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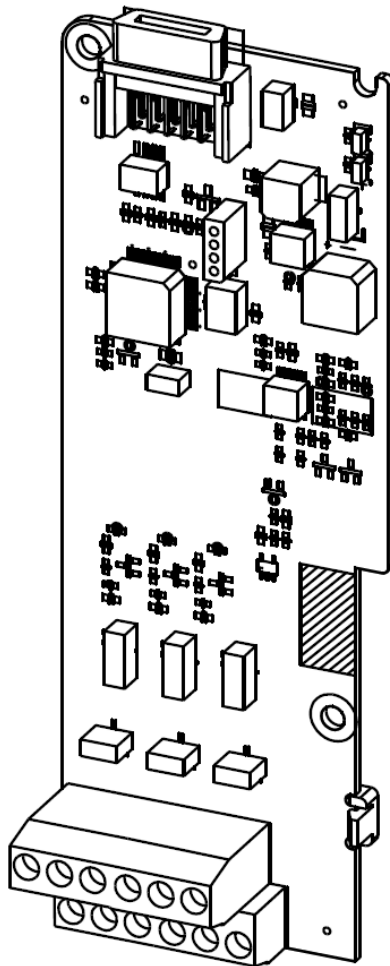
LS ELECTRIC strives to maximize your profits in gratitude for choosing us as your partner.

Extension I/O2

LSLV-H100 series

User's Manual

5.5-18.5kW [200V] 5.5-55kW [400V]



Safety Instructions

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

LS[→]**ELECTRIC**

Safety Information

Carefully read and follow all safety instructions in this manual to avoid unsafe operating conditions, property damage, personal injury, or death. Please keep this manual for future reference.

Safety symbols in this manual

Danger

Indicates an imminently hazardous situation which, if not avoided, could 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 which, if not avoided, could result in minor injury or property damage.

Safety informaton

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 IO2 PCB.
- Turn off the power to the inverter before making wiring connections. Otherwise, malfunctions including faulty network communication may occur.
- When installing the option board, ensure that the option board is properly connected to the connector on the inverter. Faulty connections may damage the inverter or the option board.
- Check the parameter units before settings the function codes. Wrong units may lead to faulty network communication.

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1 About the Product

The H100 extension IO2 module is used to extend the digital and analog input/output function terminals for the LSLV-H100 series inverters.

2 Product Specification Details

Refer to the following table for detailed product specifications.

Items		Terminal	Description	Switch
Analog Input	Voltage	V3	<ul style="list-style-type: none"> 3 Channel available Operate switch (SW1,SW2,SW3) to select voltage or current. Voltage Unipolar: 0–10 V (Max. 12 V) input Sets the frequency based on the voltage supplied to the terminal. Current Input current: 4–20 mA (Max. 0~24 mA) Sets the frequency based on the current supplied to the terminal. 	[Switch 1,2,3] Voltage (V3,V4,V5)/ Current (I3,I4,I5) Selection
	Current			
Analog Output	Voltage	VO3	<ul style="list-style-type: none"> 1 Channel available Select output frequency, output current, output voltage, or DC voltage. Output voltage: 0–10 V Maximum output voltage/current: 12 V/10 mA 	
Analog Output	Current	IO3	<ul style="list-style-type: none"> 1 Channel available Select output frequency, output current, output voltage, or DC voltage. Output current: 0–20 mA Maximum output current: 24 mA 	
CM Terminal		CM	<ul style="list-style-type: none"> 7 Channels available Common ground terminal for analog inputs/outputs 	
Compatible Inverter series			<ul style="list-style-type: none"> H100 series inverters 	

3 Items Included

- 1 x H100 extension IO2 PCB module
- 1 x H100 extension IO2 module user manual
- 2 x screws
- Plastic components

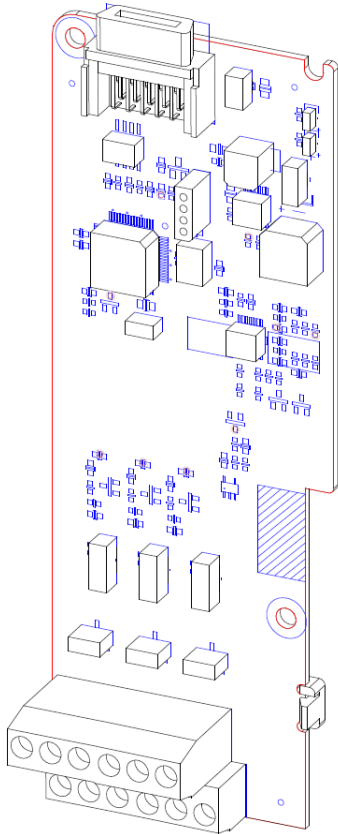
4 Product Name

EIOE2-H100

5 Overview and Installation

5.1 Overview

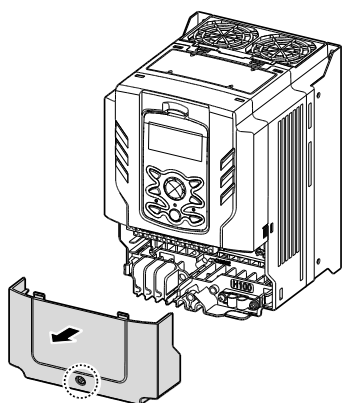
Refer to the following illustration for the H100 extension IO2 module layout.



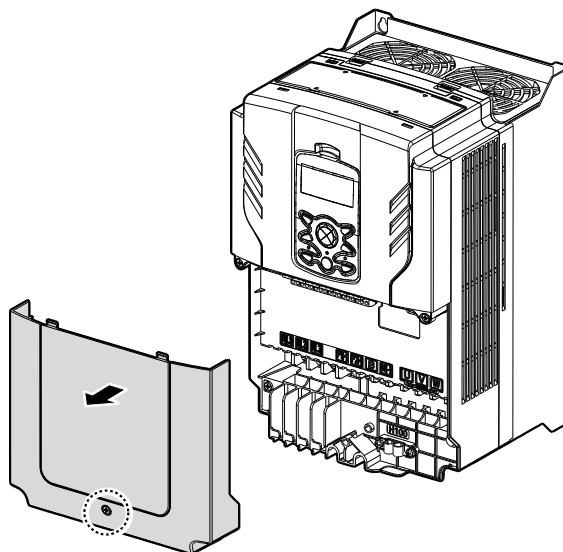
5.2 Installing the H100 extension IO2 Module

Follow the instructions below to properly install the H100 extension IO2 module.

1. Turn off the inverter and make sure that the DC link voltage has dropped to a safe level.
2. Loosen the screw on the power cover then remove the power cover.

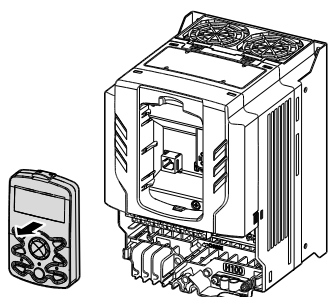


0.75–30 kW Models

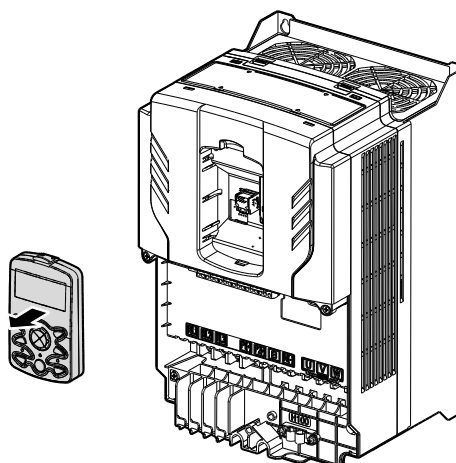


37–90 kW Models

3. Remove the keypad from the inverter body.

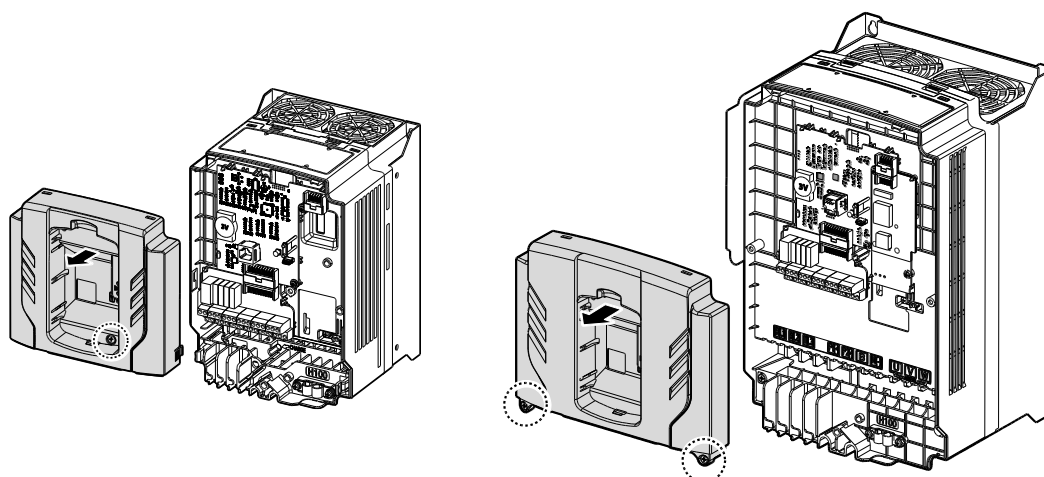


0.75–30 kW Models



37–90 kW Models

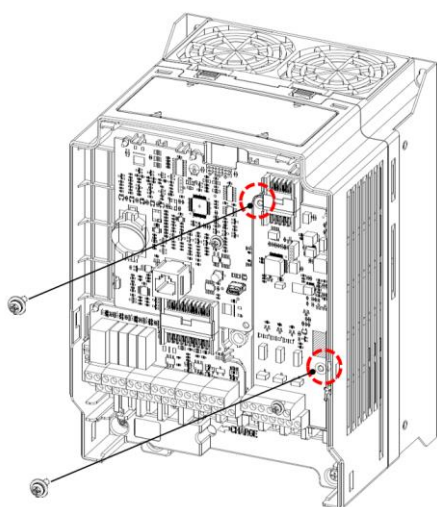
- Loosen the screws securing the front cover. Then, remove the front cover by lifting it. The main PCB is exposed.



0.75–30 kW Models

37–90 kW Models

- Place the H100 extension IO2 PCB module on the expansion slot and fasten it with the screws included in the box.



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

⚠ Caution

Ensure that the inverter is turned off and that the DC link voltage has dropped to a safe level before opening the terminal cover and installing (or removing) the H100 extension IO module.

Note

Use the keypad to check the software version and the keypad installation options.

**Use the keypad at [CNF-10] to check if the inverter's S/W version is higher than 0.11.

5.3 Signal (Control) Cable Specifications

Terminal	Wire Thickness 1)	
	mm ²	AWG
CM/V3/V4/V5	0.33-1.25	16-22
VO3/IO3	0.33-2.0	14-22

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

5.4 Installation Considerations

Refer to the following table for the operating conditions, and find an appropriate installation location accordingly.

Items	Description
Ambient Temperature*	-10 °C–50 °C (40 °C and above, 2.5% / °C Current Derating search. 50 °C 75% of the rated current of the drive if possible)
Ambient Humidity	90% relative humidity (no condensation)
Storage Temperature	- 4–149 °F (-20–65 °C)
Environmental Factors	An environment free from corrosive or flammable gases, oil residue or dust
Altitude/Vibration	Lower than 3,280 ft (1,000 m) above sea level/less than 1.0 G (9.8 m/sec ²)
Air Pressure	70 –106 kPa

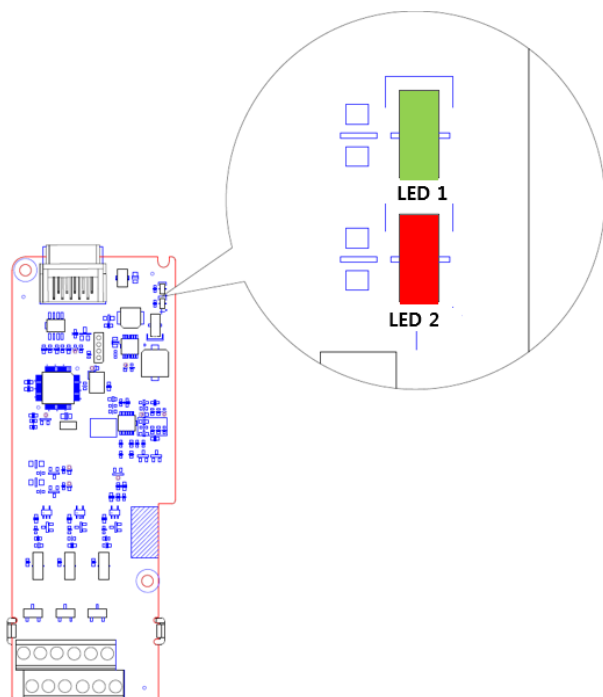
ⓘ Caution

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

5.5 LED Status and Switch Settings

5.5.1 LED Status

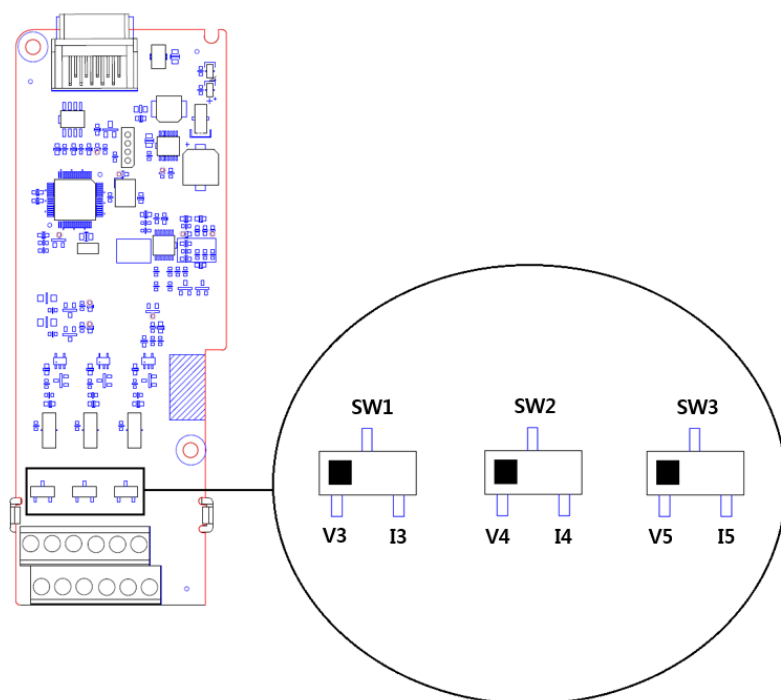
The H100 extension IO2 module has two LED indicators. Remove the front cover to check the LED status.



Status	LED 1	LED 2
LED Test Operation	LED is on for one second when power is on.	LED is on for one second when power is on.
Normal	Flashing	Off
	ON→OFF every second	-
Inverter Connection Error	Off	Off
Inverter Version Error	Synchronous flashing ¹	Synchronous Flashing ¹
	On→Off every second	On→Off every second
H/W Interface Error between Inverter and Option Module	Alternately Flashing ²	Alternately Flashing ²
	On→Off every second	On→Off every second

1. LED 1 and LED 2 flash simultaneously.
2. LED 1 and LED 2 flash alternately.

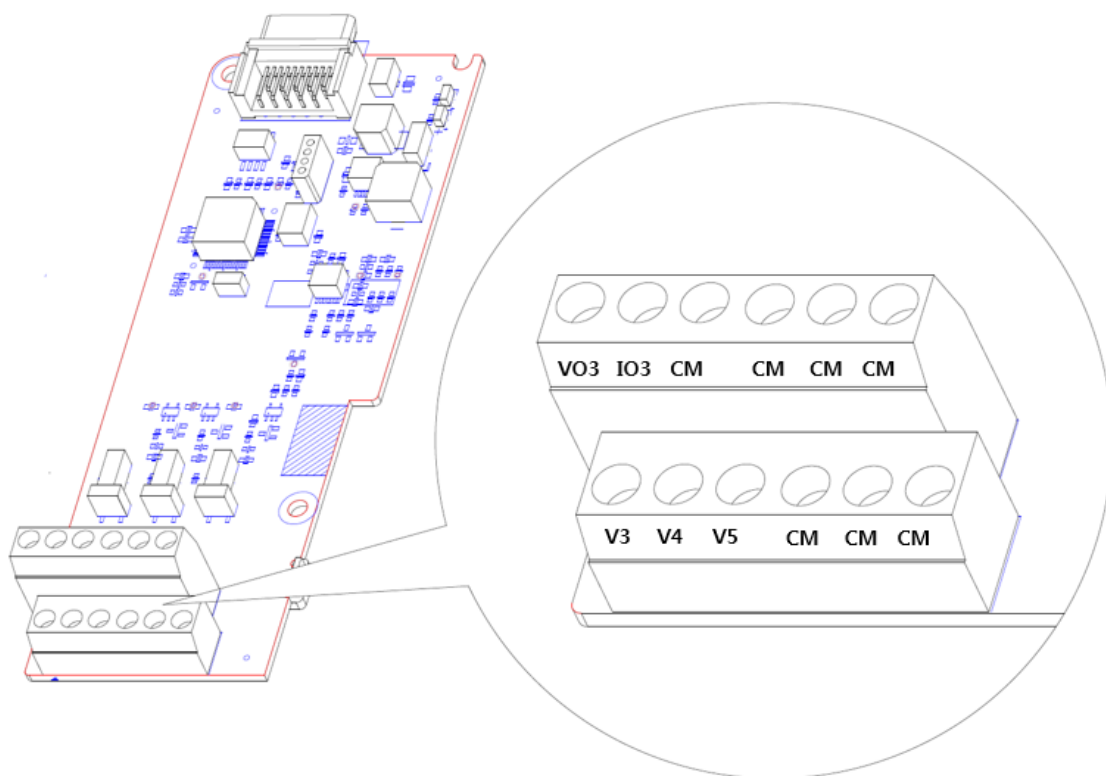
5.5.2 Switch Symbols and Descriptions



Switch	Description	Factory Default
SW1	V3/I3 mode selection switch (Left: V3, Right: I3)	Left: V3
SW2	V4/I4 mode selection switch (Left: V4, Right: I4)	Left: V4
SW3	V5/I5 mode selection switch (Left: V5, Right: I5)	Left: V5

5.6 Terminal Block Wiring Diagram

Following illustration describes the wiring of the H100 extension IO2 module. Ensure the inverter's specifications meet requirements to connect the H100 extension IO2 module. Refer to the detailed description to complete installation. Refer to **5.3 Signal(Control) Cable Specifications** on page 9 for detailed information.



6 Learning to Perform Basic Operations

6.1 Basic Features for H100 extension IO2

Basic Tasks	Example
Frequency reference source configuration for the terminal block (input voltage)	Configures the inverter to allow input voltages at the terminal block (V3) and setup or modify an operation frequency reference.
Frequency reference source configuration for the terminal block (input current)	Configures the inverter to allow input currents at the terminal block (I3) and to setup or modify an operation frequency reference.

6.2 Setting Frequency Reference

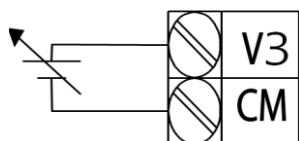
Group	Code	Name	LCD Display	Parameter Setting		Setting Range	Unit
DRV	07	Frequency reference source	Freq Ref Src	0	KeyPad-1	0~15	-
				1	KeyPad-2		
				2	V1		
				4	V2		
				5	I2		
				6	Int 485		
				7	Field Bus		
				9	Pulse		
				10	V3		
				11	I3		
				12	V4		
				13	I4		
				14	V5		
				15	I5		

6.2.1 Setting a Frequency Reference using Input Voltage (V3/V4/V5)

You can set and modify a frequency reference using the input voltage at the V3/V4/V5 terminal after selecting the voltage input at SW1/SW2/SW3. Use voltage inputs ranging from 0–10 V (unipolar) for forward only operation.

■ Setting a Frequency Reference for 0–10 V Input

Set DRV-07 (Freq Ref Src) to "10 (V3/V4/V5)". Use a voltage output from an external source or use the voltage output from the VR terminal to provide inputs to V3/V4/V5. Refer to the diagram below for the wiring required for each application.



Ex) [External source application]


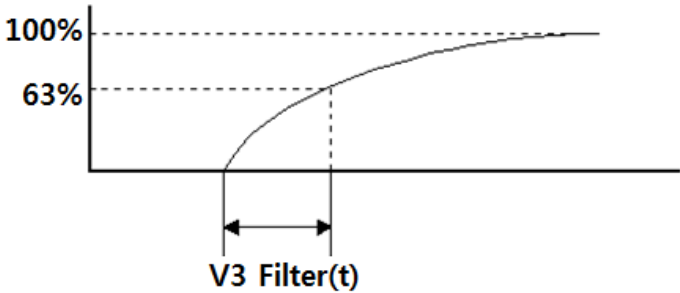
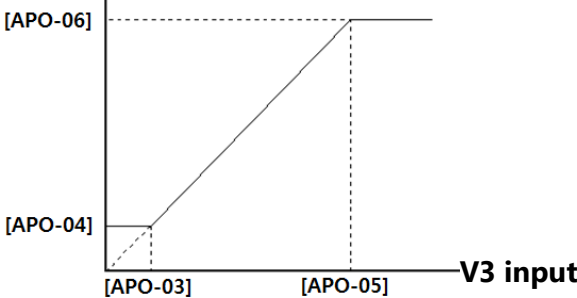
Group	Code	Name	LCD Display	Parameter Setting		Setting Range	Unit
DRV	07	Frequency reference source	Freq Ref Src	10	V3	0-11	-
IN	01	Frequency at maximum analog input	Freq at 100%	Maximum frequency		Initial frequency–Max. Frequency	Hz
APO	01	V3 input monitor	V3 Monitor[V]	0.00		0.00-12.00	V
	02	V3 input filter time constant	V3 Filter	10		0-10,000	msec
	03	V3 minimum input voltage	V3 volt x1	0.00		0.00-10.00	V
	04	V3 output at minimum voltage (%)	V3 Perc y1	0.00		0.00-100.00	%
	05	V3 maximum input voltage	V3 Volt x2	10.00		0.00-12.00	V
	06	V3 output at maximum voltage (%)	V3 Perc y2	100.00		0.00-100.00	%
	07	Rotation direction options	V3 Inverting	0	No	0-1	-
	08	Quantizing level	V3 Quantizing	0.04		0.00*, 0.04-10.00	%
	18	V4 input monitor	V4 Monitor[V]	0.00		0.00-12.00	V
	19	V4 input filter time constant	V4 Filter	10		0-10,000	msec
	20	V4 minimum input voltage	V4 volt x1	0.00		0.00-10.00	V
	21	V4 output at minimum voltage (%)	V4 Perc y1	0.00		0.00-100.00	%
	22	V4 maximum input voltage	V4 Volt x2	10.00		0.00-12.00	V
	23	V4 output at maximum voltage (%)	V4 Perc y2	100.00		0.00-100.00	%
	24	Rotation direction options	V4 Inverting	0	No	0-1	-
	25	Quantizing level	V4 Quantizing	0.04		0.00*, 0.04-10.00	%

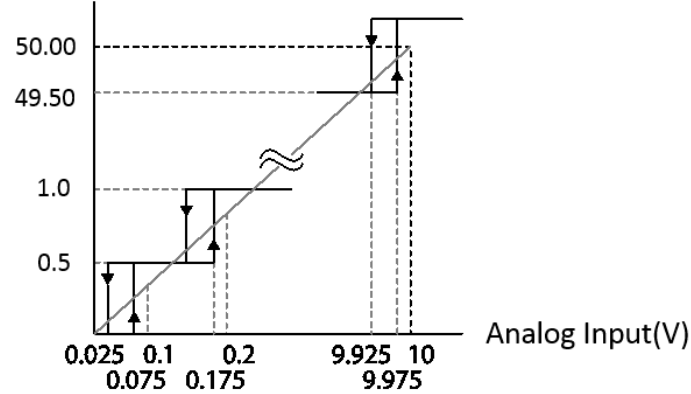
Group	Code	Name	LCD Display	Parameter Setting		Setting Range	Unit
	34	V5 input monitor	V5 Monitor[V]	0.00		0.00-12.00	V
	35	V5 input filter time constant	V5 Filter	10		0-10,000	msec
	36	V5 minimum input voltage	V5 volt x1	0.00		0.00-10.00	V
	37	V5 output at minimum voltage (%)	V5 Perc y1	0.00		0.00-100.00	%
	38	V5 maximum input voltage	V5 Volt x2	10.00		0.00-12.00	V
	39	V5 output at maximum voltage (%)	V5 Perc y2	100.00		0.00-100.00	%
	40	Rotation direction options	V5 Inverting	0	No	0-1	-
	41	Quantizing level	V5 Quantizing	0.04		0.00*, 0.04-10.00	%

* Quantizing is disabled if '0' is selected.


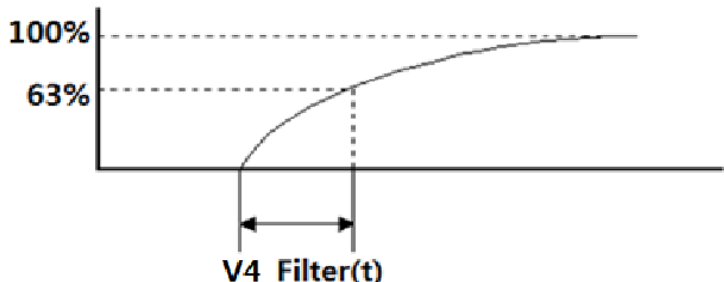
■ 0–10 V Input Voltage Setting Details(V3)

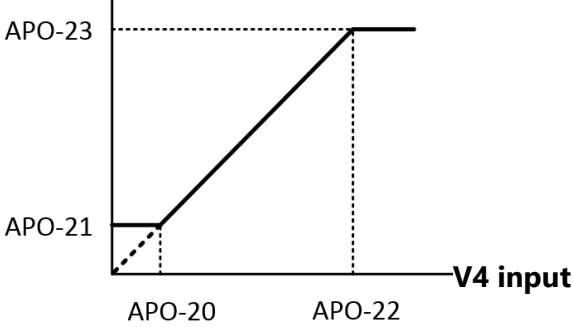
Code	Description
[IN-01] Freq at 100%	<p>This sets the frequency reference to the maximum input voltage when a potentiometer is connected to the control terminal block. A frequency set with code IN-01 becomes the maximum frequency only if the value set in code APO-04 (or APO-06) is 100 (%).</p> <ul style="list-style-type: none"> Set code IN-01 to "40.00" and use default values for codes APO-01–APO-08. The motor will run at 40.00 Hz when a 10 V input is provided at V3. Set code APO-06 to "50.00" and use default values for codes IN-01, APO-01–APO-08. The motor will run at 25.00 Hz (50% of the default maximum frequency–50 Hz) when a 10 V input is provided at V3.
[APO-01] V3 Monitor[V]	Configures the inverter to monitor the input voltage at V3.

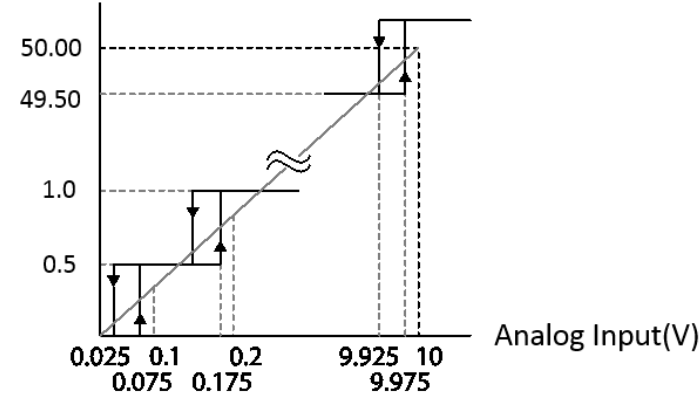
Code	Description
[APO-02] V3 Filter	<p>V3 Filter is a low-pass filter and may be used when there are large variations between reference frequencies. The filter passes only the clean input signal. Variations can be mitigated by increasing the time constant, but this requires an increased response time.</p> <p>The t (time) value indicates the time required for the frequency to reach 63% of the reference, when external input voltages are provided in multiple steps.</p> <p>V3 input from external source </p> <p>Frequency reference</p>  <p>V3 Filter(t)</p>
[APO-03] V3 volt x1 ~ [APO-06] V3 Perc y2	<p>These parameters are used to configure the gradient level and offset values of the output frequency, based on the input voltage.</p> <p>Frequency reference</p>  <p>V3 input</p>
[APO-07] V3 Inverting	<p>This inverts the input value set at V3. Set this code to "1 (Yes)" if you need the motor to run in the opposite direction from the current rotation.</p>

Code	Description
<p>[APO-08] V3 Quantizing</p>	<p>Quantizing may be used when the noise level of the analog input (V3 terminal) signal is high. The input signal's height (value) is quantized regularly to output a frequency. Quantizing is useful if you are operating a noise-sensitive system, because it suppresses any signal noise. However, quantizing will diminish system sensitivity. (The resulting power of the output frequency will decrease based on the analog input).</p> <p>Parameter values for quantizing are a percentage based on the maximum input. Therefore, if the value is set to 1% of the analog maximum input (50 Hz), the output frequency will increase or decrease by 0.5 Hz per 0.1 V difference.</p> <p>When the analog input is increased, an increase of the input equal to 75% of the set value will change the output frequency, and then the frequency will increase according to the set value. Likewise, when the analog input decreases, a decrease of the input equal to 75% of the set value will make an initial change to the output frequency.</p> <p>The low-pass filter reduces noise, but decreases the responsiveness. Variations (noise) can be mitigated by increasing the time constant, but this requires an increased response time. When the input signal is delayed, pulsation (ripple) may occur to the output frequency.</p> <p>OUTPUT Frequency (Hz)</p>  <p>50.00 49.50 1.0 0.5</p> <p>0.025 0.1 0.2 9.925 10 0.075 0.175 9.975</p> <p>Analog Input(V)</p>


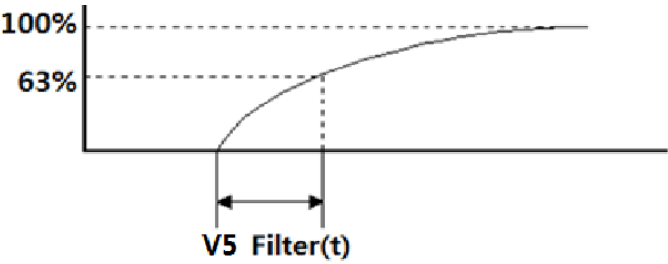
■ 0–10 V Input Voltage Setting Details(V4)

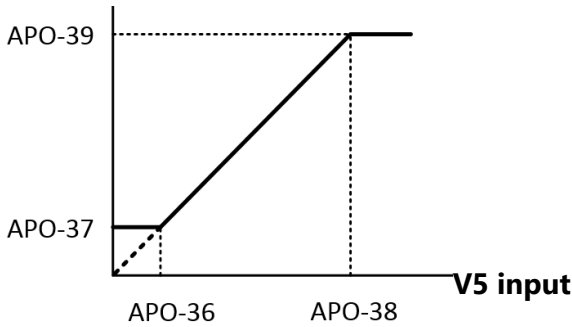
Code	Description
[IN-01] Freq at 100%	<p>This sets the frequency reference to the maximum input voltage when a potentiometer is connected to the control terminal block. A frequency set with code IN-01 becomes the maximum frequency only if the value set in code APO-21 (or APO-23) is 100 (%).</p> <ul style="list-style-type: none"> Set code IN-01 to "40.00" and use default values for codes APO-18–APO-25. The motor will run at 40.00 Hz when a 10 V input is provided at V4. Set code APO-06 to "50.00" and use default values for codes IN-01, APO-18–APO-25. The motor will run at 25.00 Hz (50% of the default maximum frequency–50 Hz) when a 10 V input is provided at V4.
[APO-18] V4 Monitor[V]	Configures the inverter to monitor the input voltage at V4.
[APO-19] V4 Filter	<p>V4 Filter is a low-pass filter and may be used when there are large variations between reference frequencies. The filter passes only the clean input signal. Variations can be mitigated by increasing the time constant, but this requires an increased response time.</p> <p>The t (time) value indicates the time required for the frequency to reach 63% of the reference, when external input voltages are provided in multiple steps.</p> <div style="text-align: center;"> <p>V4 input from external source</p>  <p>Frequency reference</p>  <p>V4 Filter(t)</p> </div>

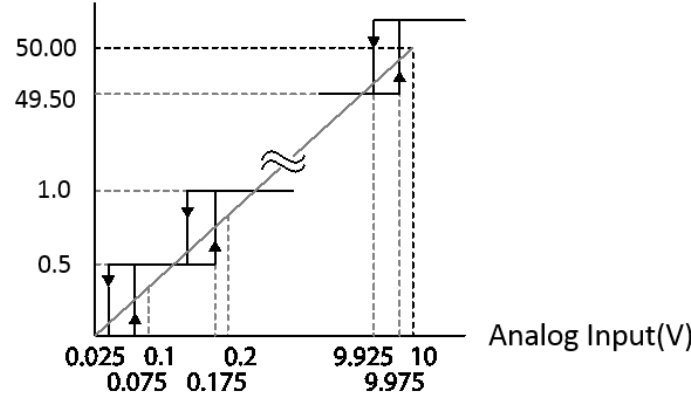
Code	Description
[APO-20] V4 volt x1 ~ [APO-23] V4 Perc y2	<p>These parameters are used to configure the gradient level and offset values of the output frequency, based on the input voltage.</p> <p>Frequency reference</p>  <p>The graph illustrates the frequency reference output based on the V4 input voltage. The horizontal axis is labeled 'V4 input'. The vertical axis represents frequency. The graph consists of three parts: a horizontal segment at a low frequency level (APO-21) for input values from 0 to APO-20; a linear ramp starting at (APO-20, APO-21) and ending at (APO-22, APO-23); and a horizontal segment at the high frequency level (APO-23) for input values greater than APO-22. Dashed lines indicate the coordinates of the key points on the graph.</p>
[APO-24] V4 Inverting	<p>This inverts the input value set at V4. Set this code to "1 (Yes)" if you need the motor to run in the opposite direction from the current rotation.</p>

Code	Description
<p>[APO-25] V4 Quantizing</p>	<p>Quantizing may be used when the noise level of the analog input (V4 terminal) signal is high. The input signal's height (value) is quantized regularly to output a frequency. Quantizing is useful if you are operating a noise-sensitive system, because it suppresses any signal noise. However, quantizing will diminish system sensitivity. (The resulting power of the output frequency will decrease based on the analog input).</p> <p>Parameter values for quantizing are a percentage based on the maximum input. Therefore, if the value is set to 1% of the analog maximum input (50 Hz), the output frequency will increase or decrease by 0.5 Hz per 0.1 V difference.</p> <p>When the analog input is increased, an increase of the input equal to 75% of the set value will change the output frequency, and then the frequency will increase according to the set value. Likewise, when the analog input decreases, a decrease of the input equal to 75% of the set value will make an initial change to the output frequency.</p> <p>The low-pass filter reduces noise, but decreases the responsiveness. Variations (noise) can be mitigated by increasing the time constant, but this requires an increased response time. When the input signal is delayed, pulsation (ripple) may occur to the output frequency.</p> <p>OUTPUT Frequency (Hz)</p>  <p>50.00 49.50 1.0 0.5</p> <p>0.025 0.075 0.1 0.175 0.2 9.925 9.975 10</p> <p>Analog Input(V)</p>

■ 0–10 V Input Voltage Setting Details(V5)

Code	Description
[IN-01] Freq at 100%	<p>This sets the frequency reference to the maximum input voltage when a potentiometer is connected to the control terminal block. A frequency set with code IN-01 becomes the maximum frequency only if the value set in code APO-37 (or APO-39) is 100 (%).</p> <ul style="list-style-type: none"> Set code IN-01 to "40.00" and use default values for codes APO-34–APO-41. The motor will run at 40.00 Hz when a 10 V input is provided at V5. Set code APO-39 to "50.00" and use default values for codes IN-01, APO-34–APO-41. The motor will run at 25.00 Hz (50% of the default maximum frequency–60 Hz) when a 10 V input is provided at V5.
[APO-34] V5 Monitor[V]	Configures the inverter to monitor the input voltage at V5.
[APO-35] V3 Filter	<p>V5 Filter is a low-pass filter and may be used when there are large variations between reference frequencies. The filter passes only the clean input signal. Variations can be mitigated by increasing the time constant, but this requires an increased response time.</p> <p>The t (time) value indicates the time required for the frequency to reach 63% of the reference, when external input voltages are provided in multiple steps.</p> <div style="text-align: center;"> <p>V5 input from external source</p>  <p>Frequency reference</p>  <p>V5 Filter(t)</p> </div>

Code	Description
[APO-36] V3 volt x1 ~ [APO-39] V3 Perc y2	<p>These parameters are used to configure the gradient level and offset values of the output frequency, based on the input voltage.</p> <p>Frequency reference</p> 
[APO-40] V5 Inverting	<p>This inverts the input value set at V5. Set this code to "1 (Yes)" if you need the motor to run in the opposite direction from the current rotation.</p>

Code	Description
[APO-41] V5 Quantizing	<p>Quantizing may be used when the noise level of the analog input (V5 terminal) signal is high. The input signal's height (value) is quantized regularly to output a frequency. Quantizing is useful if you are operating a noise-sensitive system, because it suppresses any signal noise. However, quantizing will diminish system sensitivity. (The resulting power of the output frequency will decrease based on the analog input).</p> <p>Parameter values for quantizing are a percentage based on the maximum input. Therefore, if the value is set to 1% of the analog maximum input (50 Hz), the output frequency will increase or decrease by 0.5 Hz per 0.1 V difference.</p> <p>When the analog input is increased, an increase of the input equal to 75% of the set value will change the output frequency, and then the frequency will increase according to the set value. Likewise, when the analog input decreases, a decrease of the input equal to 75% of the set value will make an initial change to the output frequency.</p> <p>The low-pass filter reduces noise, but decreases the responsiveness. Variations (noise) can be mitigated by increasing the time constant, but this requires an increased response time. When the input signal is delayed, pulsation (ripple) may occur to the output frequency.</p> <p>OUTPUT Frequency (Hz)</p>  <p>0.025 0.1 0.2 9.925 10 0.075 0.175 9.975</p>

6.2.2 Setting a Reference Frequency using Input Current (I3/I4/I5)

You can set and modify a frequency reference using the input current at the I3/I4/I5 terminal after selecting current input at SW1/SW2/SW3. Set DRV-07 (Freq Ref Src) to "11/12/13 (I3/I4/I5)" and apply 4–20 mA input current.

Group	Code	Name	LCD Display	Parameter Setting		Setting Range	Unit
DRV	07	Frequency reference source	Freq Ref Src	11	I3	0~11	-
IN	01	Frequency at maximum analog input	Freq at 100%	Max Freq.		Start Freq.-Max Freq.	Hz
APO	10	I3 input monitor	I3 Monitor	0.00		0.00-24.00	mA
	11	I3 input filter time constant	I3 Filter	10		0-10,000	mA
	12	I3 minimum input current	I3 Curr x1	4.00		0.00-20.00	mA
	13	I3 output at minimum current (%)	I3 Perc y1	0.00		0.00 – 100.00	%
	14	I3 maximum input current	I3 Curr x2	20.00		0.00-24.00	mA
	15	I3 output at maximum current (%)	I3 Perc y2	100.00		0.00-100.00	%
	16	I3 rotation direction options	I3 Inverting	0	No	0-1	-
	17	I3 Quantizing level	I3 Quantizing	0.04		0.00*, 0.04-10.00	%
	26	I4 input monitor	I4 Monitor	0.00		0.00-24.00	mA
	27	I4 input filter time constant	I4 Filter	10		0-10,000	mA
	28	I4 minimum input current	I4 Curr x1	4.00		0.00-20.00	mA
	29	I4 output at minimum current (%)	I4 Perc y1	0.00		0.00 – 100.00	%
	30	I4 maximum input current	I4 Curr x2	20.00		0.00-24.00	mA
	31	I4 output at maximum current (%)	I4 Perc y2	100.00		0.00-100.00	%
	32	I4 rotation direction options	I4 Inverting	0	No	0-1	-
	33	I4 Quantizing level	I4 Quantizing	0.04		0.00*, 0.04-	%

Group	Code	Name	LCD Display	Parameter Setting		Setting Range	Unit
						10.00	
	42	I5 input monitor	I5 Monitor	0.00		0.00-24.00	mA
	43	I5 input filter time constant	I5 Filter	10		0-10,000	mA
	44	I5 minimum input current	I5 Curr x1	4.00		0.00-20.00	mA
	45	I5 output at minimum current (%)	I5 Perc y1	0.00		0.00 – 100.00	%
	46	I5 maximum input current	I5 Curr x2	20.00		0.00-24.00	mA
	47	I5 output at maximum current (%)	I5 Perc y2	100.00		0.00-100.00	%
	48	I5 rotation direction options	I5 Inverting	0	No	0-1	-
	49	I5 Quantizing level	I5 Quantizing	0.04		0.00*, 0.04-10.00	%

■ Input Current (I3) Setting Details

Code	Description
[IN-01] Freq at 100%	<p>Configures the frequency reference for operation at the maximum current (when APO-14 is set to 100%).</p> <ul style="list-style-type: none"> If IN-01 is set to 40.00 and the default settings are used for APO-10–APO-16, a 20 mA input to the V3 terminal will produce a frequency reference of 40.00Hz. If APO-15 is set to 50.00 and the default settings are used for IN-01, APO-10–APO-16, a 20 mA input will produce a frequency reference of 25.00Hz.
[APO-10] I3 Monitor	Used to monitor input current at I3.
[APO-11] I3 Filter	Configures the time for the operation frequency to reach 63% of target frequency based on the input current at I3.
[APO-12] I3 Curr x1 ~ [APO-15] I3 Perc y2	<p>Configures the gradient level and off-set value of the output frequency.</p> <p>Frequency reference</p>

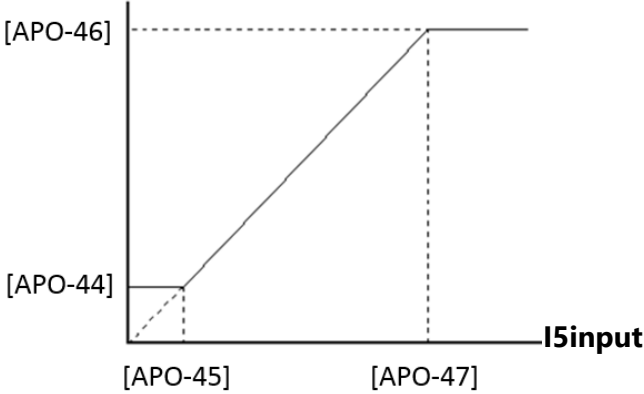
■ Input Current (I4) Setting Details

Code	Description
[IN-01] Freq at 100%	<p>Configures the frequency reference for operation at the maximum current (when APO-30 is set to 100%).</p> <ul style="list-style-type: none"> If IN-01 is set to 40.00 and the default settings are used for APO-26–APO-32, a 20 mA input to the V3 terminal will produce a frequency reference of 40.00Hz. If APO-15 is set to 50.00 and the default settings are used for IN-01, APO-26–APO-32, a 20 mA input will produce a frequency reference of 25.00Hz.
[APO-26] I4 Monitor	Used to monitor input current at I4.

Code	Description
[APO-27] I4 Filter	Configures the time for the operation frequency to reach 63% of target frequency based on the input current at I4.
[APO-28] I3 Curr x1 ~ [APO-31] I3 Perc y2	<p>Configures the gradient level and off-set value of the output frequency.</p> <p>Frequency reference</p>

■ Input Current (I5) Setting Details

Code	Description
[IN-01] Freq at 100%	<p>Configures the frequency reference for operation at the maximum current (when APO-14 is set to 100%).</p> <ul style="list-style-type: none"> If IN-01 is set to 40.00 and the default settings are used for APO-42–APO-48, a 20 mA input to the V3 terminal will produce a frequency reference of 40.00Hz. If APO-15 is set to 50.00 and the default settings are used for IN-01, APO-42–APO-48, a 20 mA input will produce a frequency reference of 25.00Hz.
[APO-42] I5 Monitor	Used to monitor input current at I5.
[APO-43] I5 Filter	Configures the time for the operation frequency to reach 63% of target frequency based on the input current at I5.

Code	Description
[APO-44] I5 Curr x1 ~ [APO-47] I5 Perc y2	<p>Configures the gradient level and off-set value of the output frequency.</p> <p>Frequency reference</p> 

6.3 Analog Output

An analog output terminal provides an output voltage of 0–10 V or 4–20 mA current.

6.3.1 Voltage Analog Output

The output size can be adjusted by selecting an output setting at the VO3 (Analog Output) terminal. Set the keypad to change the output type, voltage (VO3).

Group	Code	Name	LCD Display	Parameter Setting		Setting Range	Unit
APO	50	Analog output 3	VO3 Mode	0	Frequency	0-25	-
	51	Analog output 3 gain	VO3 Gain	100.0		-1000.0-1000.0	%
	52	Analog output 3 bias	VO3 Bias	0.0		-100.0-100.0	%
	53	Analog output 3 filter	VO3 Filter	5		0-10000	ms
	54	Analog constant output 3	VO3 Const %	0.0		0.0-100.0	%
	55	Analog output 3 monitor	VO3 Monitor	0.0		0.0-1000.0	%

■ Voltage and Current Analog Output Setting Details

Code	Description		
[APO-50] VO3 Mode	Select a constant value for output. The following example for output voltage setting.		
	Setting		Function
	0	Frequency	Outputs an operation frequency as a standard. A 10 V output is supplied based on the frequency set at DRV-20 (Max Freq).
	1	Output Current	A 10 V output is supplied based on 200% of the inverter's rated current.
	2	Output Voltage	Sets the outputs based on the inverter output voltage. 10 V output is made from a set voltage in BAS-15 (Rated Volt). If 0 V is set in BAS-15, 200 V/400 V models output 10 V based on the actual input voltages (240 V and 480 V respectively).
	3	DCLink Voltage	Outputs inverter DC link voltage as a standard. Outputs 10 V when the DC link voltage is 410 V DC for 200 V models, and 820 V DC for 400 V models.
	4	Output	Monitors output wattage. The maximum display voltage (10

Code	Description	
	Power	V) is supplied based on 200% of the rated output voltage.
7	Target Freq	Outputs a set frequency as a standard. Outputs 10 V at the maximum frequency (DRV-20).
8	Ramp Freq	Outputs a frequency calculated using the Acc/Dec function as a standard. May vary with actual output frequency. Outputs 10 V.
9	PID Ref Value	Outputs a PID controller's command value as a standard. Outputs approximately 6.6 V at 100%.
10	PID Fdb Value	Outputs a PID controller's feedback volume as a standard. Outputs approximately 6.6 V at 100%.
11	PID Output	Outputs a PID controller's output value as a standard. Outputs approximately 10 V at 100%.
12	Constant	Outputs APO-54 (AO3 Const %) value as a standard.
13	EPID1 Output	Output is based on the output value of the external PID1 controller. Outputs 10 V in 100%.
14	EPID1 RefVal	Output is based on the reference value of the external PID1 controller. Outputs 6.6 V in 100%.
15	EPID1 FdbVal	Output is based on the feedback amount of the external PID1 controller. Outputs 6.6 V in 100%.
16	EPID2 Output	Output is based on the output value of the external PID2 controller. Outputs 10 V in 100%.
17	EPID2 RefVal	Output is based on the reference value of the external PID2 controller. Outputs 6.6 V in 100%.
18	EPID2 FdbVal	Output is based on the feedback amount of the external PID2 controller. Outputs 6.6 V in 100%.
19	Comm Output 1	Analogue output is based on the communication setting value. (AO1)
20	Comm Output 2	Analogue output is based on the communication setting value. (AO2)
21	Comm Output 3	Analogue output is based on the communication setting value. (AO3)
22	Comm Output 4	Analogue output is based on the communication setting value. (AO4)
23	EPID3 Output	Output is based on the output value of the external PID3 controller. Outputs 10 V in 100%.
24	EPID3 RefVal	Output is based on the reference value of the external PID3 controller. Outputs 6.6 V in 100%.

Code	Description																
	25	EPID3 FdbVal															
		Output is based on the feedback amount of the external PID3 controller. Outputs 6.6 V in 100%.															
		Adjusts output value and offset. If frequency is selected as an output item, it will operate as shown below. $VO3 = \frac{Frequency}{MaxFreq} \times VO3\ Gain + VO3\ Bias$ The graph below illustrates how the analog voltage output (VO3) changes depending on APO-51 (VO3 Gain) and APO-52 (VO3 Bias) values. The Y-axis is the analog output voltage (0–10 V), and the X-axis is a % value of the output item. For example, if the maximum frequency set at DRV-20 (Max Freq) is 50 Hz and the present output frequency is 25 Hz, then the x-axis value on the next graph is 50%.															
[APO-51] VO3 Gain																	
[APO-52] VO3 Bias																	
		<table><tr><th colspan="2"></th><th colspan="2">[APO-51]VO3 Gain</th></tr><tr><th colspan="2"></th><th>100.0% (factory default)</th><th>80.0%</th></tr><tr><td rowspan="2">[APO-52] VO3 Bias</td><td>0.0% (factory default)</td><td></td><td></td></tr><tr><td>20.0%</td><td></td><td></td></tr></table>			[APO-51]VO3 Gain				100.0% (factory default)	80.0%	[APO-52] VO3 Bias	0.0% (factory default)			20.0%		
		[APO-51]VO3 Gain															
		100.0% (factory default)	80.0%														
[APO-52] VO3 Bias	0.0% (factory default)																
	20.0%																
[APO-53] VO3 Filter		Sets filter time constant on analog output.															
[APO-54] VO3 Const %		If the analog output at APO-50 (AO3 Mode) is set to "12 (Constant)", the analog voltage output is based on the set parameter values (0–100%).															
[APO-55] VO3 Monitor		Monitors the analog output value. Displays the maximum output voltage as a percentage (%) with 10 V as the standard.															

6.3.2 Current Analog Output

The output size can be adjusted by selecting an output setting at the IO3 (Analog Output) terminal. Set the keypad to change the output type, current (IO3).

Group	Code	Name	LCD Display	Parameter Setting		Setting Range	Unit
APO	56	Analog output 3	IO3 Mode	0	Frequency	0-25	-
	57	Analog output 3 gain	IO3 Gain	100.0		-1000.0-1000.0	%
	58	Analog output 3 bias	IO3 Bias	0.0		-100.0-100.0	%
	59	Analog output 3 filter	IO3 Filter	5		0-10000	ms
	60	Analog constant output 3	IO3 Const %	0.0		0.0-100.0	%
	61	Analog output 3 monitor	IO3 Monitor	0.0		0.0-1000.0	%

■ Voltage and Current Analog Output Setting Details

Code	Description		
[APO-56] IO3 Mode	Select a constant value for output. The following example for output voltage setting.		
	Setting		Function
	0	Frequency	Outputs an operation frequency as a standard. A 10 V output is supplied based on the frequency set at DRV-20 (Max Freq).
	1	Output Current	A 10 V output is supplied based on 200% of the inverter's rated current.
	2	Output Voltage	Sets the outputs based on the inverter output voltage. 10 V output is made from a set voltage in BAS-15 (Rated Volt). If 0 V is set in BAS-15, 200 V/400 V models output 10 V based on the actual input voltages (240 V and 480 V respectively).
	3	DCLink Voltage	Outputs inverter DC link voltage as a standard. Outputs 10 V when the DC link voltage is 410 V DC for 200 V models, and 820 V DC for 400 V models.
	4	Output Power	Monitors output wattage. The maximum display voltage (10 V) is supplied based on 200% of the rated output voltage.
	7	Target Freq	Outputs a set frequency as a standard. Outputs 10 V at the maximum frequency (DRV-20).
	8	Ramp Freq	Outputs a frequency calculated using the Acc/Dec function as a standard. May vary with actual output frequency.

Code	Description	
		Outputs 10 V.
9	PID Ref Value	Outputs a PID controller's command value as a standard. Outputs approximately 6.6 V at 100%.
10	PID Fdb Value	Outputs a PID controller's feedback volume as a standard. Outputs approximately 6.6 V at 100%.
11	PID Output	Outputs a PID controller's output value as a standard. Outputs approximately 10 V at 100%.
12	Constant	Outputs APO-54 (AO3 Const %) value as a standard.
13	EPID1 Output	Output is based on the output value of the external PID1 controller. Outputs 10 V in 100%.
14	EPID1 RefVal	Output is based on the reference value of the external PID1 controller. Outputs 6.6 V in 100%.
15	EPID1 FdbVal	Output is based on the feedback amount of the external PID1 controller. Outputs 6.6 V in 100%.
16	EPID2 Output	Output is based on the output value of the external PID2 controller. Outputs 10 V in 100%.
17	EPID2 RefVal	Output is based on the reference value of the external PID2 controller. Outputs 6.6 V in 100%.
18	EPID2 FdbVal	Output is based on the feedback amount of the external PID2 controller. Outputs 6.6 V in 100%.
19	Comm Output 1	Analogue output is based on the communication setting value. (AO1)
20	Comm Output 2	Analogue output is based on the communication setting value. (AO2)
21	Comm Output 3	Analogue output is based on the communication setting value. (AO3)
22	Comm Output 4	Analogue output is based on the communication setting value. (AO4)
23	EPID3 Output	Output is based on the output value of the external PID3 controller. Outputs 10 V in 100%.
24	EPID3 RefVal	Output is based on the reference value of the external PID3 controller. Outputs 6.6 V in 100%.
25	EPID3 FdbVal	Output is based on the feedback amount of the external PID3 controller. Outputs 6.6 V in 100%.
[APO-57] IO3 Gain	Adjusts output value and offset. If frequency is selected as an output item, it will operate as shown below.	

Code	Description													
[APO-58] IO3 Bias	<div>$IO3 = \frac{Frequency}{MaxFreq} \times IO3\ Gain + IO3\ Bias$</div> <p>The graph below illustrates how the analog voltage output (AO3) changes depending on APO-51 (IO3 Gain) and APO-52 (IO3 Bias) values. The Y-axis is the analog output voltage (0–10 V), and the X-axis is a % value of the output item.</p> <p>For example, if the maximum frequency set at DRV-20 (Max Freq) is 50 Hz and the present output frequency is 25 Hz, then the x-axis value on the next graph is 50%.</p> <div><table><tr><th colspan="2" rowspan="2"></th><th colspan="2">[APO-57]IO3 Gain</th></tr><tr><th>100.0% (factory default)</th><th>80.0%</th></tr><tr><td rowspan="2">[APO-58] IO3 Bias</td><td>0.0% (factory default)</td><td></td><td></td></tr><tr><td>20.0%</td><td></td><td></td></tr></table></div>			[APO-57]IO3 Gain		100.0% (factory default)	80.0%	[APO-58] IO3 Bias	0.0% (factory default)			20.0%		
				[APO-57]IO3 Gain										
		100.0% (factory default)	80.0%											
[APO-58] IO3 Bias	0.0% (factory default)													
	20.0%													
[APO-59] IO3 Filter	Sets filter time constant on analog output.													
[APO-60] IO3 Const %	If the analog output at APO-56 (IO3 Mode) is set to "12 (Constant)", the analog voltage output is based on the set parameter values (0–100%).													
[APO-61] IO3 Monitor	Monitors the analog output value. Displays the maximum output voltage as a percentage (%) with 10 V as the standard.													

7 Keypad Parameters for the Extension IO2 Module

Keypad Parameters for the extension IO2 module can only be used when using the extension IO2 module.

Code	Comm. Address	LCD Display	Initial Value	Property*	Setting Rang
CNF-30		Option-1 Type	-		Displays "Ext I/O 2" when the H100 extension IO module is connected.
CNF-40		Parameter Init	0	Δ	0 No
					1 All Grp
					2 DRV Grp
					3 BAS Grp
					4 ADV Grp
					5 CON Grp
					6 IN Grp
					7 OUT Grp
					8 COM Grp
					9 PID Grp
					10 EPI Grp
					11 AP1 Grp
					12 AP2 Grp
					13 AP3 Grp
					14 PRT Grp
					15 M2 Grp
					16 APO Grp
COM-06		FBus S/W Ver	21.00		Displays the version when the H100 extension IO module is connected.
DRV-07	0h1107	Freq Ref Src	0	Δ	0 Keypad-01
					1 Keypad-02
					2 V1
					3 Reserved
					4 V2

Code	Comm. Address	LCD Display	Initial Value	Property*	Setting Rang
					5 I2
					6 Int 485
					7 FieldBus
					8 Reserved
					9 Pulse
					10 V3
					11 I3
					12 V4
					13 I4
					14 V5
					15 I5
BAS-01	0h1201	Aux Ref Src	0	Δ	0 None
					1 V1
					2 Reserved
					3 V2
					4 I2
					5 Reserved
					6 Pulse
					7 Int 485
					8 FieldBus
					9 Reserved
					10 EPID1 Output
					11 EPID1 Fdb Val
					12 V3
					13 I3
					14 V4
					15 I4
					16 V5
					17 I5

Code	Comm. Address	LCD Display	Initial Value	Property*	Setting Rang
					18 EPID3 Output
					19 EPID3 Edb Val
BAS-05	0h1205	Freq 2nd Src	0	O	0 Keypad-01
					1 Keypad-02
					2 V1
					3 Reserved
					4 V2
					5 I2
					6 Int 485
					7 FieldBus
					8 Reserved
					9 Pulse
					10 V3
					11 I3
					11 V4
					11 I4
					11 V5
					11 I5
ADV-66	0h1342	OnOff Ctrl Src	0	O	0 None
					1 V1
					2 Reserved
					3 V2
					4 I2
					5 Reserved
					6 Pulse
					7 V3
					8 I3
					9 V4
					10 I4

Code	Comm. Address	LCD Display	Initial Value	Property*	Setting Rang
PID-10	0h180A	PID Ref 1 Src	0	Δ	11 V5
					12 I5
					0 Keypad
					1 V1
					2 Reserved
					3 V2
					4 I2
					5 Int 485
					6 FieldBus
					7 Reserved
					8 Pulse
					9 EPID1 Output
					10 V3
					11 I3
PID-12	0h180C	PID Ref1AuxSrc	0	Δ	0 None
					1 V1
					2 Reserved
					3 V2
					4 I2
					5 Reserved
					6 Pulse
					7 Int 485
					8 FieldBus
					9 Reserved
					10 EPID1 Output
					11 EPID1 Fdb Val
					12 V3
					13 I3
PID-15	0h180F	PID Ref2AuxSrc	0	Δ	0 Keypad
					1 V1

Code	Comm. Address	LCD Display	Initial Value	Property*	Setting Rang
					2 Reserved
					3 V2
					4 I2
					5 Int 485
					6 FieldBus
					7 Reserved
					8 Pulse
					9 EPID1 Output
					10 V3
					11 I3
PID-17	0h1811	PID Ref2AuxSrc	0	Δ	0 None
					1 V1
					2 Reserved
					3 V2
					4 I2
					5 Reserved
					6 Pulse
					7 Int 485
					8 FieldBus
					9 Reserved
					10 EPID1 Output
					11 EPID1 Fdb Val
					12 V3
					13 I3
					14 V4
					15 I4
					16 V5
					17 I5
					18 EPID3 Output

Code	Comm. Address	LCD Display	Initial Value	Property*	Setting Rang
					19 EPID3 Fdb Val
PID-20	0h1814	PID Fdb Source	0	Δ	0 V1
					1 Reserved
					2 V2
					3 I2
					4 Int 485
					5 FieldBus
					6 Reserved
					7 Pulse
					8 EPID1 Output
					9 EPID1 Fdb Val
					10 V3
					11 I3
					14 V4
					15 I4
					16 V5
					17 I5
					18 EPID3 Output
					19 EPID3 Fdb Val
PID-21	0h1815	PID Fdb AuxSrc	0	Δ	0 None
					1 V1
					2 Reserved
					3 V2
					4 I2
					5 Reserved
					6 Pulse
					7 Int 485
					8 FieldBus
					9 Reserved

Code	Comm. Address	LCD Display	Initial Value	Property*	Setting Rang
					10 EPID1 Output
					11 EPID1 Fdb Val
					12 V3
					13 I3
					14 V4
					15 I4
					16 V5
					17 I5
					18 EPID3 Output
					19 EPID3 Fdb Val
EPI-06	0h1906	EPID1 Ref Src	0	Δ	0 Keypad
					1 V1
					2 Reserved
					3 V2
					4 I2
					5 Int 485
					6 FieldBus
					7 Reserved
					8 Pulse
					9 V3
					10 I3
					11 V4
					12 I4
					13 V5
					14 I5
EPI-08	0h1908	EPID1 Fdb Src	0	O	1 V1
					2 Reserved
					3 V2
					4 I2

Code	Comm. Address	LCD Display	Initial Value	Property*	Setting Rang
					5 Int 485
					6 FieldBus
					7 Reserved
					8 Pulse
					9 V3
					10 I3
					11 V4
					12 I4
					13 V5
					14 I5
EPI-36	0h1924	EPID2 Ref Src	0	Δ	0 Keypad
					1 V1
					2 Reserved
					3 V2
					4 I2
					5 Int 485
					6 FieldBus
					7 Reserved
					8 Pulse
					9 V3
					10 I3
					11 V4
					12 I4
					13 V5
					14 I5
EPI-38	0h1926	EPID2 Fdb Src	0	O	1 V1
					2 Reserved
					3 V2
					4 I2

Code	Comm. Address	LCD Display	Initial Value	Property*	Setting Rang
					5 Int 485
					6 FieldBus
					7 Reserved
					8 Pulse
					9 V3
					10 I3
					11 V4
					12 I4
					13 V5
					14 I5
APO-00		Jump Code	30	O	-
APO-01		V3 Monitor	-	X	-
APO-02		V3 Filter	10	O	0~10000 msec
APO-03		V3 Volt x1	0.00	O	0.00~10.00 V
APO-04		V3 Perc Y1	0.00	O	0.00~100.00 %
APO-05		V3 Volt x2	10.00	O	0.00~12.00 V
APO-06		V3 Perc Y2	100.00	O	0.00~100.00 %
APO-07		V3 Inverting	0	O	0 No
					1 Yes
APO-08		V3 Quantizing	0.04	O	0.04~10.00 %
APO-10		I3 Monitor	-	O	-
APO-11		I3 Filter	10	O	0~10000 msec
APO-12		I3 Curr x1	4.00	O	0.00~20.00 mA
APO-13		I3 Perc Y1	0.00	O	0.00~100.00 %
APO-14		I3 Curr x2	20.00	O	0.00~24.00 mA
APO-15		I3 Perc Y2	100.00	O	0.00~100.00 %
APO-16		I3 Inverting	0	O	0 No
					1 Yes
APO-17		I3 Quantizing	0.04	O	0.04~10.00 %

Code	Comm. Address	LCD Display	Initial Value	Property*	Setting Rang
APO-18		V4 Monitor	-	X	-
APO-19		V4 Filter	10	O	0~10000 msec
APO-20		V4 Volt x1	0.00	O	0.00~10.00 V
APO-21		V4 Perc Y1	0.00	O	0.00~100.00 %
APO-22		V4 Volt x2	10.00	O	0.00~12.00 V
APO-23		V4 Perc Y2	100.00	O	0.00~100.00 %
APO-24		V4 Inverting	0	O	0 No
					1 Yes
APO-25		V4 Quantizing	0.04	O	0.04~10.00 %
APO-26		I4 Monitor	-	O	-
APO-27		I4 Filter	10	O	0~10000 msec
APO-28		I4 Curr x1	4.00	O	0.00~20.00 mA
APO-29		I4 Perc Y1	0.00	O	0.00~100.00 %
APO-30		I4 Curr x2	20.00	O	0.00~24.00 mA
APO-31		I4 Perc Y2	100.00	O	0.00~100.00 %
APO-32		I4 Inverting	0	O	0 No
					1 Yes
APO-33		I4 Quantizing	0.04	O	0.04~10.00 %
APO-34		V5 Monitor	-	X	-
APO-35		V5 Filter	10	O	0~10000 msec
APO-36		V5 Volt x1	0.00	O	0.00~10.00 V
APO-37		V5 Perc Y1	0.00	O	0.00~100.00 %
APO-38		V5 Volt x2	10.00	O	0.00~12.00 V
APO-39		V5 Perc Y2	100.00	O	0.00~100.00 %
APO-40		V5 Inverting	0	O	0 No
					1 Yes
APO-41		V5 Quantizing	0.04	O	0.04~10.00 %
APO-42		I5 Monitor	-	O	-
APO-43		I5 Filter	10	O	0~10000 msec
APO-44		I5 Curr x1	4.00	O	0.00~20.00 mA

Code	Comm. Address	LCD Display	Initial Value	Property*	Setting Rang
APO-45		I5 Perc Y1	0.00	O	0.00~100.00 %
APO-46		I5 Curr x2	20.00	O	0.00~24.00 mA
APO-47		I5 Perc Y2	100.00	O	0.00~100.00 %
APO-48		I5 Inverting	0	O	0 No
					1 Yes
APO-49		I5 Quantizing	0.04	O	0.04~10.00 %
APO-50		VO3 Mode	0	O	0 Frequency
					1 Output Current
					2 Output Voltage
					3 DC Link Voltage
					4 Output Power
					5 Reserved
					6 Reserved
					7 Target Freq
					8 Ramp Freq
					9 PID Ref Value
					10 PID Fdb Value
					11 PID Output
					12 Constant
					13 EPID1 Output
					14 EPID1 Ref Val
					15 EPID1 Fdb Val
					16 EPID2 Output
					17 EPID2 Ref Val
					18 EPID2 Fdb Val
					19 Comm Output 1
					20 Comm Output 2
					21 Comm Output 3
					22 Comm Output 4
					23 EPID3 Output

Code	Comm. Address	LCD Display	Initial Value	Property*	Setting Rang
					24 EPID3 Ref Val
					25 EPID3 Fdb Val
APO-51		VO3 Gain	100.0	O	-1000.0~1000.0 %
APO-52		VO3 Bias	0.0	O	-100.0~100.0 %
APO-53		VO3 Filter	5	O	0~10000 msec
APO-54		VO3 Const %	0.0	O	0.0~100.0 %
APO-55		VO3 Monitor	0.0	X	-
APO-56		IO3 Mode	0	O	0 Frequency
					1 Output Current
					2 Output Voltage
					3 DC Link Voltage
					4 Output Power
					5 Reserved
					6 Reserved
					7 Target Freq
					8 Ramp Freq
					9 PID Ref Value
					10 PID Fdb Value
					11 PID Output
					12 Constant
					13 EPID1 Output
					14 EPID1 Ref Val
					15 EPID1 Fdb Val
					16 EPID2 Output
					17 EPID2 Ref Val
					18 EPID2 Fdb Val
					19 Comm Output 1
					20 Comm Output 2
					21 Comm Output 3
					22 Comm Output 4

Code	Comm. Address	LCD Display	Initial Value	Property*	Setting Rang
					23 EPID3 Output
					24 EPID3 Ref Val
					25 EPID3 Fdb Val
APO-57		IO3 Gain	100.0	O	-1000.0~1000.0 %
APO-58		IO3 Bias	0.0	O	-100.0~100.0 %
APO-59		IO3 Filter	5	O	0~10000 msec
APO-60		IO3 Const %	0.0	O	0.0~100.0 %
APO-61		IO3 Monitor	0.0	X	-

* O/X: Write-enabled during operation

** Groups created for the H100 extension IO2 may be used when the extension IO2 is installed and when displayed as read-only, based on settings or switch options.

** Reset the related parameters after uninstalling the H100 extension IO2 module. The parameter settings for the H100 extension IO2 module are not automatically initialized when the module is removed.

8 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	H100 Extension IO2	Date of Installation	
Model Name	H100 Ext IO2	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 manufacture. 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 resulting 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.lselectric.co.kr/> for detailed service information.

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