	10	UTS150	40	EBS33c	10	MC-6a	9
	1.5		10		40		10	MC-6a	9
	2.2		15		40		15	MC-9a	11
	3.7		15		40		15	MC-12a	13
	5.5		30		40	EBS33c	30	MC-22a	22
	7.5		30		40		30	MC-32a	32
	11	ABS53c	50		40	EBS53c	50	MC-50a	50
	15	ABS63c	60		50		50		50
	18.5	ABS103c	100		70	EBS103c	100	MC-85a	85
	22	ABS103c	100		80		100		85
	30	ABS103c	100		100		100	MC-100a	100
	37	ABS203c	175	UTS250	150	EBS203c	200	MC-150a	150
	45	ABS203c	175		150		200		150
	55	ABS203c	175		150		200		150
	75	ABS203c	225		225	EBS203c	225	MC-225a	225
	90	ABS203c	250		250		250	MC-265a	265
	110	ABS603c	500	UTS600	500	EBS603c	500	MC-400a	400
	132	ABS603c	600		600	EBS603c	630	MC-400a	400
	160	ABS603c	630		600	EBS603c	630	MC-630a	630
	185	ABS803c	800	UTS800	800	EBS803c	800	MC-630a	630

Product (kW)		Circuit Breaker				Leakage Breaker		Magnetic Contactor	
		UL unapplied		UL applied		UL unapplied[note1]		UL applied[note2]	
		Model	Rated Current	Model	Rated Current	Model	Rated Current	Model	Rated Current
	220	ABS803c	800		800	EBS803c	800	MC-800a	800
	250	ABS1003b	1000		800	EBS1003b	1000	MC-800a	800
	315	ABS1203b	1200	UTS1200	1200	EBS1203b	1200	MC-1260a	1260
	355	ABS1203b	1200		1200	EBS1203b	1200	MC-1260a	1260
	400	-	1600	-	1600				
	500	-	1600	-	1600				

* In the case of inverter 400/500 kW, there is no Circuit Brake capacity qualified as UL standard.
* Refer to local and national codes for proper circuit breaker sizing. *
If you want to use UL Type products, please use that ACB product. *
Note1) LS Leakage Breaker does not have a separate UL certified product. *
Note2) When using a magnetic contactor non-UL product, please use LS Susol Type(MC-9(9A) ~ MC-95(95A).

Maximum allowed prospective short-circuit current at the input power connection is defined in IEC 60439-1 as 100 kA. LSLV-H100+ is suitable for use in a circuit capable of delivering not more than 100kA RMS at the drive's maximum rated voltage, depending on the selected MCCB. RMS symmetrical amperes for recommended MCCB are the following table.

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

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

6.5 Fuse and Reactors Specifications

Products(kW)		AC Input Fuse		AC reactor		DC Reactor	
		Current (A)	Voltage (V)	Inductance (mH)	Current (A)	Inductance (mH)	Current (A)
3-Phase 200 V	0.75	10	600[V]	2.02	5	4.04	5
	1.5	10		1.26	8	2.53	8
	2.2	15		0.78	12	1.68	12
	3.7	20		0.59	16	1.26	16
	5.5	50		0.43	24	0.93	25
	7.5	63		0.31	33	0.73	32
	11	80		0.22	46	0.53	50
	15	100		0.16	62	0.32	62
	18.5	125		0.13	77	0.29	80
3-Phase 400 V	0.75	10		8.09	2.5	16.17	3
	1.5	10		5.05	4	10.11	4
	2.2	15		3.37	6	6.74	6
	3.7	20		2.25	9	5.05	8
	5.5	32		1.56	13	3.56	13
	7.5	35		1.16	17	2.53	18
	11	50		0.76	27	1.64	26
	15	63		0.61	33	1.42	33
	18.5	70		0.48	43	0.98	42
	22	100		0.40	51	0.88	50
	30	125		0.29	69	0.59	68
	37			0.29	69	Built-In	
	45	160		0.24	85		
	55	200		0.20	100		
	75	250		0.15	134		
	90	350		0.13	160		
	110	350		0.1	217		

Products(kW)		AC Input Fuse		AC reactor		DC Reactor	
		Current (A)	Voltage (V)	Inductance (mH)	Current (A)	Inductance (mH)	Current (A)
	132	400		0.08	257		
	160	450		0.07	318		
	185	550		0.06	362		
	220	630		0.05	423		
	250	700		0.05	474		
	315	800		0.04	604		
	355	1000		0.03	673		
	400	1100		0.03	759		
	500	1250		0.03	948		

⚠ Caution

Use Class H or RK5 UL Listed Input Fuse and UL Listed Breaker Only. See the table above for the Voltage and Current rating of the fuse and the breaker.

Attention
Utiliser UNIQUEMENT des fusibles d'entrée homologués de Classe 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.

6.6 Terminal Screw Specifications

Input/Output Termianl Screw Specification

Product (kW)		Terminal Screw Size	Screw Torque (Kgf·c m/Nm)
3-Phase 200 V	0.75	M4	12.2 ~ 14.3 / 1.2 ~ 1.4
	1.5		
	2.2		
	3.7		

Product (kW)		Terminal Screw Size	Screw Torque (Kgf·c m/Nm)
	5.5		
	7.5		
	11		
	15	M5	20.4 ~ 24.5 / 2.0 ~ 2.4
	18.5		
3-Phase 400 V	0.75	M4	12.2 ~ 14.3 / 1.2 ~ 1.4
	1.5		
	2.2		
	3.7		
	5.5		
	7.5		
	11		
	15	M5	20.4 ~ 24.5 / 2.0 ~ 2.4
	18.5		
	22		
	30		
	37	M8	56.12 ~ 67.3 / 5.5 ~ 6.6
	45		
	55		
	75		
	90		
	110	M10	89.7 ~ 122.0 / 8.8 ~ 11.96
	132		
	160	M12	182.4 ~ 215.0 / 17.87 ~ 21.07
	185		
	220		
	250		
	315	M8 X 2 M12 X 1	61.2 ~ 91.8 / 6 ~ 9 182.4 ~ 215.0 / 17.87 ~ 21.07
	355		
	400		

Product (kW)		Terminal Screw Size	Screw Torque (Kgf·c m/Nm)
	500	M10 X 2 M16 X 1	89.7 ~ 122.0 / 8.8 ~ 11.96 490.9 ~ 511.0 / 48.05 ~ 50.11

Control Circuit Terminal Screw Specification

Terminal	Terminal Screw Size	Screw Torque(Kgf·cm/Nm)
P1–P7/ CM/VR/V1/I2/AO/Q1/EG/24/ TI/TO/SA,SB,SC/S+,S-,SG A1/B1/C1	M3	2.2 ~ 2.5 / 0.22 ~ 0.25

Caution

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

Attention

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

6.7 Dynamic braking unit (DBU) and Resistors

6.7.1 Dynamic braking unit (DBU)

UL form	Type	Voltage	Capacity of applied motor	Braking unit	Terminal arrangement &Dimensions
UL type	Type A (Resistance of DB Resistor refer to the table of "11.7.6 DB Resistors")	200V	30, 37 kW	SV370DBU-2U	Refer to the appearance of Group 1.
			45, 55 kW	SV550DBU-2U	
			75 kW	SV370DBU-2U, 2Set	
		400V	30, 37 kW	SV370DBU-4U	
			45, 55 kW	SV550DBU-4U	
			75 kW	SV750DBU-4U	
			90 kW	SV550DBU-4U, 2Set	
			110, 132kW	SV750DBU-4U, 2Set	
			160kW	SV750DBU-4U, 3Set	
Non UL type	Type B (Resistance of DB Resistor refer to the manual of DB Unit)	200V	30, 37 kW	SV037DBH-2	Refer to the appearance of Group 2
		400V	30, 37 kW	SV037DBH-4	
			45, 55, 75 kW	SV075DBH-4	
				SV075DB-4	Refer to the appearance of Group 3
			185, 220kW	SV2200DB-4	Refer to the appearance of Group 4
			250~355kW	SV2200DB-4, 2Set	
	Type C (Resistance of DB Resistor refer to the manual of DB Unit)	200V	30, 37 kW	LSLV0370DBU-2LN	Refer to the appearance of Group 5
				LSLV0370DBU-2HN	Refer to the appearance of Group 6
			45, 55, 75 kW	LSLV0750DBU-2LN	Refer to the appearance of Group 5
				LSLV0750DBU-2HN	Refer to the appearance of Group 6
		400V	30, 37 kW	LSLV0370DBU-4LN	Refer to the appearance of Group 5
				LSLV0370DBU-4HN	Refer to the appearance of Group 6

			45, 55, 75kW	LSLV0750DBU-4LN	Refer to the appearance of Group 5
			90 kW	LSLV0900DBU-4HN	Refer to the appearance of Group 6
			110, 132kW	LSLV1320DBU-4HN	
			160kW	LSLV1600DBU-4HN	
			185, 220kW	LSLV2200DBU-4HN	
			250~355kW	LSLV2200DBU-4HN, 2Set	
			400, 500kW	LSLV2200DBU-4HN, 2Set	

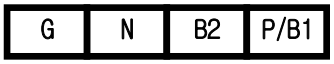
Note

- It is not necessary to use option type dynamic braking unit for H100+ 0.75~18.5kW(200V) and 0.75~30kW(400V) 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.
- Resistance/watt/braking torque/%ED of DB Resistor for Type A DB Unit refer to the table of “11.7.6 DB Resistors" and Resistance of DB Resistor for type B and C refer to the manual of DB Unit.

6.7.2 Terminal arrangement

Group 1:

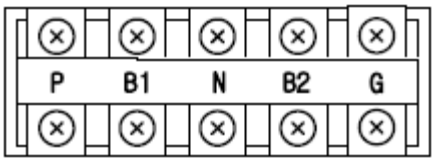
Group 2:



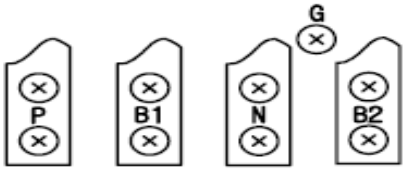
Terminals	Functions
G	Ground Terminal
B2	Terminal for connection with B2 of DBU
B1	Terminal for connection with B1 of DBU
N	Terminal for connection with N of Inverter
P	Terminal for connection with P1 of Inverter

* Note: READ DBU User manual certainly when selecting DB resistors.

Group 3:

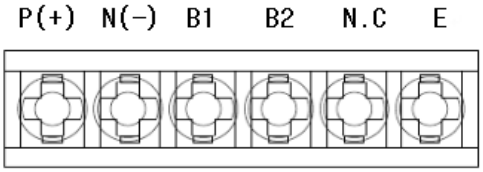


Group 4:



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
P	Terminal for connection with P of Inverter

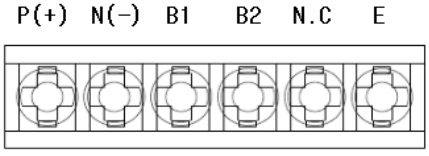
Group 5:



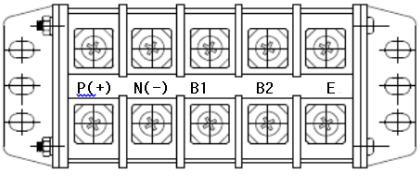
Terminals	Functions
P(+)	Terminal for connection with P of Inverter
N(-)	Terminal for connection with N of Inverter
B1	Terminal for connection with B1 of DBU
B2	Terminal for connection with B2 of DBU
N.C	Unused
E	Ground Terminal

Group6:

A Frame (37kW, 75kW-4)



B /C Frame (75kW-2, 90~220kW)



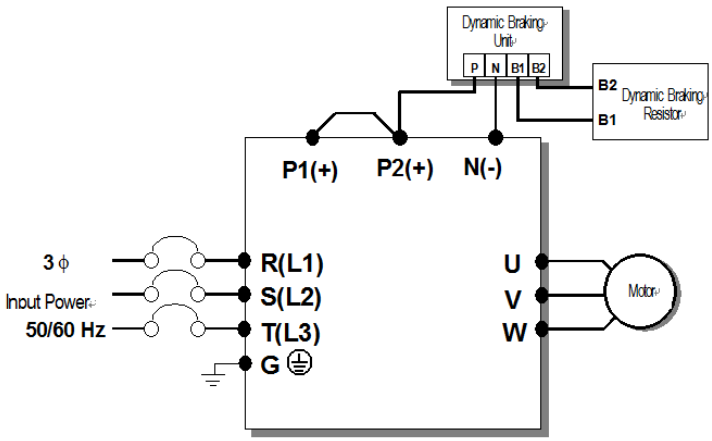
Terminals	Functions
P(+)	Terminal for connection with P of Inverter
N(-)	Terminal for connection with N of Inverter
B1	Terminal for connection with B1 of DBU
B2	Terminal for connection with B2 of DBU
E	Unused

Note

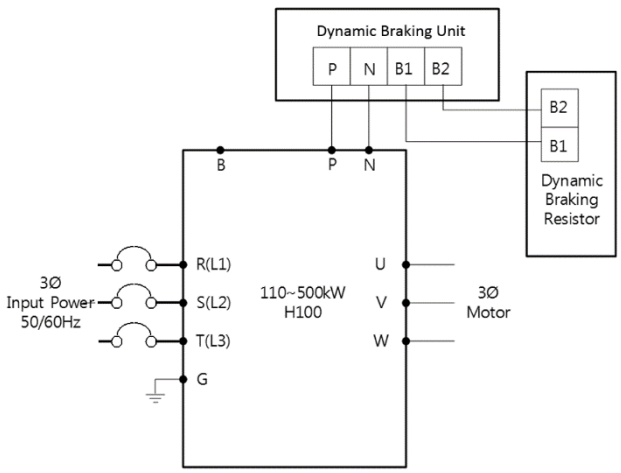
You must refer to dynamic braking unit manual for choice the braking resistor to use the dynamic braking unit.

6.7.3 Dynamic Braking (DB)Unit & DB resistor basic wiring

0.75~90Kw



110~500kW



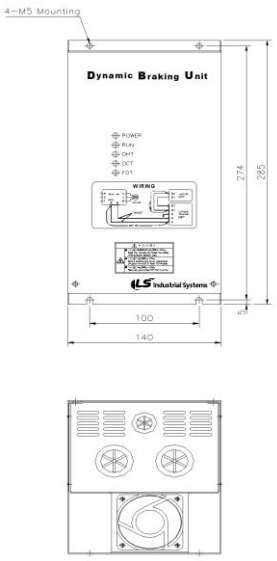
DBU Terminals	Description
B1,B2	Wire correctly referring to wiring diagram. DB Resistors connect with B1, B2 of DB Unit.

In case of large capacity, it may be necessary to connect more than 2 sets of DB Unit according to the usage environment.

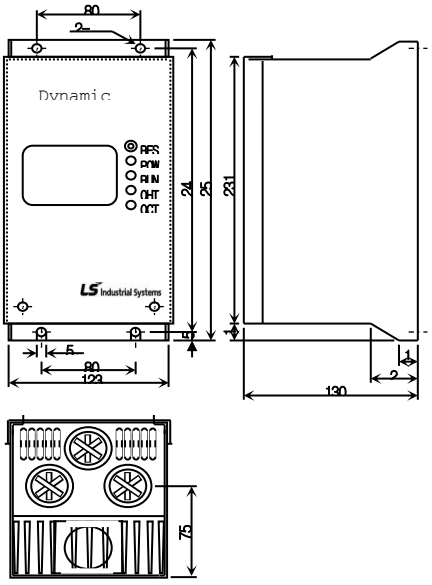
In such cases, check the DB Unit manual.

6.7.4 Dimensions

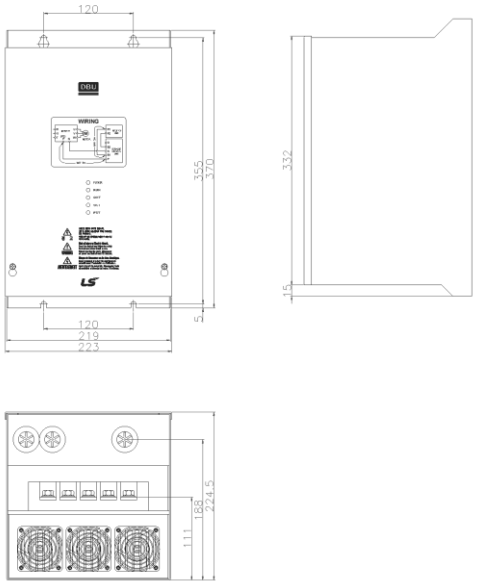
-Group1



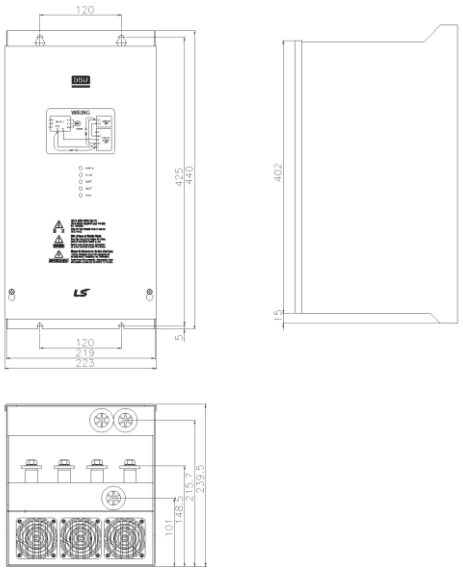
- Group2



-Group3

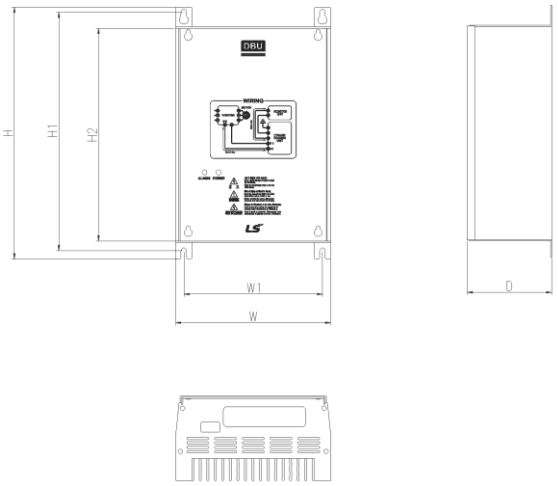


- Group4



Voltage	Capacity of applied motor	Dimension (mm)				Hole position for installation (mm)		Weight	Hole size for installation
(V)	(kW)	W	H	H2	D	W1	H1	(kg)	(ϕ)
220	15	140	227.4	192	76.4	125	215.4	1.50	M4
	22							1.55	
	37							1.57	
	75							1.84	
440	15							1.53	
	22							1.55	
	37							1.56	
	75							1.85	

- Group5



FRAME	Voltage	Capacity of applied motor	%ED	Dimension (mm)				Hole position for installation (mm)		Weight	Hole size for installation
				W	H	H2	D	W1	H1	(Kg)	(ϕ)
A Frame	220 [V]	37 [kW]	50	200	219	190	165.2	160	208.5	3.77	M6
	440 [V]	37 [kW]	50							3.84	
		75 [kW]	50							3.98	
B Frame	220 [V]	75 [kW]	50	215	340	311		175	329.5	8.26	
		90 [kW]	50							8.48	
	440 [V]	90 [kW]	50							8.30	
		132 [kW]	50							8.40	
C Frame	440 [V]	160 [kW]	50	240	380	351		200	369.5	9.40	
		220 [kW]	50							9.70	

6.7.5 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 braking 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 Braking, 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.

6.7.6 DB Resistors

Product (kW)		DB unit	Torque 100%			Torque 150%		
			Resistor (Ω)	Wattage [W] (%ED=5%)	Wattage [W] (%ED=10%)	Resistor (Ω)	Wattage [W] (%ED=5%)	Wattage [W] (%ED=10%)
3-Phase 200 V	0.75	-	200	100	200	150	150	300
	1.5	-	100	200	400	60	300	600
	2.2	-	60	300	600	50	400	800
	3.7	-	40	500	1000	33	600	1200
	5.5	-	33	600	1200	20	800	1600
	7.5	-	20	800	1600	15	1200	2400
	11	-	15	1200	2400	10	2400	4800
	15	-	10	2400	4800	8	2400	4800
	18.5	-	8	2400	4800	6	2600	5200
3-Phase 400 V	0.75	-	900	100	200	600	150	300
	1.5	-	450	200	400	300	300	600
	2.2	-	300	300	600	200	400	800
	3.7	-	200	400	800	130	600	1200
	5.5	-	120	700	1400	85	1000	2000
	7.5	-	90	1000	2000	60	1200	2400
	11	-	60	1200	2400	40	2000	4000

Product (kW)		DB unit	Torque 100%			Torque 150%		
			Resistor (Ω)	Wattage [W] (%ED=5%)	Wattage [W] (%ED=10%)	Resistor (Ω)	Wattage [W] (%ED=5%)	Wattage [W] (%ED=10%)
	15		45	2000	4000	32	2400	4800
	18.5	-	35	2400	4800	20	3600	7200
	22	-	30	2400	4800	20	3600	7200
	30	-	20	3600	7200	16	5000	10000
	37	DBU-U	16.9	3200	6400	-	-	-
		DBH	16.9	3200	6400	12	5000	10000
		LSLV-DB	16.9	3200	6400	12	5000	10000
	45	DBU-U	11.4	4800	9600	-	-	-
		DBH	11.4	4800	9600	10	6400	12800
		LSLV-DB	11.4	4800	9600	10	6400	12800
	55	DBU-U	11.4	4800	9600	-	-	-
		DBH	11.4	4800	9600	8.4	7200	14400
		LSLV-DB	11.4	4800	9600	8.4	7200	14400
	75	DBU-U	8.4	6400	12800	-	-	-
		DBH	8.4	6400	12800	6	10000	20000
		DB	8.4	6400	12800	6	10000	20000
	90	LSLV-DB	6	10000	20000	5	13000	26000
	110	LSLV-DB	5	13000	26000	4	16000	32000
	132	LSLV-DB	4	16000	32000	3.4	20000	40000
	160	LSLV-DB	3.4	20000	40000	2.8	24000	48000
	185	LSLV-DB	2.8	24000	48000	2.4	26000	52000
	220	LSLV-DB	2.4	26000	52000	2	30000	60000
	250	132kW DB Unit and Resistor * 2 Set (Parallel)						
	315	160kW DB Unit and Resistor * 2 Set (Parallel)						
	355	185kW DB Unit and Resistor * 2 Set (Parallel)						
	400	220kW DB Unit and Resistor * 2 Set (Parallel)						
	500	185kW DB Unit and Resistor * 3 Set (Parallel)						

Note

- It is not necessary to use option type dynamic braking unit for H100+ 0.75~18.5kW(200V) and 0.75~30kW(400V) because basically the dynamic braking unit is built in.
- The resistance/rated capacity/braking 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.

6.8 Inverter Continuous Rated Current Derating

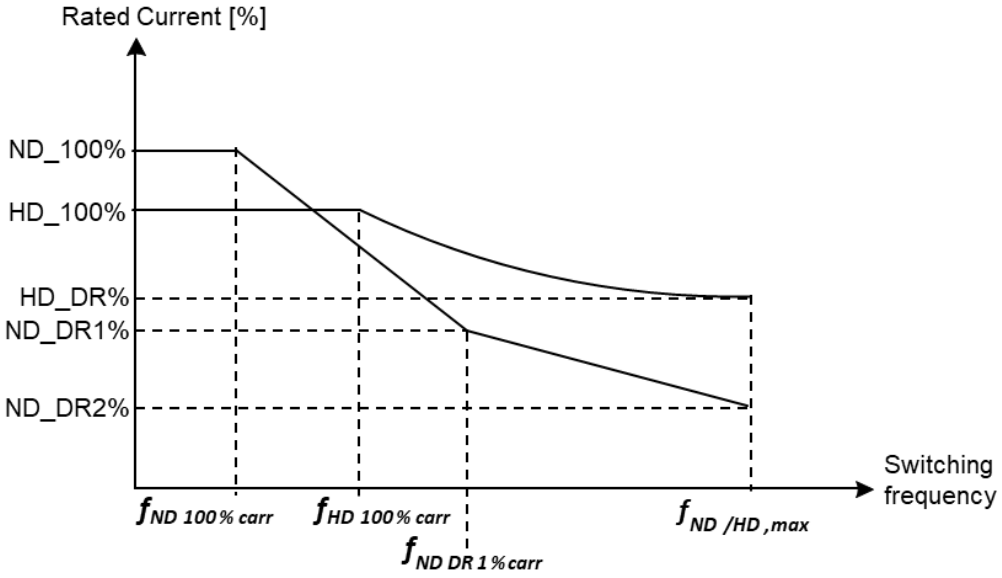
Derating by carrier frequency

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

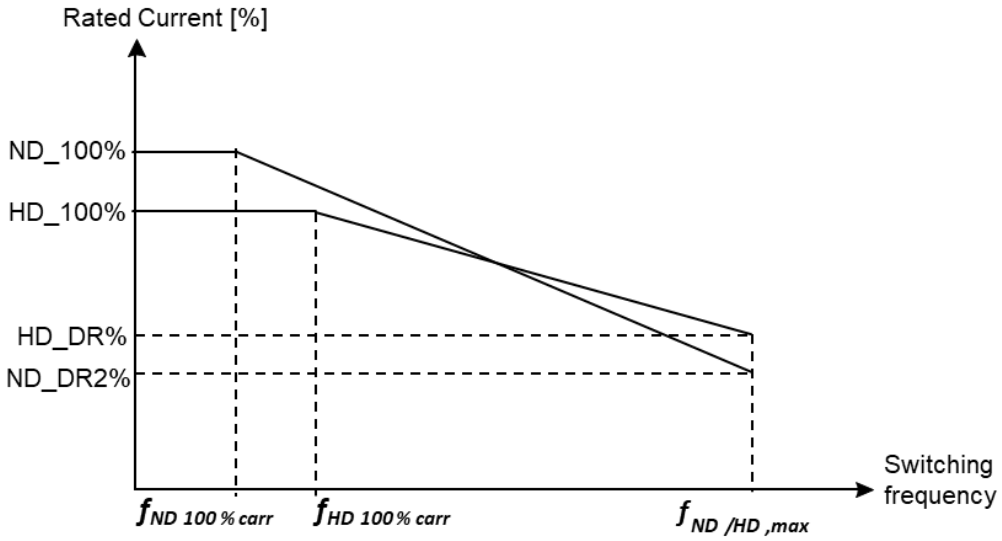
Item	Unit	200 V	400 V						
		0.75–18.5 kW	0.75–22 kW	30 kW	37–55 kW	75–90 kW	110-355 kW	400 kW	500 kW
$f_{ND/HD}$,default	kHz	3	3	3	3	3	2	1.5	1.5
$f_{ND/HD}$,max	kHz	15	15	15	10	7	5	4	4
f_{ND}100%carr	kHz	3	3	3	3	3	2	1.5	1.5
f_{ND}DR1%carr	kHz	8	8	8	-	-	-	2	2
ND_DR1	%	70	65	65	-	-	-	95	92
ND_DR2	%	60	55	50	60	55	76	75	65
f_{HD} 100%carr	kHz	6	6	6	6	4	2	1.5	1.5
HD_DR	%	72 68(18.5kW)	66	66	70	70 66(90kW)	62	61	61

* $f_{ND/HD}$,100%carr: Switching frequency for continued operation
f_{ND}DR1%carr: Switching frequency where the first current derating ends.
$f_{ND/HD}$,max: The maximum switching frequency

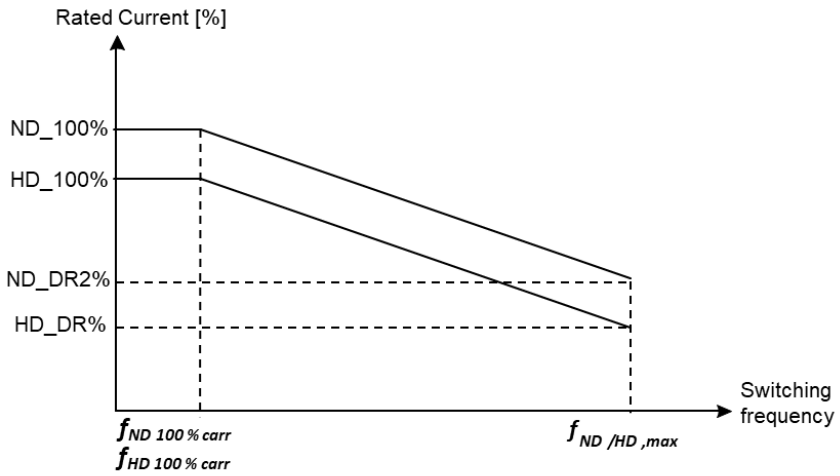
<200[V] 0.75–18.5[kW], 400[V] 0.75–30[kW] Current Derating Rate>



<400[V] 37–355[kW] Current Derating Rate >

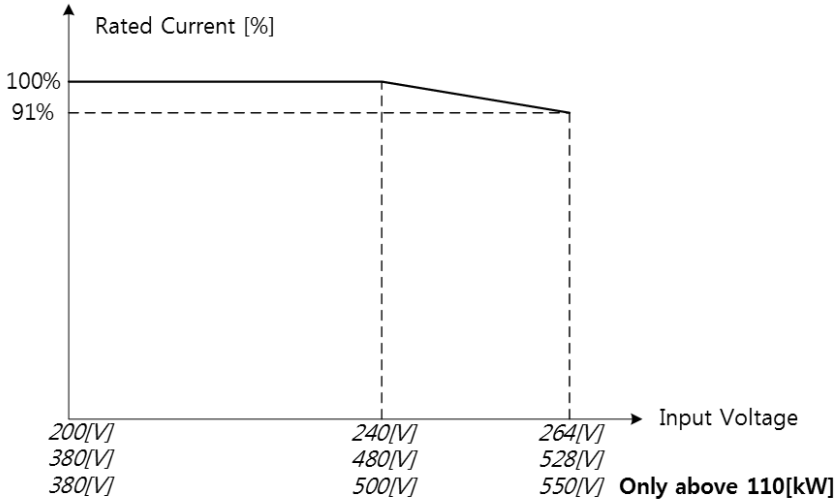


<400[V] 400–500[kW] Current Derating Rate>



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

Ambient temperature and installation type determine the constant-rated current of the inverter. Refer to the following graph. A 2.5% current derating is applied during operation when the ambient temperature is above 40℃. The inverter must be operated at less than 75% of its rated capacity when the ambient temperature is above 50℃.

7 Applying Drives to Single-phase Input Application

7.1 Introduction

LSLV-H100+ is a three-phase standard variable frequency drive(VFD). When applying single-phase power to a three-phase VFD, there are several constraints that need to be considered. Standard Pulse-Width-Modulated (PWM) VFDs use a 6-pulse diode rectifier. The 6-pulse rectification results in 360 Hz DC bus ripple when used with a three-phase 60 Hz supply.

However, under single-phase use, the DC bus ripple becomes 120 Hz and the VFDs DC bus circuit is subject to higher stress in order to deliver equivalent power.

Additionally, input currents and harmonics increase beyond those encountered with three-phase input.

Input current distortion of 90% THD and greater can be expected under single-phase input, compared to approximately 40% with three-phase input as indicated in Figure 2.

Therefore, single-phase use requires the three-phase VFD power rating be reduced (derated) to avoid over stressing the rectifier and DC link components.

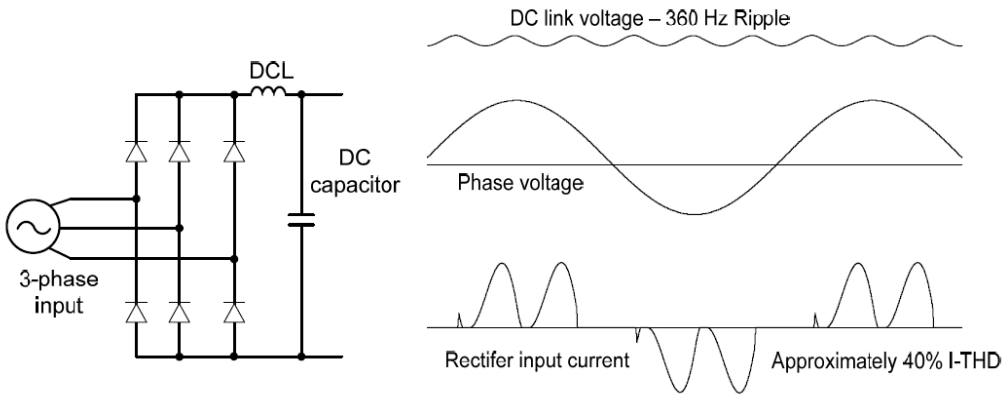


Figure-1 Typical Three-Phase Configuration

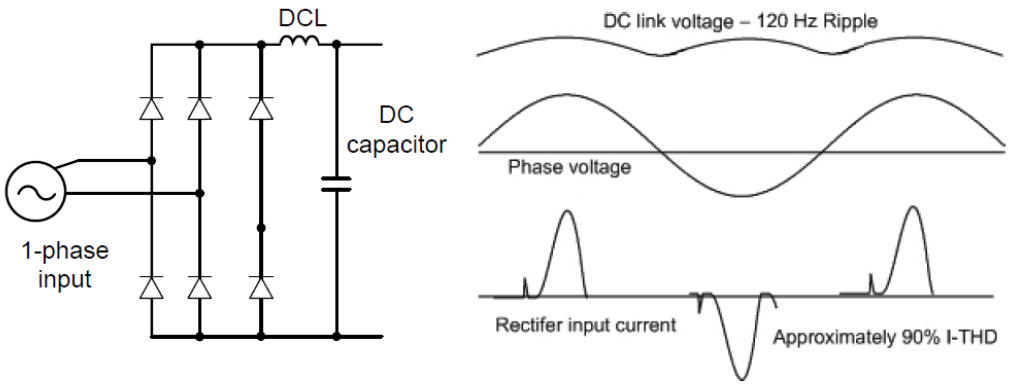


Figure-2 Typical Single-Phase Configuration

7.2 Power(HP), Input Current and Output Current

When using a three-phase VFD with single-phase input, derating the drive's output current and horsepower will be necessary because of the increase in DC bus ripple voltage and current.

In addition, the input current through the remaining two phases on the diode bridge converter will approximately double, creating another derating consideration for the VFD. Input current harmonic distortion will increase beyond that with a three-phase supply making the overall input power factor low. Input current distortion over 100% is likely under single-phase conditions without a reactor.

Therefore, the reactor is always required. When using a motor that is selected by the three-phase drive rating criteria when using single-phase input, it may result in poor performance, premature drive failure. The selected drive of single-phase current ratings must meet or exceed the motor current rating.

In case of single-phase input, the rating of the inverter is smaller than that of the motor. Please check the rating table of 11.1.

7.3 Input Frequency and Voltage Tolerance

For single-phase input AC voltage, products with 90 kW or less are within -5% to + 10% of 240/480 Vac. Products with 110 kW or more are in the range of -5% to + 10% of 380/500 Vac. Standard product with three-phase voltage input has an allowable range of +10% to –15%. Therefore, a stricter input voltage tolerance of +10 to –5% applies when using the drive with a single-phase supply. The average bus voltage with single-phase input is lower than the equivalent of a three-phase input.

Therefore, the maximum output voltage (motor voltage) will be lower with a single-phase input. The minimum input voltage must be no less than 228Vac for 240 volt models and 456Vac for 480 volt models, to ensure motor voltage production of 207Vac and 415Vac, respectively.

Thus, if full motor torque must be developed near base speed (full power) it will be necessary to maintain a rigid incoming line voltage so that adequate motor voltage can be produced. Operating a motor at reduced speed (reduced power), or using a motor with a base voltage that is lower than the incoming AC supply rating (ex. 208Vac motor with a 240Vac supply), will also minimize the effect of voltage deprivation. (240VAC Input □208V motor, 480VAC Input □ 400V motor)

7.4 Wiring

Please connect single-phase input to R(L1) and T(L3).

Figure-3 Terminal Wiring Diagram

7.5 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 37~500kW. For 0.75~30kW, external AC or DC reactor should be installed.
- Same peripheral devices (including a fuse and reactor) as 3 phases can be used for single phase as well.
- 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).
- 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.

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	LS ELECTRIC Standard Inverter	**Date of Installation**	
Model Name	LSLV-H100 (PLUS)	**Warranty Period**	
Customer Info	Name (or company)		
	Address		
	Contact Info.		
Retailer Info	Name		
	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 LS ELECTRIC 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 LS ELECTRIC rating plates
- expired warranty period

Visit Our Website

Visit us at ***http: //www.ls-electric.com*** for detailed service information.

UL mark

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

CE mark

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

Low Voltage Directive

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

EMC Directive

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

EAC mark

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

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

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

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

EC DECLARATION OF CONFORMITY

We, the undersigned,

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

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

Type of Equipment:	**Inverter (Power Conversion Equipment)**
Model Name:	**LSLV-H100 series**
Trade Mark:	**LS ELECTRIC 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 usewithin 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 IEC 61800-3:2018

EN 61800-5-1:2007/A1:2017

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

Place: **Cheonan, Chungnam, Korea**

박 창 근 2021. 5. 20 (Signature / Date)

Mr. PARK CHANGKEUN / Senior Manager
(Full Name / Position)

EMI / RFI POWER LINE FILTERS

LS inverters, H100 series

VMC vector motor control

RFI FILTERS

THE LS RANGE OF POWER LINE FILTERS FLD/AAND FEP (Standard) SERIES, HAVE BEEN SPECIFICALLY DESIGNED WITH HIGH FREQUENCY LS INVERTERS. THE USE OF LS FILTERS, WITH THE INSTALLATION ADVICE OVERLEAF 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.

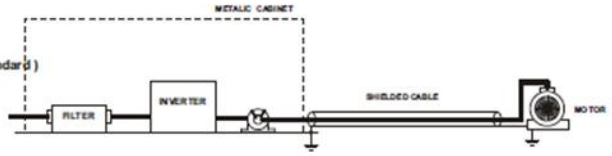
6-) Connect the motor and fit the ferrite core (output chokes) as close to the inverter as possible. Armoured or screened cable should be used with the 3 phase conductors only threaded twice through the center of the ferrite core. The earth conductor should be securely earthed at both inverter and motor 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.

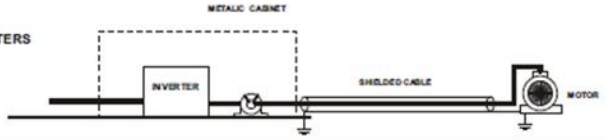
FLD/A FEP SERIES (Standard)

Fig 1



INTERNAL FILTERS

Fig 2



PR0066

LSLV series / Standard Filters											
INVERTER	POWER	CODE	CURRENT	VOLTAGE	LEAKAGE CURRENT	DIMENSIONS L W H	MOUNTING Y X	WEIGHT	MOUNT	FIG.	OUTPUT CHOKES
THREE PHASE					NOM. MAX.						
LSLV0008H100-2	0.75kW	FLD/A 3007	7A	250VAC	0.5mA 27mA	190 x 40 x 70	20 x 180	1.1Kg	---	A	FS-1
LSLV0015H100-2	1.5kW	FLD/A 3016	16A	250VAC	0.5mA 27mA	250 x 45 x 70	25 x 235	1.7Kg	---	A	FS-1
LSLV0022H100-2	2.2kW	FLD/A 3030	30A	250VAC	0.5mA 27mA	270 x 50 x 85	30 x 255	1.8Kg	---	A	FS-1
LSLV0037H100-2	3.7kW	FLD/A 3030	30A	250VAC	0.5mA 27mA	270 x 50 x 85	30 x 255	1.8Kg	---	A	FS-2
LSLV0055H100-2	5.5kW	FLD/A 3042	42A	250VAC	0.5mA 27mA	310 x 50 x 85	30 x 295	2.4Kg	---	A	FS-2
LSLV0075H100-2	7.5kW	FLD/A 3055	55A	250VAC	0.5mA 27mA	250 x 85 x 90	60 x 235	2.9Kg	---	A	FS-2
LSLV0110H100-2	11kW	FLD/A 3075	75A	250VAC	0.5mA 27mA	270 x 80 x 135	60 x 255	3.6Kg	---	A	FS-2
LSLV0150H100-2	15kW	FLD/A 3100	100A	250VAC	0.75mA 130mA	270 x 90 x 135	65 x 255	5Kg	---	A	FS-3
LSLV0185H100-2	18.5kW	FLD/A 3130	130A	250VAC	0.75mA 130mA	270 x 90 x 150	65 x 255	6.8Kg	---	A	FS-3

EN 55011 CLASS A IEC/EN 61800-3 C3

LSLV series / Standard Filters											
INVERTER	POWER	CODE	CURRENT	VOLTAGE	LEAKAGE CURRENT	DIMENSIONS L W H	MOUNTING Y X	WEIGHT	MOUNT	FIG.	OUTPUT CHOKES
THREE PHASE					NOM. MAX.						
LSLV1100H100-4	110kW	FEP-T320	320A	220-480VAC	1.3mA 150mA	300x260x116	240x235	14.2Kg.	---	B	FS-4
LSLV1320H100-4	132kW	FEP-T320	320A	220-480VAC	1.3mA 150mA	300x260x116	240x235	14.2Kg.	---	B	FS-4
LSLV1600H100-4	160kW	FEP-T400	400A	220-480VAC	1.3mA 150mA	300x260x116	240x235	14.2Kg.	---	B	FS-4
LSLV1850H100-4	185kW	FEP-T600	600A	220-480VAC	1.3mA 150mA	300x260x116	240x235	16.8Kg.	---	B	FS-4
LSLV2200H100-4	220kW	FEP-T600	600A	220-480VAC	1.3mA 150mA	300x260x116	240x235	16.8Kg.	---	B	FS-4
LSLV2500H100-4	250kW	FEP-T600	600A	220-480VAC	1.3mA 150mA	300x260x116	240x235	16.8Kg.	---	B	FS-4
LSLV3150H100-4	315kW	FEP-T1000	1000A	220-480VAC	1.3mA 150mA	350x280x166	290x255	22.5Kg.	---	B	FS-4
LSLV3550H100-4	355kW	FEP-T1000	1000A	220-480VAC	1.3mA 150mA	350x280x166	290x255	22.5Kg.	---	B	FS-4
LSLV4000H100-4	400kW	FEP-T1000	1000A	220-480VAC	1.3mA 150mA	350x280x166	290x255	22.5Kg.	---	B	FS-4
LSLV5000H100-4	500kW	FEP-T1600	1600A	220-480VAC	1.3mA 150mA	400x300x166	340x275	27.4Kg.	---	B	FS-4

EN 55011 CLASS A IEC/EN 61800-3 C3

LSLV series / Internal Filters			
INVERTER	POWER	FIG.	OUTPUT CHOKES
THREE PHASE			
LSLV0008H100-4	0.75kW	2	FS-1
LSLV0015H100-4	1.5kW	2	FS-1
LSLV0022H100-4	2.2kW	2	FS-1
LSLV0037H100-4	3.7kW	2	FS-2
LSLV0055H100-4	5.5kW	2	FS-2
LSLV0075H100-4	7.5kW	2	FS-2
LSLV0110H100-4	11kW	2	FS-2
LSLV0150H100-4	15kW	2	FS-3
LSLV0185H100-4	18.5kW	2	FS-3
LSLV0220H100-4	22kW	2	FS-3
LSLV0300H100-4	30kW	2	FS-3
LSLV0370H100-4	37kW	2	FS-3
LSLV0450H100-4	45kW	2	FS-4
LSLV0550H100-4	55kW	2	FS-4
LSLV0750H100-4	75kW	2	FS-4
LSLV0900H100-4	90kW	2	FS-4

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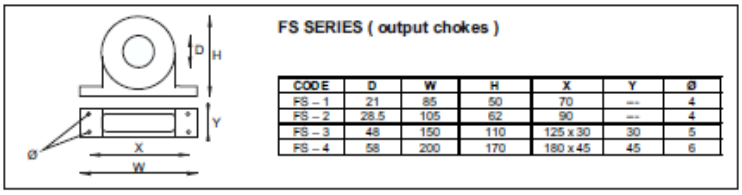
FIG. 2



FS SERIES (output chokes)

CODE	D	W	H	X	Y	Ø
FS-1	21	85	50	70	---	4
FS-2	28.5	105	62	90	---	4
FS-3	48	150	110	125 x 30	30	5
FS-4	58	200	170	180 x 45	45	6