

6 Learning Protection Features

Protection features provided by the H100 series inverter are categorized into two types: protection from overheating damage to the motor and protection against the inverter malfunction.

6.1 Motor Protection

6.1.1 Electronic Thermal Motor Overheating Prevention (ETH)

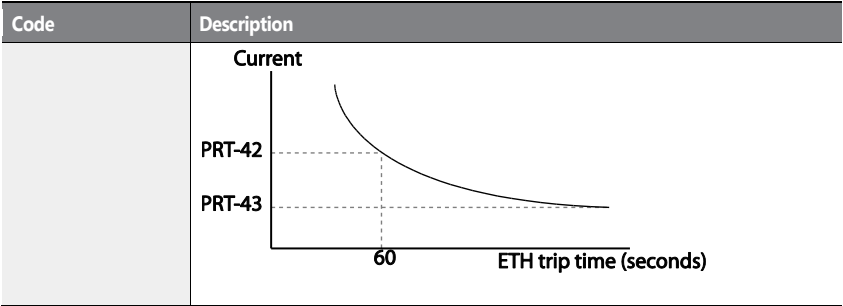
ETH is a protective function that uses the output current of the inverter, without a separate temperature sensor, to predict a rise in motor temperature to protect the motor based on its heat characteristics.

Group	Code	Name	LCD Display	Parameter Setting		Setting range	Unit
PRT	40	Electronic thermal prevention fault trip selection	ETH Trip Sel	0	None	0–2	-
	41	Motor cooling fan type	Motor Cooling	0	Self-cool	-	-
	42	Electronic thermal one minute rating	ETH 1 min	120		100–150	%
	43	Electronic thermal prevention continuous rating	ETH Cont	100		50–150	%

Electronic Thermal (ETH) Prevention Function Setting Details

Code	Description	
PRT-40 ETH Trip Sel	ETH can be selected to provide motor thermal protection. The LCD screen displays "E-Thermal."	
	Setting	Function

Code	Description	
	0	None The ETH function is not activated.
	1	Free-Run The inverter output is blocked. The motor coasts to a halt (free-run).
	2	Dec The inverter decelerates the motor to a stop.
PRT-41 Motor Cooling	Select the drive mode of the cooling fan, attached to the motor.	
	Setting	Function
	0	Self-cool As the cooling fan is connected to the motor axis, the cooling effect varies based on motor speed. Most universal induction motors have this design.
	1	Forced-cool Additional power is supplied to operate the cooling fan. This provides extended operation at low speeds. Motors designed for inverters typically have this design.
	<p>Continuous rated current (%)</p> <p>Frequency (Hz)</p>	
PRT-42 ETH 1 min	The amount of input current that can be continuously supplied to the motor for 1 minute, based on the motor-rated current (BAS-13).	
PRT-43 ETH Cont	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.	



6.1.2 Motor Over Heat Sensor

To operate the motor overheat protection, connect the overheat protection temperature sensor (PT 100, PTC) installed in the motor to the inverter’s analog input terminal.

Group	Code	Name	LCD Display	Parameter Setting		Setting Range	Unit
PRT	34	Selecting the operation after the detection of the motor overheat detection sensor	Thermal-T Sel	0	None	0-1	-
	35	Selecting the input of the motor overheat detection sensor	Thermal In Src	0	Thermal In	0-1	
	36	Fault level of the motor overheat detection sensor	Thermal-T Lev	50.0		0.0-100.0	%
	37	Fault area of the motor overheat detection sensor	Thermal-T Area	0	Low	0-1	
OUT	07	Analog output 2 item	AO2 Mode	14	Constant	0-18	
	08	Analog output 2 gain	AO2 Gain	100		0-100	%

Motor Overheat Protect Sensor Input Detail Settings

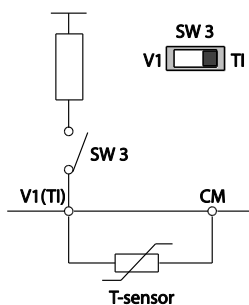
Code	Description	
PRT-34 Thermal-T Sel	Sets the inverter operation state when motor is overheated.	
	Setting	Function
	0 None	Do not operate when motor overheating is detected.
	1 Free-Run	When the motor is overheated, the inverter output is blocked and the motor will free-run by inertia.
PRT-35 Thermal In Src	3 Dec	When the motor is over heated, the motor decelerates and stops.
	Selects the type of the terminal when the motor overheat protect sensor is connected to the volt (V1) or current (I2) input terminal of the terminal block in the inverter.	
	Setting	Function
	0 Thermal In	Configure the motor overheat protect sensor connection to terminal block V1.
PRT-36 Thermal-T Lev	1 V2	Configure the motor overheat protect sensor connection to terminal block I2.
	Configure the fault level of the motor overheat detect sensor.	
PRT-37 Thermal-T Area	Setting	Function
	0 Low	Operates when the motor overheat sensor input is smaller than PRT-36.
	1 High	Operates when the motor overheat sensor input is bigger than PRT-36.
OUT-07 AO2 Mode, OUT-08 AO2 Gain	Used when supplying the constant current to the temperature sensor and receives input through the I2 or V1 terminal block by using the analog output terminal.	

Using the temperature sensor (PTC) by connecting it to the analog input terminal

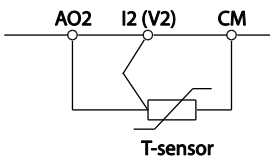
When the AO 2 (analog current outout) terminal is connected to the temperature sensor installed on a motor, the inverter supplies constant current to the temperature sensor. Then, connecting the motor signal wire to one of the the inverter's analog input terminals allows the inverter to detect the changes in the PTC resistance and translates it into voltage.

Learning Protection Features

If the I2 terminal is used to receive the signal, set the selection switch on the I/O board to V2.
If the V1 terminal is used, set the switch to T1. The sensor does not operate if SW3 is set to V1'.



To receive PTC signal at T1 input terminal, set PRT-35 (Thermal InSrc) to '0 (Thermal In)' and set the Analog1 input selection switch (SW3) to T1.



To receive PTC signal at V2 input terminal, set PRT-35 (Thermal InSrc) to '1 (V2)' and set SW 4 (Analog2 input selection switch) to V2. The sensor does not operate if SW4 is set to 'I2'.

When the inverter detects a motor overheat, motor overheat trip occurs with internal delay time. The trip delay time is not reset instantly when the trip condition is released, but it only decreases as time passes.

6.1.3 Overload Early Warning and Trip

A warning or fault trip (cutoff) occurs when the motor reaches an overload state, based on the motor's rated current. The amount of current for warnings and trips can be set separately.

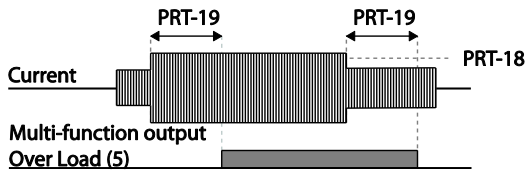
Group	Code	Name	LCD Display	Parameter Setting		Setting range	Unit
PRT	17	Overload warning selection	OL Warn Select	1	Yes	0-1	-
	18	Overload warning level	OL Warn Level	110		30-150	%
	19	Overload warning time	OL Warn Time	10.0		0-30	sec
	20	Motion at overload trip	OL Trip Select	1	Free-Run	-	-
	21	Overload trip level	OL Trip Level	120		30-150	%
	22	Overload trip time	OL Trip Time	60.0		0-60.0	sec

Learning Protection Features

Group	Code	Name	LCD Display	Parameter Setting		Setting range	Unit
OUT	31–35	Multi-function relay 1–5 item	Relay 1–5	5	Over Load	-	-
	36	Multi-function output 1 item	Q1 Define				

Overload Early Warning and Trip Setting Details

Code	Description		
PRT-17 OL Warn Select	If the overload reaches the warning level, the terminal block multi-function output terminal and relay are used to output a warning signal. If '1 (Yes)' is selected, it will operate. If '0 (No)' is selected, it will not operate.		
PRT-18 OL Warn Level, PRT-19 OL Warn Time	When the input current to the motor is greater than the overload warning level (OL Warn Level) and continues at that level during the overload warning time (OL Warn Time), the multi-function output (Relay 1, Q1) sends a warning signal. When Over Load is selected at OUT-31, OUT-33, the multi-function output terminal or relay outputs a signal. The signal output does not block the inverter output.		
PRT-20 OL Trip Select	Select the inverter protective action in the event of an overload fault trip.		
	Setting		Function
	0	None	No protective action is taken.
	1	Free-Run	In the event of an overload fault, inverter output is blocked and the motor will free-run due to inertia.
	3	Dec	If a fault trip occurs, the motor decelerates and stops.
PRT-21 OL Trip Level, PRT-22 OL Trip Time	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.		



Note

Overload warnings warn of an overload before an overload fault trip occurs. The overload warning signal may not work in an overload fault trip situation, if the overload warning level (OL Warn Level) and the overload warning time (OL Warn Time) are set higher than the overload trip level (OL Trip Level) and the overload trip time (OL Trip Time).

6.1.4 Stall Prevention and Flux Braking

The stall prevention function is a protective function that prevents motors from stalling due to overloads. If a motor stall occurs due to an overload, the inverter operation frequency is adjusted automatically. When a stall is caused by overload, high currents induced in the motor may cause motor overheating or damage the motor and interrupt operation of the motor-driven devices.

In this case, the motor decelerates with optimum deceleration without a braking resistor by using flux braking. If the deceleration time is too short, an over voltage fault trip may occur because of regenerative energy from the motor. The flux braking makes the motor use regenerate energy, therefore optimum deceleration is available without over voltage fault trip.

To protect the motor from overload faults, the inverter output frequency is adjusted automatically, based on the size of load.

Group	Code	Name	LCD Display	Parameter Setting	Setting range	Unit
PRT	50	Stall prevention and flux braking	Stall Prevent	0000	-	bit
	51	Stall frequency 1	Stall Freq 1	60.00	Start Freq–Stall Freq 1	Hz
	52	Stall level 1	Stall Level 1	130	30–150	%
	53	Stall frequency 2	Stall Freq 2	60.00	Stall Freq 1–Stall Freq 3	Hz
	54	Stall level 2	Stall Level 2	130	30–150	%
	55	Stall frequency 3	Stall Freq 3	60.00	Stall Freq 2–Stall Freq 4	Hz



Group	Code	Name	LCD Display	Parameter Setting	Setting range	Unit
OUT	56	Stall level 3	Stall Level 3	130	30–150	%
	57	Stall frequency 4	Stall Freq 4	60.00	Stall Freq 3–Maximum Freq	Hz
	58	Stall level 4	Stall Level 4	130	30–150	%
	59	Flux Braking Gain	Flux Brake kp	0	0–150	-
	31–35	Multi-function relay 1–5 item	Relay 1–5	9 Stall	-	-
	36	Multi-function output 1 item	Q1 Define			

Stall Prevention Function and Flux Braking Setting Details

Code

Description

Stall prevention can be configured for acceleration, deceleration, or while operating a motor at constant speed. When the LCD segment is on, the corresponding bit is off.

Item	Bit Status (On)	Bit Status (Off)
Keypad display		

PRT-50

Stall Prevent

Setting				Function
Bit 4	Bit 3	Bit 2	Bit 1	
			✓	Stall protection during acceleration
		✓		Stall protection while operating at a constant speed
	✓			Stall protection during deceleration
✓				Flux braking during deceleration

Setting	Function
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Learning Protection Features

Code	Description		
	0001	Stall protection during acceleration	If inverter output current exceeds the preset stall level (PRT- 52, 54, 56, 58) during acceleration, the motor stops accelerating and starts decelerating. If current level stays above the stall level, the motor decelerates to the start frequency (DRV-19). If the current level causes deceleration below the preset level while operating the stall protection function, the motor resumes acceleration.
	0010	Stall protection while operating at constant speed	Similar to stall protection function during acceleration, the output frequency automatically decelerates when the current level exceeds the preset stall level while operating at constant speed. When the load current decelerates below the preset level, it resumes acceleration.
	0100	Stall protection during deceleration	The inverter decelerates and keeps the DC link voltage below a certain level to prevent an over voltage fault trip during deceleration. As a result, deceleration times can be longer than the set time depending on the load.
	1000	Flux braking during deceleration	When using flux braking, deceleration time may be reduced because regenerative energy is expended at the motor.
	1100	Stall protection and flux braking during deceleration	Stall protection and flux braking operate together during deceleration to achieve the shortest and most stable deceleration performance.

Protection Features

Learning Protection Features

Code	Description
Flux Brake Kp	the inverter output voltage.

Note

Stall protection and flux braking operate together only during deceleration. Turn on the third and fourth bits of PRT-50 (Stall Prevention) to achieve the shortest and most stable deceleration performance without triggering an over voltage fault trip for loads with high inertia and short deceleration times. Do not use this function when frequent deceleration of the load is required, as the motor can overheat and be easily damaged.

ⓘ Caution

- Use caution when decelerating while using stall protection since the deceleration time can take longer than the time set, depending on the load. Acceleration stops when stall protection operates during acceleration. This may make the actual acceleration time longer than the preset acceleration time.
- When the motor is operating, Stall Level 1 applies and determines the operation of stall protection.



6.2 Inverter and Sequence Protection

6.2.1 Open-phase Protection

Open-phase protection is used to prevent over current levels induced by the inverter inputs due to an open-phase within the input power supply. Open-phase output protection is also available. An open-phase at the connection between the motor and the inverter output may cause the motor to stall, due to a lack of torque.


Group	Code	Name	LCD Display	Parameter Setting	Setting range	Unit
PRT	05	Input/output open-phase protection	Phase Loss Chk	00	-	bit
	06	Open-phase input voltage band	IPO V Band	40	1–100 V	V

Input and Output Open-phase Protection Setting Details

Code	Description		
PRT-05 Phase Loss Chk PRT-06 IPO V Band	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'.		
	Item	Bit status (On)	Bit status (Off)
	Keypad display		
	Setting		Function
	Bit 2	Bit 1	
		✓	Output open-phase protection
	✓		Input open-phase protection

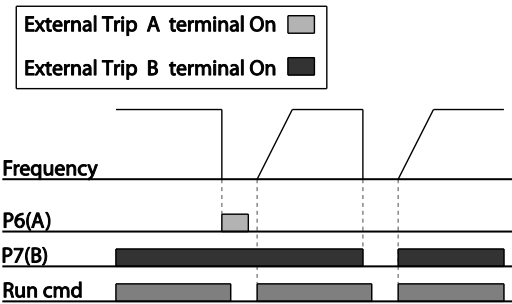
6.2.2 External Trip Signal

Set one of the multi-function input terminals to 4 (External Trip) to allow the inverter to stop operation when abnormal operating conditions arise.

Group	Code	Name	LCD Display	Parameter Setting		Setting range	Unit
IN	65–71	Px terminal setting options	Px Define(Px: P1–P7)	4	External Trip	-	-
	87	Multi-function input contact selection	DI NC/NO Sel			-	bit

External Trip Signal Setting Details

Code	Description																
IN-87 DI NC/NO Sel	Selects the type of input contact. If the mark of the switch is at the bottom (0), it operates as an A contact (Normally Open). If the mark is at the top (1), it operates as a B contact (Normally Closed). The corresponding terminals for each bit are as follows:																
	<table><tr><td>Bit</td><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td></tr><tr><td>Terminal</td><td>P7</td><td>P6</td><td>P5</td><td>P4</td><td>P3</td><td>P2</td><td>P1</td></tr></table>	Bit	7	6	5	4	3	2	1	Terminal	P7	P6	P5	P4	P3	P2	P1
	Bit	7	6	5	4	3	2	1									
Terminal	P7	P6	P5	P4	P3	P2	P1										



6.2.3 Inverter Overload Protection (IOLT)

When the inverter input current exceeds the rated current, a protective function is activated to prevent damage to the inverter, based on inverse proportional characteristics.

Group	Code	Name	LCD Display	Parameter Setting		Setting range	Unit
OUT	31–35	Multi-function relay 1–5	Relay 1–5	6	IOL	-	-
	36	Multi-function output 1	Q1 Define				

Note

A warning signal output can be provided in advance by the multi-function output terminal before the inverter overload protection function (IOLT) operates. When the overcurrent time reaches 60% of the allowed overcurrent (120%, 1 min; 140%, 5 sec), a warning signal output is provided (signal output at 120%, 36 sec).

6.2.4 Speed Command Loss

When setting operation speed using an analog input at the terminal block, communication options, or the keypad, speed command loss setting can be used to select the inverter operation for situations when the speed command is lost due to the disconnection of signal cables.

Group	Code	Name	LCD Display	Parameter Setting		Setting range	Unit
PRT	11	Keypad command loss operation mode	Lost KPD Mode	0	None	0 None	-
						1 Warning	
						2 Free-Run	
						3 Dec	
	12	Speed command loss operation mode	Lost Cmd Mode	1	Free-Run	-	-
	13	Time to determine	Lost Cmd	1.0		0.1–120.0	sec

Learning Protection Features

Group	Code	Name	LCD Display	Parameter Setting		Setting range	Unit
		speed command loss	Time				
	14	Operation frequency at speed command loss	Lost Preset F	0.00		Start frequency–Max. frequency	Hz
	15	Analog input loss decision level	AI Lost Level	0	Half of x1		-
OUT	31–35	Multi-function Relay 1–5	Relay 1–5	13	Lost Command	-	-
	36	Multi-function output 1	Q1 Define				

Speed Command Loss Setting Details

Code	Description		
PRT-11 Lost KPD Mode	Set the operation command source to keypad. If there is a communication error with the keypad or connection problem between the keypad and the inverter, select the inverter's operation.		
	Setting		Function
	0	None	The speed command immediately becomes the operation frequency without any protection function.
	1	Warning	Select 24: Lost keypad from OUT-31–36, one of the multi function terminal blocks, outputs a relevant warning signal when abnormal operating conditions arise.
	2	Free-Run	The inverter blocks output. The motor performs in free-run condition.
	3	Dec	The motor decelerates and then stops at the time set at PRT-07 (Trip Dec Time).
PRT-12 Lost Cmd Mode	In situations when speed commands are lost, the inverter can be configured to operate in a specific mode:		

Learning Protection Features

Code	Description	
	Setting	Function
	0 None	The speed command immediately becomes the operation frequency without any protection function.
	1 Free-Run	The inverter blocks output. The motor performs in free-run condition.
	2 Dec	The motor decelerates and then stops at the time set at PRT-07 (Trip Dec Time).
	3 Hold Input	The inverter calculates the average input value for 10 seconds before the loss of the speed command and uses it as the speed reference.
	4 Hold Output	The inverter calculates the average output value for 10 seconds before the loss of the speed command and uses it as the speed reference.
	5 Lost Preset	The inverter operates at the frequency set at PRT- 14 (Lost Preset F).
PRT-15 AI Lost Level, PRT-13 Lst Cmd Time	Configure the voltage and decision time for speed command loss when using analog input.	
	Setting	Function
	0 Half of x1	Based on the values set at IN-08 and IN-12, a protective operation starts when the input signal is reduced to half of the initial value of the analog input set using the speed command (DRV-01) and it continues for the time (speed loss decision time) set at PRT-13 (Lost Cmd Time). For example, set the speed command to '2 (V1)' at DRV-07, and set IN-06 (V1 Polarity) to '0 (Unipolar)'. When the voltage input drops to less than half of the value set at IN-08 (V1 Volt x 1), the protective function is activated.
	1 Below of x1	The protective operation starts when the signal becomes smaller than the initial value of the analog input set by the speed command and it continues for the speed loss decision time set at PRT-13 (Lost Cmd Time). Codes IN-08 and IN-12 are used to set the standard values.
	If the set value of the IN-08 and IN-12 is '0', the LostCmd function does not operate.	

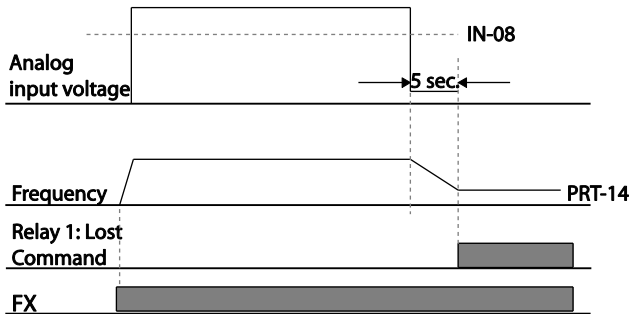
Protection
Features

Learning Protection Features

Code	Description
PRT-14 Lost Preset F	In situations where speed commands are lost, set the operation mode (PRT-12 Lost Cmd Mode) to '5 (Lost Preset)'. This operates the protection function and sets the frequency so that the operation can continue.

Learning Protection Features

Set IN-06 (V1 Polarity) to 'Unipolar' and IN-08 to '5 (V)'. Set PRT-15 (AI Lost Level) to '1 (Below x1)' and PRT-12 (Lost Cmd Mode) to '2 (Dec)' and then set PRT-13 (Lost Cmd Time) to 5 seconds. Then the inverter operates as follows:



Note

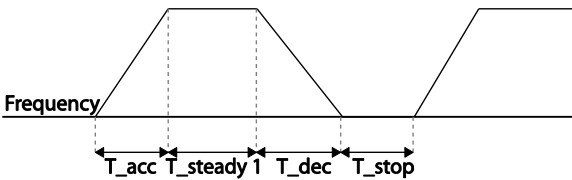
If speed command is lost while using communication options or the integrated RS-485 communication, the protection function operates after the command loss decision time set at PRT-13 (Lost Cmd Time) is elapsed.

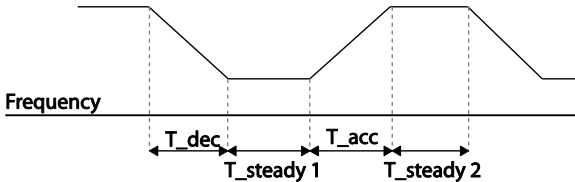
6.2.5 Dynamic Braking (DB) Resistor Configuration

For H100 series, the braking resistor circuit is integrated inside the inverter.

Group	Code	Name	LCD Display	Parameter Setting		Setting range	Unit
PRT	66	Braking resistor configuration	DB Warn %ED	0		0–30	%
OUT	31–35	Multi-function relay 1–5 item	Relay 1–5	25	DB Warn %ED	-	-
	36	Multi-function output 1 item	Q1 Define				

Dynamic Braking Resistor Setting Details

Code	Description
PRT-66 DB Warn %ED	<p>Set the braking resistor configuration (%ED: Duty cycle). The braking resistor configuration sets the rate at which the braking resistor operates for one operation cycle. The maximum time for continuous braking is 15 sec and the braking resistor signal is not output from the inverter after the 15 sec period elapses. An example of braking resistor set up is as follows:</p> $\%ED = \frac{T_{dec}}{T_{acc} + T_{steady} + T_{dec} + T_{stop}} \times 100\%$  <p>[Example 1]</p> $\%ED = \frac{T_{dec}}{T_{dec} + T_{steady1} + T_{acc} + T_{steady2}} \times 100\%$

Code	Description
	 <p>Frequency</p> <p>[Example 2]</p> <ul style="list-style-type: none"> • T_acc: Acceleration time to set frequency • T_steady: Constant speed operation time at set frequency • T_dec: Deceleration time to a frequency lower than constant speed operation or the stop time from constant speed operation frequency • T_stop: Stop time until operation resumes

⚠ Caution

Do not set the braking resistor to exceed the resistor's power rating. If overloaded; it can overheat and cause a fire. When using a resistor with a heat sensor, the sensor output can be used as an external trip signal for the inverter's multi-function input.

6.2.6 Low Battery Voltage Warning

The H100 series has a battery low voltage warning feature. If the low battery voltage warning function is set to 'Yes,' a low battery voltage warning occurs when the battery voltage is lower than 2 V (normal voltage is 3 V). Replace the battery when the low battery warning is displayed.

Group	Code	Name	LCD Display	Parameter Setting		Setting Range		Unit
PRT	90	Low battery voltage detection	Low Battery	0	No	0	No	-
						1	Yes	

Low Battery Voltage Warning Detail Settings

Code	Description
PRT-90 Low Battery	The low battery voltage warning for RTC function installed in the inverter can be enabled or disabled. The low battery voltage warning occurs when the battery voltage is lower than 2 V.

⚠ Caution

- Be careful when replacing the battery. Remaining voltage in the battery may cause electric shock.
- Make sure that the battery doesn't fall inside of the inverter.

6.3 Under load Fault Trip and Warning

The following table lists the under load fault trip and warning features of the H100 series inverter.

Group	Code	Name	LCD Display	Parameter Setting		Setting range	Unit
PRT	23	Under load detection Source	UL Source	0	Output Current	0-1	-
	24	Under load detection Band	UL Band	10.0		0.0-100.0	%
	25	Under load warning selection	UL Warn Sel	1	Yes	0-1	-
	26	Under load warning time	UL Warn Time	10.0		0-600.0	sec
	27	Under load trip selection	UL Trip Sel	1	Free-Run	-	-
	28	Under load trip timer	UL Trip Time	30.0		0-600.0	sec

Learning Protection Features

Protection
Features

Under Load Trip and Warning Setting Details

Code	Description
PRT-23 UL Source	Select a source to detect the under load trip. An under load trip can be detected using output current or output power.
PRT-24 UL Band	Make a standard value for the under load fault occurrence using system load%-UL Band value set in each frequency of the load characteristics curve made by the AP2-01 Load Tune.
PRT-25 UL Warn Sel	Select the under load warning options. Set the multi-function output terminals (at OUT-31~35 and 36) to '7' (Under load). The warning signals are output when under load conditions occur.
PRT-26 UL Warn Time	A protect function operates when under load level condition explained above maintains for the warning time set.
PRT-27 UL Trip Sel	Sets the inverter operation mode for situations when an under load trip occurs. If set to '1 (Free-Run)', the output is blocked in an under load fault trip event. If set to '2 (Dec)', the motor decelerates and stops when an under load trip occurs.
PRT-28 UL Trip Time	A protect function operates when under load level conditions explained above maintain for the trip time set.

⚠ Caution

To operate under load trip properly, a load tuning (AP2-01 Load Tune) must be performed in advance. If you cannot perform a load tuning, manually set the load fit frequencies (AP2-02 Load Fit Lfreq-AP2-10 Load Fit Hfreq). The Under Load protection does not operate while the Energy Save function is in operation.

6.3.1 Fan Fault Detection

Group	Code	Name	LCD Display	Parameter Setting	Setting range	Unit
PRT	79	Cooling fan fault selection	Fan Trip Mode	0	Trip	
OUT	31~35	Multi-function relay 1~5	Relay 1~5	8 Fan Warning		-

Group	Code	Name	LCD Display	Parameter Setting		Setting range	Unit
OUT	36	Multi-function output 1	Q1 Define				

Fan Fault Detection Setting Details

Code	Description		
PRT-79 Fan Trip Mode	Set the cooling fan fault mode.		
	Setting	Function	
	0	Trip	The inverter output is blocked and the fan trip is displayed when a cooling fan error is detected.
	1	Warning	When OUT-36 (Q1 Define) and OUT-31-35 (Relay1-5) are set to '8 (FAN Warning)', the fan error signal is output and the operation continues.
OUT-36 Q1 Define, OUT-31-35 Relay1-5	When the code value is set to '8 (FAN Warning)', the fan error signal is output and operation continues. However, when the inverter's inside temperature rises above a certain level, output is blocked due to activation of overheat protection.		

6.3.2 Low Voltage Fault Trip

When inverter input power is lost and the internal DC link voltage drops below a certain voltage level, the inverter stops output and a low voltage trip occurs.

Group	Code	Name	LCD Display	Parameter Setting		Setting range	Unit
PRT	81	Low voltage trip decision delay time	LVT Delay	0.0		0-60.0	sec
OUT	31-35	Multi-function relay 1-5	Relay 1-5	11	Low Voltage		-
	36	Multi-function	Q1 Define				

Learning Protection Features

Group	Code	Name	LCD Display	Parameter Setting		Setting range	Unit
		output 1					

Low Voltage Fault Trip Setting Details

Code	Description
PRT-81 LVT Delay	If the code value is set to '11 (Low Voltage)', the inverter stops the output first when a low voltage trip condition occurs, then a fault trip occurs after the low voltage trip decision time elapses. The warning signal for a low voltage fault trip can be provided using the multi-function output or a relay. However, the low voltage trip delay time (LVT Delay time) does not apply to warning signals.

6.3.3 Selecting Low Voltage 2 Fault During Operation

Group	Code	Name	LCD Display	Setting		Setting range	Unit
PRT	82	Low voltage trip decision during operation	Low Voltage2	0	No	0-1	
				1	Yes		

If input power is disconnected during inverter operation and internal DC voltage decreases lower than a certain voltage, the inverter disconnects the output and displays low voltage '2 (Low Voltage 2)'.

Even if the voltage increases and goes back to the normal state, unlike a low voltage fault, it remains in a fault state until the user unlocks the fault state.

6.3.4 Output Block via the Multi-function Terminal

When the multi-function input terminal is set as the output block signal terminal and the signal is input to the terminal, then the operation stops.

Learning Protection Features

Group	Code	Name	LCD Display	Parameter Setting		Setting range	Unit
IN	65–71	Px terminal setting options	Px Define(Px: P1–P7)	5	BX	-	-

Output Block by Multi-function Terminal Setting Details

Code	Description
IN-65–71 Px Define	When the operation of the multi-function input terminal is set to '5 (BX)' and is turned on during operation, the inverter blocks the output and 'BX' is displayed on the keypad display. While 'BX' is displayed on the keypad screen, the inverter's operation information including the operation frequency and current at the time of the BX signal can be monitored. The inverter resumes operation when the BX terminal turns off and operation command is input.

Protection
Features

6.3.5 Trip Status Reset

Restart the inverter, using the keypad or analog input terminal, to reset the trip status.

Group	Code	Name	LCD Display	Parameter Setting		Setting range	Unit
IN	65–71	Px terminal setting options	Px Define(Px: P1–P7)	3	RST	-	-

Trip Status Reset Setting Details

Code	Description
IN-65–71 Px Define	Press the [Stop/Reset] key on the keypad or use the multi-function input terminal to restart the inverter. Set the multi-function input terminal to '3' (RST) and turn on the terminal to reset the trip status.

6.3.6 Operation Mode for Option Card Trip

Option card trips may occur when an option card is used with the inverter. Set the operation mode for the inverter when a communication error occurs between the option card and the inverter body, or when the option card is detached during operation.

Group	Code	Name	LCD Display	Parameter Setting		Setting range	Unit
PRT	80	Operation mode for option card trip	Opt Trip Mode	0	None	0–3	-
				1	Free-Run		
				2	Dec		

Operation Mode on Option Trip Setting Details

Code	Description		
PRT-80 Opt Trip Mode	Setting		Function
	0	None	No operation
	1	Free-Run	The inverter output is blocked and fault trip information is shown on the keypad.

Code	Description		
	2	Dec	The motor decelerates to the value set at PRT-07 (Trip Dec Time).

6.3.7 No Motor Trip

If an operation command is run when the motor is disconnected from the inverter output terminal, a 'no motor trip' occurs and a protective operation is performed by the system.

Group	Code	Name	LCD Display	Parameter Setting		Setting range	Unit
PRT	31	Operation for no motor trip	No Motor Trip	0	None	-	-
	32	No motor trip current level	No Motor Level	5		1–100	%
	33	No motor detection time	No Motor Time	3.0		0.1–10	sec

No Motor Trip Setting Details

Code	Description
PRT-32 No Motor Level, PRT-33 No Motor Time	If the output current value [based on the rated current (BAS-13)] is lower than the value set at PRT-32 (No Motor Level), and if this continues for the time set at PRT-33 (No Motor Time), a 'no motor trip' occurs.

⚠ Caution

If BAS-07 (V/F Pattern) is set to '1 (Square)', set PRT-32 (No Motor Level) to a value lower than the factory default. Otherwise, a 'no motor trip,' due to a lack of output current, will occur when the 'no motor trip' operation is set.

6.4 Parts Life Expectancy

Examine the life cycle of the parts (fan and main capacitor) of the inverter. By examining these parts you can use inverter more safely.

6.4.1 Main Capacitor Life Estimation

The life of the main capacitor in the inverter can be predicted by looking at the changes in the capacitance value.

Group	Code	Name	LCD Display	Parameter Setting	Setting Range	Unit	
PRT	83	Estimated current level of the capacitance	CAPDiag Perc	0.0	10.0–100.0	%	
	84	CAP estimating mode	CAPDiag	0: None	0	None	%
					1	CAP. Diag 1	
					2	CAP. Diag 2	
					3	CAP. Init	
	85	CAP. deterioration level	CAPLevel1	0	0.0–100.0	%	
	86	CAP. detected level	CAPLevel2	0	0.0–100.0	%	
OUT	31–35	Output relay 1–5	Relay 1–5	34	CAP. Warning	-	

Main Capacitor Life Estimation Detail Settings

Code	Description
PRT-83 CAP. Diag Perc	Configure the current level of the inverter's output when capacitance life examination is in operation. For life examination, the value must be set higher than 0%.

Code	Description		
PRT-84 CAP. Diag	Configure the capacitance life examination mode. This mode is separated into installing the inverter mode and maintenance mode. To use the capacitance life examination function, proper setting is required.		
	Setting		Function
	0	None	Do not use capacitance life examination function.
	1	CAP. Diag 1	When installing the inverter for the first time, estimate initial capacitance.
	2	CAP. Diag 2	Estimate the capacitance while maintaining the inverter.
	3	CAP. Init	Initialize the estimated value of the capacitance to 0.
PRT-85 CAP. Level 1	Set the standard level for the capacitance replacement.		
PRT-86 CAP. Level 2	Display estimated capacitance value according to the mode in PRT-84. If this value is lower than the value set in PRT-85, the warning message "CAP Warning" appears on the display.		

⚠ Caution

- Be careful when replacing the battery. Remaining voltage in the battery may cause electric shock.
- Make sure that the battery doesn't fall inside of the inverter.
- The main capacitor life examination is only for reference and cannot be used as an absolute value.
- The main capacitor life examination only operates in AUTO mode and when inverter is stopped.

6.4.2 Fan Life Estimation

The inverter records the amount of time the fan is used and sets off the alarm to replace the fan if the fan is used longer than the certain period of time.

Learning Protection Features

Group	Code	Name	LCD Display	Parameter Setting	Setting Range		Unit
PRT	87	Fan accumulated time percentage	Fan Time Perc	0.0	0.0–6553.5		%
	88	Fan replacement alarm level	Fan Exchange	90.0	0.0–100.0		%
CNF	75	Initializing the accumulation time of the fan operation	Fan Time Rst	0: No	0	No	
					1	Yes	
OUT	31–35	Relay 1–5 output	Relay 1–5	35	Fan Exchange		-

Fan Life Estimation Setting Details

Code	Description											
PRT-87 Fan Time Perc	Displays the time the fan is used in percentage based on 50,000 hours. If this value is bigger than the value in PRT-88, the warning message"Fan Exchange" appears on the display.											
PRT-88 Fan Exchange	Displays the life replacement standard of the fan in percentage.											
CNF-75 Fan Time Rst	Initializes the accumulation time of the fan operation.											
	<table><tr><th colspan="2">Setting</th><th>Function</th></tr><tr><td>0</td><td>No</td><td>Do not initialize the accumulated operation time of the fan.</td></tr><tr><td>1</td><td>Yes</td><td>Initialize the accumulated operation time of the fan.</td></tr></table>			Setting		Function	0	No	Do not initialize the accumulated operation time of the fan.	1	Yes	Initialize the accumulated operation time of the fan.
	Setting		Function									
	0	No	Do not initialize the accumulated operation time of the fan.									
1	Yes	Initialize the accumulated operation time of the fan.										

ⓘ Caution

- Be careful when replacing the battery. Remaining voltage in the battery may cause electric shock.
- Make sure that the battery doesn't fall inside of the inverter.
- Fan life examination is only for the reference and cannot be used as an absolute value.

6.5 Fault/Warning List

The following list shows the types of faults and warnings that can occur while using the H100 inverter. For details, refer to [6 Learning Protection Features](#) on page 338.

Category		LCD Display	Details
Major fault	Latch type	Over Current1	Over current trip
		Over Voltage	Over voltage trip
		External Trip	Trip due to an external signal
		NTC Open	Temperature sensor fault trip
		Over Current2	ARM short current fault trip
		Option Trip-x*	Option fault trip*
		Over Heat	Over heat fault trip
		Out Phase Open	Output open-phase fault trip
		In Phase Open	Input open-phase fault trip
		Ground Trip	Ground fault trip
		Fan Trip	Fan fault trip
		E-Thermal	Motor overheat fault trip
		IO Board Trip	IO Board connection fault trip
		No Motor Trip	No motor fault trip
		Low Voltage2	Low voltage fault trip during operation
		ParaWrite Trip	Write parameter fault trip
		Pipe Broken	Pipe Break fault trip
		Damper Err	Damper Err trip
		Lubrication	Lubrication trip
		Over Load	Motor overload fault trip
		Under Load	Motor under load fault trip
		CleanRPTerr	Pump clean trip
		Level Detect	Level detect trip

Learning Protection Features

Category		LCD Display	Details
	Level type	Low Voltage	Low voltage fault trip
		BX	Emergency stop fault trip
		Lost Command	Command loss trip
	Hardware damage (Fatal)	EEP Err	External memory error
		ADC Off Set	Analog input error
		IO Board Trip	IO Board connection fault trip
		Watch Dog-1	CPU Watch Dog fault trip
		Watch Dog-2	
Warning		Lost Command	Command loss fault trip warning
		Over Load	Overload warning
		Under Load	Under load warning
		Inverter OLT	Inverter overload warning
		Fan Warning	Fan operation warning
		DB Warn %ED	Braking resistor braking rate warning
		Low Battery	Low battery warning
		Fire Mode	Fire mode warning
		Pipe Broken	Pipe Break warning
		Level Detect	Level detect warning
		CAP. Warning	Capacitor lifetime warning
		Fan Warning	Fan replacement warning

Note

- In a latch type trip, the inverter cannot unlock the fault if the user does not reset the inverter, even if the trip state is released after the trip occurs.
- In level type trip, the inverter can unlock the fault by itself if the trip state is unlocked after the trip occurs.
- In a fetal type trip, there is no way to unlock the fault other than turning the inverter off then back on after the trip occurs.

7 RS-485 Communication Features

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

7.1 Communication Standards

Following the RS-485 communication standards, H100 products exchange data with a PLC and computer. The RS-485 communication standards support the Multi-drop Link System and offer an interface that is strongly resistant to noise. Please refer to the following table for details about the communication standards.

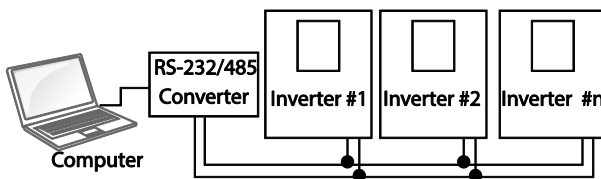
Item	Standard
Communication method/ Transmission type	RS-485/Bus type, Multi-drop Link System
Inverter type name	H100
Number of connected inverters/ Transmission distance	Maximum of 16 inverters / Maximum 1,200 m (recommended distance: within 700 m)
Recommended cable size	0.75 mm ² , (18 AWG), Shielded Type Twisted-Pair (STP) Wire
Installation type	Dedicated terminals (S+/S-/SG) on the control terminal block
Power supply	Supplied by the inverter - insulated power source from the inverter's internal circuit
Communication speed	1,200/2,400/4800/9,600/19,200/38,400/57,600/115,200 bps BACNET: 9600/19200/38400/76800 bps
Control procedure	Asynchronous communications system
Communication system	Half duplex system
Character system	Modbus-RTU: Binary / LS Bus: ASCII
Stop bit length	1-bit/2-bit

Item	Standard
Frame error check	2 bytes
Parity check	None/Even/Odd

7.2 Communication System Configuration

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

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



7.2.1 Communication Line Connection

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

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

⚠ Caution

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

7.2.2 Setting Communication Parameters

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

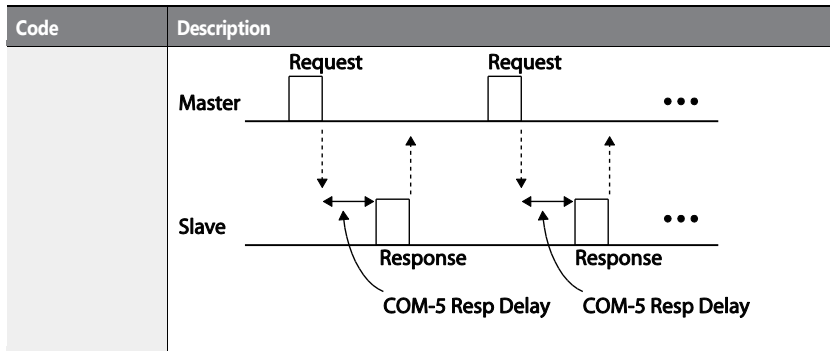
Group	Code	Name	LCD Display	Parameter Setting		Setting range	Unit
COM	01	Built-in communication inverter ID	Int485 St ID	1		1-250	-
	02	Built-in communication protocol	Int485 Proto	0	ModBus RTU	0, 2,4,5	-
	03	Built-in communication speed	Int485 BaudR	3	9600 bps	0-8	-
	04	Built-in communication frame setting	Int485 Mode	0	D8/PN/S1	0-3	-
	05	Transmission delay after reception	Resp Delay	5		0-1000	msec

Communication Parameters Setting Details

Code	Description		
COM-01 Int485 St ID	Sets the inverter station ID between 1 and 250. Using the BACnet, maximum number of station ID is COM-20 Max Master and maximum number of COM-20 is 127.		
COM-02 Int485 Proto	Select one of the four built-in protocols: Modbus-RTU, LS INV 485, BACnet or Metasys-N2.		
	Setting		Function
	0	Modbus-RTU	Modbus-RTU compatible protocol
	2	LS INV 485	Dedicated protocol for the LS inverter
	4	BACnet	BAC net protocol
	5	Metasys-N2	Metasys-N2 protocol
COM-03 Int485 BaudR	Set a communication setting speed up to 115,200 bps. The maximum setting range changes depending on the protocol.		

RS-485 Communication Features

Code	Description	
	Setting	Communication Speed
	0	1200 bps
	1	2400 bps
	2	4800 bps
	3	9600 bps
	4	19200 bps
	5	38400 bps
	6	56 Kbps (57,600 bps)
	7	76.8 Kbps (76,800 bps)
	8	115 Kbps (115,200 bps)
	<p>If the COM-02 Int485 Prtoto setting is BACnet, the available communication speed settings are 9600 bps, 19200 bps, 76.8 kbps. If the COM-02 Int485 Prtoto setting is Metasys-N2, the communication speed is fixed to 9600 bps and COM-03 Int485 BaudR is not shown.</p>	
COM-04 Int485 Mode	Set a communication configuration. Set the data length, parity check method, and the number of stop bits.	
	Setting	Function
	0 D8/PN/S1	8-bit data / no parity check / 1 stop bit
	1 D8/PN/S2	8-bit data / no parity check / 2 stop bits
	2 D8/PE/S1	8-bit data / even parity / 1 stop bit
	3 D8/PO/S1	8-bit data / odd parity / 1 stop bit
	<p>If the COM-02 Int485 Prtoto setting is Metasys-N2, the communication frame composition is fixed to D8/PN/S1 and COM-04 Int485 Mode is not visible.</p>	
COM-05 Resp Delay	Set the response time for the slave (inverter) to react to the request from the master. Response time is used in a system where the slave device response is too fast for the master device to process. Set this code to an appropriate value for smooth master-slave communication.	



7.2.3 Setting Operation Command and Frequency

After setting the DRV-06 Cmd Source code to '3 (Int 485)' and DRV-07 Freq Ref Src code to '6 (Int 485)', you can set common area parameters for the operation command and frequency via communication. For details about the operation command, refer to [4.6.4 RS-485 Communication as a Command Input Device](#) on page 115 and about the frequency command, refer to [4.2.6 Setting a Frequency Reference via RS-485 Communication](#) on page 107.

To select the built-in RS485 communication as the source of command, set DRV-07 to '6 (Int485)' on the keypad. Then, set common area parameters for the operation command and frequency via communication.

Group	Code	Name	LCD Display	Parameter Setting		Setting range	Unit
DRV	06	Command source	Cmd Source	3	Int 485	0–5	-
	07	Frequency setting method	Freq Ref Src	6	Int 485	0–9	-

7.2.4 Command Loss Protective Operation

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

RS-485 Communication Features

Group	Code	Name	LCD Display	Parameter Setting		Setting range	Unit
PRT	12	Speed command loss operation mode	Lost Cmd Mode	0	None	0–5	-
	13	Time to determine speed command loss	Lost Cmd Time	6	1.0	0.1–120.0	Sec

Command Loss Protective Operation Setting Details

Code	Description	
PRT-12 Lost Cmd Mode, PRT-13 Lost Cmd Time	Select the operation to run when a communication error has occurred and lasted exceeding the time set at PRT-13.	
	Setting	Function
	0 None	The speed command immediately becomes the operation frequency without any protection function.
	1 Free-Run	The inverter blocks output. The motor performs in free-run condition.
	2 Dec	The motor decelerates and then stops.
	3 Hold Input	Operates continuously with the speed of the inputted speed command until the loss of the speed command. The inverter calculates the average input value for 10 seconds before the loss of the speed command and uses it as the speed reference.
	4 Hold Output	Operates continuously with the operate frequency before the speed loss. The inverter calculates the average output value for 10 seconds before the loss of the speed command and uses it as the speed reference.
	5 Lost Preset	The inverter operates at the frequency set at PRT-14 (Lost Preset F).

7.3 LS INV 485/Modbus-RTU Communication

7.3.1 Setting Virtual Multi-function Input

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

Group	Code	Name	LCD Display	Parameter Setting		Setting range	Unit
COM	70–77	Communication multi-function input x	Virtual DI x(x: 1–8)	0	None	0–52	-
	86	Communication multi-function input monitoring	Virt DI Status	-	-	-	-

Example: When sending an Fx command by controlling virtual multi-function input in the common area via Int485, set COM-70 to 'FX' and set address 0h0385 to '0h0001'.

7.3.2 Saving Parameters Defined by Communication

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

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

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

Group	Code	Name	LCD Display	Parameter Setting		Setting range	Unit
CNF	48	Save parameters	Parameter Save	0	No	0-1	-
				1	Yes		

7.3.3 Total Memory Map for Communication

Communication Area	Memory Map	Details
Communication common compatible area	0h0000-0h00FF	iS5, iP5A, iV5, iG5A, S100, H100 compatible area
Parameter registration type area	0h0100-0h01FF	Areas registered at COM-31-38 and COM-51-58
	0h0200-0h023F	Area registered for User Group
	0h0240-0h027F	Area registered for Macro Group
	0h0280-0h02FF	Reserved
communication common area	0h0300-0h037F	Inverter monitoring area
	0h0380-0h03DF	Inverter control area
	0h03E0-0h03FF	Inverter memory control area
	0h0400-0h0FFF	Reserved
	0h1100	DRV Group
	0h1200	BAS Group
	0h1300	ADVGroup
	0h1400	CON Group
	0h1500	IN Group
	0h1600	OUT Group
	0h1700	COM Group
	0h1800	PID Group
	0h1900	EPI Group
	0h1A00	AP1 Group

Communication Area	Memory Map	Details
	0h1B00	AP2 Group
	0h1C00	AP3 Group
	0h1D00	PRT Group
	0h1E00	M2 Group

7.3.4 Parameter Group for Data Transmission

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

Group	Code	Name	LCD Display	Parameter Setting	Setting range	Unit
COM	31–38	Output communication address x	Para Status-x	-	0000–FFFF	Hex
	51–58	Input communication address x	Para Control-x	-	0000–FFFF	Hex

Currently Registered CM Group Parameter

Address	Parameter	Assigned content by bit
0h0100–0h0107	Status Parameter-1– Status Parameter-8	Parameter communication code value registered at COM-31–38 (Read-only)
0h0110–0h0117	Control Parameter-1– Control Parameter-8	Parameter communication code value registered at COM-51–58 (Read/Write access)

Note

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

RS-485 Communication Features

Control - x), register the operation speed at Para Control-4 and the operation command to Para Control-5.

Communication

7.3.5 Parameter Group for User/Macro Group

By defining user/macro parameter groups, communication can be carried out using the user defined group (USR Grp) and macro group (MAC Grp) addresses that are registered at the U&M mode. Parameter groups can only be defined when using the keypad.

Currently Registered User Group Parameters

Address	Parameter	Assigned Content by Bit
0h0200	User Grp. Code	Parameter value registered at U&M > USR → 1 (Read/Write)
0h0201	User Grp. Code	Parameter value registered at U&M > USR → 2 (Read/Write)
.	.	.
.	.	.
.	.	.
0h023E	User Grp. Code	Parameter value registered at U&M > USR → 63 (Read/Write)
0h023F	User Grp. Code	Parameter value registered at U&M > USR → 64 (Read/Write)

Currently Registered Macro Group Parameters

Address	Parameter	Assigned Content by Bit
0h0240	Macro Grp. Code 1	Parameter value registered at U&M > MC → 1
0h0241	Macro Grp. Code 2	Parameter value registered at U&M > MC → 1
.	.	.
.	.	.
.	.	.
0h02A2	Macro Grp. Code 98	Parameter value registered at U&M > MC → 98
0h02A3	Macro Grp. Code 99	Parameter value registered at U&M > MC → 99

7.3.6 LS INV 485 Protocol

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

Request

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

Normal Response

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

Error Response

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

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

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

- Data: ASCII-HEX (for example, when the data value is 3000: 3000 → '0'B'B'8'h → 30h 42h 42h 38h)
- Error code: ASCII-HEX (refer to [7.3.6.4 Error Code](#) on page 393)
- Transmission/reception buffer size: Transmission=39 bytes, Reception=44 bytes
- Monitor registration buffer: 8 Words
- SUM: Checks communication errors via sum.
- SUM=a total of the lower 8 bits values for station ID, command and data (Station ID+CMD+Data) in ASCII-HEX.
- For example, a command to read 1 address from address 3000:
SUM='0'+ '1'+ 'R'+ '3'+ '0'+ '0'+ '0'+ '1' = 30h+31h+52h+33h+30h+30h+30h+31h = 1A7h
(the control value is not included: ENQ, ACK, NAK, etc)

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

Note

Broadcasting

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

7.3.6.1 Detailed Read Protocol

Read Request: Reads successive n words from address XXXX.

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

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

Read Normal Response

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

Total bytes= (7 x n x 4): a maximum of 39

Read Error Response

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

Total bytes=9

7.3.6.2 Detailed Write Protocol

Write Request

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

Total bytes= (12 + n x 4): a maximum of 44

Write Normal Response

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

Total bytes= (7 + n x 4): a maximum of 39

Write Error Response

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

Total bytes=9

7.3.6.3 Monitor Registration Detailed Protocol

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

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

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

Total bytes= (8 + n x 4); a maximum of 40

Monitor Registration Normal Response

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

Total bytes=7

Monitor Registration Error Response

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

Total bytes=9

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

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

Total bytes=7

Monitor Registration Execution Normal Response

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

Total bytes= (7 + n x 4): a maximum of 39

Monitor Registration Execution Error Response

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

Total bytes=9

7.3.6.4 Error Code

Code	Abbreviation	Description
ILLEGAL FUNCTION	IF	The requested function cannot be performed by a slave because the corresponding function does not exist.
ILLEGAL DATA ADDRESS	IA	The received parameter address is invalid at the slave.

RS-485 Communication Features

Code	Abbreviation	Description
ILLEGAL DATA VALUE	ID	The received parameter data is invalid at the slave.
WRITE MODE ERROR	WM	Tried writing (W) to a parameter that does not allow writing (read-only parameters, or when writing is prohibited during operation)
FRAME ERROR	FE	The frame size does not match.

7.3.6.5 ASCII Code

Character	Hex	Character	Hex	Character	Hex
A	41	q	71	@	40
B	42	r	72	[5B
C	43	s	73	\	5C
D	44	t	74]	5D
E	45	u	75		5E
F	46	v	76		5F
G	47	w	77		60
H	48	x	78	{	7B
I	49	y	79		7C
J	4A	z	7A	}	7D
K	4B	0	30	–	7E
L	4C	1	31	BEL	07
M	4D	2	32	BS	08
N	4E	3	33	CAN	18
O	4F	4	34	CR	0D
P	50	5	35	DC1	11
Q	51	6	36	DC2	12
R	52	7	37	DC3	13
S	53	8	38	DC4	14
T	54	9	39	DEL	7F
U	55	space	20	DLE	10
V	56	!	21	EM	19
W	57	"	22	ACK	06
X	58	#	23	ENQ	05
Y	59	\$	24	EOT	04

Character	Hex	Character	Hex	Character	Hex
Z	5A	%	25	ESC	1B
a	61	&	26	ETB	17
b	62	'	27	ETX	03
c	63	(28	FF	0C
d	64)	29	FS	1C
e	65	*	2A	GS	1D
f	66	+	2B	HT	09
g	67	,	2C	LF	0A
h	68	-	2D	NAK	15
i	69	.	2E	NUL	00
j	6A	/	2F	RS	1E
k	6B	:	3A	S1	0F
l	6C	;	3B	SO	0E
m	6D	<	3C	SOH	01
n	6E	=	3D	STX	02
o	6F	>	3E	SUB	1A
p	70	?	3F	SYN	16
				US	1F
				VT	0B

7.3.7 Modbus-RTU Protocol

7.3.7.1 Function Code and Protocol

In the following section, station ID is the value set at COM-01 (Int485 St ID), and the starting address is the communication address (starting address size is in bytes). For more information about communication addresses, refer to [7.3.8 Compatible Common Area Parameter](#) on page 400.

Reading up to 8 Consecutive Inverter Parameters Based on the Set Number - Read Holding Register (Func. Code: 0x03) and Read Input Register (Func. Code: 0x04)

Read Holding Registers (Func. Code: 0x03) and Read Input Registers (Func. Code: 0x04) are processed identically by the inverter.

RS-485 Communication Features

Codes	Description
Start Addr.	Starting address 1 of the inverter parameters (common area or keypad) to be read from.
No. of Reg.	Number of the inverter parameters (common area or keypad) to be read.
Byte Count	Byte number of normal response values based on the number of registers (No. of Reg).
Except. Code	Error codes

Request

Slave Station ID	Func. Code	Start Addr (Hi)	Start Addr (Lo)	No of Reg (Hi)	No of Reg (Lo)	CRC (Lo)	CRC (Hi)
1 byte	1 byte	1 byte	1 byte	1 byte	1 byte	1 byte	1 byte

Normal Response

Slave Station ID	Func. Code	Byte Count	Value (Hi)	Value (Lo)	...	Value (Hi)	Value (Lo)	CRC (Lo)	CRC (Hi)
1 byte	1 byte	1 byte	1 byte	1 byte	...	1 byte	1 byte	1 byte	1 byte

* The number of Value(Hi) and Value(Lo) is changed by the [Request No. of Reg].

Error Response

Slave Station ID	Func. Code	Except. Code	CRC(Lo)	CRC(Hi)
1 byte	1 byte	1 byte	1 byte	1 byte

* Func. Code of the error response is [Request Func. Code] + 0x80.

Writing One Inverter Parameter Value (Func. Code: 0x06)

Codes	Description
Addr.	Address 1 of the inverter parameter (common area or keypad) to be written to.
Reg. Value	The inverter parameter (common area or keypad) value to write with.
Except. Code	Error codes

Request

Slave Station ID	Func.Code	Addr (Hi)	Addr(Lo)	Value(Hi)	Value(Lo)	CRC(Lo)	CRC(Hi)
1 byte	1 byte	1 byte	1 byte	1 byte	1 byte	1 byte	1 byte

Normal Response

Slave Station ID	Func.Code	Addr (Hi)	Addr(Lo)	Value(Hi)	Value(Lo)	CRC(Lo)	CRC(Hi)
1 byte	1 byte	1 byte	1 byte	1 byte	1 byte	1 byte	1 byte

Error Response

Slave Station ID	Func. Code	Except. Code	CRC(Lo)	CRC (Hi)
1 byte	1 byte	1 byte	1 byte	1 byte

* Func. Code of the error response is [Request Func. Code] + 0x80.

Writing Multiple Registers (Func. Code: 0x10)

Codes	Description
Start Addr.	Starting address 1 of the inverter parameters (common area or keypad) to be written to.
No. of Reg.	Number of the inverter parameters (common area or keypad) to be written.
Reg. Value	The inverter parameter (common area or keypad) values to write with.
Except. Code	Error codes

Request

Slave Station ID	Func. Code	Start Addr. (Hi)	Start Addr. (Lo)	No of Reg. (Hi)	No of Reg. (Lo)	Byte Count	Reg. Value (Hi)	Reg. Value (Lo)	CRC (Lo)	CRC (Hi)
1 byte	1 byte	1 byte	1 byte	1 byte	1 byte	1 byte	1 byte	1 byte	1 byte	1 byte

Normal Response

Slave Station ID	Func. Code	Start Addr (Hi)	Start Addr (Lo)	No of Reg. (Hi)	No of Reg. (Lo)	CRC (Lo)	CRC (Hi)
1 byte	1 byte	1 byte	1 byte	1 byte	1 byte	1 byte	1 byte

Error Response

Slave Station ID	Func. Code	Except. Code	CRC(Lo)	CRC(Hi)
1 byte	1 byte	1 byte	1 byte	1 byte

* Func. Code of the error response is [Request Func. Code] + 0x80.

Exception Code

Code
01: ILLEGAL FUNCTION
02: ILLEGAL DATA ADDRESS
03: ILLEGAL DATA VALUE
06: SLAVE DEVICE BUSY
14: Write-Protection

Example of Modbus-RTU Communication In Use

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

Frame Transmission from Master to Slave

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

Frame Transmission from Slave to Master

RS-485 Communication Features

Example of Modbus-RTU Communication In Use

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

7.3.8 Compatible Common Area Parameter

The following are common area parameters partly compatible with the iS5, iP5A, iV5, iG5A, S100 series inverters. (Addresses 0h0000-0h0011 are for compatible common area parameters. Addresses 0h0012-0h001B are for H100 series inverter parameters.)

Comm. Address	Parameter	Scale	Unit	R/W	Assigned Content by Bit
0h0000	Inverter model	-	-	R	F: H100
0h0001	Inverter capacity	-	-	R	4: 5.5 kW, 5: 7.5 kW 6: 11 kW, 7: 15 kW, 8: 18.5 kW 9: 22 kW 10: 30 kW 11: 37 kW 12: 45 kW 13: 55 kW, 14: 75 kW 15: 90 kW
0h0002	Inverter input voltage	-	-	R	0: 220 V product 1: 440 V product
0h0003	Version	-	-	R	(Example) 0h0064: Version 1.00 (Example) 0h0065: Version 1.01
0h0004	Reserved	-	-	R	-
0h0005	Command frequency	0.01	Hz	R/W	-
0h0006	Operation command (option)	-	-	R	B15 Reserved
					B14 0: Keypad Freq,
					B13 2-8: Terminal block

RS-485 Communication Features

Comm. Address	Parameter	Scale	Unit	R/W	Assigned Content by Bit	
					B12	multi-step speed
					B11	17: Up, 18: Down
					B10	19: STEADY
					B9	22: V1, 24: V2, 25: I2,
						26: PULSE
						27: Built-in 485
					B8	28: Communication option
						30: JOG, 31: PID
						0: Keypad
					B7	1: Fx/Rx-1
						2: Fx/Rx-2
				B6		3: Built-in 485
						4: Communication option
						5: Time Event
				R/W	B5	Reserved
					B4	Emergency stop
					B3	W: Trip initialization (0→1),
						R: Trip status
					B2	Reverse operation (R)
					B1	Forward operation (F)
					B0	Stop (S)
0h0007	Acceleration time	0.1	sec	R/W	-	
0h0008	Deceleration time	0.1	sec	R/W	-	
0h0009	Output current	0.1	A	R	-	
0h000A	Output frequency	0.01	Hz	R	-	
0h000B	Output voltage	1	V	R	-	
0h000C	DC link voltage	1	V	R	-	
0h000D	Output power	0.1	kW	R	-	
0h000E	Operation status	-	-	R	B15	0: HAND, 1: AUTO

RS-485 Communication Features

Comm. Address	Parameter	Scale	Unit	R/W	Assigned Content by Bit	
					B14	1: Frequency command source by communication (built-in, option)
					B13	1: Operation command source by communication (built-in, option)
					B12	Reverse operation command
					B11	Forward operation command
					B10	Reserved
					B9	Jog mode
					B8	Drive stopping
					B7	DC Braking
					B6	Speed reached
					B5	Decelerating
					B4	Accelerating
					B3	Fault Trip - operates according to OUT-30 setting
					B2	Operating in reverse direction
					B1	Operating in forward direction
					B0	Stopped
0h000F	Fault trip information	-	-	R	B15	Reserved
					B14	Reserved
					B13	Reserved
					B12	Reserved
					B11	Reserved

RS-485 Communication Features

Comm. Address	Parameter	Scale	Unit	R/W	Assigned Content by Bit	
					B10	H/W-Diag
					B9	Reserved
					B8	Reserved
					B7	Reserved
					B6	Reserved
					B5	Reserved
					B4	Reserved
					B3	Level Type trip
					B2	Reserved
					B1	Reserved
					B0	Latch Type trip
0h0010	Input terminal information	-	-	R	B15 -B7	Reserved
					B6	P7
					B5	P6
					B4	P5
					B3	P4
					B2	P3
					B1	P2
					B0	P1
0h0011	Output terminal information	-	-	R	B15	Reserved
					B14	Reserved
					B13	Reserved
					B12	Reserved
					B11	Reserved
					B10	Q1
					B9	Reserved

Communication

RS-485 Communication Features

Comm. Address	Parameter	Scale	Unit	R/W	Assigned Content by Bit
					B8 Reserved
					B7 Reserved
					B6 Reserved
					B5 Reserved
					B4 Relay 5
					B3 Relay 4
					B2 Relay 3
					B1 Relay 2
					B0 Relay 1
0h0012	V1	0.1	%	R	V1 input voltage
0h0013	Thermal	0.1	%	R	Input Thermal
0h0014	V2	0.1	%	R	V2 input voltage
0h0015	I2	0.1	%	R	I2 input Current
0h0016	Motor rotation speed	1	Rpm	R	Displays existing motor rotation speed
0h0017 –0h0019	Reserved	-	-	-	-
0h001A	Select Hz/rpm	-	-	R	0: Hz unit, 1: rpm unit
0h001B	Display the number of poles for the selected motor	-	-	R	Display the number of poles for the selected motor

7.3.9 H100 Expansion Common Area Parameter

7.3.9.1 Monitoring Area Parameter (Read Only)

RS-485 Communication Features

Comm. Address	Parameter	Scale	Unit	Assigned content by bit
0h0300	Inverter model	-	-	H100: 000Fh
0h0301	Inverter capacity	-	-	5.5 kW: 4055h, 7.5 kW: 4075h 11 kW: 40B0h, 15 kW: 40F0h 18.5 kW: 4125h, 22 kW: 4160h 30 kW: 41E0h, 37 kW: 4250h, 45 kW: 42D0h, 55 kW: 4370h, 75 kW: 44B0h, 90 kW: 45A0h,
0h0302	Inverter input voltage/power (Single phase, 3-phase)/cooling method	-	-	200 V 3-phase forced cooling: 0231h 400 V 3-phase forced cooling: 0431h
0h0303	Inverter S/W version	-	-	(ex) 0h0064: Version 1.00 0h0065: Version 1.01
0h0304	Reserved	-	-	-
0h0305	Inverter operation state	-	-	B15
				B14
				B13
				B12
				B11–
				B8
				B7
				B6
				B5
				B4
				B3

0: Normal state
4: Warning occurred
8: Fault occurred

-

1: Speed searching
2: Accelerating
3: Operating at constant rate
4: Decelerating
5: Decelerating to stop
6: H/W OCS
7: S/W OCS
8: Dwell operating

0: Stopped

Communication

RS-485 Communication Features

Comm. Address	Parameter	Scale	Unit	Assigned content by bit	
				B2	1: Operating in forward direction
				B1	2: Operating in reverse direction
				B0	3: DC operating
0h0306	Inverter operation frequency command source	-	-	B15	Operation command source 0: Keypad 1: Communication option 3: Built-in RS 485 4: Terminal block
				B14	
				B13	
				B12	
				B11	
				B10	
				B9	
				B8	
				B7	Frequency command source
				B6	0: Keypad speed
				B5	1: Keypad torque
				B4	2-4: Up/Down operation speed
				B3	5: V1, 7: V2, 8: I2
				B2	9: Pulse
				B1	10: Built-in RS 485
				B0	11: Communication option
0h0307	Keypad S/W version	-	-	(Ex.) 0h0064: Version 1.00	
0h0308	Keypad title version	-	-	(Ex.) 0h0065: Version 1.01	
0h0309	IO Board Version	-	-	(Ex.) 0h0064: Version 1.00 (Ex.) 0h0065: Version 1.01	
0h030A–0h030F	Reserved	-	-	-	
0h0310	Output current	0.1	A	-	

RS-485 Communication Features

Comm. Address	Parameter	Scale	Unit	Assigned content by bit	
0h0311	Output frequency	0.01	Hz	-	
0h0312	Output rpm	0	Rpm	-	
0h0313	Reserved	-	-	-	
0h0314	Output voltage	1	V	-	
0h0315	DC Link voltage	1	V	-	
0h0316	Output power	0.1	kW	-	
0h0317	Reserved	-	-	-	
0h0318	PID reference	0.1	%	PID reference value	
0h0319	PID feedback	0.1	%	PID feedback value	
0h031A	Display the number of poles for the 1 st motor	-	-	Displays the number of poles for the first motor	
0h031B	Display the number of poles for the 2 nd motor	-	-	Displays the number of poles for the 2nd motor	
0h031C	Display the number of poles for the selected motor	-	-	Displays the number of poles for the selected motor	
0h031D	Select Hz/rpm	-	-	0: Hz, 1: rpm	
0h031E –0h031F	Reserved	-	-	-	
0h0320	Digital input information			B15–B7	Reserved
				B6	P7 (I/O board)
				B5	P6 (I/O board)
				B4	P5 (I/O board)
				B3	P4 (I/O board)
				B2	P3 (I/O board)
				B1	P2 (I/O board)
				B0	P1 (I/O board)

Communication

RS-485 Communication Features

Comm. Address	Parameter	Scale	Unit	Assigned content by bit	
0h0321	Digital output information	-	-	B15–B11	Reserved
				B10	Q1
				B9–B5	Reserved
				B4	Relay 5
				B3	Relay 4
				B2	Relay 3
				B1	Relay 2
				B0	Relay 1
0h0322	Virtual digital input information	-	-	B15–B8	Reserved
				B7	Virtual DI 8 (COM-77)
				B6	Virtual DI 7 (COM-76)
				B5	Virtual DI 6 (COM-75)
				B4	Virtual DI 5 (COM-74)
				B3	Virtual DI 4 (COM-73)
				B2	Virtual DI 3 (COM-72)
				B1	Virtual DI 2 (COM-71)
				B0	Virtual DI 1 (COM-70)
0h0323	Display the selected motor	-	-	0: 1st motor/1: 2nd motor	
0h0324	AI1	0.01	%	Analog input V1 or Thermal (I/O board)	
0h0325	AI2	0.01	%	Analog input V2 or I2 (I/O board)	
0h0326	Reserved	-	-	Reserved	
0h0327	Reserved	-	-	Reserved	
0h0328	AO1	0.01	%	Analog output 1 (I/O board)	
0h0329	AO2	0.01	%	Analog output 2 (I/O board)	

RS-485 Communication Features

Comm. Address	Parameter	Scale	Unit	Assigned content by bit	
0h032A	Reserved	0.01	%	Reserved	
0h032B	Reserved	0.01	%	Reserved	
0h032C	Reserved	-	-	Reserved	
0h032D	Reserved	-	-	Reserved	
0h032E	Consumption energy (kWh)	0.1	kWh	Consumption energy (kWh)	
0h032F	Consumption energy (MWh)	1	MWh	Consumption energy (MWh)	
0h0330	Latch type trip information - 1	-	-	B15	PC Repeat Err
				B14	Over Heat Trip
				B13	Reserved
				B12	External Trip
				B11	Damper Err
				B10	Pipe Break
				B9	NTC Open
				B8	Reserved
				B7	Reserved
				B6	In Phase Open
				B5	Out Phase Open
				B4	Low Voltage2
				B3	E-Thermal
				B2	Inverter OLT
				B1	Under Load
0h0331	Latch type trip information - 2	-	-	B0	Over Load
				B15	Reserved
				B14	MMC Interlock
				B13	Reserved

Communication

RS-485 Communication Features

Comm. Address	Parameter	Scale	Unit	Assigned content by bit	
				B12	Reserved
				B11	Reserved
				B10	Option Trip-1
				B9	No Motor Trip
				B8	Reserved
				B7	IO Board Trip
				B6	Reserved
				B5	ParaWrite Trip
				B4	TB Trip
				B3	Fan Trip
				B2	Thermal Trip
				B1	Level Detect
				B0	Reserved
0h0332	Level type trip information	-	-	B15–B4	Reserved
				B3	Lost Keypad
				B2	Lost Command
				B1	Low Voltage
				B0	BX
0h0333	H/W Diagnosis Trip information	-	-	B15–B3	Reserved
				B2	Watchdog-1 error
				B1	EEP Err
				B0	ADC Offset
0h0334	Warning information	-	-	B15	Reserved
				B14	Low Battery
				B13	Load Tune

RS-485 Communication Features

Comm. Address	Parameter	Scale	Unit	Assigned content by bit	
				B12	Fan Exchange
				B11	CAP. Warning
				B10	Level Detect
				B9	Reserved
				B8	Lost Keypad
				B7	Pipe Break
				B6	Fire Mode
				B5	DB Warn %ED
				B4	Fan Warning
				B3	Lost Command
				B2	Inv Over Load
				B1	Under Load
				B0	Over Load
0h0335	Latch type trip information -3	-	-	B15	Reserved
				—	Reserved
				B4	Reserved
				B3	Overcurrent2 Trip
				B2	Overvoltage Trip
				B1	Overcurrent1 Trip
				B0	Ground Fault Trip
0h0336–0h0339	Reserved	-	-	Reserved	
0h033A	Proc PID Output	0.01	%	Process PID Output (%)	
0h033B	Proc PID UnitScale Ref	Proc Unit	Proc Unit	Unit Scaled Process PID reference value	
0h033C	Proc PID UnitScale Fdb	Proc Unit	Proc Unit	Unit Scaled Process PID feedback value	

Communication

RS-485 Communication Features

Comm. Address	Parameter	Scale	Unit	Assigned content by bit
0h0340	On Time date	0	Day	Total number of days the inverter has been powered on
0h0341	On Time Minute	0	Min	Total number of minutes excluding the total number of On Time days
0h0342	Run Time date	0	Day	Total number of days the inverter has driven the motor
0h0343	Run Time minute	0	Min	Total number of minutes excluding the total number of Run Time days
0h0344	Fan Time date	0	Day	Total number of days the heat sink fan has been running
0h0345	Fan Time minute	0	Min	Total number of minutes excluding the total number of Fan Time days
0h0346–0h0348	Reserved	-	-	Reserved
0h0349	Reserved	-	-	-
0h034A	Option 1	-	-	0: None, 5: LonWorks
0h034B	Reserved	-	-	Reserved
0h034C	Reserved	-	-	Reserved
0h034D–0h034F	Reserved	-	-	Reserved
0h0350	E-PID 1 Output	0.01	%	External PID 1 output
0h0351	E-PID 1 Ref	0.1	%	External PID 1 Reference
0h0352	E-PID 1 Fdb	0.1	%	External PID 1 feedback
0h0353	E-PID 1 Unit Scale Ref	Proc Unit	Proc Unit	Unit Scale External PID 1 Reference
0h0354	E-PID 1 Unit Scale Fdb	Proc Unit	Proc Unit	Unit Scale External PID 1 feedback
0h0355	Reserved	-	-	Reserved

RS-485 Communication Features

Comm. Address	Parameter	Scale	Unit	Assigned content by bit	
0h0356	Reserved	-	-	Reserved	
0h0357	E-PID 2 Output	0.01	%	External PID 2 output	
0h0358	E-PID 2 Ref	0.1	%	External PID 2 Reference	
0h0359	E-PID 2 Fdb	0.1	%	External PID 2 feedback	
0h035A	E-PID 2 Unit Scale Ref	Proc Unit	Proc Unit	Unit Scale External PID 2 Reference	
0h035B	E-PID 2 Unit Scale Fdb	Proc Unit	Proc Unit	Unit Scale External PID 2 feedback	
0h035C	Applicaion Status	-	-	B15-B2	Reserved
				B1	Fire Mode
				B0	Pump Clean
0h035D	Inv Temperature	0	°C	Heatsink Temperature	
0h035E	Power Factor	0.1	-	Output power factor	
0h035F	Inv Fan Time	-	%	INV Fan running time(%)	
0h0360	Multi motor control terminal output	-	-	B15	Reserved
				-	Reserved
				B5	Reserved
				B4	5 th motor running
				B3	4 th motor running
				B2	3 rd motor running
				B1	2 nd motor running
				B0	1 st motor running

Communication

7.3.9.2 Control Area Parameter (Read/Write)

Comm. Address	Parameter	Scale	Unit	Assigned Content by Bit	
0h0380	Frequency command	0.01	Hz	Command frequency setting	
0h0381	RPM command	1	Rpm	Command rpm setting	
0h0382	Operation command	-	-	B15–B4	Reserved
				B3	0 → 1: Free-run stop
				B2	0 → 1: Trip initialization
				B1	0: Reverse command, 1: Forward command
				B0	0: Stop command, 1: Run command
				Example: Forward operation command 0003h, Reverse operation command 0001h	
0h0383	Acceleration time	0.1	sec	Acceleration time setting	
0h0384	Deceleration time	0.1	sec	Deceleration time setting	
0h0385	Virtual digital input control (0: Off, 1: On)	-	-	B15–B8	Reserved
				B7	Virtual DI 8 (COM-77)
				B6	Virtual DI 7 (COM-76)
				B5	Virtual DI 6 (COM-75)
				B4	Virtual DI 5 (COM-74)
				B3	Virtual DI 4 (COM-73)
				B2	Virtual DI 3 (COM-72)
				B1	Virtual DI 2 (COM-71)
				B0	Virtual DI 1 (COM-70)
0h0386	Digital output control (0: Off, 1: On)	-	-	B15–B11	Reserved
				B10	Q1
				B9–B5	Reserved

RS-485 Communication Features

Comm. Address	Parameter	Scale	Unit	Assigned Content by Bit	
				B4	Relay 5
				B3	Relay 4
				B2	Relay 3
				B1	Relay 2
				B0	Relay 1
0h0387	Reserved	-	-	Reserved	
0h0388	PID reference	0.1	%	Process PID reference	
0h0389	PID feedback value	0.1	%	Process PID feedback	
0h038A	Motor rated current	0.1	A	-	
0h038B	Motor rated voltage	1	V	-	
0h038C– 0h038D	Reserved	-	-	Reserved	
0h038E	Proc PID Unit Reference	Proc Unit	Proc Unit	Unit Scale Process PID reference	
0h038F	Proc PID Unit Feedback	Proc Unit	Proc Unit	Unit Scale Process PID feedback	
0h0390– 0h0399	Reserved	-	-	Reserved	
0h039A	Anytime Para	-	-	Set the CNF-20 value (refer to 5.49 Operation State Monitor on page 332)	
0h039B	Monitor Line-1	-	-	Set the CNF-21 value (refer to 5.49 Operation State Monitor on page 332)	
0h039C	Monitor Line-2	-	-	Set the CNF-22 value (refer to 5.49 Operation State Monitor on page 332)	
0h039D	Monitor Line-3	-	-	Set the CNF-23 value (refer to 5.49 Operation State Monitor on page 332)	
0h039E– 0h039F	Reserved			Reserved	
0h03A0	PID Ref 1 Aux Value	0.1	%	PID Aux 1 reference	

Comm. Address	Parameter	Scale	Unit	Assigned Content by Bit
0h03A1	PID Ref 2 Aux Value	0.1	%	PID Aux 2 reference
0h03A2	PID Feedback Aux Value	0.1	%	PID Aux feedback
0h03A3	Proc PID Aux 1 Unit Scale	Proc Unit	Proc Unit	Unit Scale PID Aux 1 reference
0h03A4	Proc PID Aux 2 Unit Scale	Proc Unit	Proc Unit	Unit Scale PID Aux 2 reference
0h03A5	Proc PID Fdb Aux Unit Scale	Proc Unit	Proc Unit	Unit Scale PID Aux feedback
0h03A6–0h03AF	Reserved			Reserved
0h03B0	E-PID 1 Ref	0.1	%	External PID 1 reference
0h03B1	E-PID 1 Fdb	0.1	%	External PID 1 feedback
0h03B2	E-PID 1 Unit Scale Ref	Proc Unit	Proc Unit	Unit Scale External PID 1 reference
0h03B3	E-PID 1 Unit Scale Fdb	Proc Unit	Proc Unit	Unit Scale External PID 1 feedback
0h03B4	Reserved			Reserved
0h03B5	E-PID 2 Ref	0.1	%	External PID 2 reference
0h03B6	E-PID 2 Fdb	0.1	%	External PID 2 feedback
0h03B7	E-PID 2 Unit Scale Ref	Proc Unit	Proc Unit	Unit Scale External PID 2 reference
0h03B8	E-PID 2 Unit Scale Fdb	Proc Unit	Proc Unit	Unit Scale External PID 2 feedback

Note

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

- 1 Set DRV-07 to 'Keypad-1' and select a target frequency.

RS-485 Communication Features

- 2** Set the frequency via communication into the parameter area frequency address (0h1101).
- 3** Perform the parameter save (0h03E0: '1') before turning off the power. After the power cycle, the frequency set before turning off the power is displayed.

7.3.9.3 Inverter Memory Control Area Parameter (Read and Write)

Comm. Address	Parameter	Scale	Unit	Changeable During Running	Function
0h03E0	Save parameters	-	-	X	0: No, 1: Yes
0h03E1	Monitor mode initialization	-	-	O	0: No, 1: Yes
0h03E2	Parameter initialization	-	-	X	<div> <div> 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 </div> <div> 10: EPID Grp 11: AP1 Grp 12: AP2 Grp 13: AP3 Grp 14: PRT Grp 15: M2 Grp Setting is prohibited during fault trip interruptions. </div> </div>
0h03E3	Display changed	-	-	O	0: No, 1: Yes
0h03E4	Macro Function Setting	-	-	X	0: BASIC 1: Compressor 2: Supply Fan 3: Exhaust Fan 4: Cooling Tower 5: Circul. Pump 6: Vacuum Pump 7: Constant Torq
0h03E5	Delete all fault history	-	-	O	0: No, 1: Yes
0h03E6	Delete user-registered codes	-	-	O	0: No, 1: Yes
0h03E7	Hide parameter mode	0	Hex	O	Write: 0–9999 Read: 0: Unlock, 1: Lock
0h03E8	Lock parameter mode	0	Hex	O	Write: 0–9999

RS-485 Communication Features

Comm. Address	Parameter	Scale	Unit	Changeable During Running	Function
					Read: 0: Unlock, 1: Lock
0h03E9	Easy start on (easy parameter setup mode)	-	-	O	0: No, 1: Yes
0h03EA	Initializing power consumption	-	-	O	0: No, 1: Yes
0h03EB	Initialize inverter operation accumulative time	-	-	O	0: No, 1: Yes
0h03EC	Initialize cooling fan accumulated operation time	-	-	O	0: No, 1: Yes

Note

- When setting parameters in the inverter memory control area, the values are reflected to the inverter operation and saved. Parameters set in other areas via communication are reflected to the inverter operation, but are not saved. All set values are cleared following an inverter power cycle and revert back to its previous values. When setting parameters via communication, ensure that a parameter save is completed prior to shutting the inverter down.
- Set parameters very carefully. After setting a parameter to '0' via communication, set it to another value. If a parameter has been set to a value other than '0' and a non-zero value is entered again, an error message is returned. The previously-set value can be identified by reading the parameter when operating the inverter via communication.
- The addresses 0h03E7 and 0h03E8 are parameters for entering the password. When the password is entered, the condition will change from Lock to Unlock, and vice versa. When the same parameter value is entered continuously, the parameter is executed just once. Therefore, if the same value is entered again, change it to another value first and then re-enter the previous value. For example, if you want to enter 244 twice, enter it in the following order: 244 → 0 → 244.
- If the communication parameter settings are initialized by setting the address 0h03E2 to [1: All Grp] or [8: COM Grp], or if any Macro function item is modified by setting the address 0h03E4, all the communication parameter settings are reverted to the factory

default. If this happens, the inverter may not be able to properly receive responses from the upper-level devices due to the changes in the settings.

- If there is an undefined address in the addresses for reading multiple consecutive data defined in the common area, the undefined address returns 0xFFFF while all the others return normal response. If all the consecutive addresses are undefined, one return code is received from the first undefined address only.
- If there is an undefined address in the addresses for writing into multiple consecutive data defined in the common area, or if the value that is being written is not a valid one, no error response about the writing operation is returned. If all the consecutive addresses are undefined, or if all the data is invalid, one return code is received from the first undefined address only.

⚠ Caution

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

7.4 BACnet Communication

7.4.1 What is BACnet Communication?

BACnet (Building Automation and Control network) is a communication network frequently used in building automation. BACnet introduces the concept of object-oriented systems, and defines standardized objects. By exchanging data, this function makes communication possible between products from different companies. It also standardizes some of the general services carried out by using these standard objects.

7.4.2 BACnet Communication Standards

Application	Items	Specification
Connection	Interface	5 Pin Pluggable connector
	Data transmission	RS-485 MS/TP, Half-duplex

RS-485 Communication Features

Application	Items	Specification
Communication	Cable	Twisted pair (1 pair and shield)
	BACnet MS/TP	Stated in ANSI/ASHRAE Standards 135-2004
	Baud Rate	Supports 9600, 19200, 38400, 76800 bps
	MAC Address	1-127
	Start/Stop bit	Start 1 bit, Stop ½ bit
	Parity check	None/Even/Odd

7.4.3 BACnet Quick Communication Start

Follow the instructions below to configure the BACnet network for a quick start.

- 1 Set five multi-function input terminals (IN-65-71 PxDefine) to 'Interlock 1' – 'Interlock 5' respectively, in the correct motor order.

Note

- When auto change mode selection (AP1-55) is set to '0 (None)' or '1 (Aux)', and if 5 motors are operated, including the main motor, the interlock numbers 1,2,3,4,5 refer to the monitors connected to Relay 1,2,3,4,5 (If interlock numbers 1,2,3,4,5 are connected to Relay 1,2,3,4,5 at the inverter output terminal).
- If auto change mode selection (AP1-55) is set to '2 (Main)', and the main and auxiliary motors are connected to the inverter output terminal Relay 1,2,3,4, Interlock 1,2,3,4 are the monitors connected to Relay 1,2,3,4. Set COM-04 Int485 Mode.

- 2 Set the Device Object Instances for COM-21 and 22 and define the values. The device object instances must have unique values.
- 3 Set COM-01 (Int485 St ID) by entering a value (for BACnet, the Int485 station ID must be set within a range of 0-127). The station ID value set at COM-01 must be within the value range defined by the Max Master Property of different Master for MS/TP token passing.
- 4 Test the network and make sure the BACnet communication is working properly.

Group	Code	Name	LCD display	Parameter Setting	Setting Range	Unit
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RS-485 Communication Features

Group	Code	Name	LCD display	Parameter Setting	Setting Range	Unit
COM	03	Communication Speed	Baudrate	9600 bps	0	1200 ¹⁾
					1	2400 ¹⁾
					2	4800 ¹⁾
					3	9600
					4	19200
					5	38400
					6	57600 ¹⁾
					7	76800
					8	115200 ¹⁾
	04	Communication Mode	Int485 Mode	D8/PN/S1	0	D8/PN/S1
					1	D8/PN/S2
					2	D8/PE/S1
					3	D8/PO/S1
	20	Maximum number of BACnet Masters	BAC Max Master	0	0-127	-
	21	BACnet device number 1	BAC Dev Inst1	237	0-4149	-
	22	BACnet device number 2	BAC Dev Inst1	0	0-999	-
	23	BACnet device password	BAC PassWord	0	0-32767	-

Communication

1) 1200 bps, 2400 bps, 4800 bps, 57600 bps, 115200 bps cannot be set in communication speed setting in case of BACnet communication.

BACnet Parameter Setting Details

Code	Description
COM-01 Int485	Refers to MACID setting parameter used in BACnet. All MACIDs of the

RS-485 Communication Features

Code	Description
ST ID(MAC ID)	inverter using BACnet must be set before connecting to BUS. MACID must have the unique value from the Network to be connected to MACID. If BACnet is used, the value must be within 0–127. Communication is not available if the value is not included in the range.
COM-03 Baud Rate	Sets the communication speed to use in the network.
COM-20 BAC Mas Master	Range for Max Master that is the number of devices currently connected to the communication Line is 1–127, and the default value is 127.
COM-21–22 BAC Dev Inst 1–2	<p>BACnet Device Instance is used to identify BACnet Device, and must be set as the unique value in the BACnet network. It is used efficiently when finding BACnet Device of other Devices while installing.</p> <p>The following formula is used to calculate the Device Instance value: (COM-21 X 1000) + COM-22</p> <p>Therefore, in the Device Instance value, COM-21 takes the thousands and higher places (fourth digit and over) and COM-22 takes the hundreds and lower places (third digit and below).</p> <p>COM-21 and COM-22 have the ranges of 0–4194 and 0–999 respectively, because Device Instance can have the value within 0–4,194,302.</p>
COM-23 BAC Password	<p>Refers to the password used for Warm/Cold Start. COM-23 Password parameter can be set within 0–32767, and the default value is 0. If the parameter setting range is set to 1–32768, the Password value set at BACnet Master and the value set at COM-23 must be the same to operate Warm/Cold Start.</p> <p>If COM-23 Password is set to '0', the password of BACnet Master is ignored and Warm/Cold Start is operated.</p>

Note

MaxMaster and MACID affect performing Network communication. It is recommended to set as small value as possible, and to set the continuous value for MACID. If the values are set as explained above, efficient Token Passing Configuration is possible because each Master tries to give Token to Device set as its own (MACD+1).

7.4.4 Protocol Implementation

RS-485 Communication Features

The following table sums the information required to implement a BACnet system. Refer to each section of the table to implement a BACnet system properly.

Category	Items	Remarks
BACnet Services	I-Am (Answer to Who-Is, when broadcast or reset after power-up)	
	I-Have (Answer to Who-Has)	
	Read Property	
	Write Property	
	Device Communication Control	Ignores Password in Device Communication Control
	Reinitialize Device	Warm/Cold Starts (Supports Password) Start Backup, End Backup, Start Restore, End Restore, or Abort Restore services are NOT available.
Data Link Layer	BACnet communication card supports an MS/TP Master Data Link Layer	Supported Standards: MS/TP Available speed: 9600, 19200, 38400, and 76800 bps
MAC ID/Device Object Instance configuration	Set at COM-01 Int485 ST ID (MAC ID). The Device Object Instances are set at COM-21 and COM-22.	
MAX Master Property	Set at COM-20 (MAX Master Value).	

Communication

7.4.5 Object Map

Property	Object Type						
	Device	BI	BV	AI	AO	MSI	MVI
Object Identifier	O	O	O	O	O	O	O
Object Name	O	O	O	O	O	O	O
Object Type	O	O	O	O	O	O	O

RS-485 Communication Features

Property	Object Type						
System Status	O						
Vendor Name	O						
Vendor Identifier	O						
Model Name	O						
Firmware Revision	O						
Appl Software Revision	O						
Location	O						
Protocol Version	O						
Protocol Revision	O						
Services Supported	O						
Object Types Supported	O						
Object List	O						
Max APDU Length	O						
APDU Timeout	O						
Number APDU Retries	O						
Max Master	O						
Max Info Frames	O						
Device Address Binding	O						
Database Revision	O						
Preset Value		O	O	O	O	O	O
Description	O	O	O	O	O	O	O
Status Flags		O	O	O	O	O	O
Event State		O	O	O	O	O	O
Reliability		O	O	O	O	O	O
Out-of-Service		O	O	O	O	O	O
Number of states						O	O
State text						O	O

Property	Object Type						
Units				O	O		
Polarity		O					
Active Text		O	O				
Inactive Text		O	O				

* **BI**–Binary Input / **BV**–Binary Value / **AI**–Analog Input / **AV**–Analog Value / **MSI**–Multistate Input / **MSV**–Multistate Value

You can read/write in Location and Description only if it is the device object. You can write a maximum of 29 words.

7.4.5.1 Analog Value Object Instance

Instance ID	Object Name	Description	Setting Range	Units	R/W
AV1	CommTimeoutSet	Command timeout setting	0.1–120.0	Secs	R/W
AV2	AccelTimeSet	Accelerate time setting	0.0–600.0	Secs	R/W
AV3	DecelTimeSet	Decelerate time setting	0.0–600.0	Secs	R/W
AV4	CommandFreqSet	Command frequency setting**	0.00–DRV-20	Hz	R/W
AV5	PIDReferenceSet	PID reference setting	0–100.0	%	R/W
AV6	PIDFeedbackSet	PID feedback setting	0–100.0	%	R/W

⚠ Caution

- When PowerOn Resume (COM-96) is set to 'yes', value is saved even if the power of the inverter is disconnected. When PowerOn Resume (COM-96) is set to 'no', value is not saved if the power of the inverter is disconnected.
- A value higher than the maximum frequency (DRV-20) cannot be used. The maximum frequency can be set by using the keypad. This value can be used when Freq Ref Src (DRV-07) is set to 'Int 485'.
- AV2, AV3 and AV4 are used to provide acceleration/deceleration rate and frequency

reference commands. These can be written in AUTO mode only.

7.4.5.2 Multi-state Value Object Instance

Instance ID	Object Name	Description	Setting Range	Units	R/W
MSV1	LostCommand	Command lost operation setting	0: None 1: FreeRun 2: Dec 3: HoldInput 4: HoldOutput 5: LostPreset	MSG	R/W

7.4.5.3 Binary Value Object Instance

Instance ID	Object Name	Description	Active /Inactive Text	R/W
BV1	StopCmd	Stop command	False/True	R/W
BV2	RunForwardCmd	Run forward command	False/True	R/W
BV3	RunReverseCmd	Run reverse command	False/True	R/W
BV4	ResetFaultCmd	Fault reset command	False/True	R/W
BV5	FreeRunStopCmd	Free run stop command	False/True	R/W
BV6	Relay1Cmd	Relay 1 On/Off command	False/True	R/W
BV7	Relay2Cmd	Relay 2 On/Off command	False/True	R/W
BV8	Relay3Cmd	Relay 3 On/Off command	False/True	R/W
BV9	Relay4Cmd	Relay 4 On/Off command	False/True	R/W
BV10	Relay5Cmd	Relay 5 On/Off command	False/True	R/W

Instance ID	Object Name	Description	Active /Inactive Text	R/W
BV11	Q1Cmd	Q 1 On/Off command	False/True	R/W

7.4.5.4 Analog Input Object Instance

Instance ID	Object Name	Description	Units	R/W
AI1	InvCap (kW)	Inverter capacity	kW	R
AI2	InvCap (HP)	Inverter capacity	HP	R
AI3	InvVoltageClass	Inverter voltage type	Volts	R
AI4	OutputCurrent	Output current	Amps	R
AI5	OutputFreq	Output frequency	Hz	R
AI6	OutputVolgate	Output voltage	Volts	R
AI7	DCLinkVoltage	DC Link voltage	Volts	R
AI8	OutputPower	Output power	kW	R
AI9	AI1	Value of Analog 1	%	R
AI10	AI2	Values of Analog 2	%	R
AI11	OutputRPM	Output speed	RPM	R
AI12	Pole	Pole number of the motor	-	R
AI13	InvStatus	Information of the inverter state (Refer to address 0h0305 in the common area) ^(Note1)	-	R
AI14	LatchTripInfo1	Latch type trip information1 (Refer to address 0h0330 in the common area) ^(Note1)	-	R
AI15	LatchTripInfo2	Latch type trip information2 (Refer to address 0h0331 in the common area) ^(Note1)	-	R
AI16	LatchTripInfo3	Latch type trip information3 (Refer to address 0h0335 in the common area) ^(Note1)	-	R

RS-485 Communication Features

Instance ID	Object Name	Description	Units	R/W
AI17	LevelTripInfo	Level type trip information (Refer to address 0h0332 in the common area) ^(Note1)	-	R
AI18	HWDIagInfo	H/W Diagnosis trip information (Refer to address 0h0333 in the common area)*	-	R
AI19	WarningInfo	Warning information (Refer to address 0h0334 in the common area)*	-	R
AI20	KiloWattHour	Output power by kW/h	kW/h	R
AI21	MegaWattHour	Output power by MW/h	MW/h	R
AI22	PowerFactor	Power factor	-	R
AI23	RunTimeDay	Run time by day	Day	R
AI24	RunTimeMin	Run time by minute	Day	R
AI25	PidOutValue	PID Output Value	%	R
AI26	PidReferenceValue	PID Reference Value	%	R
AI27	PidFeedbackValue	PID Feedback Value	%	R

*Refer to the relevant addresses in 7.3.8 communication compatible common area parameters.

7.4.5.5 Binary Input Object Instance

Instance ID	Object Name	Description	R/W
BI1	Stopped	Stop state	R
BI2	RunningForward	Running forward	R
BI3	RunningReverse	Running reverse	R
BI4	Tripped	Trip occurred	R
BI5	Accelerating	Accelerating	R

Instance ID	Object Name	Description	R/W
BI6	Decelerating	Decelerating	R
BI7	SteadySpeed	Operating at steady speed	R
BI8	RunningDC	Operating at a 0 step speed	R
BI9	Stopping	Stopping	R
BI10	FwdRunCommandState	Forward run command state	R
BI11	RevRunCommandState	Reverse run command state	R
BI12	P1	P1 state	R
BI13	P2	P2 state	R
BI14	P3	P3 state	R
BI15	P4	P4 state	R
BI16	P5	P5 state	R
BI17	P6	P6 state	R
BI18	P7	P7 state	R
BI19	Relay1	Relay1 state*	R
BI20	Relay2	Relay2 state*	R
BI21	Relay3	Relay3 state*	R
BI22	Relay4	Relay4 state*	R
BI23	Relay5	Relay5 state*	R
BI24	Q1	Q1 state	R
BI25	SpeedSearch	Speed search operating	R
BI26	HWOCS	H/W OCS occurred	R
BI27	SWOCS	S/W OCS occurred	R
BI28	RunningDwell	Dwell operating state	R
BI29	SteadyState	Steady state	R
BI30	Warning	Warning state	R

⚠ Caution

OUT-31–35 (Relay1–5) must be set to '0 (none)' to control outputs via communication.

7.4.5.6 MultiState Input Object Instance

Instance ID	Object Name	Description	Units	R/W
MSI1	UnitsDisplay	Displays Unit setting	1 Hz 2 RPM	R

7.4.5.7 Error Message

Display	Description
serviceserror+7	Inconsistent parameters
propertyerror+9	Invalid data type
serviceserror+10	Invalid access method
serviceserror+11	Invalid file start
serviceserror+29	Service request denied
objecterror+31	Unknown object
propertyerror+0	Property other
propertyerror+27	Read access denied
propertyerror+32	Unknown property
propertyerror+37	Value out of range
propertyerror+40	Write access denied
propertyerror+42	Invalid array index
clienterror+31	Unknown device
resourceserror+0	Resources other
clienterror+30	Time out
abortreason+4	Segmentation not supported

Display	Description
rejectreason+4	Invalid tag
clienterror+0xFF	No invoke id
securityerror+26	Password failure

7.5 Metasys-N2 Communication

7.5.1 Metasys-N2 Quick Communication Start

Follow the instructions below to configure the Metasys-N2 network for a quick start.

- 1 Set COM-02 (Int485 Prtoto) to '5 (Metasys-N2)'.
- 2 Set the network communication speed to '9600 bps'.
- 3 Configure the communication modes and make sure that they are fixed to Data Bit 8 / No Parity Bit/ Start Bit 1 / Stop Bit 1.
- 4 Test the network and make sure Metasys-N2 communication is working properly.

7.5.2 Metasys-N2 Communication Standard

Item	Standards
Communication speed	9600 bps
Control procedure	Asynchronous communications system
Communication system	Half duplex system
Cable	Twisted pair (1 pair and shield)
Character system	LS485: ASCII (8bit) Modbus-RTU: Binary (7/8 bit) Metasys-N2: ASCII (8bit)
Start/Stop bit	Start 1bit, Stop 1bit

RS-485 Communication Features

Item	Standards
Error check	RS485: Checksum (2byte)
	Modbus-RTU: CRC16 (2byte)
	Metastys-N2: CRC16 (2byte)
Parity check	None

7.5.3 Metasys-N2 Protocol I/O Point Map

7.5.3.1 Analog Output

The output point map controlling the inverter from the Metasys-N2 master.

No.	Name	Range		Unit	Description
AO1	Command Frequency	0.0–Max Freq		Hz	Command frequency setting**
AO2	Accel Time	0.0–600.0		Sec	ACC time setting*
AO3	Decel Time	0.0–600.0		Sec	DEC time setting*
AO4	Drive mode	0	KeyPad	-	Drive mode setting
		1	Fx/Rx-1		
		2	: Fx/Rx-2		
		3	Int. 485		
		4	FieldBus		
		5	Time Event		
AO5	Freq mode	0	–KeyPad-1	-	Frequency mode setting
		1	–KeyPad-2		
		2	V1		
		3	–Reversed		
		4	V2		
		5	I2		
		6	Int485		
		7	FieldBus		
		8	Reversed		
		9	Pulse		

⚠ Caution

- When PowerOn Resume (COM-96) is set to 'yes', value is saved even if the power of the inverter is disconnected. If PowerOn Resume (COM-96) is set to 'no', value is not saved when the power of the inverter is disconnected.
- Cannot set the value higher than the maximum frequency (DRV-20). The maximum frequency can be set by using the keypad. This value can be used when Freq Ref Src (DRV-07) is set to 'Int 485'.

7.5.3.2 Binary Output

The output point map controlling the inverter from the Metasys-N2 master.

No.	Name	Range	Description
BO1	Stop Command	1: Stop	Stop command
BO2	Run Forward Command	1: Forward Run	Forward run command
BO3	Run Reverse Command	1: Reverse Run	Reverse run command
BO4	Reset Fault	1: Reset	Fault reset command
BO5	Free-Run Stop	1: Bx	Free-run stop command

7.5.3.3 Analog Input

Metasys-N2 master monitors inverter state.

No.	Name	Unit	Description
AI1	Output Current	Amps	Output current
AI2	Output Frequency	Hz	Output frequency
AI3	Output Speed	RPM	Output speed
AI4	Trip Code	-	Trip code information (Refer to Common Area parameter address 0h000F)*
AI5	Latch Trip Info1	-	'Latch' type fault trip information 1

No.	Name	Unit	Description
AI6	Latch Trip Info2	-	(Refer to Common Area parameter address 0h0330)*
			'Latch' type fault trip information 2 (Refer to Common Area parameter address 0h0331)*
AI7	Latch Trip Info3	-	'Latch' type fault trip information 3 (Refer to Common Area parameter address 0h0335)*
AI8	Level Trip Info	-	'Level' type fault trip information (Refer to Common Area parameter address 0h0332)(1)
AI9	H/W Diagnosis Trip Info	-	H/W Diagnosis fault trip information (Refer to Common Area parameter address 0h0333)(1)
AI10	Warning Info	-	Warning information (Refer to Common Area parameter address 0h0334)(1)

* Refer to [7.3.8 Compatible Common Area Parameter](#) on page 400.

7.5.3.4 Binary Input

Metasys-N2 master unit monitors the inverter input and output status in binary codes. The following table lists the binary codes used and their meanings.

No.	Name	Description
BI1	Stopped	1 – Stopped
BI2	Running Forward	1 – Forward operation is running.
BI3	Running Reverse	1 – Reverse operation is running.
BI4	Tripped	1 – Fault trip occurred.
BI5	Accelerating	1 – Accelerating
BI6	Decelerating	1 – Decelerating
BI7	Reached Full Speed	1 – Running at a steady speed (frequency reference)
BI8	DC Braking	1 – Running on DC power source

No.	Name	Description
BI9	Stopping	1–Stopping is in progress.
BI10	P1 Input	1–True / 0 - False
BI11	P2 Input	1–True / 0–False
BI12	P3 Input	1–True / 0–False
BI13	P4 Input	1–True / 0–False
BI14	P5 Input	1–True / 0–False
BI15	P6 Input	1–True / 0–False
BI16	P7 Input	1–True / 0–False
BI17	Relay1 State	1–On / 0 - Off
BI18	Relay2 State	1–On / 0 - Off
BI19	Relay3 State	1–On / 0 - Off
BI20	Relay4 State	1–On / 0 - Off
BI21	Relay5 State	1–On / 0 - Off
BI22	Q1 (OC1) State	1–On / 0 - Off

7.5.3.5 Error Code

Defined Codes	Description
00	The device has been reset. Currently waiting for the 'Identity Yourself' command.
01	Undefined command
02	Checksum error has occurred.
03	Data size exceeded the input buffer (message is bigger than the device buffer size).
05	Data field error (input message size does not fit the command type)
10	Invalid data (message value is out of the range)
11	Invalid command for data type (command does not fit the message frame)

RS-485 Communication Features

Defined Codes	Description
12	Command is not accepted (device has ignored a command due to a fault. The master device sends a 'Status Update Request').

Communication

8 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.

8.1 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*	Ref.
00	-	Jump Code	Jump Code	1–99		9	O	p.72
01	0h1101	Target frequency	Cmd Frequency	0.00, Low Freq– High Freq		0.00	O	p.93
02	0h1102	Keypad run direction	Keypad Run Dir	0	Reverse	1	O	p.90
				1	Forward			
03	0h1103	Acceleration time	Acc Time	0.0–600.0 (sec)		20.0	O	p.121
04	0h1104	Deceleration time	Dec Time	0.0–600.0 (sec)		30.0	O	p.121
06	0h1106	Command source	Cmd Source	0	Keypad	1: Fx/Rx-1	Δ	p.111
				1	Fx/Rx-1			
				2	Fx/Rx-2			
				3	Int 485			
				4	Field Bus			
				5	Time Event			

Table of Functions

Function
Table

Code	Comm. Address	Name	LCD Display	Setting Range		Initial value	Property*	Ref.
07	0h1107	Frequency reference source	Freq Ref Src	0	Keypad-1	0: Keypad -1	Δ	<u>p.92</u>
				1	Keypad-2			
				2	V1			
				4	V2			
				5	I2			
				6	Int 485			
				7	FieldBus			
				9	Pulse			
09	0h1109	Control mode	Control Mode	0	V/F	0: V/F	Δ	<u>p.133</u> ' <u>p.177</u> '
				1	Slip Compen			
11	0h110B	Jog frequency	Jog Frequency	0.00, Low Freq–High Freq		10.00	O	<u>p.168</u>
12	0h110C	Jog run acceleration time	Jog Acc Time	0.0–600.0 (sec)		20.0	O	<u>p.168</u>
13	0h110D	Jog run deceleration time	Jog Dec Time	0.0–600.0 (sec)		30.0	O	<u>p.168</u>
14	0h110E	Motor capacity	Motor Capacity	7	3.7 kW(5.0HP)	Dependent on motor setting	Δ	<u>p.239</u>
				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)			

Table of Functions

Code	Comm. Address	Name	LCD Display	Setting Range		Initial value	Property*	Ref.
				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(100.0 HP)			
				20	90.0kW(125.0 HP)			
15	0h110F	Torque boost options	Torque Boost	0	Manual	0: Manual	Δ	p.138
				1	Auto 1			
				2	Auto 2			
16 ¹	0h1110	Forward Torque boost	Fwd Boost	0.0–15.0 (%)		2.0	Δ	p.138
17	0h1111	Reverse Torque boost	Rev Boost	0.0–15.0 (%)		2.0	Δ	p.138
18	0h1112	Base frequency	Base Freq	30.00–400.00 (Hz)		60.00	Δ	p.133
19	0h1113	Start	Start Freq	0.01–10.00 (Hz)		0.50	Δ	p.133

¹ DRV-16–17 are displayed when DRV-15 is set to '0 (Manual)'.

Table of Functions

Code	Comm. Address	Name	LCD Display	Setting Range		Initial value	Property*	Ref.
		frequency						
20	0h1114	Maximum frequency	Max Freq	40.00-400.00 (Hz)		60.00	Δ	p.149
21	0h1115	Select speed unit	Hz/Rpm Sel	0	Hz Display	0: Hz Display	O	p.109
				1	RPM Display			
25	0h1119	Hand mode operation frequency	HAND Cmd Freq	0.00, Low Freq- High Freq		0.00	O	p.85
26	0h111A	Hand mode operation Frequency reference source	HAND Ref Mode	0	HAND Parameter	0: HAND Parameter	Δ	p.85
				1	Follow AUTO			
30	0h111E	kW/HP unit selection	kW/HP Unit Sel	0	kW	1:HP	O	-
				1	HP			
98	0h1162	Display I/O S/W Version	I/O S/W Ver	-	-	-	X	-

Function Table

8.2 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**

Table of Functions

Code	Comm. Address	Name	LCD Display	Setting Range	Initial value	Property*	Ref.
00	-	Jump Code	Jump Code	1-99	20	O	p.72
01	0h1201	Auxiliary reference source	Aux Ref Src	0	None	0: None Δ	p.161
				1	V1		
				3	V2		
				4	I2		
				6	Pulse		
				7	Int 485		
				8	FieldBuses		
				10	EPID1 Output		
				11	EPID1 Fdb Val		
02 ²	0h1202	Auxiliary command calculation type	Aux Calc Type	0	M+(G*A)	0: M+(G*A) Δ	p.161
				1	Mx (G*A)		
				2	M/(G*A)		
				3	M+[M*(G*A)]		
				4	M+G*2 (A-50%)		
				5	M*[G*2 (A-50%)		

² BAS-02-03 are displayed when BAS-01 is not '0 (None)'.

Table of Functions

Code	Comm. Address	Name	LCD Display	Setting Range		Initial value	Property*	Ref.
				6	M/[G*2 (A-50%)]			
				7	M+M*G*2 (A-50%)			
03	0h1203	Auxiliary command gain	Aux Ref Gain	-200.0-200.0 (%)		100.0	O	p.161
04	0h1204	Second command source	Cmd 2nd Src	0	Keypad	1: Fx/Rx-1	Δ	p.154
				1	Fx/Rx-1			
				2	Fx/Rx-2			
				3	Int 485			
				4	FieldBus			
				5	Tme Event			
05	0h1205	Second frequency source	Freq 2nd Src	0	Keypad-1	0: Keypad-1	O	p.154
				1	Keypad-2			
				2	V1			
				4	V2			
				5	I2			
				6	Int 485			
				7	FieldBus			
				9	Pulse			
				0	Linear	0: Linear	Δ	p.133
07	0h1207	V/F pattern options	V/F Pattern	1	Square			

Table of Functions

Code	Comm. Address	Name	LCD Display	Setting Range		Initial value	Property*	Ref.		
08	0h1208	Acc/Dec standard frequency	Ramp T Mode	2	User V/F	0: Max Freq	Δ	p.121		
				3	Square 2					
				0	Max Freq	1: 0.1 sec			Δ	p.121
				1	Delta Freq					
09	0h1209	Time scale settings	Time Scale	0	0.01 sec	1: 0.1 sec	Δ	p.121		
				1	0.1 sec					
				2	1 sec					
10	0h120A	Input power frequency	60/50 Hz Sel	0	60 Hz	0: 60 Hz	Δ	p.278		
				1	50 Hz					
11	0h120B	Number of motor poles	Pole Number	2-48		Dependent on motor setting	Δ	p.177		
12	0h120C	Rated slip speed	Rated Slip	0-3000 (RPM)			Δ	p.177		
13	0h120D	Motor rated current	Rated Curr	1.0-1000.0 (A)			Δ	p.177		
14	0h120E	Motor no-load current	NoloadCurr	0.0-1000.0 (A)			Δ	p.177		
15	0h120F	Motor rated voltage	Rated Volt	0, 170-528 (V)		0	Δ	p.141		
16	0h1210	Motor efficiency	Efficiency	70-100 (%)		Dependent on motor setting	Δ	p.239		
18	0h1212	Trim power display	Trim Power %	70-130 (%)		100	O	-		

Table of Functions

Code	Comm. Address	Name	LCD Display	Setting Range	Initial value	Property*	Ref.
19	0h1213	Input power voltage	AC Input Volt	170-528V	220/380 V	O	p.278
20	-	Auto Tuning	Auto Tuning	0 None	0: None	Δ	p.239
				1 All (Rotation type)			
				2 All (Static type)			
				3 Rs+ Lsigma (Rotation type)			
21	-	Stator resistor	Rs	0.000-9.999 (Ω)	Dependent on motor setting	Δ	p.239
22	-	Leakage inductance	Lsigma	0.00-9.99 (mH)		Δ	p.239
41 ³	0h1229	User frequency1	User Freq 1	0.00 - Maximum frequency (Hz)	15.00	Δ	p.136
42	0h122A	User voltage1	User Volt 1	0-100 (%)	25	Δ	p.136
43	0h122B	User frequency2	User Freq 2	0.00- Maximum frequency (Hz)	30.00	Δ	p.136
44	0h122C	User voltage2	User Volt 2	0-100 (%)	50	Δ	p.136

³BAS-41-48 are displayed when BAS-07 or M2-25 is set to '2 (User V/F)'.

Table of Functions

Code	Comm. Address	Name	LCD Display	Setting Range	Initial value	Property*	Ref.
45	0h122D	User frequency3	User Freq 3	0.00 - Maximum frequency (Hz)	45.00	Δ	p.136
46	0h122E	User voltage3	User Volt 3	0-100 (%)	75	Δ	p.136
47	0h122F	User frequency4	User Freq 4	0.00 - Maximum frequency (Hz)	60.00	Δ	p.136
48	0h1230	User voltage4	User Volt 4	0-100 (%)	100	Δ	p.136
50 ⁴	0h1232	Multi-step speed frequency1	Step Freq-1	0.00, Low Freq- High Freq	10.00	O	p.109
51	0h1233	Multi-step speed frequency2	Step Freq-2	0.00, Low Freq- High Freq	20.00	O	p.109
52	0h1234	Multi-step speed frequency3	Step Freq-3	0.00, Low Freq- High Freq	30.00	O	p.109
53	0h1235	Multi-step speed frequency4	Step Freq-4	0.00, Low Freq- High Freq	40.00	O	p.109
54	0h1236	Multi-step speed frequency5	Step Freq-5	0.00, Low Freq- High Freq	50.00	O	p.109
55	0h1237	Multi-step speed	Step Freq-6	0.00, Low Freq- High	60.00	O	p.109

⁴BAS-50~56 are displayed when IN-65-71 is set to 'Speed-L/M/H'.

Table of Functions

Code	Comm. Address	Name	LCD Display	Setting Range	Initial value	Property*	Ref.
		frequency6		Freq			
56	0h1238	Multi-step speed frequency7	Step Freq-7	0.00, Low Freq-High Freq	60.00	O	p.109
70	0h1246	Multi-step deceleration time1	Acc Time-1	0.0-600.0 (sec)	20.0	O	p.125
71	0h1247	Multi-step deceleration time1	Dec Time-1	0.0-600.0 (sec)	20.0	O	p.125
72 ⁵	0h1248	Multi-step deceleration time2	Acc Time-2	0.0-600.0 (sec)	30.0	O	p.125
73	0h1249	Multi-step deceleration time2	Dec Time-2	0.0-600.0 (sec)	30.0	O	p.125
74	0h124A	Multi-step deceleration time3	Acc Time-3	0.0-600.0 (sec)	40.0	O	p.125
75	0h124B	Multi-step deceleration time3	Dec Time-3	0.0-600.0 (sec)	40.0	O	p.125
76	0h124C	Multi-step acceleration time4	Acc Time-4	0.0-600.0 (sec)	50.0	O	p.125
77	0h124D	Multi-step acceleration time4	Dec Time-4	0.0-600.0 (sec)	50.0	O	p.125
78	0h124E	Multi-step acceleration	Acc Time-5	0.0-600.0 (sec)	40.0	O	p.125

⁵ BAS-72-83 are displayed when IN-65-71 is set to 'Xcel-L/M/H'

Table of Functions

Code	Comm. Address	Name	LCD Display	Setting Range	Initial value	Property*	Ref.
		n time5					
79	0h124F	Multi-step acceleration time5	Dec Time-5	0.0-600.0 (sec)	40.0	O	p.125
80	0h1250	Multi-step acceleration time6	Acc Time-6	0.0-600.0 (sec)	30.0	O	p.125
81	0h1251	Multi-step deceleration time6	Dec Time-6	0.0-600.0 (sec)	30.0	O	p.125
82	0h1252	Multi-step acceleration time7	Acc Time-7	0.0-600.0 (sec)	20.0	O	p.125
83	0h1253	Multi-step acceleration time7	Dec Time-7	0.0-600.0 (sec)	20.0	O	p.125

8.3 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*	Ref.
00	-	Jump Code	Jump Code	1-99		24	O	p.72
01	0h1301	Acceleration pattern	Acc Pattern	0	Linear	0: Linear	Δ	p.129
02	0h1302	Deceleration pattern	Dec Pattern	1	S-curve		Δ	p.129

Table of Functions

Code	Comm. Address	Name	LCD Display	Setting Range		Initial Value	Property*	Ref.
		on pattern						
03 ⁶	0h1303	S-curve accelerati on start point gradient	Acc S Start	1–100 (%)		40	Δ	p.129
04	0h1304	S-curve accelerati on end point gradient	Acc S End	1–100 (%)		40	Δ	p.129
05 ⁷	0h1305	S-curve decelerati on start point gradient	Dec S Start	1–100 (%)		40	Δ	p.129
06	0h1306	S-curve decelerati on end point gradient	Dec S End	1–100 (%)		40	Δ	p.129
07	0h1307	Start Mode	Start Mode	0	Acc	0: Acc	Δ	p.142
				1	DC-Start			
08	0h1308	Stop Mode	Stop Mode	0	Dec	0: Dec	Δ	p.143
				1	DC-Brake			
				2	Free-Run			

⁶ADV-03–04 are displayed when ADV-01 is set to '1 (S-curve)'.

⁷ADV-05–06 are displayed when ADV-02 is set to '1 (S-curve)'.

Table of Functions

Code	Comm. Address	Name	LCD Display	Setting Range		Initial Value	Property*	Ref.
				4	Power Braking			
09	0h1309	Selection of prohibited rotation direction	Run Prevent	0	None	0: None	Δ	<p><u>p.115</u> <u>오류</u> <u>책갈피</u> <u>가</u> <u>정의되</u> <u>어</u> <u>있지</u> <u>않습니</u> <u>다.</u></p>
				1	Forward Prev			
				2	Reverse Prev			
10	0h130A	Starting with power on	Power-on Run	0	No	0: No	O	<p><u>p.117</u></p>
				1	Yes			
11 ⁸	0h130B	Power-on run delay time	Power-On Delay	0.0 -6000.0 (sec)		0.0	O	<p><u>p.117</u></p>
12 ⁹	0h130C	DC braking time at startup	DC-Start Time	0.00-60.00 (sec)		0.00	Δ	<p><u>p.142</u></p>
13	0h130D	Amount of applied DC	DC Inj Level	0-200 (%)		50	Δ	<p><u>p.142</u></p>
14 ¹⁰	0h130E	Output blocking time	DC-Block Time	0.00- 60.00 (sec)		0.00	Δ	<p><u>p.143</u></p>

⁸ADV-11 is displayed when ADV-10 is set to '1 (YES)'.

⁹ADV-12 is displayed when ADV-07 is set to '1 (DC-Start)'.

¹⁰ADV-14 is displayed when ADV-08 is set to '1 (DC-Brake)'.

Table of Functions

Function
Table

Code	Comm. Address	Name	LCD Display	Setting Range	Initial Value	Property*	Ref.
		before DC braking					
15	0h130F	DC braking time	DC-Brake Time	0.00- 60.00 (sec)	1.00	Δ	p.143
16	0h1310	DC braking rate	DC-Brake Level	0-200 (%)	50	Δ	p.143
17	0h1311	DC braking frequency	DC-Brake Freq	Start frequency- 60 Hz	5.00	Δ	p.143
20	0h1314	Dwell frequency on acceleration	Acc Dwell Freq	Start frequency- Maximum frequency (Hz)	5.00	Δ	p.175
21	0h1315	Dwell operation time on acceleration	Acc Dwell Time	0.0-60.0 (sec)	0.0	Δ	p.175
22	0h1316	Dwell frequency on deceleration	Dec Dwell Freq	Start frequency- Maximum frequency (Hz)	5.00	Δ	p.175
23	0h1317	Dwell operation time on deceleration	Dec Dwell Time	0.0-60.0 (sec)	0.0	Δ	p.175
24	0h1318	Frequency limit	Freq Limit	0	No	0: No	p.149
				1	Yes		

Table of Functions

Code	Comm. Address	Name	LCD Display	Setting Range	Initial Value	Property*	Ref.
25	0h1319	Frequency lower limit value	Freq Limit Lo	0.00-Upper limit frequency (Hz)	0.50	Δ	p.149
26	0h131A	Frequency upper limit value	Freq Limit Hi	Lower limit frequency-Maximum frequency (Hz)	Max freq	Δ	p.149
27	0h131B	Frequency jump	Jump Freq	<div>0 No</div> <div>1 Yes</div>	0: No	Δ	p.153
28 ¹⁾	0h131C	Jump frequency lower limit1	Jump Lo 1	0.00-Jump frequency upper limit1 (Hz)	10.00	O	p.153
29	0h131D	Jump frequency upper limit1	Jump Hi 1	Jump frequency lower limit1-Maximum frequency (Hz)	15.00	O	p.153
30	0h131E	Jump frequency lower limit2	Jump Lo 2	0.00-Jump frequency upper limit2 (Hz)	20.00	O	p.153
31	0h131F	Jump frequency upper limit2	Jump Hi 2	Jump frequency lower limit2-Maximum frequency (Hz)	25.00	O	p.153
32	0h1320	Jump frequency lower limit3	Jump Lo 3	0.00-Jump frequency upper limit3 (Hz)	30.00	O	p.153
33	0h1321	Jump frequency upper	Jump Hi 3	Jump frequency lower limit3-Maximum	35.00	O	p.153

¹⁾ADV-28-33 are displayed when ADV-27 is set to '1 (Yes)'.

Table of Functions

Code	Comm. Address	Name	LCD Display	Setting Range		Initial Value	Property*	Ref.
50	0h1332	limit3		frequency (Hz)				
		Energy saving operation	E-Save Mode	0	None	0: None	Δ	p.264
				1	Manual			
				2	Auto			
51 ¹²	0h1333	Energy saving level	Energy Save	0-30 (%)		0	O	p.264
52	0h1334	Energy saving point search time	E-Save Det T	0-100.0 (sec)		20.0	Δ	p.264
60	0h133C	Acc/Dec time transition frequency	Xcel Change Fr	0.00-Maximum frequency (Hz)		0.00	Δ	p.126
64	0h1340	Cooling fan control	Fan Control	0	During Run	0: During Run	O	p.277
				1	Always ON			
				2	Temp Control			
65	0h1341	Up/Down operation frequency save	U/D Save Mode	0	No	0: No	O	p.170
				1	Yes			
66	0h1342	Output	On/Off	0	None	0: None	O	p.314

¹²ADV-51 is displayed when ADV-50 is set to '1 (Manual)'.

ADV-52 is displayed when ADV-50 is set to '2 (Auto)'.

Table of Functions

Code	Comm. Address	Name	LCD Display	Setting Range		Initial Value	Property*	Ref.
		contact On/Off control options	Ctrl Src	1	V1			
				3	V2			
				4	I2			
				6	Pulse			
67	0h1343	Output contact On level	On-Ctrl Level	Output contact off level-100.00%		90.00	Δ	p.314
68	0h1344	Output contact Off level	Off-Ctrl Level	-100.00-outputcontact on level (%)		10.00	Δ	p.314
70	0h1346	Safe operation selection	Run En Mode	0	Always Enable	0: Always Enable	Δ	p.173
				1	DI Depend ent			
71 ¹³	0h1347	Safe operation stop options	Run Dis Stop	0	Free-Run	0: Free-Run	Δ	p.173
				1	Q-Stop			
				2	Q-Stop Resume			
72	0h1348	Safe operation deceleration time	Q-Stop Time	0.0-600.0 (sec)		5.0	O	p.173
74	0h134A	Selection of regeneration evasion function	RegenAvdSel	0	No	0: No	Δ	p.315
				1	Yes			

¹³ADV-71-72 are displayed when ADV-70 is set to '1 (DI Dependent)'.

Table of Functions

Code	Comm. Address	Name	LCD Display	Setting Range	Initial Value	Property*	Ref.
75		for press					
	0h134B	Voltage level of regeneration evasion motion for press	RegenAvd Level	200 V: 300-400 V	350	Δ	p.315
				400 V: 600-800 V	700		
76 ¹⁴	0h134C	Compensation frequency limit of regeneration evasion for press	CompFreq Limit	0.00-10.00 Hz	1.00	Δ	p.315
77	0h134D	Regeneration evasion for press P-Gain	RegenAvdP gain	0.0-100.0%	50.0	O	p.315
78	0h134E	Regeneration evasion for press I gain	RegenAvdI gain	20-30000 (msec)	500	O	p.315

Function
Table¹⁴ADV-76-78 are displayed when ADV-74 is set to '1 (Yes)'.

8.4 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**

Cod e	Comm. Address	Name	LCD Display	Setting Range	Initial Value	Property *	Ref.
00	-	Jump Code	Jump Code	1-99	4	O	p.72
04	0h1404	Carrier frequency	Carrier Freq	1.0- 15.0 (kHz)	3.0	O	p.272
05	0h1405	Switching mode	PWM Mode	0 Normal PWM	0: Normal PWM	Δ	p.272
				1 Low leakage PWM			
13	0h140D	Anti-hunting regulator mode	AHR Sel	0 No	1	Δ	p.261
				1 Yes			
14	0h140E	Anti-hunting regulator P-Gain	AHR P-Gain	0-32767	1000	O	p.261
15	0h140F	Anti-hunting regulator start frequency	AHR Low Freq	0-AHR High Freq	0.5	O	p.261
16	0h1410	Anti-hunting regulator end frequency	AHR High Freq	AHR Low Freq-400.00	400.00	O	p.261
17	0h1411	Anti-hunting regulator compensation voltage limit rate	AHR limit	0-20	2	O	p.261

Table of Functions

Cod e	Comm. Address	Name	LCD Display	Setting Range		Initial Value	Property *	Ref.
21 ¹⁵	0h1415	Auto torque boost filter gain	ATB Filt Gain	1 – 9999 (msec)		10	O	p.139
22	0h1416	Auto torque boost voltage	ATB Volt Gain	0.0-300.0%		100.0	O	p.139
70	0h1446	Speed search mode selection	SS Mode	0	Flying Start-1	0: Flying Start-1	Δ	p.265
				1	Flying Start-2			
71	0h1447	Speed search operation selection	Speed Search	Bit	0000-1111	0000	Δ	p.265
				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			

¹⁵CON-21-22 are displayed when DRV-15 is set to 'Auto 2'.

Table of Functions

Cod e	Comm. Address	Name	LCD Display	Setting Range	Initial Value	Property *	Ref.
72 ¹⁶	0h1448	Speed search reference current	SS Sup-Current	50–120 (%)	90%	O	p.265
73 ¹⁷	0h1449	Speed search proportional gain	SS P-Gain	0-9999	Flying Start-1 : 100 Flying Start-2 : Depend ent on motor setting	O	p.265
74	0h144A	Speed search integral gain	SS I-Gain	0-9999	Flying Start-1 : 200 Flying Start-2 : Depend ent on motor setting	O	p.265
75	0h144B	Output block time before speed search	SS Block Time	0.0-60.0 (sec)	1.0	Δ	p.265
77	0h144D	Energy buffering selection	KEB Select	0 No 1 Yes	0: No	Δ	p.215
78 ¹⁸	0h144E	Energy	KEB Start	110.0-140.0	125.0	Δ	p.215

¹⁶CON-72 is displayed after Flying Start-1 and when any CON-71 bit is set to '1'.

¹⁷CON-73–75 are displayed when any CON-71bit is set to '1'.

Table of Functions

Cod e	Comm. Address	Name	LCD Display	Setting Range	Initial Value	Property *	Ref.
		buffering start level	Lev	(%)			
79	0h144F	Energy buffering stop level	KEB Stop Lev	125.0-145.0 (%)	130.0	Δ	p.215
80	0h1450	Energy buffering slip gain	KEB Slip Gain buffering slip gain	1-20000	300	O	p.215
81	0h1451	Energy buffering P-Gain	KEB P Gain	1-20000	1000	O	p.215
82	0h1452	Energy buffering I gain	KEB I Gain	1-20000	500	O	p.215
83	0h1453	Energy buffering acceleration time	KEB Acc Time	0.0-600.0	10.0	O	p.215

8.5 Input Terminal Group (IN)

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**

Cod e	Comm. Address	Name	LCD Display	Setting Range	Initial Value	Property *	Ref.
00	-	Jump Code	Jump Code	1-99	65	O	p.72

¹⁸CON-78-83 are displayed when CON-77 is set to '1 (Yes)'.

Table of Functions

Cod e	Comm. Address	Name	LCD Display	Setting Range	Initial Value	Property*	Ref.	
01	0h1501	Frequency at maximum analog input	Freq at 100%	Start frequency- Maximum frequency (Hz)	Maximum frequency	O	p.94	
05 ¹⁹	0h1505	V1 input voltage display	V1 Monitor(V)	0~12.00(V) or -12.00~12.00 (V)	0.00	X	p.94	
06	0h1506	V1 input polarity selection	V1 Polarity	0	Unipolar	0: Unipolar	Δ	p.94
				1	Bipolar			
07	0h1507	Time constant of V1 input filter	V1 Filter	0–10000 (ms)	10	O	p.94	
08	0h1508	V1 minimum input voltage	V1 Volt x1	0.00-10.00 (V)	0.00	O	p.94	
09	0h1509	Output at V1 minimum voltage (%)	V1 Perc y1	0.00-100.00 (%)	0.00	O	p.94	
10	0h150A	V1 maximum input voltage (%)	V1 Volt x2	0.00-12.00 (V)	10.00	O	p.94	
11	0h150B	Output at V1 maximum voltage (%)	V1 Perc y2	0.00-100.00 (%)	100.00	O	p.94	
12 ²⁰	0h150C	V1 input at minimum voltage (%)	V1 –Volt x1’	-10.00- 0.00 (V)	0.00	O	p.98	
13	0h150D	Output at V1 minimum	V1 –Perc y1’	-100.00-0.00 (%)	0.00	O	p.98	

¹⁹'IN-05' setting range can be changed according to the 'IN-06' settings.

²⁰IN-12~17 are displayed when IN-06 is set to '1 (Bipolar)'.

Table of Functions

Cod e	Comm. Address	Name	LCD Display	Setting Range		Initial Value	Propert y*	Ref.
		voltage (%)						
14	0h150E	V1 maximum input voltage (%)	V1 –Volt x2’	-12.00- 0.00 (V)		-10.00	O	p.98
15	0h150F	Output at V1 maximum voltage (%)	V1 –Perc y2’	-100.00-0.00 (%)		-100.00	O	p.98
16	0h1510	V2 rotation direction change	V1 Inverting	0	No	0: No	O	p.94
				1	Yes			
17	0h1511	V1quantization change	V1 Quantizing	0.00 ²¹ , 0.04-10.00 (%)		0.04	O	p.94
20 ²²	0h1514	Temperature monitor	T1 Monitor	0.00 - 100.00 (%)		-	X	p.340
35 ²³	0h1523	V2 input rate monitor	V2 Monitor (V)	0.00-12.00 (V)		0.00	O	p.104
37	0h1525	V2 input filter time	V2 Filter	0-10000 (msec)		10	O	p.104
38	0h1526	V2 minimum input voltage	V2 Volt x1	0.00-10.00 (V)		0.00	O	p.104
39	0h1527	Output at V2 minimum voltage (%)	V2 Perc y1	0.00-100.00 (%)		0.00	O	p.104
40	0h1528	V2 maximum	V2 Volt x2	0.00-10.00 (V)		10.00	O	p.10

²¹* Quantizing is disabled if '0' is selected.

²²IN-20 is displayed when the analog current/voltage input circuit selection switch (SW3) is selected on T1.

²³IN-35-47 are displayed when the analog current/voltage input circuit selection switch (SW4) is selected on V2.

Table of Functions

Cod e	Comm. Address	Name	LCD Display	Setting Range	Initial Value	Property*	Ref.
		input voltage					4
41	0h1529	Output at V2 maximum voltage (%)	V2 Perc y2	0.00-100.00 (%)	100.00	O	p.104
46	0h152E	V2 Rotation direction options	V2 Inverting	0 No	0: No	O	p.104
				1 Yes			
47	0h152F	V2 Quantizing level	V2 Quantizing	0.00 ²⁴ , 0.04- 10.00 (%)	0.04	O	p.104
50 ²⁵	0h1532	I2 input monitor	I2 Monitor (mA)	0-24 (mA)	0	O	p.101
52	0h1534	I2 input filter time	I2 Filter	0-10000 (msec)	10	O	p.101
53	0h1535	I2 minimum input power supply	I2 Curr x1	0.00-20.00 (mA)	4.00	O	p.101
54	0h1536	Output at I2 maximum current (%)	I2 Perc y1	0.00-100.00 (%)	0.00	O	<u>p.101</u>
55	0h1537	I2 maximum input current	I2 Curr x2	0.00-24.00 (mA)	20.00	O	<u>p.101</u>
56	0h1538	Output at I2 maximum current (%)	I2 Perc y2	0.00-100.00 (%)	100.00	O	<u>p.101</u>
61	0h153D	I2 rotation direction options	I2 Inverting	0 No	0: No	O	<u>p.101</u>
				1 Yes			

²⁴* Quantizing is disabled if '0' is selected.

²⁵IN-50-62 are displayed when the analog current/voltage input circuit selection switch (SW5) is selected on I2.

Table of Functions

Cod e	Comm. Address	Name	LCD Display	Setting Range	Initial Value	Property*	Ref.
62	0h153E	I2 Quantizing level	I2 Quantizing	0.00 ²⁶ 0.04-10.00 (%)	0.04	O	p.101
65	0h1541	P1 Px terminal configuration	P1 Define	0 None 1 Fx	1: Fx	Δ	p.111
66	0h1542	P2 Px terminal configuration	P2 Define	2 Rx	2: Rx	Δ	p.111
67	0h1543	P3 Px terminal configuration	P3 Define	3 RST	5: BX	Δ	p.366
68	0h1544	P4 Px terminal configuration	P4 Define	4 External Trip	3: RST	Δ	p.364
69	0h1545	P5 Px terminal configuration	P5 Define	5 BX	7: Sp-L	Δ	p.364
70	0h1546	P6 Px terminal configuration	P6 Define	6 JOG	8: Sp-M	Δ	p.168
71	0h1547	P7 Px terminal configuration	P7 Define	7 Speed-L	9: Sp-H	Δ	p.109
				8 Speed-M			p.109
				9 Speed-H			p.109
				11 XCEL-L			p.125
				12 XCEL-M			p.125
				13 XCEL-H			p.125
				1 XCEL Stop			p.13

Function
Table

^{26*} Quantizing is disabled if '0' is selected.

Table of Functions

Cod e	Comm. Addres s	Name	LCD Display	Setting Range	Initial Value	Propert y*	Ref.
				4			<u>1</u>
				1 5	RUN Enable		<u>p.17</u> <u>3</u>
				1 6	3-Wire		<u>p.17</u> <u>2</u>
				1 7	2nd Source		<u>p.15</u> <u>4</u>
				1 8	Exchange		<u>p.27</u> <u>6</u>
				1 9	Up		<u>p.17</u> <u>0</u>
				2 0	Down		<u>p.17</u> <u>0</u>
				2 2	U/D Clear		<u>p.17</u> <u>0</u>
				2 3	Analog Hold		<u>p.10</u> <u>8</u>
				2 4	I-Term Clear		<u>p.17</u> <u>9</u>
				2 5	PID Openloop		<u>p.17</u> <u>9</u>
				2 6	PID Gain2		<u>p.17</u> <u>9</u>
				2 7	PID Ref Change		<u>p.13</u> <u>1</u>
				2 8	2nd Motor		<u>p.27</u> <u>4</u>
				2 9	Interlock 1		<u>p.30</u> <u>8</u>
				3	Interlock 2		<u>p.30</u>

Table of Functions

Cod e	Comm. Addres s	Name	LCD Display	Setting Range	Initial Value	Propert y*	Ref.
				0			<u>8</u>
				3 1	Interlock 3		<u>p.30</u> <u>8</u>
				3 2	Interlock 4		<u>p.30</u> <u>8</u>
				3 3	Interlock 5		<u>p.30</u> <u>8</u>
				3 4	Pre Excite		<u>-</u>
				3 5	Timer In		<u>p.29</u> <u>1</u>
				3 7	dis Aux Ref		<u>p.16</u> <u>1</u>
				3 8	FWD JOG		<u>p.16</u> <u>2</u>
				3 9	REV JOG		<u>p.16</u> <u>2</u>
				4 0	Fire Mode		<u>p.26</u> <u>2</u>
				4 1	EPID1 Run		<u>p.20</u> <u>1</u>
				4 2	EPID1 ItemClr		<u>p.20</u> <u>1</u>
				4 3	Time Event En		<u>p.24</u> <u>3</u>
				4 4	Pre Heat		<u>p.23</u> <u>6</u>
				4 5	Damper Open		<u>p.21</u> <u>1</u>
				4	PumpClea		<u>p.21</u>

Function
Table

Table of Functions

Cod e	Comm. Addres s	Name	LCD Display	Setting Range		Initial Value	Propert y*	Ref.
				6	n			<u>9</u>
				4 7	EPID2 Run			<u>p.20</u> <u>1</u>
				4 8	EPID2 ItermClr			<u>p.20</u> <u>1</u>
				4 9	Sleep Wake Chg			<u>p.20</u> <u>1</u>
				5 0	PID Step Ref L			<u>p.17</u> <u>9</u>
				5 1	PID Step Ref M			<u>p.17</u> <u>9</u>
				5 2	PID Step Ref H			<u>p.17</u> <u>9</u>
85	0h1555	Multi-function input terminal On filter	DI On Delay	0–10000 (msec)		10	O	<u>p.15</u> <u>6</u>
86	0h1556	Multi-function input terminal Off filter	DI Off Delay	0–10000 (msec)		3	O	<u>p.15</u> <u>6</u>
87	0h1557	Multi-function input terminal selection	DI NC/NO Sel	P7 – P1		000 0000	Δ	<u>p.15</u> <u>6</u>
				0	A Terminal (NO)			
				1	B Terminal (NC)			
89	0h1559	Multi-step command delay time	InCheck Time	1–5000 (msec)		1	Δ	<u>p.10</u> <u>9</u>
90	0h155	Multi-function	DI Status	P7 – P1		000 0000	O	<u>p.15</u>

Table of Functions

Cod e	Comm. Address	Name	LCD Display	Setting Range		Initial Value	Property*	Ref.
	A	input terminal status		0	Contact (Off)			<u>6</u>
				1	Contact (On)			
91	0h155B	Pulse input amount display	Pulse Monitor (kHz)	0.00-50.00 (kHz)		0.00	X	<u>p.10</u> <u>5</u>
92	0h155C	TI minimum input pulse	TI Filter	0-9999 (msec)		10	O	<u>p.10</u> <u>5</u>
93	0h155D	TI minimum input pulse	TI Pls x1	0 - TI Pls x2		0.00	O	<u>p.10</u> <u>5</u>
94	0h153E	Output at TI minimum pulse (%)	TI Perc y1	0.00-100.00 (%)		0.00	O	<u>p.10</u> <u>5</u>
95	0h155F	TI maximum input pulse	TI Pls x2	TI Pls x1-32.00		32.00	O	<u>p.10</u> <u>5</u>
96	0h1560	Output at TI maximum pulse (%)	TI Perc y2	0-100 (%)		100.00	O	<u>p.10</u> <u>5</u>
97	0h1561	TI rotation direction change	TI Inverting	0	No	0: No	O	<u>p.10</u> <u>5</u>
				1	Yes			
98	0h1562	TI quantization level	TI Quantizing	0.00 ²⁷ , 0.04-10.00 (%)		0.04	O	<u>p.10</u> <u>5</u>

²⁷ Quantizing is disabled if '0' is selected.

8.6 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

Cod e	Comm. Address	Name	LCD Display	Parameter Setting		Initial Value	Property *	Ref.
00	-	Jump Code	JumpCode	1-99		30	O	<u>p.72</u>
01	0h1601	Analog output1	AO1 Mode	0	Frequency	0: Frequency	O	<u>p.317</u>
				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			
				14	EPID1 RefVal			
				15	EPID1 FdbVal			
				16	EPID2 Output			

Table of Functions

Function
Table

Code	Comm. Address	Name	LCD Display	Parameter Setting		Initial Value	Property *	Ref.
				17	EPID2 RefVal			
				18	EPID2 FdbVal			
02	0h1602	Analog output1 gain	AO1 Gain	-1000.0-1000.0 (%)		100.0	O	p.317
03	0h1603	Analog output1 bias	AO1 Bias	-100.0-100.0 (%)		0.0	O	p.317
04	0h1604	Analog output1 filter	AO1 Filter	0-10000 (msec)		5	O	p.317
05	0h1605	Analog constant output1	AO1 Const %	0.0-100.0 (%)		0.0	O	p.317
06	0h1606	Analog output1 monitor	AO1 Monitor	0.0-1000.0 (%)		0.0	X	p.317
07	0h1607	Analog output2	AO2 Mode	Identical to the OUT-02 AO1 Mode selected range		0: Frequency	O	p.317
08	0h1608	Analog output2 gain	AO2 Gain	-1000.0-1000.0 (%)		100.0	O	p.317
09	0h1609	Analog output2 bias	AO2 Bias	-100.0-100.0 (%)		0.0	O	p.317
10	0h160A	Analog output2 filter	AO2 Filter	0-10000 (msec)		5	O	p.317
11	0h160B	Analog constant	AO2 Const %	0.0-100.0 (%)		0.0	O	p.317

Table of Functions

Cod e	Comm. Address	Name	LCD Display	Parameter Setting		Initial Value	Property *	Ref.
		output2						
12	0h160C	Analog output2 monitor	AO2 Monitor	0.0-1000.0 (%)		0.0	X	p.317
30	0h161E	Fault output item	Trip OutMode	bit	000-111	010	O	p.330
				Bit 0	Low voltage			
				Bit 1	Any faults other than low voltage			
				Bit 2	Automatic restart final failure			
31	0h161F	Multi-function relay1	Relay 1	0	None	23:Trip	O	p.323
				1	FDT-1			
				2	FDT-2			
				3	FDT-3			
				4	FDT-4			
				5	Over Load			
				6	IOL			
				7	Under Load			
				8	Fan Warning			
				9	Stall			
				10	Over Voltage			
				11	Low Voltage			
				12	Over Heat			
				13	Lost Command			

Table of Functions

Cod e	Comm. Address	Name	LCD Display	Parameter Setting		Initial Value	Property *	Ref.
				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	CAPWarnin g			
				35	Fan Exchange			

Function
Table

Table of Functions

Cod e	Comm. Address	Name	LCD Display	Parameter Setting		Initial Value	Property *	Ref.
32	0h1620	Multi-function relay2	Relay 2	36	AUTO State	14: RUN	O	p.323
33	0h1621	Multi-function relay3	Relay 3	37	Hand State	0: None	O	p.323
34	0h1622	Multi-function relay4	Relay 4	38	TO	0: None	O	p.323
35	0h1623	Multi-function relay5	Relay 5	39	Except Date	0: None	O	p.323
36	0h1624	Multi-function 1 item	Q1 Define	40	KEB Operating	0: None	O	p.323
41	0h1629	Multi-function output monitor	DO Status	DO Status		000000	X	p.323
50	0h1632	Multi-function output On delay	DO On Delay	0.00-100.00 (sec)		0.00	O	p.331
51	0h1633	Multi-function output Off delay	DO Off Delay	0.00-100.00 (sec)		0.00	O	p.331
52	0h1634	Multi-function output contact selection	DO NC/NO Sel	Q1,Relay5-Relay1		000000	Δ	p.331
				0	A contact (NO)			
				1	B contact (NC)			

Table of Functions

Function
Table

Cod e	Comm. Address	Name	LCD Display	Parameter Setting		Initial Value	Property *	Ref.
53	0h1635	Fault output On delay	TripOutO nDly	0.00-100.00 (sec)		0.00	O	p.330
54	0h1636	Fault output Off delay	TripOutOf fDly	0.00-100.00 (sec)		0.00	O	p.330
55	0h1637	Timer On delay	TimerOn Delay	0.00-100.00 (sec)		0.00	O	p.290
56	0h1638	Timer Off delay	TimerOff Delay	0.00-100.00 (sec)		0.00	O	p.290
57	0h1639	Detected frequency	FDT Frequenc y	0.00-Maximum frequency (Hz)		30.00	O	p.323
58	0h163 A	Detected frequency band	FDT Band	0.00-Maximum frequency (Hz)		10.00	O	p.323
61	0h163 D	Pulse output item	TO Mode	0	Frequency	0: Frequency	O	p.320
				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			

Table of Functions

Cod e	Comm. Address	Name	LCD Display	Parameter Setting		Initial Value	Property *	Ref.
				11	PID Output			
				12	Constant			
				13	EPID1 Output			
				14	EPID1 RefVal			
				15	EPID1 FdbVal			
				16	EPID2 Output			
				17	EPID2 RefVal			
				18	EPID2 FdbVal			
62	0h163E	Pulse output gain	TO Gain	-1000.0-1000.0 (%)		100.0	O	p.320
63	0h163F	Pulse output bias	TO Bias	-100.0-100.0 (%)		0.0	O	p.320
64	0h1640	Pulse output filter	TO Filter	0-10000 (msec)		5	O	p.320
65	0h1641	Pulse output constant output 2	TO Const %	0.0-100.0 (%)		0.0	O	p.320
66	0h1642	Pulse output monitor	TO Monitor	0.0-1000.0 (%)		0.0	X	p.320

8.7 Communication Function Group (COM)

Table of Functions

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**

Cod e	Comm. Address	Name	LCD Display	Parameter Setting		Initial Value	Property *	Ref.
00	-	Jump Code	Jump Code	1-99		20	O	p.72
01	0h1701	Built-in communication inverter ID	Int485 St ID	1-250		1	O	p.377
02	0h1702	Built-in communication protocol	Int485 Proto	0	ModBus RTU	0: ModBus RTU	O	p.377
03	0h1703	Built-in communication speed	Int485 BaudR	0	1200 bps	3: 9600 bps	O	p.377
				1	2400 bps			
				2	4800 bps			
				3	9600 bps			
				4	19200 bps			
				5	38400 bps			
				6	56 Kbps			
				7	76.8 kbps			
				8	115 Kbps ²⁸			
04	0h1704	Built-in communication frame setting	Int485 Mode	0	D8/PN/S1	0: D8/PN/S1	O	p.377
				1	D8/PN/S2			
				2	D8/PE/S1			
				3	D8/PO/S1			
05	0h1705	Transmissio	Resp Delay	0-1000 (msec)		5	O	p.377

²⁸115,200 bps

Table of Functions

Cod e	Comm. Address	Name	LCD Display	Parameter Setting		Initial Value	Property *	Ref.
		n delay after reception						
06 ²⁹	0h1706	Communication option S/W version	FBus S/W Ver	-		-	O	-
07	0h1707	Communication option inverter ID	FBus ID	0-255		1	O	-
08	0h1708	FIELD BUS communication speed	FBUS BaudRate	-		12 Mbps	O	-
09	0h1709	Communication option LED status	FieldBus LED	-		-	O	-
20	0h1714	BACnet maximum master number	BAC Max Master	1~127		127	O	<u>p.421</u>
21	0h1715	BACnet device number1	BAC Dev Inst1	0~4194		237	O	<u>p.421</u>
22	0h1716	BACnet device number2	BAC Dev Inst2	0-999		0	O	<u>p.421</u>
23	0h1717	BACnet password	BAC PassWord	0-32767		0	O	<u>p.421</u>
28	0h171C	USB Protocol	USB Protocol	0	Modbus RTU	2: LS Inverter 485	O	-

²⁹COM-06~09 are displayed only when a communication option card is installed.
Please refer to the communication option manual for details.

Table of Functions

Cod e	Comm. Address	Name	LCD Display	Parameter Setting		Initial Value	Property *	Ref.
				2	LS Inv 485			
30	0h171E	Number of output parameters	ParaStatus Num	0-8		3	O	p.386
31	0h171F	Output Communica tion address1	Para Status-1	0000-FFFF Hex		000A	O	p.386
32	0h1720	Output Communica tion address2	Para Status-2	0000-FFFF Hex		000E	O	p.386
33	0h1721	Output Communica tion address3	Para Status-3	0000-FFFF Hex		000F	O	p.386
34	0h1722	Output Communica tion address4	Para Status-4	0000-FFFF Hex		0000	O	p.386
35	0h1723	Output Communica tion address5	Para Status-5	0000-FFFF Hex		0000	O	p.386
36	0h1724	Output Communica tion address6	Para Status-6	0000-FFFF Hex		0000	O	p.386
37	0h1725	Output Communica tion address7	Para Status-7	0000-FFFF Hex		0000	O	p.386
38	0h1726	Output	Para	0000-FFFF Hex		0000	O	p.386

Table of Functions

Cod e	Comm. Address	Name	LCD Display	Parameter Setting	Initial Value	Property *	Ref.
		Communica- tion address8	Status-8				
50	0h1732	Number of input parameters	Para Ctrl Num	0-8	2	O	p.386
51	0h1733	Input Communica- tion address1	Para Control-1	0000-FFFF Hex	0005	O	p.386
52	0h1734	Input Communica- tion address2	Para Control-2	0000-FFFF Hex	0006	O	p.386
53	0h1735	Input Communica- tion address3	Para Control-3	0000-FFFF Hex	0000	O	p.386
54	0h1736	Input Communica- tion address 4	Para Control-4	0000-FFFF Hex	0000	O	p.386
55	0h1737	Input Communica- tion address 5	Para Control-5	0000-FFFF Hex	0000	O	p.386
56	0h1738	Input Communica- tion address 6	Para Control-6	0000-FFFF Hex	0000	O	p.386
57	0h1739	Input Communica- tion address 7	Para Control-7	0000-FFFF Hex	0000	O	p.386

Table of Functions

Function
Table

Cod e	Comm. Address	Name	LCD Display	Parameter Setting		Initial Value	Property *	Ref.
58	0h173 A	Input Communica tion address 8	Para Control-8	0000-FFFF Hex		0000	O	p.386
70	0h1746	Communica tion multi- function input 1	Virtual DI 1	0	None	0: None	O	p.415
71	0h1747	Communica tion multi- function input 2	Virtual DI 2	1	Fx	0: None	O	p.415
72	0h1748	Communica tion multi- function input 3	Virtual DI 3	2	Rx	0: None	O	p.415
73	0h1749	Communica tion multi- function input 4	Virtual DI 4	3	RST	0: None	O	p.415
74	0h174 A	Communica tion multi- function input 5	Virtual DI 5	4	External Trip	0: None	O	p.415
75	0h174B	Communica tion multi- function input 6	Virtual DI 6	5	BX	0: None	O	p.415
76	0h174C	Communica tion multi- function input 7	Virtual DI 7	6	JOG	0: None	O	p.415
77	0h174	Communica	Virtual DI 8	7	Speed-L	0: None	O	p.415

Table of Functions

Cod e	Comm. Address	Name	LCD Display	Parameter Setting	Initial Value	Property *	Ref.
	D	tion multi- function input 8		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	2 nd source		
				18	Exchange		
				19	Up		
				20	Down		
				22	U/D Clear		
				23	Analog Hold		
				24	I-Term Clear		
				25	PID Openloop		
				26	PID Gain 2		
				27	PID Ref Change		
				28	2 nd Motor		
				29	Interlock1		
				30	Interlock2		
				31	Interlock3		
				32	Interlock4		

Table of Functions

Cod e	Comm. Address	Name	LCD Display	Parameter Setting	Initial Value	Property *	Ref.
				33 Interlock5			
				34 Pre Excite			
				35 Timer In			
				37 Dis Aux Ref			
				38 FWD JOG			
				39 REV JOG			
				40 Fire Mode			
				41 EPID1 Run			
				42 EPID1 ItemClr			
				43 Time Event En			
				44 Pre Heat			
				45 Damper Open			
				46 Pump Clean			
				47 EPID2 Run			
				48 EPID2 ItemClr			
				49 Sleep Wake Chg			
				50 PID Step Ref L			
				51 PID Step Ref M			
				52 PID Step Ref H			
86	0h1756	Communica	Virt DI	-	0	Δ	<u>p.382</u>

Function
Table

Table of Functions

Cod e	Comm. Address	Name	LCD Display	Parameter Setting		Initial Value	Property *	Ref.
		tion multi-function input monitoring	Status					
94	-	Communica tion option parameter setting update	Comm Update	0	No	0.No	Δ	=
				1	Yes			
96	0h173C	Communica tion operation auto resume	PowerOn Resume	0	No	0: No	Δ	<u>p.337</u>

8.8 Advanced Function Group(PID Functions)

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

Unit MAX = PID Unit100%(PID-68)

Unit Min = (2xPID Unit 0%(PID-67)-PID Unit 100%)

Unit Default = (PID Unit 100%-PID Unit 0%)/2

Unit Band = Unit 100%-Unit 0%

***O /X: Write-enabled during operation,Δ: Writing available when operation stops**

Cod e	Comm. Address	Name	LCD Display	Parameter Setting		Initial Value	Property *	Ref.
00	-	Jump Code	Jump Code	1-99		50	O	<u>p.72</u>
01	0h1801	PID mode	PID Sel	0	No	0: No	Δ	<u>p.179</u>

Table of Functions

Function
Table

Cod e	Comm. Address	Name	LCD Display	Parameter Setting		Initial Value	Property *	Ref.
02	0h1802	selection	E-PID Sel	1	Yes	0: No	O	p.201
		E-PID selection		0	No			
				1	Yes			
03	0h1803	PID output monitor	PID Output	-		-	X	p.179
04	0h1804	PID reference monitor	PID Ref Value	-		-	X	p.179
05	0h1805	PID feedback monitor	PID Fdb Value	-		-	X	p.179
06	0h1806	PID error monitor value	PID Err Value	-		-	X	p.179
10	0h180A	PID reference 1 source selection	PID Ref 1 Src	0	KeyPad	0: Keypad	Δ	p.179
				1	V1			
				3	V2			
				4	I2			
				5	Int485			
				6	Fieldbus			
				8	Pulse			
				9	EPID1 Output			
11	0h180B	PID reference 1 keypad value	PID Ref 1 Set	Unit Min–Unit Max		Unit Default	O	p.179
12	0h180C	PID reference 1 auxiliary source selection	PIDRef1AuxSrc	0	None	0: None	Δ	p.179
				1	V1			
				3	V2			
				4	I2			
				6	Pulse			

Table of Functions

Cod e	Comm. Address	Name	LCD Display	Parameter Setting		Initial Value	Property *	Ref.
13	0h180D	PID reference 1 auxiliary mode selection	PID Ref1AuxMod	7	Int 485			
				8	FieldBus			
				10	EPID1 Output			
				11	E-PID Fdb Val			
				0	$M+(G \cdot A)$	0: $M+(G \cdot A)$	O	p.179
				1	$M \cdot (G \cdot A)$			
				2	$M/(G \cdot A)$			
				3	$M+(M \cdot (G \cdot A))$			
				4	$M+G \cdot 2 \cdot (A-50)$			
				5	$M \cdot (G \cdot 2 \cdot (A-50))$			
				6	$M/(G \cdot 2 \cdot (A-50))$			
				7	$M+M \cdot G \cdot 2 \cdot (A-50)$			
				8	$(M-A)^2$			
				9	M^2+A^2			
				10	$\text{MAX}(M,A)$			
				11	$\text{MIN}(M,A)$			
				12	$(M+A)/2$			
				13	$\text{Root}(M+A)$			
14	0h180E	PID reference auxiliary gain	PID Ref1 Aux G	-200.0–200.0 (%)		0.0	O	p.179
15	0h180F	PID reference 2 auxiliary	PID Ref 2 Src	0	Keypad	0: Keypad	Δ	p.179
				1	V1			

Table of Functions

Function
Table

Cod e	Comm. Address	Name	LCD Display	Parameter Setting		Initial Value	Property *	Ref.
		source selection		3	V2			
				4	I2			
				5	Int 485			
				6	Fieldbus			
				8	Pulse			
				9	E-PID Output			
16	0h1810	PID reference 2 keypad setting	PID Ref 2 Set	Unit Min–Unit Max		Unit Default	O	p.179
17	0h1811	PID reference 2 auxiliary source selection	PID Ref2AuxSrc	0	None	0: None	Δ	p.179
				1	V1			
				3	V2			
				4	I2			
				6	Pulse			
				7	Int 485			
				8	FieldBus			
				10	EPID1 Output			
18	0h1812	PID reference 2 auxiliary mode selection	PID Ref2AuxM od	0	$M+(G \cdot A)$	0: $M+(G \cdot A)$	O	p.179
				1	$M \cdot (G \cdot A)$			
				2	$M/(G \cdot A)$			
				3	$M+(M \cdot (G \cdot A))$			
				4	$M+G \cdot 2 \cdot (A-50)$			

Table of Functions

Cod e	Comm. Address	Name	LCD Display	Parameter Setting		Initial Value	Property *	Ref.
				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	$Root(M+A)$			
19	0h1813	PID reference 2 auxiliary gain	PID Ref2 Aux G	-200.0–200.0 (%)		0.0	O	p.179
20	0h1814	PID feedback selection	PIDFdb Source	0	V1	0: V1	Δ	p.179
				2	V2			
				3	I2			
				4	Int 485			
				5	FieldBus			
				7	Pulse			
				8	EPID1 Output			
				9	EPID1 Fdb Val			
21	0h1815	PID feedback auxiliary source selection	PID Fdb Aux Src	0	None	0: None	Δ	p.179
				1	V1			
				3	V2			
				4	I2			

Table of Functions

Cod e	Comm. Address	Name	LCD Display	Parameter Setting		Initial Value	Property *	Ref.
				6	Pulse			
				7	Int 485			
				8	FieldBus			
				10	EPID1 Output			
				11	EPID1 Fdb Val			
22	0h1816	PID feedback auxiliary mode selection	PID FdbAuxMod	0	$M+(G \cdot A)$	0: $M+(G \cdot A)$	O	p.179
				1	$M \cdot (G \cdot A)$			
				2	$M / (G \cdot A)$			
				3	$M + (M \cdot (G \cdot A))$			
				4	$M + G \cdot 2 \cdot (A - 50)$			
				5	$M \cdot (G \cdot 2 \cdot (A - 50))$			
				6	$M / (G \cdot 2 \cdot (A - 50))$			
				7	$M + M \cdot G \cdot 2 \cdot (A - 50)$			
				8	$(M - A)^2$			
				9	$M^2 + A^2$			
				10	$\text{MAX}(M, A)$			
				11	$\text{MIN}(M, A)$			
				12	$(M + A) / 2$			
				13	$\text{Root}(M + A)$			
23	0h1817	PID feedback auxiliary gain	PID Fdb Aux G	-200.0–200.0 (%)		0.0	O	p.179
24	0h1818	PID feedback	PID Fdb	0–Unit Band		0.00	O	p.179

Table of Functions

Cod e	Comm. Address	Name	LCD Display	Parameter Setting	Initial Value	Property *	Ref.
		band	Band				
25	0h1819	PID controller proportional gain 1	PID P-Gain 1	0.00–300.00 (%)	50.00	O	<u>p.179</u>
26	0h181A	PID controller integral time 1	PID I-Time 1	0.0–200.0 (sec)	10.0	O	<u>p.179</u>
27	0h181B	PID controller differential time 1	PID D-Time 1	0.00–1.00 (sec)	0.00	O	<u>p.179</u>
28	0h181C	PID controller feed forward gain	PID FF-Gain	0.0–1000.0 (%)	0.0	O	<u>p.179</u>
29	0h181D	PID output filter	PID Out LPF	0.00–10.00 (sec)	0.00	O	<u>p.179</u>
30	0h181E	PID output upper limit	PID Limit Hi	PID Limit Lo–100.00	100.00	O	<u>p.179</u>
31	0h181F	PID output lower limit	PID Limit Lo	-100.00–PID Limit Hi	0.00	O	<u>p.179</u>
32	0h1820	PID controller proportional gain 2	PID P-Gain 2	0.00–300.00 (%)	50.0	O	<u>p.179</u>
33	0h1821	PID controller integral time 2	PID I-Time 2	0.0–200.0 (sec)	10.0	O	<u>p.179</u>
34	0h1822	PID controller differential	PID D-Time 2	0.00–1.00 (sec)	0.00	O	<u>p.179</u>

Table of Functions

Cod e	Comm. Address	Name	LCD Display	Parameter Setting		Initial Value	Property *	Ref.
35	0h1823	PID output mode	PID Out Mode			0: PID Output	O	<u>p.179</u>
				0	PID Output			
				1	PID+ Main Freq			
				2	PID+EPID1 Out			
				3	PID+EPID1+ Main			
36	0h1824	PID output inverse	PID Out Inv	0	No	0: No	Δ	<u>p.179</u>
				1	Yes			
37	0h1825	PID output scale	PID Out Scale	0.1–1000.0 (%)		100.0	Δ	<u>p.179</u>
40	0h1828	PID multi-step reference setting 1	PID Step Ref 1	Unit Min–Unit Max		Unit Default	O	<u>p.179</u>
41	0h1829	PID multi-step reference setting 2	PID Step Ref 2	Unit Min–Unit Max		Unit Default	O	<u>p.179</u>
42	0h182A	PID multi-step reference setting 3	PID Step Ref 3	Unit Min–Unit Max		Unit Default	O	<u>p.179</u>
43	0h182B	PID multi-step reference setting 4	PID Step Ref 4	Unit Min–Unit Max		Unit Default	O	<u>p.179</u>
44	0h182C	PID multi-step reference setting 5	PID Step Ref 5	Unit Min–Unit Max		Unit Default	O	<u>p.179</u>

Function
Table

Table of Functions

Cod e	Comm. Address	Name	LCD Display	Parameter Setting	Initial Value	Property *	Ref.
45	0h182D	PID multi-step reference setting 6	PID Step Ref 6	Unit Min–Unit Max	Unit Default	O	p.179
46	0h182E	PID multi-step reference setting 7	PID Step Ref 7	Unit Min–Unit Max	Unit Default	O	p.179
50	0h1832	PID controller unit selection	PID Unit Sel	Refer to the Unit List	1: %	O	p.179
				0 CUST			
				1 %			
				2 PSI			
				3 °F			
				4 °C			
				5 inWC			
				6 inM			
				7 mBar			
				8 Bar			
				9 Pa			
				10 kPa			
				11 Hz			
				12 RPM			
				13 V			
				14 A			
				15 kW			
				16 HP			
				17 mpm			

Table of Functions

Function
Table

Cod e	Comm. Address	Name	LCD Display	Parameter Setting	Initial Value	Property *	Ref.
				18 ft			
				19 m/s			
				20 m3/s(m3/S)			
				21 m3/m(m3/ min)			
				22 m 3/h(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 (ft3/Sec)			
				34 f3/m (ft3/Min)			
				35 f3/h (ft3/Hour)			
				36 lb/s			
				37 lb/m			
				38 lb/h			
				39 ppm			
				40 pps			

Table of Functions

Cod e	Comm. Address	Name	LCD Display	Parameter Setting		Initial Value	Property *	Ref.
51	0h1833	PID unit scale	PID Unit Scale	0	x100	2: x 1	O	<u>p.179</u>
				1	x10			
				2	x1			
				3	x 0.1			
				4	x0.01			
52	0h1834	PID control 0% setting figure	PID Unit 0%	X100	-30000–Unit Max	Range varies depending on PID-50 setting	O	<u>p.179</u>
				X10	- 3000.0–Unit Max			
				X1	-300.00–Unit Max			
				X0.1	- 30.000–Unit Max			
				X0.01	-3.0000–Unit Max			
53	0h1835	PID control 100% setting figure	PID Unit 100%	X100	Unit Min–30000	Range differs depending on PID-50 setting	O	<u>p.179</u>
				X10	Unit Min–3000.0			
				X1	Unit Min–300.00			
				X0.1	Unit Min–30.000			
				X0.01	Unit Min–3.0000			

Table of Functions

8.9 EPID Function Group (EPID)³⁰

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

Unit MAX = EPID1 (EPID2) Unit 100%

Unit Min = (2xEPID1 (EPID2) Unit0%-EPID1 (EPID2) Unit100%)

Unit Default = (EPID1 (EPID2) Unit 100%-EPID1 (EPID2) Unit 0%)/2

***O/X : Write-enabled during operation, Δ: Writing available when operation stops**

Code	Comm. Address	Name	LCD Display	Setting Range		Initial Value	Property*	Ref.
00	-	Jump Code	Jump Code	1-99		1	O	p.72
01	0h1901	EPID 1 Mode Selection	EPID1 Mode	0	None	0: None	O	p.201
				1	Always ON			
				2	During Run			
				3	DI dependent			
02 ³¹	0h1902	EPID1output monitor value	EPID1 Output	-100.00-100.00%		0.00	X	p.201
03	0h1903	EPID1 standard	EPID1 Ref Val	-		-	X	p.201
04	0h1904	EPID1 feedback monitor value	EPID1 Fdb Val	-		-	X	p.201

³⁰ EPID Group is displayed when PID-02 code is set to 'Yes'.

³¹EPID-02-20 are displayed when EPID-01 code is not '0 (None)'.

Table of Functions

Cod e	Comm. Address	Name	LCD Display	Setting Range		Initial Value	Propert y*	Ref.
05	0h1905	EPID1error monitor value	EPID1 Err Val	-		-	X	<u>p.201</u>
06	0h1906	EPID1 command source selection	EPID1 Ref Src	0	Keypa	0: KeyPad	Δ	<u>p.201</u>
				1	V1			
				3	V2			
				4	I2			
				5	Int 485			
				6	FieldB			
				8	Pulse			
07	0h1907	EPID1 keypad command	EPID1 Ref Set	Unit Min–Unit Max		Unit Min	O	<u>p.201</u>
08	0h1908	EPID1 feedback source selection	EPID1 FdbSrc	0	V1	0: V1	O	<u>p.201</u>
				2	V2			
				3	I2			
				4	Int485			
				5	FieldB			
				7	Pulse			
09	0h1909	EPID1 proportional gain	EPID1 P-Gain	0.00–300.00 (%)		50.00	O	<u>p.201</u>
10	0h190A	EPID1 integral time	EPID1 I-Time	0.0–200.0 (sec)		10.0	O	<u>p.201</u>
11	0h190B	EPID1 differentiation time	EPID1 D-Time	0.00–1.00 (sec)		0.00	O	<u>p.201</u>
12	0h190C	EPID1 feed-forward gain	EPID1 FF-Gain	0.0–1000.0 (%)		0.0	O	<u>p.201</u>
13	0h190D	EPID1 output filter	EPID1 Out LPF	0.00–10.00 (sec)		0.00	O	<u>p.201</u>

Function Table

Table of Functions

Cod e	Comm. Address	Name	LCD Display	Setting Range		Initial Value	Propert y*	Ref.
14	0h190E	EPID1 output upper limit	EPID1 Limit Hi	EPID1 Limit Lo–100.00		100.00	O	p.201
15	0h190F	EPID1 lower limit	EPID1 Limit Lo	-100.00–EPID1 Limit Hi		0.00	O	p.201
16	0h1910	EPID1 output inverse	EPID1 Out Inv	0	No	0: No	O	p.201
				1	Yes			
17	0h1911	EPID1 unit	EPID1 Unit Sel	Refer to the EPID Unit details table (p.201)		1: %	O	p.201
18	0h1912	EPID1 unit scale	EPID1 Unit Scl	0	X100	2: X1	O	p.201
				1	X10			
				2	X1			
				3	X0.1			
				4	X0.01			
19	0h1913	EPID1 unit 0% value	EPID1 Unit0%	X100	- 30000	Values vary depending on the unit setting	O	p.201
				X10	- 3000.0			
				X1	- 300.00			
				X0.1	- 30.000			
				X0.01	- 3.0000			
20	0h1914	EPID1 unit 100% value	EPID1 Unit100%	X100	Unit Min–	Values vary depending on the unit setting	O	p.201
				X10	Unit Min–			
				X1	Unit Min–			

Table of Functions

Function
Table

Code	Comm. Address	Name	LCD Display	Setting Range		Initial Value	Property*	Ref.
				X0.1	Unit Min–			
31	0h191F	EPID2 Mode selection	EPID2 Mode	X0.01	Unit Min–	0: None	O	p.201
				0	None			
				1	Always ON			
				2	During Run			
32 ³²	0h1920	EPID2 output monitor value	EPID2 Output	3	DI dependent	0.00	X	p.201
				-100.00–100.00%				
33	0h1921	EPID2 reference monitor value	EPID2 Ref Val	-		-	X	p.201
34	0h1922	EPID2 feedback monitor value	EPID2 Fdb Val	-		-	X	p.201
35	0h1923	EPID2 error monitor value	EPID2 Err Val	-		-	X	p.201
36	0h1924	EPID2 command source selection	EPID2 Ref Src	0	Keypad	0: Keypad	Δ	p.201
				1	V1			
				3	V2			
				4	I2			
				5	Int 485			

³²EPID-32–50 are displayed when EPID-31 code is not '0 (None)'.

Table of Functions

Cod e	Comm. Address	Name	LCD Display	Setting Range		Initial Value	Propert y*	Ref.
				6	FieldB			
				8	Pulse			
37	0h1925	EPID2 keypad command	EPID2 Ref Set	Unit Min–Unit Max		Unit Min	O	p.201
38	0h1926	EPID2 feedback source selection	EPID2 FdbSrc	0	V1	0: V1	O	p.201
				2	V2			
				3	I2			
				4	Int 485			
				5	FieldB			
				7	Pulse			
39	0h1927	EPID2 proportional gain	EPID2 P-Gain	0.0–300.0 (%)		50.0	O	p.201
40	0h1928	EPID2 integral time	EPID2 I-Time	0.0–200.0 (sec)		10.0	O	p.201
41	0h1929	EPID2 differentiation time	EPID2 D-Time	0.00–1.00 (sec)		0.00	O	p.201
42	0h192A	EPID2 feed-forward gain	EPID2 FF-Gain	0.0–1000.0 (%)		0.0	O	p.201
43	0h192B	EPID2 output filter	EPID2 Out LPF	0.00–10.00 (sec)		0.00	O	p.201
44	0h192C	EPID2 output upper limit	EPID2 Limit Hi	EPID2 Limit Lo–100.00		100.00	O	p.201
45	0h192D	EPID2 output lower limit	EPID2 Limit Lo	-100.00–EPID2 Limit Hi		0.00	O	p.201
46	0h192E	EPID2 output inverse	EPID2 Out Inv	0	No	0: No	O	p.201
				1	Yes			
47	0h192F	EPID2 unit	EPID2 Unit Sel	Refer to EPID Unit details table		0: CUST	O	p.201

Table of Functions

Function
Table

Cod e	Comm. Address	Name	LCD Display	Setting Range		Initial Value	Propert y*	Ref.
48	0h1930	EPID2 unit scale	EPID2 Unit Scl	(p.201)		2: X1	O	<u>p.201</u>
				0	X100			
				1	X10			
				2	X1			
				3	X0.1			
				4	X0.01			
49	0h1931	EPID2 unit 0% value	EPID2 Unit0%	X100	- 30000	Values vary depending on the unit setting	O	<u>p.201</u>
				X10	- 3000.0			
				X1	- 300.00			
				X0.1	- 30.000			
				X0.01	- 3.0000			
50	0h1932	EPID2 unit 0% value	EPID2 Unit100%	X100	Unit Min- 30000	Values vary depending on the unit setting	O	<u>p.201</u>
				X10	Unit Min- 3000.0			
				X1	Unit Min- 300.00			
				X0.1	Unit Min- 30.000			
				X0.01	Unit Min- 3.0000			

Table of Functions

8.10 Application 1 Function Group (AP1)

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

Unit MAX = PID Unit 100%

Unit Min = (2xPID Unit 0%-PID Unit 100%)

Unit Default = (PID Unit 100%-PID Unit 0%)/2

Unit Band = Unit 100%-Unit 0%

***O/X: Write-enabled during operation, Δ: Writing available when operation stops**

Code	Comm. Address	Name	LCD Display	Setting Range	Initial Value	Property *	Ref.
00	-	Jump Code	Jump Code	1-99	20	O	p.72
05	0h1A05	Sleep boost amount	Sleep Bst Set	0.00-Unit Max	0.00	O	p.196
06	0h1A06	Sleep boost speed	Sleep BstFreq	0.00, Low Freq-High Freq	60.00	O	p.196
07	0h1A07	PID sleep mode 1 delay time	PID Sleep 1 DT	0.0-6000.0 (sec)	20.0	O	p.196
08	0h1A08	PID sleep mode 1 frequency	PID Sleep1Freq	0.00, Low Freq-High Freq	0.00	O	p.196
09	0h1A09	PID wakeup 1 delay time	PID WakeUp1 DT	0.0-6000.0 (sec)	20.0	O	p.196
10	0h1A0A	PID wakeup 1 value	PID WakeUp1 Dev	0.00-Unit Band	20.00	O	p.196
11	0h1A0B	PID sleep mode 2 delay time	PID Sleep 2 DT	0.0-6000.0 (sec)	20.0	O	p.196
12	0h1A0C	PID sleep mode 2	PID Sleep2Freq	0.00, Low Freq-High Freq	0.00	O	p.196

Table of Functions

Function
Table

Cod e	Comm. Address	Name	LCD Display	Setting Range		Initial Value	Property *	Ref.
		frequency	q					
13	0h1A0D	PID wakeup 2 delay time	PID WakeUp2 DT	0.0–6000.0 (sec)		20.0	O	p.196
14	0h1A0E	PID wakeup 2 value	PID WakeUp2 Dev	0.00–Unit Band		20.00	O	p.196
20	0h1A14	Soft Fill function options	Soft Fill Sel	0	No	0: No	O	p.195
				1	Yes			
21	0h1A15	Pre- PID operation frequency	Pre-PID Freq	Low Freq– High Freq		30.00	O	p.195
22	0h1A16	Pre- PID delay time	Pre-PID Delay	0.0–600.0 (sec)		60.0	O	p.195
23	0h1A17	Soft Fill escape value	Soft Fill Set	Unit Min–Unit Max		20.00	O	p.195
24	0h1A18	Soft Fill reference increasing value	Fill Step Set	0.00–Unit Band		2.00	O	p.195
25	0h1A19	Soft Fill reference increasing cycle	Fill Step Time	0–9999 (sec)		20	O	p.195
26	0h1A1A	Soft Fill changing amount	Fill Fdb Diff	0.00–Unit Band		0.00	O	p.195
30	0h1A1E	Flow Comp function options	Flow Comp Sel	0	No	0: No	O	p.212
				1	Yes			

Table of Functions

Cod e	Comm. Address	Name	LCD Display	Setting Range		Initial Value	Property *	Ref.
31	0h1A1F	Max Comp amount	Max Comp Value	0.00–Unit Band		0.00	O	p.212
40 ³³	0h1A28	MMC option selection	MMC Sel	0	No	0: No	Δ	p.293
				1	Yes			
41 ³⁴	0h1A29	Bypass selection	Regul Bypass	0	No	0: No	Δ	p.38
				1	Yes			
42	0h1A2A	Number of auxiliary motors	Num of Aux	1–5		5	Δ	p.293
43	0h1A2B	Select starting auxiliary motor	Starting Aux	1–5		1	Δ	p.293
44	0h1A2C	Display the number of running auxiliary motors	Aux Motor Run	-		-	X	p.293
45	0h1A2D	Display auxiliary motors 1– 4 priority	Aux Priority 1	-		-	X	p.293
46	0h1A2E	Display auxiliary motors 5– 8 priority	Aux Priority 2	-		-	X	p.293
48	0h1A30	Auxiliary	Aux All	0	No	1: Yes	O	p.293

³³ Set PID-1 to 'YES' to configure AP1-40.

³⁴ Set AP1-40 to 'YES' to configure AP1-41.

Table of Functions

Cod e	Comm. Address	Name	LCD Display	Setting Range		Initial Value	Property *	Ref.
49	0h1A31	motor options for	Stop	1	Yes	0: FILO	Δ	<u>p.293</u>
		Auxiliary motor stop order.	FIFO/FILO	0	FILO			
				1	FIFO			
50	0h1A32	Auxiliary motors pressure difference	Actual Pr Diff	0–100 (%)		2	O	<u>p.293</u>
51	0h1A33	Main motor acceleration time when the number of auxiliary motors is reduced	Aux Acc Time	0.0–600.0 (sec)		2.0	O	<u>p.293</u>
52	0h1A34	Main motor acceleration time when the number of auxiliary motors is increased	Aux Dec Time	0.0–600.0 (sec)		2.0	O	<u>p.293</u>
53	0h1A35	Auxiliary motors start delay time	Aux Start DT	0.0–3600.0 (sec)		60.0	O	<u>p.293</u>
54	0h1A36	Auxiliary motors stop delay time	Aux Stop DT	0.0–3600.0 (sec)		60.0	O	<u>p.293</u>
55	0h1A37	Auto change mode selection	Auto Ch Mode	0	None	1: AUX Exchange	Δ	<u>p.293</u>
				1	AUX Exchange			

Function
Table

Table of Functions

Cod e	Comm. Address	Name	LCD Display	Setting Range		Initial Value	Property *	Ref.
				2	Main Exchange			
56	0h1A38	Auto change time	Auto Ch Time	00: 00–99: 00		72: 00	O	p.293
57	0h1A39	Auto change frequency	Auto Ch Level	Low Freq–High Freq		20.00	O	p.293
58	0h1A3A	Auto change operation time	Auto Op Time	-		-	X	p.293
61	0h1A3D	#1 auxiliary motor start frequency	Start Freq 1	Freq Low Limit–Freq High limit (Hz)		45.00	O	p.293
62	0h1A3E	#2 auxiliary motor start frequency	Start Freq 2	Low Freq–High Freq		45.00	O	p.293
63	0h1A3F	#3 auxiliary motor start frequency	Start Freq 3	Low Freq–High Freq		45.00	O	p.293
64	0h1A40	#4 auxiliary motor start frequency	Start Freq 4	Low Freq–High Freq		45.00	O	p.293
65	0h1A41	#5 auxiliary motor start frequency	Start Freq 5	Low Freq–High Freq		45.00	O	p.293
70	0h1A46	#1 auxiliary motor stop frequency	Stop Freq 1	Low Freq–High Freq		20.00	O	p.293
71	0h1A47	#2 auxiliary motor stop frequency	Stop Freq 2	Low Freq–High Freq		20.00	O	p.293
72	0h1A48	#3 auxiliary motor stop	Stop Freq 3	Low Freq–High Freq		20.00	O	p.293

Table of Functions

Cod e	Comm. Address	Name	LCD Display	Setting Range		Initial Value	Property *	Ref.
		frequency						
73	0h1A49	#4 auxiliary motor stop frequency	Stop Freq 4	Low Freq–High Freq		20.00	O	<u>p.293</u>
74	0h1A4A	#5 auxiliary motor stop frequency	Stop Freq 5	Low Freq–High Freq		20.00	O	<u>p.293</u>
80	0h1A50	#1 auxiliary motor's reference compensatio	Aux1 Ref Comp	0.00–Unit Band		0.00	O	<u>p.293</u>
81	0h1A51	#2 auxiliary motor reference	Aux2 Ref Comp	0.00–Unit Band		0.00	O	<u>p.293</u>
82	0h1A52	#3 auxiliary motor reference compensatio	Aux3 Ref Comp	0.00–Unit Band		0.00	O	<u>p.293</u>
83	0h1A53	#4 auxiliary motor reference compensatio	Aux4 Ref Comp	0.00–Unit Band		0.00	O	<u>p.293</u>
84	0h1A54	#5 auxiliary motor reference compensatio	Aux5 Ref Comp	0.00–Unit Band		0.00	O	<u>p.293</u>
90	0h1A5A	Interlock selection	Interlock	0	NO	0: No	O	<u>p.308</u>
				1	YES			

Function
Table

Table of Functions

Cod e	Comm. Address	Name	LCD Display	Setting Range	Initial Value	Property *	Ref.
91	0h1A5B	Delay time before next motor operates when an interlock or an auto change on the main	Interlock DT	0.1–360.0 (Sec)	5.0	O	p.308

8.11 Application 2 Function Group (AP2)

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

***O/X: Write-enabled during operation, Δ: Writing available when operation stops**

Cod e	Comm. Address	Name	LCD Display	Setting Range	Initial Value	Property *	Ref.
00	-	Jump Code	Jump Code	1–99	40	O	p.72
01 ³⁵	0h1B01	Load curve Tuning	Load Tune	0 No	No	Δ	p.228
				1 Yes			
02	0h1B02	Low Freq load curve	Load Fit Lfreq	Base Freq*15%–Load Fit HFreq	30.00	Δ	p.228
03	0h1B03	Low Freq current	Load Fit LCurr	0.0–80.0 (%)	40.0	Δ	p.228
04	0h1B04	Low Freq power total	Load Fit LPwr	0.0–80.0 (%)	30.0	Δ	p.228

³⁵ Set the operation mode to AUTO to configure AP2-01.

Table of Functions

Cod e	Comm. Address	Name	LCD Display	Setting Range		Initial Value	Property *	Ref.
08	0h1B08	High Freq load curve	Load Fit Hfreq	Load Fit LFreq–HighFreq		51.00	Δ	p.228
09	0h1B09	High Freq current.	Load Fit HCurr	Load Fit LCurr – 200.0 (%)		80.0	Δ	p.228
10	0h1B0A	High Freq total power	Load Fit HPwr	Load Fit LPwr – 200.0 (%)		80.0	Δ	p.228
11	0h1B0B	Current load curve	Load Curve Cur	-		-	X	p.228
12	0h1B0C	Power load curve	Load Curve Pwr	-		-	X	p.228
15	0h1B0F	Pump clean setting1	Pump Clean Mode1	0	None	0: None	O	p.219
				1	DI			
				2	Output			
				3	Output Current			
16	0h1B10	Pump clean setting2	Pump Clean Mode2	0	None	0: None	Δ	p.219
				1	Start			
				2	Stop			
				3	Start and Stop			
17	0h1B11	Pump clean load setting	PC Curve Rate	0.1–200.0 (%)		100.0	O	p.219
18	0h1B12	Pump clean reference band	PC Curve Band	0.0–100.0 (%)		5.0	O	p.219
19	0h1B13	Pump clean operation delay time	PC Curve DT	0.0–6000.0 (sec)		60.0	O	p.219
20	0h1B14	Pump clean start delay time	PC Start DT	0.0–6000.0 (sec)		10.0	O	p.219

Table of Functions

Cod e	Comm. Address	Name	LCD Display	Setting Range	Initial Value	Property *	Ref.
21	0h1B15	0 speed operating time at Fx/Rx switching	PC Step DT	0.1–6000.0 (sec)	5.0	O	<u>p.21</u> <u>9</u>
22	0h1B16	Pump clean Acc time	PC Acc Time	0.0–600.0 (sec)	10.0	O	<u>p.21</u> <u>9</u>
23	0h1B17	Pump clean Dec time	PC Dec Time	0.0–600.0 (sec)	10.0	O	<u>p.21</u> <u>9</u>
24	0h1B18	Forward step maintaining time	FwdSteady Time	1.0–6000.0 (sec)	10.0	O	<u>p.21</u> <u>9</u>
25	0h1B19	Forward step maintaining frequency	FwdSteady Freq	0.00, Low Freq–High Freq	30.00	O	<u>p.21</u> <u>9</u>
26	0h1B1A	Reverse step running time	Rev SteadyTime	0.0–6000.0 (sec)	10.0	O	<u>p.21</u> <u>9</u>
27	0h1B1B	Reverse step running frequency	Rev SteadyFreq	0.00, Low Freq–High Freq	30.00	O	<u>p.21</u> <u>9</u>
28	0h1B1C	Pump clean number of Fx/Rx steps	PC Num of Steps	0–10	2	O	<u>p.21</u> <u>9</u>
29	0h1B1D	Pump clean function cycle monitoring	Repeat Num Mon	-	-	X	<u>p.21</u> <u>9</u>
30	0h1B1E	Number of pump clean repetitions	Repeat Num Set	0–10	2	O	<u>p.21</u> <u>9</u>
31	0h1B1F	Operation after pump clean end	PC End Mode	0 Stop 1 Run	0:Stop	Δ	<u>p.21</u> <u>9</u>
32	0h1B20	Pump clean	PC Limit	6–60 (min)	10	O	<u>p.21</u>

Table of Functions

Cod e	Comm. Address	Name	LCD Display	Setting Range		Initial Value	Property *	Ref.
		continuous limit time	Time					<u>9</u>
33	0h1B21	Pump clean continuous limit numbers	PC Limit Num	0–10		3	O	<u>p.21</u> <u>9</u>
38	0h1B26	Dec Valve operation frequency	Dec Valve Freq	Low Freq– High Freq		40.00	O	<u>p.22</u> <u>5</u>
39	0h1B27	Dev Valve Dec time	Dev Valve Time	0.0–6000.0 (sec)		0.0	O	<u>p.22</u> <u>5</u>
40	0h1B28	Start and End ramp settings	Start&End Ramp	0	No	0: No	Δ	<u>p.22</u> <u>4</u>
				1	Yes			
41	0h1B29	Start Ramp Acc time	Start Ramp Acc	0.0–600.0 (sec)		10.0	O	<u>p.22</u> <u>4</u>
42	0h1B2A	End Ramp Dec time	End Ramp Dec	0.0–600.0 (sec)		10.0	O	<u>p.22</u> <u>4</u>
45	0h1B2D	Damper check time	Damper DT	0.0 – 600.0 (sec)		0.0	O	<u>p.21</u> <u>1</u>
46	0h1B2E	Lubrication operation time	Lub Op Time	0.0–600.0 (sec)		5.0	O	<u>p.21</u> <u>4</u>
48 ³⁶	0h1B30	Pre heat level	Pre Heat Level	1–100 (%)		20	O	<u>p.23</u> <u>6</u>
49	0h1B31	Pre-heat duty	Pre-Heat Duty	1–100 (%)		30	O	<u>p.23</u> <u>6</u>
50	0h1B32	DC input delay time	DC Inj Delay T	0.0–600.0 (sec)		60.0	O	<u>p.23</u> <u>6</u>

³⁶ AP2-48–49 are displayed when IN-65–71 is set to 'Pre-Heat'.

Table of Functions

Cod e	Comm. Address	Name	LCD Display	Setting Range	Initial Value	Property *	Ref.
87	0h1B57	#1 Motor average power	M1 AVG PWR	0.1–90 (kW)	-	O	<u>p.21</u> Z
88	0h1B58	#2 Motor average power	M2 AVG PWR	0.1–90 (kW)	-	O	<u>p.21</u> Z
89	0h1B59	Cost per kWh	Cost per kWh	0.0–1000.0	0.0	O	<u>p.21</u> Z
90	0h1B5A	Saved kWh	Saved kWh	-	0.0	X	<u>p.21</u> Z
91	0h1B5B	Saved MWh	Saved MWh	-	0	X	<u>p.21</u> Z
92	0h1B5C	Saved Cost below 1000 unit	Saved Cost1	-	0.0	X	<u>p.21</u> Z
93	0h1B5D	Saved Cost over 1000 unit	Saved Cost2	-	0	X	<u>p.21</u> Z
94	0h1B5E	Saved CO2 conversion Factor	CO2 Factor	0.0–5.0	0.0	O	<u>p.21</u> Z
95	0h1B5F	Saved CO2 (Ton)	Saved CO2 – 1	-	0.0	X	<u>p.21</u> Z
96	0h1B60	Saved CO2 (kTon)	Saved CO2 – 2	-	0	X	<u>p.21</u> Z
97	0h1B61	Saved energy reset	Reset Energy	0	No	0.No Δ	<u>p.21</u> Z
				1	Yes		

8.12 Application 3 Function Group (AP3)

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

***O/X: Write-enabled during operation, Δ: Writing available when operation stops**

07h: Write enabled during operation, 2: Writing available when operation stops								
Cod e	Comm. Address	Name	LCD Display	Setting Range	Initial Value	Pro pert y*	Ref.	
00	-	Jump code	Jump Code	1-99	70	O	p.72	
01	0h1C01	Current date	Now Date	01/01/2000 ~ 12/31/2099 (Date)	01/01/2000	O	p.243	
02	0h1C02	Current time	Now Time	0: 00-23: 59 (min)	0: 00	O	p.243	
03	0h1C03	Current day	Now Weekday	0000000-1111111 (Bit)	0000001	O	p.243	
04	0h1C04	Summer Time Start date	Summer T Start	01/01 ~ Summer T Stop	04/01	O	p.243	
05	0h1C05	Summer Time Finish date	Summer T Stop	Summer T Start ~ 12/31(Date)	11/31	O	p.243	
06 ³⁷	0h1C06	Date display format	Date Format	0	YYYY/MM/D	Date Format	O	p.243
				1	MM/DD/YYYY			
				2	DD/MM/YYYY			
10	0h1C0A	Period connection status	Period Status	-	-	X	p.243	
11	0h1C0B	Time Period 1 Start time configuration	Period1 Start T	00: 00-24: 00	24: 00	O	p.243	

³⁷ The date format can be changed according to the AP3-06 settings.

Table of Functions

Cod e	Comm. Address	Name	LCD Display	Setting Range	Initial Value	Pro pert y*	Ref.
12	0h1C0C	Time Period 1 End time configuration	Period1 Stop T	Period1 Start T – 24: 00 (min)	24: 00	O	p.243
13	0h1C0D	Time Period 1 Day of the week configuration	Period1 Day	0000000– 1111111 (Bit)	0000000		p.243
14	0h1C0E	Time Period 2 Start time configuration	Period2 Start T	00: 00–24: 00 (min)	24: 00	O	p.243
15	0h1C0F	Time Period 2 End time configuration	Period2 Stop T	Period2 Start T – 24: 00 (min)	24: 00	O	p.243
16	0h1C10	Time Period 2 Day of the week configuration	Period2 Day	0000000– 1111111 (Bit)	00000000	O	p.243
17	0h1C11	Time Period 3 Start time configuration	Period3 Start T	00: 00–24: 00 (min)	24: 00	O	p.243
18	0h1C12	Time Period 3 End time configuration	Period3 Stop T	Period3 Start T – 24: 00 (min)	24: 00	O	p.243
19	0h1C13	Time Period 3 Day of the week configuration	Period3 Day	0000000– 1111111 (Bit)	0000000	O	p.243
20	0h1C14	Time Period 4 Start time configuration	Period4 Start T	00: 00–24: 00 (min)	24: 00	O	p.243
21	0h1C15	Time Period 4 End time configuration	Period4 Stop T	Period4 Start T – 24: 00 (min)	24: 00	O	p.243

Table of Functions

Function
Table

Cod e	Comm. Address	Name	LCD Display	Setting Range	Initial Value	Pro perty*	Ref.
22	0h1C16	Time Period 4 Day of the week configuration	Period4 Day	0000000–1111111 (Bit)	0000000	O	p.243
30	0h1C1E	Except1 Date Start time configuration	Except1 Start T	00: 00–24: 00 (min)	24: 00	O	p.243
31	0h1C1F	Except1 Date End time configuration	Except1 Stop T	Except1 StartT – 24: 00 (min)	24: 00	O	p.243
32	0h1C20	Except1 Date configuration	Except1D ate	01/01–12/31 (Date)	01/01	O	p.243
33	0h1C21	Except2 Date Start time configuration	Except2 Start T	00: 00–24: 00 (min)	24: 00	O	p.243
34	0h1C22	Except2 Date Stop time configuration	Except2 Stop T	Except2 StartT – 24: 00 (min)	24: 00	O	p.243
35	0h1C23	Except2 Date configuration	Except2D ate	01/01–12/31 (Date)	01/01	O	p.243
36	0h1C24	Except3 Date Start time configuration	Except3 Start T	00: 00–24: 00 (min)	24: 00	O	p.243
37	0h1C25	Except3 Date End time configuration	Except3 Stop T	Except3 StartT – 24: 00 (min)	24: 00	O	p.243
38	0h1C26	Except3Date configuration	Except3D ate	01/01–12/31 (Date)	01/01	O	p.243
39	0h1C27	Except4 Date Start time configuration	Except4 Start T	00: 00–24: 00 (min)	24: 00	O	p.243

Table of Functions

Cod e	Comm. Address	Name	LCD Display	Setting Range	Initial Value	Pro pert y*	Ref.
40	0h1C28	Except4 Date End time configuration	Except4 Stop T	Except4 StartT – 24: 00 (min)	24: 00	O	<u>p.243</u>
41	0h1C29	Except4Date configuration	Except4D ate	01/01–12/31 (Date)	01/01	O	<u>p.243</u>
42	0h1C2 A	Except5 Date Start time configuration	Except5 Start T	00: 00–24: 00 (min)	24: 00	O	<u>p.243</u>
43	0h1C2 B	Except5 Date End time confiauration	Except5 Stop T	Except5 StartT – 24: 00 (min)	24: 00	O	<u>p.243</u>
44	0h1C2 C	Except5 Date configuration	Except5 Date	01/01–12/31 (Date)	01/01	O	<u>p.243</u>
45	0h1C2 D	Except6 Date Start time configuration	Except6 Start T	00: 00–24: 00 (min)	24: 00	O	<u>p.243</u>
46	0h1C2E	Except6 Date End time configuration	Except6 Stop T	Except6 StartT – 24: 00 (min)	24: 00	O	<u>p.243</u>
47	0h1C2F	Except6 Date configuration	Except6 Date	01/01–12/31 (Date)	01/01	O	<u>p.243</u>
48	0h1C30	Except7 Date Start time configuration	Except7 Start T	00: 00–24: 00 (min)	24: 00	O	<u>p.243</u>
49	0h1C31	Except7 Date End time configuration	Except7 Stop T	Except7 StartT – 24: 00 (min)	24: 00	O	<u>p.243</u>
50	0h1C32	Except7 Date configuration	Except7 Date	01/01–12/31 (Date)	01/01	O	<u>p.243</u>
51	0h1C33	Except8 Date	Except8	00: 00–24: 00	24: 00	O	<u>p.243</u>

Table of Functions

Function
Table

Cod e	Comm. Address	Name	LCD Display	Setting Range		Initial Value	Pro perty*	Ref.
		Start time configuration	Start T	(min)				
52	0h1C34	Except8 Date End time configuration	Except8 Stop T	Except8 StartT – 24: 00 (min)		24: 00	O	p.243
53	0h1C35	Except8 Date configuration	Except8 Date	01/01–12/31 (Date)		01/01	O	p.243
70	0h1C46	Time Event function confiauration	Time Event En	0 1	No Yes	0: NO	Δ	p.243
71	0h1C47	Time Event configuration static	T-Event Status	-		-	X	p.243
72	0h1C48	Time Event 1 connection status	T-Event1Period	000000000000 – 111111111111		000000000000 0	Δ	p.243
73	0h1C49	Time Event 1 functions	T-Event1Define	0 1 2 3 4 5 7 8 9 10 11 12 13 14 15	None Fx Rx Speed-L Speed-M Speed-H Xcel-L Xcel-M Xcel-H Xcel Stop Run Enable 2nd Source Exchange Analog I-Term	0: None	Δ	p.243

Table of Functions

Cod e	Comm. Address	Name	LCD Display	Setting Range	Initial Value	Pro pert y*	Ref.
				16 PID			
				17 PID Gain 2			
				18 PID Ref Change			
				19 2nd Motor			
				20 Timer In			
				21 Dias Aux			
				22 EPID1 Run			
				23 EPID1 ITermClr			
				24 Pre Heat			
				25 EPID2RUN			
				26 EPID2 ITermClr			
				27 Sleep Wake Cha			
				28 PID Step Def 1			
				29 PID Step Ref M			
				30 PID Step Ref H			
74	0h1C4 A	Time Event 2 connection configuration	T-Event2Period	000000000000 – 111111111111	000000000000 0	Δ	p.243
75	0h1C4 B	Time Event 2 functions	T-Event2Define	Identical to the setting range for AP3-73	0: None	Δ	p.243
76	0h1C4 C	Time Event 3 connection configuration	T-Event2Period	000000000000 – 111111111111	000000000000 0	Δ	p.243

Table of Functions

Cod e	Comm. Address	Name	LCD Display	Setting Range	Initial Value	Pro perty*	Ref.
77	0h1C4D	Time Event 3 functions	T-Event3De fine	Identical to the setting range for AP3-73	0: None	Δ	p.243
78	0h1C4E	Time Event 4 connection configuration	T-Event4Pe riod	000000000000 – 111111111111	000000000000 0	Δ	p.243
79	0h1C4F	Time Event 4 functions	T-Event4De fine	Identical to the setting range for AP3-73	0: None	Δ	p.243
80	0h1C50	Time Event 5 connection configuration	T-Event5Pe riod	000000000000 – 111111111111	000000000000 0	Δ	p.243
81	0h1C51	Time Event 5 functions	T-Event5De fine	Identical to the setting range for AP3-73	0: None	Δ	p.243
82	0h1C52	Time Event 6 connection configuration	T-Event6Pe riod	000000000000 – 111111111111	000000000000 0	Δ	p.243
83	0h1C53	Time Event 6 functions	T-Event6De fine	Identical to the setting range for AP3-73	0: None	Δ	p.243
84	0h1C54	Time Event 7 connection configuration	T-Event7Pe riod	000000000000 – 111111111111	000000000000 0	Δ	p.243
85	0h1C55	Time Event 7 functions	T-Event7De fine	Same setting range as r AP3-73	0: None	Δ	p.243
86	0h1C56	Time Event 8 connection configuration	T-Event8Pe riod	000000000000 – 111111111111	000000000000 0	Δ	p.243

Function
Table

Table of Functions

Cod e	Comm. Address	Name	LCD Display	Setting Range	Initial Value	Pro pert y*	Ref.
87	0h1C57	Time Event 8 functions	T- Event8De fine	Same setting range as AP3-73	0: None	Δ	<u>p.243</u>

8.13 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 stopped, X: Write disabled

Cod e	Comm. Address	Name	LCD Display	Setting Range		Initial Value	Propert y*	Ref.
00	-	Jump Code	Jump Code	1-99		40	O	p.72
05	0h1D05	Input/output open-phase protection	Phase Loss Chk	Bit	00-11	00	Δ	p.351
				Bit0	Output open phase			
				Bit1	Input open phase			
06	0h1D06	Input voltage range during open-phase	IPO V Band	1-100 (V)		15	O	p.351
07	0h1D07	Deceleration time at fault trip	Trip Dec Time	0.0-600.0 (sec)		3.0	O	=
08	0h1D08	Selection of startup on trip reset	RST Restart	Bit	00-11	00	O	p.270
				Bit0	Fault trips other than LV trip			
				Bit1	LV Trip			
09	0h1D09	Number of automatic restarts	Retry Number	0-10		0	O	p.270
10	0h1D0A	Automatic restart delay time	Retry Delay	0.1-600.0 (sec)		5.0	O	p.270
11	0h1D0B	Keypad command loss operation	Lost KPD Mode	0	None	0:	O	p.353
				1	Warning			
				2	Free-Run			

Table of Functions

Cod e	Comm. Address	Name	LCD Display	Setting Range		Initial Value	Propert y*	Ref.
		mode		3	Dec	None		
12	0h1D0 C	Speed command loss operation mode	Lost Cmd Mode	0	None	0: None	O	p.353
				1	Free-Run			
				2	Dec			
				3	Hold Input			
				4	Hold Output			
				5	Lost Preset			
13 ³⁸	0h1D0 D	Time to determine speed command loss	Lost Cmd Time	0.1–120.0 (sec)		1.0	O	p.353
14	0h1D0 E	Operation frequency at speed command loss	Lost Preset F	0.00, Low Freq–High Freq		0.00	O	p.353
15	0h1D0 F	Analog input loss decision level	AI Lost Level	0	Half of x1	0: Half of x1	O	p.353
				1	Below x1			
17	0h1D1 1	Overload warning selection	OL Warn Select	0	No	0: No	O	p.340
				1	Yes			
18	0h1D1 2	Overload warning level	OL Warn Level	30–OL Trip Level(%)		110	O	p.340
19	0h1D1 3	Overload warning time	OL Warn Time	0.0–30.0 (sec)		10.0	O	p.340
20	0h1D1 4	Motion at overload trip	OL Trip Select	0	None	1: Free-Run	O	p.340
				1	Free-Run			
				2	Dec			
21	0h1D1	Overload trip	OL Trip	30–150 (%)		120	O	p.340

³⁸PRT-13–15 are displayed when PRT-12 is not set to '0 (NONE)'.

Table of Functions

Cod e	Comm. Address	Name	LCD Display	Setting Range		Initial Value	Propert y*	Ref.
22	5	level	Level					
	0h1D16	Overload trip time	OL Trip Time	0.0–60.0 (sec)		60.0	O	p.340
23	0h1D17	Under load detection Source	UL Source	0	Output Current	0: Output Current	Δ	p.360
				1	Output Power			
24	0h1D18	Under load detection band	UL Band	0.0–100.0 (%)		10.0	Δ	p.360
25	0h1D19	Under load warning selection	UL Warn Sel	0	No	0: No	O	p.360
				1	Yes			
26	0h1D1A	Under load warning time	UL Warn Time	0.0–600.0 (sec)		10.0	O	p.360
27	0h1D1B	Under load trip selection	UL Trip Sel	0	None	0: None	O	p.360
				1	Free-Run			
				2	Dec			
28	0h1D1C	Under load trip timer	UL Trip Time	0.0–600.0 (sec)		30.0	O	p.360
31	0h1D1F	Operation on no motor trip	No Motor Trip	0	None	0: None	O	p.367
				1	Free-Run			
32	0h1D20	No motor trip current level	No Motor Level	1–100 (%)		5	O	p.367
33	0h1D21	No motor detection time	No Motor Time	0.1–10.0 (sec)		3.0	O	p.367
34	0h1D22	Operation at motor overheat detection	Thermal-T Sel	0	None	0: None	O	p.340
				1	Free-Run			
				2	Dec			

Function Table

Table of Functions

Cod e	Comm. Address	Name	LCD Display	Setting Range		Initial Value	Propert y*	Ref.
35	0h1D23	Thermal sensor input	Thermal In Src	0	Thermal In	0: Thermal In	O	p.340
				1	V2			
36	0h1D24	Thermal sensor fault level	Thermal-T Lev	0.0–100.0 (%)		50.0	O	p.340
37	0h1D25	Thermal sensor fault range	Thermal-T	0	Low	0: Low	O	p.340
				1	High			
38 ³⁹	0h1D26	Motor overheat detection sensor	Thermal Monitor	-		-	X	p.340
40	0h1D28	Electronic thermal prevention fault trip	ETH Trip Sel	0	None	0: None	O	p.338
				1	Free-Run			
				2	Dec			
41	0h1D29	Motor cooling fan type	Motor Cooling	0	Self-cool	0: Self-cool	O	p.338
				1	Forced-cool			
42	0h1D2A	Electronic thermal one minute rating	ETH 1 min	ETH Cont–150 (%)		120	O	p.338
43	0h1D2B	Electronic thermal prevention continuous rating	ETH Cont	50–120 (%)		100	O	p.338
44	0h1D2C	Fire mode password	Fire Mode PW	-		3473	O	p.262
45 ⁴⁰	0h1D2	Fire mode	Fire Mode	0	None	0:	O	p.353

³⁹PRT-38 is displayed when PRT-34 is not set to '0 (NONE)'.

Table of Functions

Cod e	Comm. Address	Name	LCD Display	Setting Range		Initial Value	Propert y*	Ref.
	D	setting	Sel	1	Fire Mode	None		
				2	Test Mode			
46 ⁴¹	0h1D2 E	Fire mode direction setting	Fire Mode Dir	0	Reverse	1: Forward	O	p.353
				1	Forward			
47 ⁴²	0h1D2 F	Fire mode frequency setting	Fire Mode Freq	0.00–max Freq		60.00	O	p.353
48	0h1D3 0	Number of fire mode operations	Fire Mode Cnt	-		0	X	p.353
50	0h1D3 2	Stall prevention and flux braking	Stall Prevent	bit	0000–1111	0100	Δ	p.346
				Bit 0	At acceleration			
				Bit 1	At constant speed			
				Bit 2	At deceleration			
				Bit 3	Flux braking			
51	0h1D3 3	Stall frequency 1	Stall Freq 1	Start frequency-Stall frequency2 (Hz)		60.00	O	p.346
52	0h1D3	Stall level 1	Stall Level	30-150 (%)		130	Δ	p.346
53	0h1D3	Stall frequency	Stall Freq 2	Stall frequency1-		60.00	O	p.346

⁴⁰ 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.

⁴¹PRT-46–47 are displayed when PRT-45 is not set to '0 (NONE)'.

⁴² 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.

Table of Functions

Cod e	Comm. Address	Name	LCD Display	Setting Range	Initial Value	Propert y*	Ref.
	5	2		Stall frequency3 (Hz)			
54	0h1D3	Stall level 2	Stall Level	30-150 (%)	130	Δ	p.346
55	0h1D3 7	Stall frequency 3	Stall Freq 3	Stall frequency2- Stall frequency 4 (Hz)	60.00	O	p.346
56	0h1D3	Stall level 3	Stall Level	30-150 (%)	130	Δ	p.346
57	0h1D3 9	Stall frequency 4	Stall Freq 4	Stall frequency3- Maximum frequency (Hz)	60.00	O	p.346
58	0h1D3	Stall level 4	Stall Level	30-150 (%)	130	Δ	p.346
59	0h1D3 B	Flux braking gain	Flux Brake Kp	0-150 (%)	0	O	
60	0h1D3 C	Pipe break detection setting	PipeBroken Sel	0 None	0: None	O	p.234
				1 Warning			
				2 Free-Run			
				3 Dec			
61	0h1D3 D	Pipe break detection variation	PipeBroken Lev	0.0-100.0 (%)	97.5	O	p.234
62	0h1D3 E	Pipe break detection time	PipeBroken DT	0.0-6000.0 (Sec)	10.0	O	p.234
66	0h1D4 2	Braking resistor configuration	DB Warn %ED	0-30 (%)	0	O	p.358
70	0h1D4 6	Level detect mode selection	LDT Sel	0 None	0: None	O	p.230
				1 Warning			
				2 Free-Run			
				3 Dec			
71	0h1D4	Level detect	LDT Area	0 Below Level	0:	O	p.230

Table of Functions

Cod e	Comm. Address	Name	LCD Display	Setting Range		Initial Value	Propert y*	Ref.
	7	range setting	Sel	1	Above Level	Below Level		
72	0h1D48	Level detect source	LDT Source	0	Output Current	0: Output Current	O	p.230
				1	DC Link Voltage			
				2	Output Voltage			
				3	kW			
				4	HP			
				5	V1			
				6	V2			
				7	I2			
				8	PID Ref Value			
				9	PID Fdb Value			
				10	PID Output			
				11	EPID1 Fdb Val			
				12	EPID2 Fdb Val			
73	0h1D49	Level detect delay time	LDT DlyTime	0-9999 (sec)		2	O	p.230
74	0h1D4A	Level detect standard set value	LDT Level	Source setting		Source setting	O	p.230
75	0h1D4B	Level detect band width	LDT Band width	Source setting		Source setting	O	p.230
76	0h1D4C	Level detect frequency	LDT Freq	0.00-High Freq (Hz)		20.00	O	p.230
77	0h1D4D	Level detect trip restart time	LDT Restart DT	0.0-3000.0		60.0	O	p.230
79	0h1D4	Cooling fan	Fan Trip	0	Trip	0: Trip	O	p.362

Function
Table

Table of Functions

Cod e	Comm. Address	Name	LCD Display	Setting Range		Initial Value	Propert y*	Ref.
	F	fault selection	Mode	1	Warning			
80	0h1D50	Operation mode on optional card tria	Opt Trip Mode	0	None	1: Free-Run	O	p.366
				1	Free-Run			
				2	Dec			
81	0h1D51	Low voltage trip decision delay time	LVT Delay	0.0–60.0 (sec)		0.0	Δ	p.363
82	0h1D52	Low voltage trip decision durinn	LV2 Trip Sel	0	No	0: No	Δ	p.363
				1	Yes			
83	0h1D53	Remaining capacitor life diagnosis level	CAP.DiagPerc	10–100 (%)		0	O	p.368
84 ⁴³	-	Capacitor life diagnosis mode	CAP.Diag	0	None	0: None	Δ	p.368
				1	Cap.Diag 1			
				2	Cap.Diag 2			
				3	Cap.Init			
85	0h1D55	Capacitor life diagnosis level 1	CAP.Level1	50.0–95.0 (%)		0.0	Δ	p.368
86 ⁴⁴	0h1D56	Capacitor life diagnosis level -	CAP.Level2	0.0–100.0 (%)		0.0	X	p.368
87	0h1D57	Fan accumulated	Fan Time Perc	-		0	X	p.369
88	0h1D58	Fan replacement alarm level	Fan Exchange	0.0–100.0 (%)		0.0	O	p.369

⁴³PRT- 84 can only be set in Auto-State.

⁴⁴ PRT-86 is read only.

Table of Functions

Cod e	Comm. Address	Name	LCD Display	Setting Range		Initial Value	Propert y*	Ref.
90	0h1D5 A	Low battery voltage setting	Low Battery	0	None	0:None	O	<u>p.359</u>
				1	Warning			

Function
Table

8.14 2nd Motor Function Group (M2)

The second motor function group is displayed when one or more of the IN-65–71 codes is set to '**28 (2nd MOTOR)**'. 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 stopped, X: Write disabled**

G: Write enabled during operation, L: Write enabled when stopped, X: Write disabled								
Cod e	Comm. Address	Name	LCD Display	Setting Range		Initial Value	Proper ty*	Ref.
00	-	Jump code	Jump Code	1-99		14	O	<u>p.272</u>
04	0h1E04	Acceleration time	M2-Acc Time	0.0-600.0 (sec)		20.0	O	<u>p.274</u>
05	0h1E05	Deceleration time	M2-Dec Time	0.0-600.0 (sec)		30.0	O	<u>p.274</u>
06	0h1E06	Motor capacity	M2-Capacity	7	3.7 kW(5.0HP)	-	Δ	<u>p.274</u>
				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)			
07	0h1E07	Base frequency	M2-Base Freq	30.00-400.00 (Hz)		60.00	Δ	<u>p.274</u>

Table of Functions

Cod e	Comm. Address	Name	LCD Display	Setting Range		Initial Value	Proper ty*	Ref.
08	0h1E08	Control mode	M2-Ctrl Mode	0	V/F	0: V/F	Δ	p.274
				2	Slip Compen			
10	0h1E0A	Number of motor poles	M2-Pole Num	2–48		Dependent on motor settings	Δ	p.274
11	0h1E0B	Rated slip speed	M2-Rated Slip	0–3000 (RPM)			Δ	p.274
12	0h1E0C	Motor rated current	M2-Rated Curr	1.0–1000.0 (A)			Δ	p.274
13	0h1E0D	Motor no-load current	M2-No-load Curr	0.0–1000.0 (A)			Δ	p.274
14	0h1E0E	Motor rated voltage	M2-Rated Volt	0 ⁴⁵ , 170–480 (V)			Δ	p.274
15	0h1E0F	Motor efficiency	M2-Efficiency	70–100 (%)			Δ	p.274
17	-	Stator resistor	M2-Rs	0.000–9.999 (Ω)			Δ	p.274
18	0h1E12	Leakage inductance	M2-Lsigma	0.00–99.99 (mH)			Δ	p.274
25	0h1E19	V/F pattern	M2-V/F Patt	0	Linear	0: Linear	Δ	p.274
				1	Square			
				2	User V/F			
26	0h1E1A	Forward torque boost	M2-Fwd Boost	0.0–15.0 (%)		2.0	Δ	p.274
27	0h1E1B	Reverse torque boost	M2-Rev Boost	0.0–15.0 (%)			Δ	p.274
28	0h1E1C	Stall	M2-Stall	30–150 (%)		130	Δ	p.274

⁴⁵ Refer to <4.15 Output Voltage Setting>

Table of Functions

Code	Comm. Address	Name	LCD Display	Setting Range	Initial Value	Property*	Ref.
		prevention level	Lev				
29	0h1E1D	Electronic thermal 1 minute rating	M2-ETH 1 min	100–150 (%)	120	Δ	p.274
30	0h1E1E	Electronic thermal continuous rating	M2-ETH Cont	50–120 (%)	100	Δ	p.274

8.15 Trip (TRIP Last-x) and Config (CNF) Mode

8.15.1 Trip Mode (TRP Last-x)

Code	Name	LCD Display	Setting Range	Initial Value	Ref.
00	Trip type display	Trip Name(x)	-	-	-
01	Frequency reference at trip	Output Freq	-	-	-
02	Output current at trip	Output Current	-	-	-
03	Acceleration/Deceleration state at trip	Inverter State	-	-	-
04	DC section state	DCLink Voltage	-	-	-
05	NTC temperature	Temperature	-	-	-
06	Input terminal state	DI State	-	0000 0000	-
07	Output terminal state	DO State	-	000	-

Table of Functions

Code	Name	LCD Display	Setting Range		Initial Value	Ref.
08	Trip time after Power on	Trip On Time	-		00/00/00 00: 00	-
09	Trip time after operation start	Trip Run Time	-		00/00/00 00: 00	-
10	Delete trip history	Trip Delete?	0	No	-	
			1	Yes		

Function
Table

Table of Functions

8.15.2 Config Mode (CNF)

Cod e	Name	LCD Display	Setting Range		Initial Value	Ref.
00	Jump code	Jump Code	1-99		42	p.72
01	Keypad language selection	Language Sel	0: English		0: English	
02	LCD contrast adjustment	LCD Contrast	-		-	p.288
10	Inverter S/W	Inv S/W Ver	-		-	p.288
11	Keypad S/W version	KeypadS/W Ver	-		-	p.288
12	Keypad title version	KPD Title Ver	-		-	p.288
20	Display item condition	Anytime Para	0	Frequency	0: Frequency	p.332
21	Monitor mode display 1	Monitor Line-1	1	Speed	0: Frequency	p.332
22	Monitor mode display 2	Monitor Line-2	2	Output Current	2: OutputCurrent	p.332
23	Monitor mode display 3	Monitor Line-3	3	Output Voltage	3: OutputVoltage	p.332
			4	Output Power		
			5	WHour Counter		
			6	DCLink Voltage		
			7	DI State		
			8	DO State		
			9	V1 Monitor(V)		
			10	V1 Monitor(%)		
			13	V2 Monitor(V)		
			14	V2 Monitor(%)		
			15	I2 Monitor(mA)		
			16	I2 Monitor(%)		

Table of Functions

Function
Table

Cod e	Name	LCD Display	Setting Range		Initial Value	Ref.
			17	PID Output		
			18	PID Ref Value		
			19	PID Fdb Value		
			20	EPID1 Out		
			21	EPID1 Ref Val		
			22	EPID1 Fdb Val		
			23	EPID2 Out		
			24	EPID2 Ref Val		
			25	EPID2Fdb Val		
24	Monitor mode initialize	Mon Mode Init	0	No	0: No	p.332
			1	Yes		
30 ⁴⁶	Option slot 1 type display	Option-1 Type	-		-	p.288
31	Option slot 2 type display	Option-2 Type	-		-	p.288
32	Option slot 3 type display	Option-3 Type	-		-	p.288
40	Parameter initialization	Parameter Init	0	No	0: No	p.281
			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		

⁴⁶ Please refer to the communication option manual for details.

Table of Functions

Cod e	Name	LCD Display	Setting Range		Initial Value	Ref.
			10	EPI Grp		
			11	AP1 Grp		
			12	AP2 Grp		
			13	AP3 Grp		
			14	PRT Grp		
			15	M2 Grp		
41	Display changed Parameter	Changed Para	0	View All	0: View All	<u>p.284</u>
			1	View Changed		
42	Multi key item	Multi Key Sel	0	None	0: None	<u>p.284</u>
			1	UserGrpSelKey		
43	Macro function item	Macro Select	0	Basic	0: Basic	<u>p.290</u>
			1	Compressor		
			2	Supply Fan		
			3	Exhaust Fan		
			4	Cooling Tower		
			5	Circul. Pump		
			6	Vacuum Pump		
44	Trip history deletion	Erase All Trip	0	No	0: No	<u>p.288</u>
			1	Yes		
45	User registration code deletion	UserGrpAllDel	0	No	0: No	<u>p.285</u>
			1	Yes		
46	Read parameters	Parameter Read	0	No	0: No	<u>p.279</u>
			1	Yes		
47	Write parameters	Parameter	0	No	0: No	<u>p.279</u>

Table of Functions

Cod e	Name	LCD Display	Setting Range		Initial Value	Ref.
		Write	1	Yes		
48	Save parameters	Parameter Save	0	No	0: No	p.279
			1	Yes		
50	Hide parameter mode	View Lock Set	0-9999		Un-locked	p.282
51	Password protection (hide parameters)	View Lock Pw	0-9999		Password	p.282
52	Lock parameter ..	Key Lock Set	0-9999		Un-locked	p.282
53	Password for locking parameter edit	Key Lock Pw	0-9999		Password	p.282
60	Additional title update	Add Title Up	0	No	0: No	p.288
			1	Yes		
61	Simple parameter setting	Easy Start On	0	No	1: Yes	p.287
			1	Yes		
62	Power consumption	WHCount Reset	0	No	0: No	p.287
			1	Yes		
70 ⁴⁷	Accumulated inverter motion time	On-time	Date-Format		-	p.335
71 ⁴⁸	Accumulated inverter operation time	Run-time	Date-Format		-	p.335
72	Accumulated inverter operation time initialization	Time Reset	0	No	0: No	p.335
			1	Yes		

⁴⁷ The date format can be changed according to the AP3-06 settings.

⁴⁸ The date format can be changed according to the AP3-06 settings.

Table of Functions

Cod e	Name	LCD Display	Setting Range		Initial Value	Ref.
73 ⁴⁹	Real Time	Real Time	Date-Format			
74	Accumulated cooling fan	Fan Time	Date-Format		-	<u>p.335</u>
75 ⁵⁰	Reset of accumulated cooling fan operation time	Fan Time Rst	0	No	0: No	<u>p.335</u>
			1	Yes		

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

⁵⁰ The date format can be changed according to the AP3-06 settings.

8.16 Macro Groups

The following table lists detailed parameter settings for each macro configuration.

8.16.1 Compressor (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	10.0
2	DRV-4	Dec Time	20.0	3	DRV-7	Freq Ref Src	1: Keypad-2
4	DRV-9	Control Mode	1: Slip Compen	5	DRV-11	JOG Frequency	20.00
6	DRV-12	JOG Acc Time	13.0	7	DRV-13	JOG Dec Time	20.0
8	DRV-15	Torque Boost	1: Auto1	9	BAS-70	Acc Time-1	10.0
10	BAS-71	Dec Time-1	20.0	11	ADV-10	Power-on Run	1: Yes
12	ADV-65	U/D Save Mode	1: Yes	13	CON-4	Carrier Freq	3.0
14	CON-70	SS Mode	0: Flying Start-1	15	CON-77	KEB Select	1: Yes
16	OUT-32	Relay 2	14: Run	17	PID-1	PID Sel	1: Yes
18	PID-3	PID Output	0.00	19	PID-4	PID Ref Value	-
20	PID-5	PID Fdb Value	-	21	PID-10	PID Ref 1 Src	4: I2
22	PID-11	PID Ref 1 Set	0.5000	23	PID-25	PID P-Gain 1	70.00
24	PID-26	PID I-Time 1	5.0	25	PID-50	PID Unit Sel	5: inWC

Table of Functions

Macro Code	Code	LCD Display	Initial Value	Macro Code	Code	LCD Display	Initial Value
26	PID-51	PID Unit Scale	4: x0.01	27	AP-1 8	PID Sleep1Freq	5.00
28	AP1-21	Pre-PID Freq	30.00	29	AP1-22	Pre-PID Delay	120.0
30	PRT-8	RST Restart	11	31	PRT-9	Retry Number	3
32	PRT-10	Retry Delay	4.0	33	PRT-011	Lost KPD Mode	3: Dec
34	PRT-12	Lost Cmd Mode	2: Dec	35	PRT-13	Lost Cmd Time	4.0
36	PRT-40	ETH Trip Sel	1: Free Run	37	PRT-42	ETH 1 min	120
38	PRT-52	Stall Level 1	130	39	PRT-66	DB Warn %ED	10
40	PRT-70	LDT Sel	1: Warning	41	PRT-72	LDT Source	0: Output Current
42	PRT-75	LDT Band Width	LDT Source/10% of the Max. value	43	PRT-76	LDT Freq	20.00
44	M2-4	M2-Acc Time	10.0	45	M2-5	M2-Dec Time	20.0
46	M2-8	M2-Ctrl Mode	1: Slip Compen	47	M2-28	M2-Stall Lev	125
48	M2-29	M2-ETH 1 min	120				

8.16.2 Supply Fan (MC2) Group

Macro Code	Code	LCD Display	Initial Value	Macro Code	Code	LCD Display	Initial Value
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Table of Functions

Function
Table

Macro Code	Code	LCD Display	Initial Value	Macro Code	Code	LCD Display	Initial Value
0	-	Jump Code	1: CODE	1	DRV-3	Acc Time	20.0
2	DRV-4	Dec Time	30.0	3	DRV-7	Freq Ref Src	1: Keypad-2
4	DRV-11	JOG Frequency	15.00	5	BAS-7	V/F Pattern	1: Square
6	BAS-70	Acc Time-1	20.0	7	BAS-71	Dec Time-1	30.0
8	ADV-10	Power-on Run	1: Yes	9	ADV-50	E-Save Mode	2: Auto
10	ADV-64	FAN Control	2: Temp Control	11	ADV-65	U/D Save Mode	1: Yes
12	CON-4	Carrier Freq	3.0	13	CON-70	SS Mode	1: Flying Start-2
14	CON-77	KEB Select	1: Yes	15	OUT-32	Relay 2	10: Over Voltage
16	PID-1	PID Sel	1: Yes	17	PID-3	PID Output	-
18	PID-4	PID Ref Value	-	19	PID-5	PID Fdb Value	-
20	PID-10	PID Ref 1 Src	4: I2	21	PID-11	PID Ref 1 Set	0.5000
22	PID-25	PID P-Gain 1	40.00	23	PID-26	PID I-Time 1	20.0
24	PID-36	PID Out Inv	1: Yes	25	PID-50	PID Unit Sel	5: inWC
26	PID-51	PID Unit Scale	4: x0.01	27	AP- 21	Pre-PID Freq	30.00
28	AP1-22	Pre-PID Delay	120.0	29	PRT- 8	RST Restart	11
30	PRT-9	Retry Number	0	31	PRT-10	Retry Delay	20.0
32	PRT-11	Lost KPD Mode	3: Dec	33	PRT-12	Lost Cmd Mode	3: Hold Input

Table of Functions

Macro Code	Code	LCD Display	Initial Value	Macro Code	Code	LCD Display	Initial Value
34	PRT-40	ETH Trip Sel	1: Free Run	35	PRT-42	ETH 1 min	120
36	PRT-52	Stall Level 1	130	37	PRT-70	LDT Sel	1: Warning
38	PRT-72	LDT Source	0: Output Current	39	PRT-75	LDT Band Width	LDT Source/10% of the Max. value
40	PRT-76	LDT Freq	10.00	41	PRT-77	LDT Restart DT	500.0
42	M2-25	M2-V/F Patt	1: Square	43	M2-28	M2-Stall Lev	110
44	M2-29	M2-ETH 1 min	110				

8.16.3 Exhaust Fan (MC3) 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	20.0
2	DRV-4	Dec Time	30.0	3	DRV-7	Freq Ref Src	1: Keypad-2
4	DRV-11	JOG Frequency	15.00	5	BAS-7	V/F Pattern	1: Square
6	BAS-70	Acc Time-1	20.0	7	BAS-71	Dec Time-1	30.0
8	BAS-72	Acc Time-2	22.5	9	BAS-73	Dec Time-2	32.5
10	BAS-74	Acc Time-3	25.0	11	BAS-75	Dec Time-3	35.0
12	BAS-76	Acc Time-4	27.5	13	BAS-77	Dec Time-4	37.5
14	BAS-78	Acc Time-5	30.0	15	BAS-80	Acc Time-6	32.5
16	BAS-81	Dec Time-6	42.5	17	BAS-82	Acc Time-7	35.0
18	BAS-83	Dec Time-7	45.0	19	ADV-	Power-on	1: Yes

Table of Functions

Function Table

Macro Code	Code	LCD Display	Initial Value	Macro Code	Code	LCD Display	Initial Value
					10	Run	
20	ADV-50	E-Save Mode	2: Auto	21	ADV-64	FAN Control	2: Temp Control
22	ADV-65	U/D Save Mode	1: Yes	23	CON-4	Carrier Freq	3.0
24	CON-70	SS Mode	1: Flying Start-2	25	CON-77	KEB Select	1: Yes
26	OUT-32	Relay 2	10: Over Voltage	27	PID-1	PID Sel	1: Yes
28	PID-3	PID Output	-	29	PID-4	PID Ref Value	-
30	PID-5	PID Fdb Value	-	31	PID-10	PID Ref 1 Src	4: I2
32	PID-11	PID Ref 1 Set	0.5000	33	PID-25	PID P-Gain 1	35.00
34	PID-26	PID I-Time 1	15.0	35	PID-36	PID Out Inv	1: Yes
36	PID-50	PID Unit Sel	5: inWC	37	PID-51	PID Unit Scale	4: x0.01
38	AP1-21	Pre-PID Freq	30.00	39	PRT-8	RST Restart	11
40	PRT-9	Retry Number	0	41	PRT-10	Retry Delay	10.0
42	PRT-11	Lost KPD Mode	3: Dec	43	PRT-12	Lost Cmd Mode	3: Hold Input
44	PRT-40	ETH Trip Sel	1: Free-Run	45	PRT-42	ETH 1 min	120
46	PRT-52	Stall Level 1	130	47	PRT-70	LDT Sel	1: Warning
48	PRT-72	LDT Source	0: Output Current	49	PRT-75	LDT Band Width	LDT Source/10% of the Max. value
50	PRT-76	LDT Freq	10.00	51	PRT-77	LDT Restart	300.0

Table of Functions

Macro Code	Code	LCD Display	Initial Value	Macro Code	Code	LCD Display	Initial Value
						DT	
52	M2-4	M2-Acc Time	10.0	53	M2-5	M2-Dec Time	20.0
54	M2-25	M2-V/F Patt	1: Square	55	M2-28	M2-Stall Lev	110
56	M2-29	M2-ETH 1 min	110				

8.16.4 Cooling Tower (MC4) 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	20.0
2	DRV-4	Dec Time	30.0	3	DRV-7	Freq Ref Src	1: Keypad-2
4	DRV-11	JOG Frequency	15.00	5	BAS-7	V/F Pattern	1: Square
6	BAS-70	Acc Time-1	20.0	7	BAS-71	Dec Time-1	30.0
8	BAS-072	Acc Time-2	22.5	9	BAS-73	Dec Time-2	32.5
10	BAS-74	Acc Time-3	25.0	11	BAS-75	Dec Time-3	35.0
12	BAS-76	Acc Time-4	27.5	13	BAS-77	Dec Time-4	37.5
14	BAS-78	Acc Time-5	30.0	15	BAS-80	Acc Time-6	32.5
16	BAS-81	Dec Time-6	42.5	17	BAS-82	Acc Time-7	35.0
18	BAS-83	Dec Time-7	45.0	19	ADV-10	Power-on Run	1: Yes
20	ADV-50	E-Save Mode	2: Auto	21	ADV-64	FAN Control	2: Temp Control
22	ADV-65	U/D Save Mode	1: Yes	23	CON-4	Carrier Freq	3.0
24	CON-70	SS Mode	1: Flying Start-2	25	CON-77	KEB Select	1: Yes
26	OUT-32	Relay 2	10: Over Voltage	27	PID-1	PID Sel	1: Yes
28	PID-3	PID Output	-	29	PID-4	PID Ref Value	-
30	PID -5	PID Fdb Value	-	31	PID-10	PID Ref 1 Src	4: I2
32	PID-11	PID Ref 1 Set	50.00	33	PID-25	PID P-Gain 1	40.00

Table of Functions

Macro Code	Code	LCD Display	Initial Value	Macro Code	Code	LCD Display	Initial Value
34	PID-26	PID I-Time 1	15.0	35	PID-36	PID Out Inv	1: Yes
36	PID-50	PID Unit Sel	3: °F	37	PID-51	PID Unit Scale	2: x1
38	AP1-21	Pre-PID Freq	30.00	39	AP1-22	Pre-PID Delay	120.0
40	PRT-8	RST Restart	11	41	PRT-9	Retry Number	0
42	PRT-10	Retry Delay	10.0	43	PRT-11	Lost KPD Mode	3: Dec
44	PRT-12	Lost Cmd Mode	3: Hold Input	45	PRT-40	ETH Trip Sel	1: Free Run
46	PRT-42	ETH 1 min	120	47	PRT-52	Stall Level 1	130
48	PRT-70	LDT Sel	1: Warning	49	PRT-72	LDT Source	0: Output Current
50	PRT-75	LDT Band Width	LDT Source/10% of the Max. value	51	PRT-76	LDT Freq	10.00
52	PRT 77	LDT Restart DT	300.0	53	M2-25	M2-V/F Patt	1: Square
54	M2 28	M2-Stall Lev	110	55	M2-29	M2-ETH 1 min	110

8.16.5 Circulation Pump (MC5) 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	30.0
2	DRV-4	Dec Time	50.0	3	DRV-7	Freq Ref Src	1: Keypad-2

Table of Functions

Function
Table

Macro Code	Code	LCD Display	Initial Value	Macro Code	Code	LCD Display	Initial Value
4	DRV-9	Control Mode	1: Slip Compen	5	DRV-11	JOG Frequency	15.00
6	DRV-12	JOG Acc Time	30.0	7	DRV-13	JOG Dec Time	50.0
8	DRV-15	Torque Boost	1: Auto1	9	BAS-7	V/F Pattern	1: Square
10	BAS-70	Acc Time-1	30.0	11	BAS-71	Dec Time-1	50.0
12	BAS-72	Acc Time-2	32.0	13	BAS-73	Dec Time-2	52.0
14	BAS-74	Acc Time-3	34.0	15	BAS-75	Dec Time-3	54.0
16	BAS-76	Acc Time-4	36.0	17	BAS-77	Dec Time-4	56.0
18	BAS-78	Acc Time-5	38.0	19	BAS-79	Dec Time-5	58.0
20	BAS-80	Acc Time-6	40.0	21	BAS-81	Dec Time-6	59.0
22	BAS-82	Acc Time-7	42.0	23	BAS-83	Dec Time-7	60.0
24	ADV-10	Power-on Run	1: Yes	25	ADV-25	Freq Limit Lo	20.00
26	ADV-50	E-Save Mode	2: Auto	27	ADV-64	FAN Control	2: Temp Control
28	ADV-65	U/D Save Mode	1: Yes	29	CON-4	Carrier Freq	3.0
30	CON-70	SS Mode	0: Flying Start-1	31	CON-77	KEB Select	1: Yes
32	OUT-32	Relay 2	14: Run	33	PID-1	PID Sel	1: Yes
34	PID-3	PID Output	-	35	PID-4	PID Ref Value	-
36	PID-5	PID Fdb Value	-	37	PID-10	PID Ref 1 Src	4: I2
38	PID-11	PID Ref 1 Set	5.000	39	PID-25	PID P-Gain 1	50.00

Table of Functions

Macro Code	Code	LCD Display	Initial Value	Macro Code	Code	LCD Display	Initial Value
40	PID-26	PID I-Time 1	5.0	41	PID-50	PID Unit Sel	2: PSI
42	PID-51	PID Unit Scale	3: x0.1	43	AP1-8	PID Sleep1Freq	10.00
44	AP1-21	Pre-PID Freq	30.00	45	AP1-22	Pre-PID Delay	120.0
46	PRT-8	RST Restart	11	47	PRT-9	Retry Number	3
48	PRT-10	Retry Delay	5.0	49	PRT-11	Lost KPD Mode	3: Dec
50	PRT-12	Lost Cmd Mode	3: Hold Input	51	PRT-40	ETH Trip Sel	1: Free Run
52	PRT-42	ETH 1 min	120	53	PRT-52	Stall Level 1	130
54	PRT-60	PipeBroken Sel	1: Warning	55	PRT-61	PipeBroken Lev	90.0
56	PRT-62	Pipe Broken DT	22.0	57	PRT-70	LDT Sel	1: Warning
58	PRT-72	LDT Source	0: Output Current	59	PRT-75	LDT Band Width	LDT Source/10% of the Max. value
60	PRT-76	LDT Freq	10.00	61	PRT-77	LDT Restart DT	100.0
62	M2-4	M2-Acc Time	10.0	63	M2-5	M2-Dec Time	20.0
64	M2-25	M2-V/F Patt	1: Square	65	M2-28	M2-Stall Lev	125
66	M2-29	M2-ETH 1 min	120				

8.16.6 Vacuum Pump (MC6) Group

Table of Functions

Function
Table

Macro Code	Code	LCD Display	Initial Value	Macro Code	Code	LCD Display	Initial Value
0	-	Jump Code	1: CODE	1	DRV-3	Acc Time	30.0
2	DRV-4	Dec Time	60.0	3	DRV-7	Freq Ref Src	1: Keypad-2
4	DRV-9	Control Mode	1: Slip Compen	5	DRV-11	JOG Frequency	20.00
6	DRV-12	JOG Acc Time	30.0	7	DRV-13	JOG Dec Time	60.0
8	DRV-15	Torque Boost	1: Auto1	9	BAS-7	V/F Pattern	1: Square
10	BAS-70	Acc Time-1	30.0	11	BAS-71	Dec Time-1	50.0
12	BAS-72	Acc Time-2	32.0	13	BAS-73	Dec Time-2	52.0
14	BAS-74	Acc Time-3	34.0	15	BAS-75	Dec Time-3	54.0
16	BAS-76	Acc Time-4	36.0	17	BAS-77	Dec Time-4	56.0
18	BAS-78	Acc Time-5	38.0	19	BAS-79	Dec Time-5	58.0
20	BAS-80	Acc Time-6	40.0	21	BAS-81	Dec Time-6	59.0
22	BAS-82	Acc Time-7	42.0	23	BAS-83	Dec Time-7	60.0
24	ADV-10	Power-on Run	1: Yes	25	ADV-25	Freq Limit Lo	40.00
26	ADV-64	FAN Control	2: Temp Control	27	ADV-65	U/D Save Mode	1: Yes
28	CON-4	Carrier Freq	3.0	29	CON-70	SS Mode	0: Flying Start-1
30	CON-77	KEB Select	1: Yes	31	OUT-32	Relay 2	14: Run
32	PID-1	PID Sel	1: Yes	33	PID-3	PID Output	-
34	PID-4	PID Ref Value	-	35	PID-5	PID Fdb Value	-

Table of Functions

Macro Code	Code	LCD Display	Initial Value	Macro Code	Code	LCD Display	Initial Value
36	PID-10	PID Ref 1 Src	4: I2	37	PID-11	PID Ref 1 Set	5.000
38	PID-25	PID P-Gain 1	50.00	39	PID-26	PID I-Time 1	2.5
40	PID-50	PID Unit Sel	5: inWC	41	PID-51	PID Unit Scale	3: x0.1
42	AP1-21	Pre-PID Freq	30.00	43	PRT-8	RST Restart	11
44	PRT-9	Retry Number	3	45	PRT-10	Retry Delay	4.0
46	PRT-11	Lost KPD Mode	3: Dec	47	PRT-12	Lost Cmd Mode	3: Hold Input
48	PRT-40	ETH Trip Sel	1: Free Run	49	PRT-42	ETH 1 min	120
50	PRT-52	Stall Level 1	130	51	PRT-60	PipeBroken Sel	1: Warning
52	PRT-61	PipeBroken Lev	90.0	53	PRT-62	Pipe Broken DT	22.0
54	PRT-66	DB Warn %ED	10	55	PRT-70	LDT Sel	1: Warning
56	PRT-72	LDT Source	0: Output Current	57	PRT-75	LDT Band Width	LDT Source /10% of the Max. value
58	PRT-76	LDT Freq	15.00	59	PRT-77	LDT Restart DT	100.0
60	M2-4	M2-Acc Time	10.0	61	M2-5	M2-Dec Time	20.0
62	M2-8	M2-Ctrl Mode	1: Slip Compen	63	M2-25	M2-V/F Patt	1: Square
64	M2-28	M2-Stall Lev	125	65	M2-29	M2-ETH 1 min	120

8.16.7 Constant Torque (MC7) 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	30.0
2	DRV-4	Dec Time	20.0	3	DRV-7	Freq Ref Src	1: Keypad-2
4	DRV-9	Control Mode	1: Slip Compen	5	DRV-12	JOG Acc Time	10.0
6	DRV-13	JOG Dec Time	20.0	7	DRV-15	Torque Boost	1: Auto1
8	BAS-70	Acc Time-1	10.0	9	BAS-71	Dec Time-1	20.0
10	BAS-72	Acc Time-2	12.5	11	BAS-73	Dec Time-2	22.5
12	BAS-74	Acc Time-3	15.0	13	BAS-75	Dec Time-3	25.0
14	BAS-76	Acc Time-4	17.5	15	BAS-77	Dec Time-4	27.5
16	BAS-78	Acc Time-5	20.0	17	BAS-79	Dec Time-5	30.0
18	BAS-80	Acc Time-6	22.5	19	BAS-81	Dec Time-6	32.5
20	BAS-82	Acc Time-7	25.0	21	BAS-83	Dec Time-7	35.0
22	ADV-1	Acc Pattern	1: S-curve	23	ADV-2	Dec Pattern	1: S-curve
24	ADV-25	Freq Limit Lo	20.00	25	ADV-74	RegenAvd Sel	1: Yes
26	CON-4	Carrier Freq	3.0	27	CON-70	SS Mode	0: Flying Start-1
28	CON-77	KEB Select	1: Yes	29	OUT-32	Relay 2	14: Run
30	AP1-21	Pre-PID Freq	30.00	31	AP1-22	Pre-PID Delay	120.0
32	PRT-12	Lost Cmd Mode	2: Dec	33	PRT-40	ETH-Trip Sel	2:Dec

Table of Functions

Macro Code	Code	LCD Display	Initial Value	Macro Code	Code	LCD Display	Initial Value
34	PRT-66	DB Warn %ED	10	35	PRT-70	LDT Sel	1: Warning
36	PRT-72	LDT Source	0:Output Current	37	PRT-75	LDT Band Width	LDT Source/10% of the Max. value
38	PRT-76	LDT Freq	5.00	39	PRT-77	LDT Restart DT	250.0
40	M2-4	M2-Acc Time	10.0	41	M2-5	M2-Dec Time	20.0
42	M2-8	M2-Ctrl Mode	1: Slip Compen				

9 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 LSIS customer service center.

9.1 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 the inverter is still in a fault condition after powering it on again, please contact the supplier or the LSIS customer service center.

9.1.1 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'.

LCD Display	Type	Description
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 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). 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).
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

LCD Display	Type	Description
		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'.

General Fault Trips

LCD Display	Type	Description
Damper Err	Level	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.
CleanRPTErr	Latch	Triggered when the pump clean operation is operated frequently. The conditions may be modified with the AP2-36–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.

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 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.

Troubleshooting

LCD Display	Type	Description
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.

9.1.2 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 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

LCD Display	Description
	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 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'.

9.2 Troubleshooting Fault Trips

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

Type	Cause	Remedy
Over Load	The load is greater than the motor's rated capacity.	Ensure that the motor and inverter have appropriate capacity ratings.
	The set value for the overload trip level	Increase the set value for the

Troubleshooting

Type	Cause	Remedy
Under Load	(PRT-21) is too low.	overload trip level.
	There is a motor-load connection problem.	Replace the motor and inverter with models with lower capacity.
	The set value for underload level (PRT-24) is less than the system's minimum load.	Reduce the set value for the underload level.
Over Current1	Acc/Dec time is too short, compared to load inertia (GD^2).	Increase Acc/Dec time.
	The inverter load is greater than the rated capacity.	Replace the inverter with a model that has increased capacity.
	The inverter supplied an output while the motor was idling.	Operate the inverter after the motor has stopped or use the speed search function (CON-70).
	The mechanical brake of the motor is operating too fast.	Check the mechanical brake.
Over Voltage	Deceleration time is too short for the load inertia (GD^2).	Increase the acceleration time.
	A generative load occurs at the inverter output.	Use the braking unit.
	The input voltage is too high.	Determine if the input voltage is above the specified value.
Low Voltage	The input voltage is too low.	Determine if the input voltage is below the specified value.
	A load greater than the power capacity is connected to the system (a welder, direct motor connection, etc.)	Increase the power capacity.
	The magnetic contactor connected to the power source has a faulty connection.	Replace the magnetic contactor.
Low Voltage2	The input voltage has decreased during the operation.	Determine if the input voltage is above the specified value.
	An input phase-loss has occurred.	Check the input wiring.

Type	Cause	Remedy
Ground Trip	The power supply magnetic contactor is faulty.	Replace the magnetic contractor.
	A ground fault has occurred in the inverter output wiring.	Check the output wiring.
	The motor insulation is damaged.	Replace the motor.
	The motor has overheated.	Reduce the load or operation frequency.
E-Thermal	The inverter load is greater than the rated capacity.	Replace the inverter with a model that has increased capacity.
	The set value for electronic thermal protection is too low.	Set an appropriate electronic thermal level.
	The inverter has been operated at low speed for an extended duration.	Replace the motor with a model that supplies extra power to the cooling fan.
Out Phase Open	The magnetic contactor on the output side has a connection fault.	Check the magnetic contactor on the output side.
	The output wiring is faulty.	Check the output wiring.
In Phase Open	The magnetic contactor on the input side has a connection fault.	Check the magnetic contactor on the input side.
	The input wiring is faulty.	Check the input wiring.
	The DC link capacitor needs to be replaced.	Replace the DC link capacitor. Contact the retailer or the LSIS customer service center.
Inverter OLT	The load is greater than the rated motor capacity.	Replace the motor and inverter with models that have increased capacity.
	The torque boost level is too high.	Reduce the torque boost level.
Over Heat	There is a problem with the cooling system.	Determine if a foreign object is obstructing the air inlet, outlet, or vent.
	The inverter cooling fan has been operated for an extended period.	Replace the cooling fan.

Troubleshooting

Type	Cause	Remedy
	The ambient temperature is too high.	Keep the ambient temperature below 50 °C.
Over Current2	Output wiring is short-circuited.	Check the output wiring.
	There is a fault with the electronic semiconductor (IGBT).	Do not operate the inverter. Contact the retailer or the LSIS customer service center.
NTC Open	The ambient temperature is too low.	Keep the ambient temperature above -10 °C.
	There is a fault with the internal temperature sensor.	Contact the retailer or the LSIS customer service center.
Fan Lock	A foreign object is obstructing the fan's air vent.	Remove the foreign object from the air inlet or outlet.
	The cooling fan needs to be replaced.	Replace the cooling fan.

9.3 Troubleshooting Other Faults

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

Type	Cause	Remedy
Parameters cannot be set.	The inverter is in operation (driving mode).	Stop the inverter to change to program mode and set the parameter.
	The parameter access is incorrect.	Check the correct parameter access level and set the parameter.
	The password is incorrect.	Check the password, disable the parameter lock and set the parameter.
	Low voltage is detected.	Check the power input to resolve the low voltage and set the parameter.
The motor does	The frequency command source is set	Check the frequency command

Type	Cause	Remedy
not rotate.	incorrectly.	source setting.
	The operation command source is set incorrectly.	Check the operation command source setting.
	Power is not supplied to the terminal R/S/T.	Check the terminal connections R/S/T and U/V/W.
	The charge lamp is turned off.	Turn on the inverter.
	The operation command is off.	Turn on the operation command. (RUN).
	The motor is locked.	Unlock the motor or lower the load level.
	The load is too high.	Operate the motor independently.
	An emergency stop signal is input.	Reset the emergency stop signal.
	The wiring for the control circuit terminal is incorrect.	Check the wiring for the control circuit terminal.
	The input option for the frequency command is incorrect.	Check the input option for the frequency command.
	The input voltage or current for the frequency command is incorrect.	Check the input voltage or current for the frequency command.
	The PNP/NPN mode is selected incorrectly.	Check the PNP/NPN mode setting.
	The frequency command value is too low.	Check the frequency command and input a value above the minimum frequency.
	The [OFF] key is pressed.	Check that the stop state is normal, if so resume operation normally.
	Motor torque is too low.	Change the operation modes (V/F, IM, and Sensorless). If the fault remains, replace the inverter with a model with increased capacity.
The motor rotates in the opposite	The wiring for the motor output cable is incorrect.	Determine if the cable on the output side is wired correctly to the phase (U/V/W) of the motor.

Troubleshooting

Type	Cause	Remedy
direction to the command.	The signal connection between the control circuit terminal (forward/reverse rotation) of the inverter and the forward/reverse rotation signal on the control panel side is incorrect.	Check the forward/reverse rotation wiring.
The motor only rotates in one direction.	Reverse rotation prevention is selected.	Remove the reverse rotation prevention.
	The reverse rotation signal is not provided, even when a 3-wire sequence is selected.	Check the input signal associated with the 3-wire operation and adjust as necessary.
The motor is overheating.	The load is too heavy.	Reduce the load. Increase the Acc/Dec time.
		Check the motor parameters and set the correct values.
		Replace the motor and the inverter with models with appropriate capacity for the load.
	The ambient temperature of the motor is too high.	Lower the ambient temperature of the motor.
	The phase-to-phase voltage of the motor is insufficient.	Use a motor that can withstand phase-to-phase voltages surges greater than the maximum surge voltage.
		Only use motors suitable for applications with inverters.
The motor stops during acceleration.	The load is too high.	Connect the AC reactor to the inverter output (set the carrier frequency to 3 kHz).
		Check the motor fan and remove any foreign objects.
		Reduce the load. Increase the volume of the torque boost.

Type	Cause	Remedy
		Replace the motor and the inverter with models with capacity appropriate for the load.
	The current is too big.	If the output current exceeds the rated load, decrease the torque boost.
The motor stops when connected to load.	The load is too high.	Reduce the load.
		Replace the motor and the inverter with models with capacity appropriate for the load.
The motor does not accelerate. /The acceleration time is too long.	The frequency command value is low.	Set an appropriate value.
	The load is too high.	Reduce the load and increase the acceleration time. Check the mechanical brake status.
	The acceleration time is too long.	Change the acceleration time.
	The combined values of the motor properties and the inverter parameter are incorrect.	Change the motor related parameters.
	The stall prevention level during acceleration is low.	Change the stall prevention level.
	The stall prevention level during operation is low.	Change the stall prevention level.
Motor speed varies during operation.	There is a high variance in load.	Replace the motor and inverter with models with increased capacity.
	The input voltage varies.	Reduce input voltage variation.
	Motor speed variations occur at a specific frequency.	Adjust the output frequency to avoid a resonance area.
The motor rotation is different from the setting.	The V/F pattern is set incorrectly.	Set a V/F pattern that is suitable for the motor specification.

Troubleshooting

Type	Cause	Remedy
The motor deceleration time is too long even with Dynamic Braking (DB) resistor connected.	The deceleration time is set too long.	Change the setting accordingly.
	The motor torque is insufficient.	If motor parameters are normal, it is likely to be a motor capacity fault. Replace the motor with a model with increased capacity.
	The load is higher than the internal torque limit determined by the rated current of the inverter.	Replace the inverter with a model with increased capacity.
While the inverter is in operation, a control unit malfunctions or noise occurs.	Noise occurs due to switching inside the inverter.	Change the carrier frequency to the minimum value.
		Install a micro surge filter in the inverter output.
When the inverter is operating, the earth leakage breaker is activated.	An earth leakage breaker will interrupt the supply if current flows to ground during inverter operation.	Connect the inverter to a ground terminal.
		Check that the ground resistance is less than 100Ω for 200 V inverters and less than 10Ω for 400 V inverters.
		Check the capacity of the earth leakage breaker and make the appropriate connection, based on the rated current of the inverter.
		Lower the carrier frequency.
		Make the cable length between the inverter and the motor as short as possible.
The motor vibrates severely and does not rotate normally.	Phase-to-phase voltage of 3-phase power source is not balanced.	Check the input voltage and balance the voltage.
		Check and test the motor's insulation.
The motor makes	Resonance occurs between the motor's natural frequency and the	Slightly increase or decrease the carrier frequency.

Type	Cause	Remedy
humming, or loud noises.	carrier frequency.	
	Resonance occurs between the motor's natural frequency and the inverter's output frequency.	Slightly increase or decrease the carrier frequency. Use the frequency jump function to avoid the frequency band where resonance occurs.
The motor vibrates/hunts.	The frequency input command is an external, analog command.	In situations of noise inflow on the analog input side that results in command interference, change the input filter time constant (IN-07).
	The wiring length between the inverter and the motor is too long.	Ensure that the total cable length between the inverter and the motor is less than 200 m (50 m for motors rated 3.7 kW or lower).
The motor does not come to a complete stop when the inverter output stops.	It is difficult to decelerate sufficiently, because DC braking is not operating normally.	Adjust the DC braking parameter.
		Increase the set value for the DC braking current. Increase the set value for the DC braking stopping time.
The output frequency does not increase to the frequency reference.	The frequency reference is within the jump frequency range.	Set the frequency reference higher than the jump frequency range.
	The frequency reference is exceeding the upper limit of the frequency command.	Set the upper limit of the frequency command higher than the frequency reference.
	Because the load is too heavy, the stall prevention function is working.	Replace the inverter with a model with increased capacity.
The cooling fan does not rotate.	The control parameter for the cooling fan is set incorrectly.	Check the control parameter setting for the cooling fan.

10 Maintenance

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

⚠ Caution

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

10.1 Regular Inspection Lists

10.1.1 Daily Inspection

Inspection area	Inspection item	Inspection details	Inspection method	Inspection standard	Inspection equipment
All	Ambient environment	Is the ambient temperature and humidity within the design range, and is there any dust or foreign objects present?	<u>Refer to 1.3 Installation Considerations</u> on page 5	No icing (ambient temperature: -10 ~ +50) and no condensation (ambient humidity below 90%)	Thermometer, hygrometer, recorder
	Inverter	Is there any abnormal vibration or noise?	Visual inspection	No abnormality	

Maintenance

Inspection area	Inspection item	Inspection details	Inspection method	Inspection standard	Inspection equipment
	Power voltage	Are the input and output voltages normal?	Measure voltages between R/ S/ T-phases in the inverter terminal block.	Refer to <u>11.1 Input and Output Specifications</u> on page 578	Digital multimeter tester
Input/Output circuit	Smoothing capacitor	Is there any leakage from the inside?	Visual inspection	No abnormality	-
		Is the capacitor swollen?			
Cooling system	Cooling fan	Is there any abnormal vibration or noise?	Turn off the system and check operation by rotating the fan manually.	Fan rotates smoothly	-
Display	Measuring device	Is the display value normal?	Check the display value on the panel.	Check and manage specified values.	Voltmeter, ammeter, etc.
Motor	All	Is there any abnormal vibration or noise?	Visual inspection	No abnormality	-
		Is there any abnormal smell?	Check for overheating or damage.		

10.1.2 Annual Inspection

Inspection area	Inspection item	Inspection details	Inspection method	Judgment standard	Inspection equipment
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Inspection area	Inspection item	Inspection details	Inspection method	Judgment standard	Inspection equipment
Input/Output circuit	All	Megger test (between input/output terminals and earth terminal)	Disconnect inverter and short R/S/T/U/V/W terminals, and then measure from each terminal to the ground terminal using a Megger.	Must be above 5 MΩ	DC 500 V Megger
		Is there anything loose in the device?	Tighten all screws.	No abnormality	
		Is there any evidence of parts overheating?	Visual inspection		
	Cable connections	Are there any corroded cables?	Visual inspection	No abnormality	-
		Is there any damage to cable insulation?			
	Terminal block	Is there any damage?	Visual inspection	No abnormality	-
	Smoothing condenser	Measure electrostatic capacity.	Measure with capacity meter.	Rated capacity over 85%	Capacity meter
	Relay	Is there any chattering noise during operation?	Visual inspection	No abnormality	-

Maintenance

Inspection area	Inspection item	Inspection details	Inspection method	Judgment standard	Inspection equipment
		Is there any damage to the contacts?	Visual inspection		
	Braking resistor	Is there any damage from resistance?	Visual inspection	No abnormality	Digital multimeter / anaog tester
		Check for disconnection.	Disconnect one side and measure with a tester.	Must be within $\pm 10\%$ of the rated value of the resistor.	
Control circuit Protection circuit	Operation check	Check for output voltage imbalance while the inverter is in operation.	Measure voltage between the inverter output terminal U/ V/ W.	Balance the voltage between phases: within 4 V for 200 V series and within 8 V for 400 V series.	Digital multimeter or DC voltmeter
		Is there an error in the display circuit after the sequence protection test?	Test the inverter output protection in both short and open circuit conditions.	The circuit must work according to the sequence.	
Cooling system	Cooling fan	Are any of the fan parts loose?	Check all connected parts and tighten all screws.	No abnormality	-
Display	Display device	Is the display value normal?	Check the command value on the	Specified and managed values must	Voltmeter, Ammeter, etc.

Inspection area	Inspection item	Inspection details	Inspection method	Judgment standard	Inspection equipment
			display device.	match.	

10.1.3 Bi-annual Inspection

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

ⓘ Caution

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

10.2 Real Time Clock (RTC) Battery Replacement

A CR2032 Lithium-Manganese battery to power the inverter's built-in RTC (real time clock) is installed on the main PCB. When the battery charge is low, a low battery voltage level warning is given on the keypad display.

The RTC feature and any other features related to the RTC feature, such as the time event control, do not work properly when the battery runs out. Refer to the following battery specifications when a battery replacement is required.

RTC Battery Specifications

Maintenance

Model type: CR 2032 (lithium-manganese)

Nominal voltage: 3 V

Nominal capacity: 220 mAh

Operating temperature range: -20–80 degrees C

Life span (approximately): 53,300 hrs (inverter on) / 25,800 hrs (inverter off)

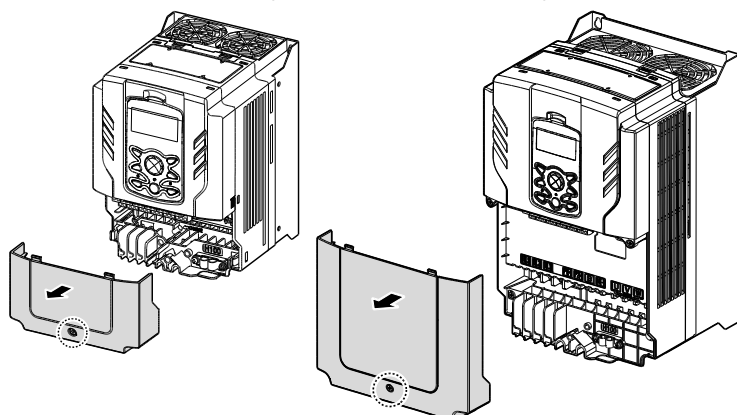
Follow the instructions below to replace the RTC battery.

ⓘ 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 main 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.

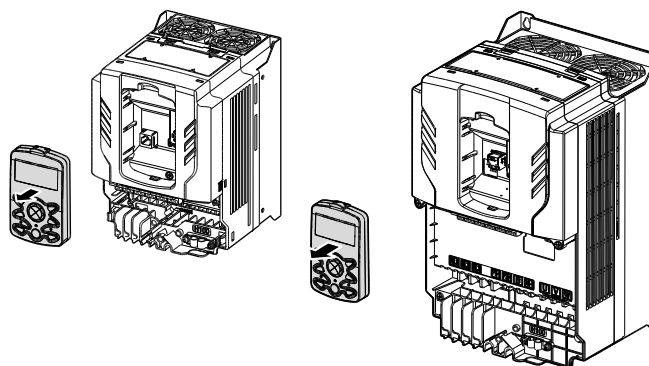
- 1 Turn off the inverter and make sure that DC link voltage has dropped to a safe level.
- 2 Loosen the screw on the power cover then remove the power cover.



5.5–30 kW Models

37–90 kW Models

- 3 Remove the keypad from the inverter body.

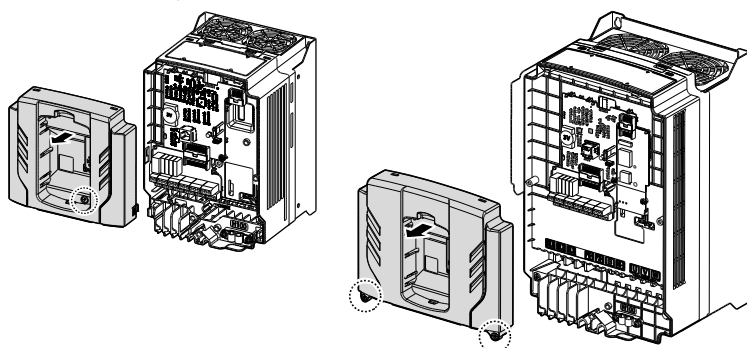


5.5–30 kW Models

37–90 kW Models

Maintenance

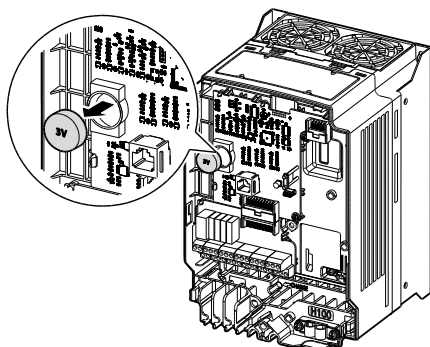
- 4 Loosen the screws securing the front cover, and remove the front cover by lifting it. The main PCB is exposed.



5.5–30 kW Models

37–90 kW Models

- 5 Locate the RTC battery holder on the main PCB, and replace the battery.



5.5–90 kW 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.

10.3 Storage and Disposal

10.3.1 Storage

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

- Store the product in the same environmental conditions as specified for operation (Refer to 1.3 Installation Considerations on page 5).
- When storing the product for a period longer than 3 months, store it between -10 °C and 30 °C, to prevent depletion of the electrolytic capacitor.
- Do not expose the inverter to snow, rain, fog, or dust.
- Package the inverter in a way that prevents contact with moisture. Keep the moisture level below 70% in the package by including a desiccant, such as silica gel.
- Do not allow the inverter to be exposed to dusty or humid environments. If the inverter is installed in such environments (for example, a construction site) and the inverter will be unused for an extended period, remove the inverter and store it in a safe place.

10.3.2 Disposal

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

⚠ Caution

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

11 Technical Specification

11.1 Input and Output Specifications

Three Phase 200 V (5.5–18.5 kW)

Model	H100-2	0055	0075	0110	0150	0185
Applied Motor	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)	22	30	42	56	69
	Output Frequency	0–400 Hz				
Rated input	Output Voltage (V)	3-Phase 200–240 V				
	Working Voltage (V)	3-Phase 200–240 VAC (-15%–+10%)				
	Input Frequency	50–60 Hz (±5%)				
	Rated Current (A)	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 (5.5–22 kW)

Model H100-4		0055	0075	0110	0150	0185	0220
Applied Motor	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)	12	16	24	30	38	45
	Output Frequency	0–400 Hz					
	Output Voltage(V)	3-Phase 380–480 V					
Rated input	Working Voltage(V)	3-Phase 380–480 VAC (-15%–+10%)					
	Input Frequency	50–60 Hz (±5%)					
	Rated Current(A)	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 H100-4		0300	0370	0450	0550	0750	0900
Applied Motor	HP	40	50	60	75	100	120
	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)	61	75	91	107	142	169
	Output Frequency	0–400 Hz					
	Output Voltage (V)	3-Phase 380–480 V					
Rated input	Working Voltage (V)	3-Phase 380–480 VAC (-15%–+10%)					
	Input Frequency	50 – 60 Hz (±5%)					
	Rated Current (A)	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.

11.2 Product Specification Details

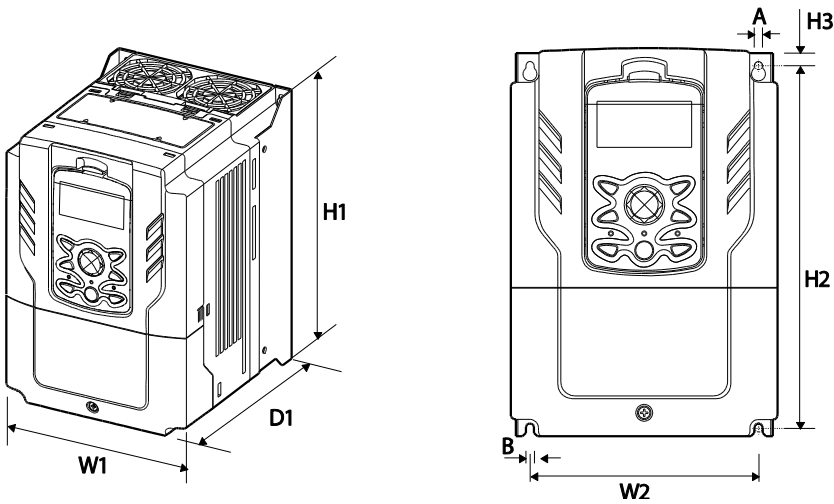
Items		Description	
Control	Control method	V/F control, Slip compensation.	
	Frequency settings power resolution	Digital command: 0.01 Hz Analog command: 0.06 Hz (60 Hz standard)	
	Frequency accuracy	1% of maximum output frequency.	
	V/F pattern	Linear, square reduction, user V/F.	
	Overload capacity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

Items			Description	
			DC braking during stop Frequency increase 3-wire Select acc/dec/stop MMC Interlock	Frequency reduction Fix analog command frequency Transtion from PID to general operation Pre Heat Pump Cleaning RTC(Time Event)
		Pulse train	0–32 kHz, Low Level: 0–0.8 V, High Level: 3.5–12 V	
	Output	Multi function open collector terminal		Less than DC 26 V, 50 mA
		Fault signal relay terminal	Fault output and inverter operation status output	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	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

Items		Description	
	Alarm	Parameter writing trip Emergency stop trip Command loss trip External memory error CPU watchdog trip Motor under load trip	Analog input error Motor overload trip Pipe broken trip Keypad command lost trip Damper trip Level Detect trip MMC Interlock trip PumpCleannig trip
		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, UL Open & Enclosed Type 1 (option) (UL Enclosed Type 1 is satisfied by conduit installation option.)	
	Ambient temperature	-10 °C–50 °C (2.5% current derating is applied above 40 °C) No ice or frost should be present. Working under normal load at 50 °C (122 °F), it is recommended that less than 75% load is applied.	
	Ambient humidity	Relative humidity less than 90% 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 (Pollution Degree 2 Environment).	
	Operation altitude/oscillation	No higher than 3,280 ft (1,000 m). Less than 9.8 m/sec ² (1.0 G).	
	Pressure	70-106 kPa	

11.3 External Dimensions (IP 20 Type)

5.5–30 kW (3-phase)



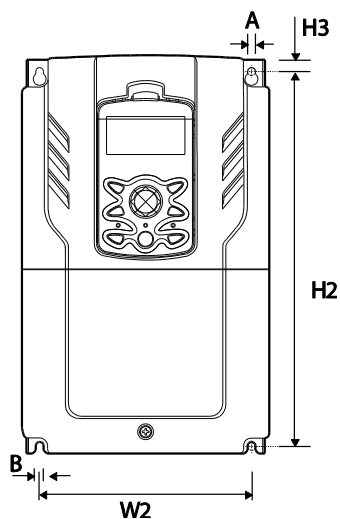
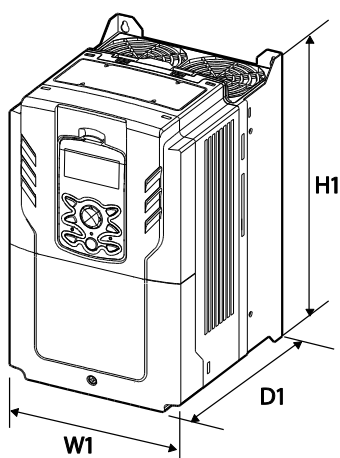
Units: mm

Items		W1	W2	H1	H2	H3	D1	A	B	Φ
3-phase 200 V	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	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	-

Technical Specification

Items		W1	W2	H1	H2	H3	D1	A	B	Φ
	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	-

37-90 kW (3-phase)



Units : inches

Items		W1	W2	H1	H2	H3	D1	A	B	Φ
3-phase 200 V	0055H100-2	6.30	5.39	9.13	8.52	4.13	7.13	0.20	0.20	-
	0075H100-2	6.30	5.39	9.13	8.52	4.13	7.13	0.20	0.20	-
	0110H100-2	6.30	5.39	9.13	8.52	4.13	7.13	0.20	0.20	-
	0150H100-2	7.09	6.18	11.42	10.78	4.45	8.08	0.20	0.20	-

Items		W1	W2	H1	H2	H3	D1	A	B	Φ
	0185H100-2	8.66	7.63	13.78	13.03	5.12	8.79	0.24	0.24	-
3-Phase 400 V	0055H100-4	6.30	5.39	9.13	8.52	4.13	7.13	0.20	0.20	-
	0075H100-4	6.30	5.39	9.13	8.52	4.13	7.13	0.20	0.20	-
	0110H100-4	6.30	5.39	9.13	8.52	4.13	7.13	0.20	0.20	-
	0150H100-4	7.09	6.18	11.42	10.78	4.45	8.08	0.20	0.20	-
	0185H100-4	7.09	6.18	11.42	10.78	4.45	8.08	0.20	0.20	-
	0220H100-4	8.66	7.63	13.78	13.03	5.12	8.79	0.24	0.24	-
	0300H100-4	8.66	7.63	13.78	13.03	5.12	8.79	0.24	0.24	-
	0370H100-4	10.83	9.13	17.72	168.70	5.51	11.18	0.28	0.28	-
	0450H100-4	12.80	11.10	20.08	191.54	6.30	11.18	0.28	0.28	-
	0550H100-4	12.80	11.10	20.08	191.54	6.30	11.18	0.28	0.28	-
	0750H100-4	12.80	10.83	21.65	206.50	6.30	12.17	0.35	0.35	-
	0900H100-4	12.80	10.83	21.65	206.50	6.30	12.17	0.35	0.35	-

11.4 Peripheral Devices

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

Product (kW)		Circuit Breaker		Leakage Breaker		Magnetic Contactor	
		Model	Rated Current	Model	Rated Current	Model	Rated Current
3-Phase 200 V	5.5	TD125U	50	EBS 53c	50	MC-40a	40
	7.5		60	EBS 63c	60		
	11		100	EBS 103c	100	MC-50a	55
	15		100		100	MC-65a	65
	18.5	TS250U	150	EBS 203c	200	MC-130a	130
3-Phase 400 V	5.5	TD125U	50	EBS 33C	30	MC-32a	32
	7.5		50		30		

Technical Specification

Product (kW)		Circuit Breaker		Leakage Breaker		Magnetic Contactor	
	11		60	EBS 53c	50	MC-40a	40
	15		80	EBS 63c	60	MC-50a	55
	18.5		100	EBS 103c	100	MC-65a	65
	22		125		125		
	30		125		125	MC100a	105
	37	TS250U	175	EBS 203c	200	MC-130a	130
	45		225		225	MC-150a	150
	55		250		250	MC-185a	185
	75	TS400U	300	EBS403C	300	MC-225a	225
	90		350		350	MC-330a	330

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	TD125NU	TD125HU	TS250NU	TS250HU	TS400NU	TS400HU
240V(50/60Hz)	50kA	100kA	50kA	100kA	50kA	100kA
480V(50/60Hz)	35kA	65kA	35kA	65kA	35kA	65kA

11.5 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	5.5	50	600[V]	0.43	24	0.93	25
	7.5	63		0.31	33	0.73	32

Products(kW)		AC Input Fuse		AC reactor		DC Reactor	
	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	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		

⚠ 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.

11.6 Terminal Screw Specifications

Input/Output Terminal Screw Specification

Product (kW)		Terminal Screw Size	Screw Torque (Kgf·c m/Nm)
3-Phase 200 V	5.5	M4	7.1~12.2/0.7~1.2
	7.5		
	11		
	15	M5	24.5~31.8/2.4~3.1

Technical Specification

Product (kW)		Terminal Screw Size	Screw Torque (Kgf·cm/Nm)
3-Phase 400 V	18.5	M4	7.1~12.2/0.7~1.2
	5.5		
	7.5		
	11		
	15	M5	24.5~31.8/2.4~3.1
	18.5		
	22		
	30		
	37	M8	61.2~91.8/6~9
	45		
	55		
	75		
	90		

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	M2	2.2~2.5/0.22~0.25
A1/B1/C1	M2.6	4.0/0.4

⚠ Caution

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

11.7 Braking Resistor Specifications

Product (kW)		Resistor (Ω)	Rated Capacity (W)
3-Phase 200 V	5.5	25	600
	7.5	20	750
	11	15	1200
	15	10	1500
	18.5	8	2000
	5.5	100	600
	7.5	80	750
	11	50	1200
3-Phase 400 V	15	40	1500
	18.5	30	2000
	22	25	2400
	30	20	3000
	37	15	3700
	45	12	4500
	55	10	5500
	75	8	7500
	90	6	9000

The standard for braking torque is 150% and the working rate (%ED) is 5%. If the working rate is 10%, the rated capacity for braking resistance must be calculated at twice the standard.

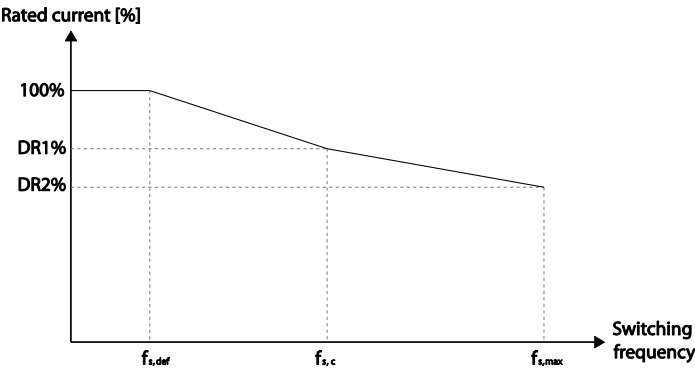
11.8 Inverter Continuous Rated Current Derating

Derating by carrier frequency

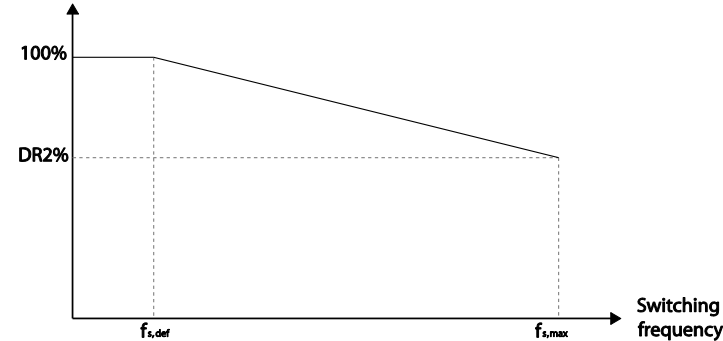
The continuous rated current of the inverter is limited based on the carrier frequency. Refer to the following graph.

<200[V], 5.5[kW]–18.5[kW], 400[V] 5.5–30[kW] Current Derating Rate>

Technical Specification



<400[V] 37-90[kW] Current Derating Rate >



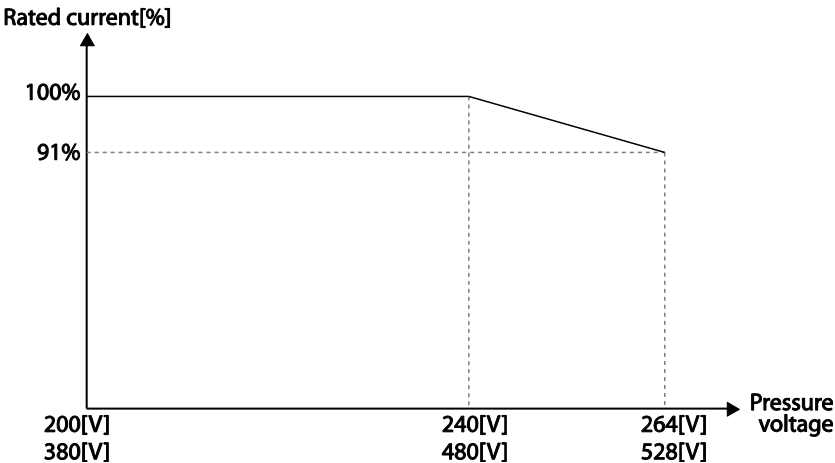
Item	Unit	200 V	400 V			
		5.5-18.5 kW	5.5-18.5 kW	22-30 kW	37-55 kW	75-90 kW
$f_{s,def}$	kHz	3	3	3	3	3
$f_{s,c}$	kHz	8	8	8	-	-
$f_{s,max}$	kHz	15	15	15	10	7
DR1 %	%	70	65	65	-	-
DR2 %	%	60	55	50	60	55

* $f_{s,def}$: Switching frequency for continued operation
 $f_{s,c}$: Switching frequency where the first current derating ends.

ffs.max: The maximum switching frequency (where the second current derating begins)

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℃.

Product Warranty

Warranty Information

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

Product Name	LSIS Standard Inverter	Date of Installation	
Model Name	LSLV-H100	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 LSIS agent or service center.

Product Warranty

Non-Warranty Service

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

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

Visit Our Website

Visit us at <http://www.lsis.biz> 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 Handling 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.

EC DECLARATION OF CONFORMITY

Ⓢ
We, the undersigned,Ⓢ

Ⓢ
Representative: LSIS Co., Ltd.Ⓢ
Address: LS Tower, Hoge-dong, Dongan-gu,Ⓢ
Anyang-si, Gyeonggi-do 1026-6,Ⓢ
KoreaⓈ

Ⓢ
Manufacturer: LSIS Co., Ltd.Ⓢ
Address: 181, Samsung-ri, Mokchon-Eup,Ⓢ
Chonan, Chungnam, 330-845,Ⓢ
KoreaⓈ

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

Ⓢ
Type of Equipment: Inverter (Power Conversion Equipment)Ⓢ

Ⓢ
Model Name: STARVERT-H100 series..

Ⓢ
Trade Mark: LSIS Co., Ltd.Ⓢ

Ⓢ
Conforms with the essential requirements of the directives: ..

Ⓢ
2006/95/EC Directive of the European Parliament and of the Council on the harmonisation of the laws of Member States relating to Electrical Equipment designed for use within certain voltage limits Ⓢ

Ⓢ
2004/108/EC Directive of the European Parliament and of the Council on the approximation of the laws of the Member States relating to electromagnetic compatibilityⓈ

Ⓢ
Based on the following specifications applied:Ⓢ

Ⓢ
EN 61800-3:2004Ⓢ Ⓢ

Ⓢ
EN 61800-5-1:2007Ⓢ

Ⓢ
and therefore complies with the essential requirements and provisions of the 2006/95/CE and 2004/108/CE Directives..

Ⓢ
Place: Chonan, Chungnam,Ⓢ
KoreaⓈ

Ⓢ
Ⓢ
2014. 4. 24 (Signature /Date) Ⓢ
Mr. In Sik Choi / General ManagerⓈ
(Full name / Position)Ⓢ

EMI / RFI POWER LINE FILTERS

LSis inverters, H100 series



RFI FILTERS

THE LS RANGE OF POWER LINE FILTERS, FLDA AND FEP (Standard) SERIES, HAVE BEEN SPECIFICALLY DESIGNED WITH HIGH FREQUENCY LSI INVERTERS. THE USE OF LS FILTERS WITH THE INSTALLATION ADVICE OUTLINE WILL HELP TO ENSURE TROUBLE-FREE USE ALONGSIDE SENSITIVE DEVICES AND COMPLIANCE TO CONDUCTED EMISSION AND IMMUNITY STANDARDS TO EN 50081.

CAUTION

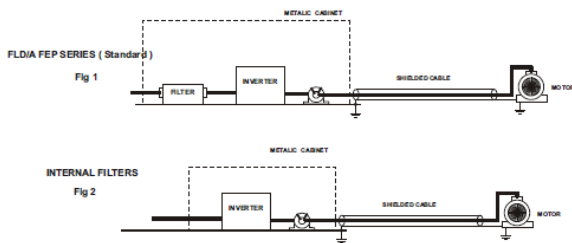
IN CASE OF A LEAKAGE CURRENT PROTECTIVE DEVICES IS USED ON POWER SUPPLY, IT MAY BE FAULT AT POWER-ON OR OFF. IN AVOID THIS CASE, THE SENSE CURRENT OF PROTECTIVE DEVICE SHOULD BE LARGER.

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 enclosure, usually directly after the enclosures 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 famile.com/ (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 enclosure body via an earthed cable gland.
- 7-) Connect any control cables as instructed in the inverter instructions manual.

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



PR0066

LSLV series / Standard Filters											
INVERTER	POWER	CODE	CURRENT	VOLTAGE	LSLV/GE CURRENT	DIMENSIONS L W H	MOUNTING Y X	WEIGHT	MOUNT	FIG.	OUTPUT CHOKE(S)
THREE PHASE					NOM. MAX.						
LSLV0055H100-2	5.5kW	FLD/A 3 042	42A	250VAC	0.9kA 27hA	310 x 50 x 85	30 x 295	24Kg	---	A	FS-2
LSLV0075H100-2	7.5kW	FLD/A 3 055	55A	250VAC	0.9kA 27hA	250 x 85 x 90	60 x 235	29Kg	---	A	FS-2
LSLV0110H100-2	11kW	FLD/A 3 075	75A	250VAC	0.9kA 27hA	270 x 80 x 135	60 x 255	36Kg	---	A	FS-2
LSLV0150H100-2	15kW	FLD/A 3 100	100A	250VAC	0.9kA 27hA	270 x 90 x 135	65 x 255	5Kg	---	A	FS-3
LSLV0185H100-2	18.5kW	FLD/A 3 130	130A	250VAC	0.9kA 27hA	270 x 90 x 150	65 x 255	6.8Kg	---	A	FS-3

EN 55011 CLASS A IEC/EN 61800-3 C3

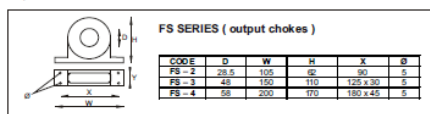
LSLV series / Standard Filters											
INVERTER	POWER	CODE	CURRENT	VOLTAGE	LSLV/GE CURRENT	DIMENSIONS L W H	MOUNTING Y X	WEIGHT	MOUNT	FIG.	OUTPUT CHOKE(S)
THREE PHASE					NOM. MAX.						
LSLV0750H100-4	75kW	FEP-T180	180A	220-480VAC	1.3kA 18hA	280 x 170 x 120	115 x 155	16Kg	---	B	FS-4
LSLV0900H100-4	90kW	FEP-T250	250A	220-480VAC	1.3kA 18hA	300 x 190 x 116	260 x 165	22.6Kg	---	B	FS-4

EN 55011 CLASS A IEC/EN 61800-3 C3

LSLV series / Internal Filters			
INVERTER	POWER	FIG.	OUTPUT CHOKE(S)
THREE PHASE			
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-3
LSLV0550H100-4	55kW	2	FS-3

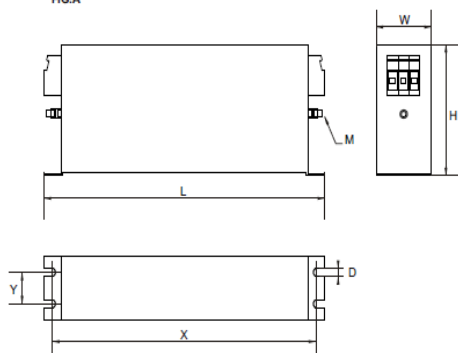
EN 55011 CLASS A IEC/EN 61800-3 C3

FIG. 2



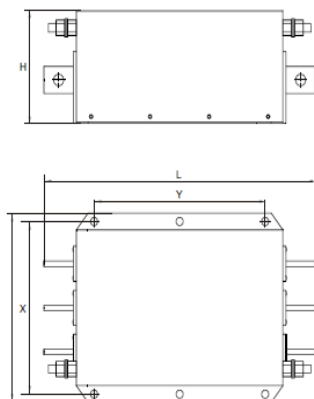
FLD SERIES (Standard)

FIG. A



FEP SERIES

FIG. B



Index

I

[AUTO] key	54
[DOWN] key	54
[ESC] key	54
[HAND] key	54
[LEFT] key	54
[Mode] key	54
[MULTI] key	54
[MULTI] key configuration	56
[OFF] key	54
[PROG / Ent] key	54
[RIGHT] key	54
[UP] key	54

2

24 terminal	39, 41
2 nd motor operation	273
2 nd operation mode	153
2 nd command source	154
Shared command (Main Source)	154
Shared command (Main Source)	154

3

3-wire operation	171
------------------------	-----

4

4-pole standard motor	577, 578, 579
-----------------------------	---------------

A

A terminal (Normally Open)	156
A1/C1/B1 terminal	39
AC power input terminal	Refer to R/S/T terminal

Acc/Dec pattern	83, 128
linear pattern	128
S-curve pattern	128
Acc/Dec reference	123
Delta Freq	121
Max Freq	121
Acc/Dec reference frequency	120
Ramp T Mode	120
Acc/Dec stop	83, 130
Acc/Dec time	120
Acc/Dec time switch frequency	125
configuration via multi-function terminal	124
maximum frequency	120
operation frequency	123
Acc/Dec time configuration	82
accelerating start	83
add User group	
UserGrp SelKey	284
ADV (advanced)	62
ADV (Expanded function group)	449
advanced features group	62
Advanced function groupRefer to ADV (advanced)	
function group	
analog frequency hold	107
analog hold	107
analog hold	Refer to <i>analog frequency hold</i>
analog input	37, 62
I2 current input	101
I2 voltage input	103
TI pulse input	104
V1 voltage input	93
analog input selection switch (SW2)	103
analog input selection switch (SW4)	34
analog output	38, 316
AO terminal	38
pulse output	319
voltage and current output	316
analog output selection switch (SW5)	34, 316
anti-hunting regulation	260

AO terminal	38, 316
analog output selection switch (SW5)	34
AP1 (Application 1 function group)	501
AP1 (Application1 function group)	62
AP2 (Application 2 function group)	62, 507
AP3 (Application 3 function group)	62, 512
ARM short current fault trip	Refer to <i>Over Current2</i>
ASCII code	393
asymmetric ground power	42
asymmetric ground structure	
disabling the EMC filter	42
asynchronous communications system	373
auto restart	269
auto restart settings	269
auto torque boost	138
auto torque boost 1	138
auto torque boost 2	138
auto tuning	238
auto tuning	238, 446
All (rotating)	240
All (static)	240
default parameter setting	240
automatic reset after a trip	82
automatic start-up at power-on	82
automatic torque boost	83
auto-tuning	238
auxiliary command source	84
auxiliary frequency	160
auxiliary frequency reference configuration	162
auxiliary reference	160
auxiliary reference gain	162
final command frequency calculation	164
main reference	160
auxiliary motor PID compensation	312

B

B terminal (Normally Closed)	156
BACnet	376, 420
analog input object	428
analog value object	426
binary input object	429
binary object	427
communication standard	420
data link layer	424
defining	420
error message	431
MAC ID/Sevice object Instance	424
Max Master Property	424
multi-state input object	431
multi-state object	427
object map	424
parameter setup	421
protocol	420
protocol implement	423
quick start	421
BACnet object	
analog	426
analog input	428
binary	427
binary input	429
error message	431
multi-state	427
multi-state input	431
BAS (Basic function group)	442
BAS (Basic group)	62
basic configuration diagram	16
Basic group	Refer to BAS (Basic function group)
basic operation	53
battery replacement	572
bipolar	37, 98
bit156	
bit (Off)	156
bit (On)	156
bit setting	156
multi-function input setting	156
multi-function output setting	329
Reset Restart configuration	270
speed search configuration	266
stall prevention	346
brake unit	315
braking resistor	29
braking torque	590
specifications	589
braking resistors	16

broadcast.....	388
built-in communication.....	Refer to <i>RS-485</i>
BX371, 555	

C

cable.....	10, 26, 27, 34
ground cable specifications	10
power cable specifications.....	10
selection.....	10, 26, 27, 34
shielded twisted pair	48
cable tie.....	39
CAP. Warning	558
carrier frequency.....	272
derating.....	590
factory default.....	272
charge indicator	24, 553, 562
charge lamp	24
Circulation Pump (MC5).....	545
cleaning.....	568
CleanRPTerr	556
CM terminal	37, 41
COM (Communication function group).....	62
command.....	110
Cmd Source.....	110
configuration.....	110
command source	
fwd/rev command terminal.....	112
keypad	110
RS-485.....	114
commercial power source transition.....	275
common terminal	Refer to EG terminal
communication.....	373
BACnet.....	420
command loss protective operation.....	378
communication address.....	394
communication line connection.....	374
communication parameters	376
communication speed.....	376
communication standards.....	373
memory map.....	382
parameter group for data transmission.....	383
PLC.....	373
saving parameters defined by communication	381
setting virtual multi-function input.....	381
Communication function group.....	Refer to COM
(communication function group)	
communication system configuration	374
compatible common area parameter.....	399
Compressor (MC1).....	538
CON (Control function group).....	62, 457
Config (CNF) mode.....	287
inverter S/W version.....	287
keypad S/W version.....	287
keypad title update	287
LCD contrast.....	287
reset cumulative power consumption.....	287
Config mode	531
Config mode (CNF).....	533
configuration mode	61
considerations for installation	
air pressure	5
considerations for installation.....	5
altitude/vibration.....	5
ambient humidity.....	5
ambient temperature.....	5
environmental factors	5
storing temperature	5
Control group.....	Refer to CON (control function
group)	
control terminal board wiring.....	34
cooling fan	
cumulated fan operation time.....	335
fan control	276
fan malfunctions.....	361
initialize cumulated fan operation time.....	335
Cooling Tower (MC4).....	544
cursor keys	54
[DOWN] key.....	54
[LEFT] key.....	54
[RIGHT] key.....	54
[UP] key.....	54

D	
damper.....	211
Damper Err Trip.....	Refer to <i>Damper Err Trip</i>
damper operation.....	211
damper open delay time.....	211
DB resistor.....	
braking resistor circuit.....	357
DB Warn %ED.....	357
DB Warn %ED.....	357, 558
DC braking after start.....	141
DC braking after stop.....	144
DC braking frequency.....	144
DC link voltage.....	159
Dec valve ramping.....	224
deceleration stop.....	84
delta wiring.....	42
derating.....	272, 590
digital output.....	323
display.....	55
command source.....	55
display mode table.....	61
display modes.....	60
frequency reference.....	55
operation mode.....	55
rotational direction.....	55
disposal.....	568, 576
draw operation.....	158
Drive group.....	Refer to DRV (Drive group)
DRV (Drive function group).....	62
DRV (Drive group).....	439
dwell operation.....	174
Acc/Dec dwell frequency.....	174
acceleration dwell.....	174
deceleration dwell.....	174
dynamic braking (DB) resistor configuration.....	357

E	
earth leakage breaker.....	565
Easy Start On.....	286

EEP Rom Empty.....	278
EG terminal.....	39
electronic thermal overheating protection (ETH)	
.....	337
EMC filter.....	42
asymmetric power source.....	42
disabling.....	42, 44, 45
enable.....	44
enabling.....	44, 45
emergency stop fault trip.....	Refer to <i>BX</i>
Enclosed Type 1.....	582
energy saving.....	216
energy saving operation.....	263
automatic energy saving operation.....	264
manual energy saving operation.....	263
EPID (EPID control) group.....	62
EPID (External PID function group).....	495
EPID control.....	
external PID.....	200
EPID control group.....	62
ETH.....	Refer to <i>electronic thermal overheating protection (ETH)</i>
E-Thermal.....	554
Exception Date.....	242
Exhaust Fan (MC3).....	541
external 24V power terminal.....	Refer to 24 terminal
External Trip.....	555
external trip signal.....	351

F	
fault trips.....	553
fan life estimation.....	368
fan replacement level.....	369
fan time.....	369
fan operation warning.....	371
fan replacement warning.....	558
Fan Trip.....	361, 555
Fan Warning.....	361, 557
fatal.....	553

fault.....	370
fatal.....	553
latch.....	553
level.....	553
major fault.....	370
fault monitoring.....	77
multiple fault trips.....	78
fault signal output terminal..... Refer to A1/C1/B1 terminal	
fault trip mode.....	61
fault/warning list.....	370
braking resistor braking rate warning.....	371
capacitor lifetime warning.....	371
CleanRPTerr Trip.....	370
CPU Watch Dog fault trip.....	371
Damper Err Trip.....	370
E-Thermal.....	370
External Trip.....	370
fan replacement warning.....	371
Fan Trip.....	370
Fan Warning.....	371
Fire mode Warning.....	371
Ground Trip.....	370
In Phase Open.....	370
IO Board Trip.....	370
Level Detect trip.....	370
Level Detect Warning.....	371
Lost Command.....	371
Low Battery Warning.....	371
Low Voltage.....	371
Low Voltage2.....	370
Lubrication Trip.....	370
No Motor Trip.....	370
NTC Open.....	370
Option Trip-x.....	370
Out Phase Open.....	370
Over Current1.....	370
Over Current2.....	370
Over Heat.....	370
Over Load Trip.....	370
Over Voltage.....	370
ParaWrite Trip.....	370
Pipe Broken Trip.....	370
Pipe Broken Warning.....	371
Under Load Trip.....	370
FE (Frame Error).....	393

ferrite.....	39
fieldbus.....	91, 110
communication option.....	153
FIFO/FILO.....	296
filter time constant.....	93
filter time constant number.....	155
Fire mode.....	261
Fire Mode Warning.....	558
flow compensation.....	214
maximum compensation value.....	215
flux braking.....	345
forward or reverse run prevention.....	114
free-run stop.....	84, 145
frequency hold by analog input.....	107
frequency jump.....	84, 152
frequency limit.....	84, 148
frequency jump.....	152
frequency upper and lower limit value.....	148
maximum/start frequency.....	148
frequency reference.....	92, 141
frequency reference for 0–10V input.....	93
frequency reference for -10–10V Input.....	98
frequency reference source configuration.....	81
frequency setting.....	91
I2 current input.....	101
I2 voltage input.....	103
keypad.....	92
RS-485.....	106
TI pulse input.....	104
V1 voltage input.....	93
frequency setting (Pulse train) terminal...Refer to <i>V7 terminal</i>	
frequency setting(voltage) terminal..... Refer to <i>V1 terminal</i>	
frequency upper and lower limit value.....	
Frequency lower limit value.....	148
Frequency upper limit value.....	149
fuse specifications.....	587

G

ground.....	26
class 3 ground.....	27
ground cable specifications.....	10
ground fault trip.....	Refer to <i>Ground Trip</i>
Ground Trip.....	554

H

H100 expansion common area parameter.....	403
control area parameter (Read/Write).....	414
memory control area parameter (Read/Write).....	418
monitor area parameter (read only).....	403
half duplex system.....	373

I

I/O point map.....	434
I2 38	
analog input selection switch (SW4).....	38
frequency setting(current/voltage) terminal.....	38
I2 Terminal.....	101
IA (illegal data address).....	392
ID (illegal data value).....	393
IF (illegal function).....	392
IN (Input terminal function group).....	62, 460
In Phase Open.....	554
initializing accumulated electric energy count.....	287
input and output specifications.....	577
input open-phase fault trip.....	Refer to <i>In Phase Open</i>
input phase open	
input open-phase protection.....	350
input power frequency.....	277
input power voltage.....	278
input power voltage settings.....	277
input terminal.....	37, 156
A (NO) or B (NC) terminal configuration.....	156
bit setting.....	156
CM terminal.....	37
I2 terminal.....	38
NO/NC configuration.....	156

P1–P7 terminal.....	37
TI terminal.....	38
V1 terminal.....	37
VR terminal.....	37
input terminal contact	
A contact.....	351
B contact.....	351
Input terminal function group.....	Refer to IN (Input terminal function group)
inspection	
annual inspection.....	569
bi-annual inspection.....	572
daily inspection.....	568
installation.....	14
basic configuration diagram	16
installation flowchart.....	14
location.....	6
mounting the Inverter.....	17
side-by-side installation.....	8
wiring.....	24
installation conditions.....	5
INV Over Load	
Inv Over Load Warning.....	557
Inverter OLT.....	554
inverter overload protection (IOLT).....	352
Inverter overload warning.....	371
IO Board connection fault trip.....	Refer to <i>IO Board Trip</i>
IO Board Trip.....	557
IP 20.....	582
IP 20 Type external dimensions.....	584

J

Jog operation.....	167
FWD Jog.....	167
Jog frequency.....	167
Jog operation 2 by terminal input.....	168
Jog operation 2-Rev Jog by terminal input.....	168
jump frequency.....	152

K

keypad	53
[AUTO] key	54
[ESC] key	54
[HAND] key	54
[Mode] key	54
[MULTI] key	54, 59
[OFF] key	54
[PROG / Ent] key	54
code information	59
Config mode (CNF)	533
configuration mode	61
cursor keys	54
display	53, 55
display item	59
display mode	60
LCD brightness/contrast	287
monitor mode	61
monitor mode cursor	56
monitor mode item	56
navigating between groups	60
operating status	56, 59
operation keys	53
operation mode	58
parameter group	58
parameter mode	61
parameter value	59
rotational direction	58
S/W version	287
set value	59
setting range	59
status bar configuration	56
trip mode	61
User & Macro mode	61
wiring length	39
keypad display	55
keypad features	
fault monitoring	77
navigating directly to different codes	71
navigating through the codes	69
operation modes	65
parameter settings	72
selecting a display mode	64
selecting the status bar display item	75
setting the monitor display items	74
switching between groups in Parameter Display	

mode	67
switching between groups in User & Macro	
mode	68
keypad title update	287
keypad trip mode	531
kinetic energy buffering	256

L

latch	553
LCD display	55
leakage breaker	586
learning basic features	81
level	553
level detectiontrip restart time	230
Level Detect	556
Level Detect Warning	558
Level Detect Trip	370
level detection control	229
lift-type load	128, 137
linear pattern	128
linear V/F operation	83
linear V/F pattern operation	132
base frequency	132
start frequency	132
load tuning	227
Lost Command	556
command loss fault trip warning	371
command loss trip	371
Lost Command Warning	557
Lost KeyPad	556
Lost KeyPad Warning	558
Low Battery	
low battery warning	558
low battery warning	358
low voltage	362
low voltage fault trip	362, 371
Low Voltage	554
Low voltage fault trip during operation	Refer to
<i>Low Voltage2 Trip</i>	

Low Voltage2.....	554
LowLeakage PWM.....	272
LS INV 485 communication.....	381
LS INV 485 Detailed Read Protocol.....	388
LS INV 485 Detailed Write Protocol.....	389
LS INV 485 error code.....	392
FE (Frame Error).....	393
IA (illegal data address).....	392
ID (illegal data value).....	393
IF (illegal function).....	392
WM (write mode error).....	393
LS INV 485 protocol.....	386
LSINV 485.....	376
lubrication.....	213
Lubrication Trip.....	370
lubrication operation.....	213

M

M2 (Secondary Motor function group).....	529
M2 (secondary motor-related features) group.....	63
Macro	
Circulation Pump (MC5).....	545
Compressor (MC1).....	538
Constant Torque (MC7).....	550
Cooling Tower (MC4).....	544
Exhaust Fan (MC3).....	541
Supply Fan (MC2).....	539
Vacuum Pump (MC6).....	548
Macro function group.....	538
Macro group.....	538
Macro mode.....	64
macro selection.....	289
Macro selection	
Basic.....	289
Circulation Pump.....	290
Compressor.....	289
Constant Torque.....	290
Coolong Tower.....	289
Supply Fan.....	289
Vacuum Pump.....	290
magnetic contactor.....	32, 586
main capacitor life estimation.....	367
CAP Level 1.....	368
CAP Level 2.....	368
maintenance.....	568
manual torque boost.....	83, 137
master.....	374
maximum allowed prospective short-circuit	
current.....	iv
megger test.....	570, 572
Metasys-N2.....	376
analog input.....	435
analog output.....	434
binary input.....	436
binary output.....	435
communication standard.....	432
error code.....	437
I/O point map.....	434
protocol.....	432
metasys-N2 communication.....	432
Metasys-N2 I/O map	
analog input.....	435
analog output.....	434
binary input.....	436
binary output.....	435
MMC.....	292
auto cahnge.....	300
auto change aux.....	302, 305
basic sequence.....	297
interlock.....	307
regular bypass.....	310
MMC Interlock.....	556
Modbus-RTU.....	376
Modbus-RTU communication.....	381
Modbus-RTU function code and protocol.....	394
Modbus-RTU protocol	
exception code	398
read holding resister.....	394
read input resister.....	394
momentary power interruption.....	266, 268
monitoring	
monitor mode.....	61
monitor mode cursor.....	56
monitor mode display.....	55

monitor mode item	56
monitor registration protocol details.....	391
operation state monitoring.....	331
operation time monitoring.....	334
motor features	
capacity	176
efficiency.....	176
no-load current.....	176
operation display options	81
output voltage adjustment.....	140
overheat sensor.....	339
protection.....	337
rotation control.....	82
thermal protection(ETH)	
E-Thermal.....	337
verifying rotational direction	50
Motor overheat fault trip.....	370
motor thermal protection(ETH)	
ETH trip.....	337
mounting bolt.....	17
Multi Key	
Multi key item.....	535
Multi Key Sel	535
multi-drop link system.....	373
multi-function input terminal	37
factory default	37
IN 65–71	464
multi-function input terminal Off filter	155
multi-function input terminal On filter	155
P1–P7	37
Px Define	464
Px terminal configuration.....	464
multi-function input terminal control	155
multi-function input terminals	
factory default	37
multi-function output terminal	
multi-function output category (Q1 Define)....	473
multi-function output on/off control	313
multi-function output terminal and relay settings	323
multi-function output terminal delay time	330
settings	330
multi-function relay1 category (Relay 1)	471
multi-function relay2 category (Relay 2)	473
multi-function relay3category (Relay 3)	473

multi-function relay4 category (Relay 4)	473
multi-function relay5 category (Relay 5)	473
trip output by multi-function output terminal and relay	329
multi-function terminal configuration.....	84
multiple motor control.....	292
multi-step frequency.....	108
setting	108
Speed-L/Speed-M/Speed-H	109
multi-step speed (frequency).....	81

N

N- terminal (- DC link terminal).....	29, 31
no motor trip	366
No Motor Trip.....	554
noise.....	42, 96
Normal PWM.....	272
NPN mode (Sink).....	41
NTC Open.....	555
number of motor poles.....	176

O

open-phase protection.....	350
operation frequency	Refer to <i>frequency setting</i>
operation mode selection.....	81
operation noise	271
carrier frequency.....	272
frequency jump	152
operation time	334
cumulated operation time.....	335
initialize cumulated operation time.....	335
inverter power-on time.....	335
option trip.....	365, Refer to <i>Option Trip-x</i>
Option Trip-1.....	557
Option Trip-x	
option trip.....	370
OUT (Output terminal function group)	62, 469
Out Phase Open.....	554
output block by multi-function terminal.....	363

output open-phase fault trip.....Refer to <i>Out Phase Open</i>	
output terminal.....Refer to R/S/T terminal	
Output terminal function group.....Refer to OUT (Output terminal function group)	
output/communication terminal.....	38
24 terminal.....	39
A1/C1/B1 terminal.....	39
AO terminal.....	38
EG terminal.....	39
S+/S-/SG terminal.....	39
over current trip..... Refer to <i>Over Current1</i>	
Over Current1.....	554
Over Current2.....	555
Over Heat.....	555
over heat fault trip.....Refer to <i>Over Heat</i>	
Over Load.....	553
Over Load Warning.....	557
overload fault trip.....	370
overload warning.....	371
Over Voltage.....	554
over voltage trip..... Refer to <i>Over Voltage</i>	
overload.....Refer to <i>Over Load</i>	
overload trip.....	342
overload warning.....	342
overload rate.....	272
overload trip.....Refer to <i>Over Load</i>	

P

P/I gain.....	268
P1+ terminal (+ DC link terminal).....	29
P2+ terminal (+ DC link terminal).....	29, 31
P2+/B terminal.....	29
P3+ terminals (+ DC link terminal).....	31
parameter.....	72
display changed parameter.....	283
hide parameter mode.....	281
initializing the parameters.....	79
parameter initialization	280
parameter lock.....	282

parameter settings.....	72
password.....	281, 282
Parameter Initialization.....	280
parameter mode.....	61
parameter setting mode.....	62
ParaWrite Trip.....	557
parameter	
read/write/save.....	278
part names.....	3
parts illustrated.....	3
parts life.....	367
capacitor life estimation.....	367
fan life.....	368
password.....	281, 282, 419
payback counter.....	216
peripheral devices.....	586
phase-to-phase voltage.....	563
PID	
flow control.....	178
pressure control.....	177
speed control.....	177
temperature control.....	178
PID (Advanced function group).....	483
PID (PID control) group.....	62
PID control	
PID openloop.....	199
PID operation sleep mode.....	197
PID operation switching.....	199
PID reference.....	190
PID control groupRefer to PID (PID control) group	
pipe break.....	233
pipe break detection control	
Pipe Broken.....	233
pipe break detection control	
Pipe Broken.....	556
Pipe Broken Warning.....	558
Pipe Broken fault trip.....Refer to <i>PipeBroken Trip</i>	
PNP mode (Source).....	41
PNP/NPN mode selection switch (SW2).....	34
NPN mode (Sink).....	41
PNP mode (Source).....	41

post-installation checklist.....	47
potentiometer.....	37
power braking.....	84
power consumption.....	333, 334
power input terminal.....Refer to <i>R/S/T terminal</i>	
power output terminal.....Refer to <i>R/S/T terminal</i>	
power terminal board wiring.....	27
power terminals.....	31
N- terminal.....	29, 31
P1+ terminal.....	29
P2+ terminal.....	29, 31
P2+/B terminal.....	29
P3+ terminal.....	31
R/S/T terminals.....	29, 31
U/V/W terminal.....	29, 31
PowerOn Resume.....	336
PowerOn Resume by serial communication.....	336
Power-on Run.....	116
pre-heating.....	235
preparing the installation.....	1
press regeneration prevention.....	314
P gain/I gain.....	315
product identification.....	1
product specification details.....	580
protocol.....	
BACnet protocol.....	420
LS INV 485 protocol.....	386
Metasys-N2 protocol.....	432
PRT (protection features) group.....	63
PRT (Protection function group).....	520
Pulse output terminal..... Refer to TO terminal	
pump clean.....	218
Pump clean trip..... Refer to <i>Pump Clean Trip</i>	
PWM.....	272
frequency modulation.....	271

Q

quantizing.....	96
Quantizing	

noise.....	96
------------	----

quick reference.....	v
----------------------	---

R

R/S/T terminals.....	29, 31, 562
R/S/T terminals.....	32
rating.....	
braking resistor rated capacity.....	589
derating.....	590
rated motor current.....	176
rated motor voltage.....	238
rated slip frequency.....	176
rated slip speed.....	176
rating plate.....	1
reactor.....	16
reactors specifications.....	587
real-time clock.....	21
regenerated energy.....	146
Reset Restart.....	119
settings.....	270
resonance frequency.....	
carrier frequency.....	271
restarting after a trip.....	
Reset Restart.....	119
retry number.....	119
ripple.....	96
RS-232.....	374
communication.....	374
RS-485.....	373
communication.....	374
converter.....	374
integrated communication.....	106
setting command and frequency.....	378
signal terminal.....	39, 106
RS-485 signal input terminal..... Refer to <i>S+/S-/SG</i>	
terminal.....	
RTC battery.....	21, 572
enabling.....	21
replacing.....	572
specifications.....	572
run prevention.....	
Fwd.....	116

Rev	116
-----------	-----

S

S/W version	287
inverter.....	287
keypad	287
S+ /S- /SG terminal	39
safe operation mode	172
safety information	ii
screw specification	
control circuit terminal screw	589
input/output terminal screw.....	589
screw size.....	589
screw torque	589
S-curve pattern	128
actual Acc/Dec time.....	130
secondary motor-related features group.....Refer to	
M2 (the secondary motor-related features)	
group	
selecting operation modes	65, 84
auto mode operation.....	86
basic operation	87
function codes.....	89
hand mode operation.....	85
mode keys and indicators.....	86
Power-on Run/PowerOn Resume in each mode	
.....	90
switching between the modes.....	89
sequence common terminal..Refer to <i>CM terminal</i>	
side-by-side installation.....	8
slave.....	374
slip.....	176
slip compensation operation.....	176
soft fill control	
soft fill operation.....	194
speed command loss	352
speed search operation.....	264
Flying Start-1	265
Flying Start-2	265
options.....	266
P/I gain	268

speed unit selection (Hz or Rpm).....	108
square reduction.....	83
square reduction load	133
V/F pattern operation.....	133
stall	345
bit On/Off	346
stall prevention.....	345
start after DC braking.....	83
start at power-on	
PowerOn Resume	118
Power-on Run.....	116
start mode.....	141
acceleration start	141
start after DC braking	141
Start&End Ramp operation	223
Station ID.....	394
stop mode.....	142
DC braking after stop	144
deceleration stop.....	142
free run stop	145
power braking.....	146
storage	576
Supply Fan (MC2)	539
surge killer	32, 48
SW1	Refer to Terminating Resistor selection switch (SW1)
SW2	Refer to PNP/NPN mode selection switch (SW2)
SW3	Refer to V1/T1 (PTC) mode selection switch (SW3)
SW4	Refer to analog input selection switch (SW4)
SW5	Refer to analog output selection switch (SW5)
switch	
analog input selection switch (SW4).....	34
analog output selection switch (SW5)	34
PNP/NPN mode selection switch (SW2).....	34
Terminating Resistor selection switch (SW1)	34
V1/T1 (PTC) mode selection switch (SW3).....	34
Switches.....	34

T

target frequency	
Cmd frequency	439
Temperature sensor fault trip	<i>NTC Open</i>
terminal	
A terminal	156, 331
B terminal	156, 331
terminal for frequency reference setting	Refer to <i>VR terminal</i>
terminal screw specifications	588
Terminating Resistor selection switch (SW1)	34
test run	50
Thermal Trip	556
TI terminal	38, 104
Time Event	242
time event scheduling	242
Exception Date	242
module types	242
parameters	242
RTC battery	242
RTC clock	242
Time Event	242
Time Period Module	242
Time Period Module	242
time scale setting	121
0.01sec	121
0.1sec	121
1sec	121
timer	290
protection features groupPRT (protection features)	
group	
TO terminal	319
torque	24
torque boost	137
auto torque boost	138
manual torque boost	137
overexcitation	138
trip	553
erasing trip history	287
fault/warning list	370
trip no motor trip	366

trip status reset	365
troubleshooting	558
Trip mode	61
Trip mode	531
troubleshooting	553
fault trips	558
other faults	561

U

U&M mode	284, 385
U/V/W terminals	29, 31, 32, 562
Under Load	
Under Load Trip	359, 554
Under Load Warning	359, 557
underload fault trip	370
underload warning	371
underload fault trip	Refer to <i>Under Load</i>
Unipolar	37
up-down operation	169
User & Macro mode	60, 61, 64
User group	284
delete parameters	284
parameter registration	284
User mode	64
user V/F pattern operation	135
User/Macro group	
parameter group	385
U&M mode	385
using the keypad	64

V

V/F control	132
linear V/F pattern operation	132
square reduction V/F pattern operation	133
user V/F pattern operation	135
V/F pattern configuration	83
V1 terminal	37, 93
V1/T1 (PTC) mode selection switch (SW3)	34
V2	
analog input selection switch (SW4)	38

V2 input.....	103
I2 voltage input.....	103
Vacuum Pump (MC6).....	548
variable torque load.....	133
vent cover.....	8
virtual multi-function input.....	381
voltage/current output terminal.....	Refer to AO
terminal.....	
VR terminal.....	37

W

warning.....	370, 553
fault/warning list.....	370

warning message.....	557
Warning.....	371
wiring.....	10, 24
circuit breaker.....	586
control terminal board wiring.....	34
copper cable.....	24
disassembling the cover.....	24
ferrite.....	39
ground.....	26
power terminal board.....	27
re-assembling the cover.....	46
wiring length.....	39
WM (write mode error).....	393
Write parameter fault trip	Refer to <i>ParaWrite Trip</i>