

Chapter 3 OPERATION USING THE KEYPAD

3.1 LED Monitor, Keys and LED Indicators on the Keypad

As shown at the right, the keypad consists of a four-digit LED monitor, six keys, and five LED indicators.


The keypad allows you to run and stop the motor, monitor running status, and switch to the menu mode. In the menu mode, you can set the function code data, monitor I/O signal states, maintenance information, and alarm information.



Table 3.1 Overview of Keypad Functions

Item	LED Monitor, Keys, and LED Indicators	Functions
LED Monitor		<p>Four-digit, 7-segment LED monitor which displays the followings according to the operation modes.</p> <ul style="list-style-type: none"> ■ In Running mode: Running status information (e.g., output frequency, current, and voltage) ■ In Programming mode: Menus, function codes and their data ■ In Alarm mode: Alarm code, which identifies the alarm factor if the protective function is activated.
Operation Keys		<p>Program/Reset key which switches the operation modes of the inverter.</p> <ul style="list-style-type: none"> ■ In Running mode: Pressing this key switches the inverter to Programming mode. ■ In Programming mode: Pressing this key switches the inverter to Running mode. ■ In Alarm mode: Pressing this key after removing the alarm factor will switch the inverter to Running mode.
		<p>Function/Data key which switches the operation you want to do in each mode as follows:</p> <ul style="list-style-type: none"> ■ In Running mode: Pressing this key switches the information to be displayed concerning the status of the inverter (output frequency (Hz), output current (A), output voltage (V), etc.). ■ In Programming mode: Pressing this key displays the function code and sets the data entered with and keys. ■ In Alarm mode: Pressing this key displays the details of the problem indicated by the alarm code that has come up on the LED monitor.
		RUN key. Press this key to run the motor.
		STOP key. Press this key to stop the motor.
		UP and DOWN keys. Press these keys to select the setting items and change the function code data displayed on the LED monitor.

Table 3.1 Overview of Keypad Functions (Continued)

Item	LED Monitor, Keys, and LED Indicators	Functions					
LED Indicators	RUN LED	Lights when any run command to the inverter is active.					
	KEYPAD CONTROL LED	Lights when the inverter is ready to run with a run command entered by the  key (F02 = 0, 2, or 3). In Programming and Alarm modes, you cannot run the inverter even if the indicator lights.					
	Unit LEDs (3 LEDs)	<p>These three LED indicators identify the unit of numeral displayed on the LED monitor in running mode by combination of lit and unlit states of them. Unit: kW, A, Hz, r/min and m/min Refer to Chapter 3, Section 3.3.1 "Monitoring the running status" for details.</p> <p>While the inverter is in Programming mode, the LEDs of</p> <table style="float: right;"> <tr> <td><input checked="" type="checkbox"/></td> <td>Hz</td> </tr> <tr> <td><input type="checkbox"/></td> <td>A</td> </tr> <tr> <td><input checked="" type="checkbox"/></td> <td>kW</td> </tr> </table>	<input checked="" type="checkbox"/>	Hz	<input type="checkbox"/>	A	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	Hz						
<input type="checkbox"/>	A						
<input checked="" type="checkbox"/>	kW						

Simultaneous keying

Simultaneous keying means pressing two keys at the same time. The FRENIC-Multi supports simultaneous keying as listed below. The simultaneous keying operation is expressed by a "+" letter between the keys throughout this manual.











(For example, the expression " +  keys" stands for pressing the  key while holding down the  key.)

Table 3.2 Simultaneous Keying

Operation mode	Simultaneous keying	Used to:
Programming mode	 +  keys	Change certain function code data. (Refer to codes F00, H03, H45, H97, J75, and J77 in Chapter 5 "FUNCTION CODES.")
	 +  keys	
Alarm mode	 +  keys	Switch to Programming mode without resetting alarms currently occurred.

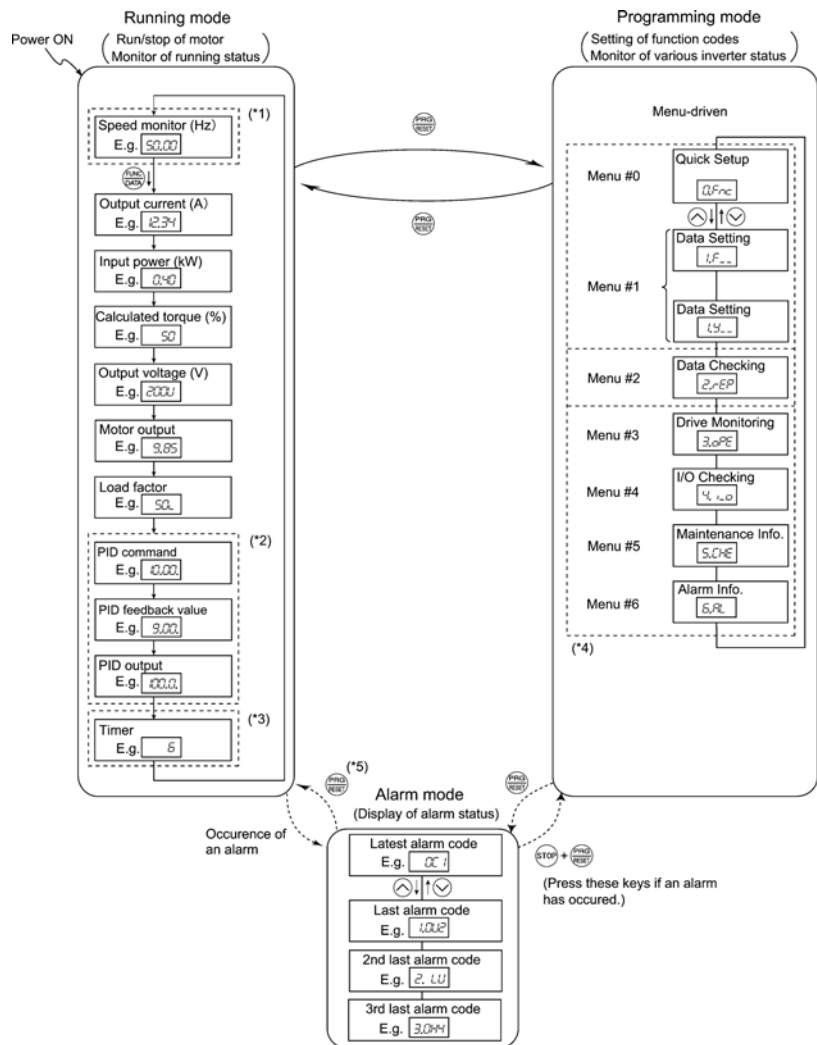
3.2 Overview of Operation Modes

FRENIC-Multi features the following three operation modes:

- Running mode : This mode allows you to enter run/stop commands in regular operation. You can also monitor the running status in real time.
- Programming mode : This mode allows you to configure function code data and check a variety of information relating to the inverter status and maintenance.
- Alarm mode : If an alarm condition arises, the inverter automatically enters Alarm mode. In this mode, you can view the corresponding alarm code* and its related information on the LED monitor.

* Alarm code: Indicates the cause of the alarm condition that has triggered a protective function. For details, refer to Chapter 8, Section 8.5 "Protective Functions."

Figure 3.1 shows the status transition of the inverter between these three operation modes.



(*1) The speed monitor allows you to select the desired one from the seven speed monitor items by using function code E48.

(*2) Applicable only when PID control is active (J01 = 1, 2 or 3).

(*3) The Timer screen appears only when the timer operation is enabled with function code C21.

(*4) Applicable only when the full-menu mode is selected (E52 = 2).

(*5) Pressing **STOP** key can reset an alarm only when the latest alarm is displayed on the LED monitor.

Figure 3.1 Transition between Basic Screens in Individual Operation Mode

3.3 Running Mode

When the inverter is turned ON, it automatically enters Running mode in which you can:

- (1) Monitor the running status (e.g., output frequency and output current),
- (2) Configure the reference frequency and other settings,
- (3) Run/stop the motor, and
- (4) Jog (inch) the motor.

3.3.1 Monitoring the running status



In Running mode, the eleven items listed below can be monitored. Immediately after the inverter is turned ON, the monitor item specified by function code E43 is displayed. Press the  key to switch between monitor items. For details of switching the monitor item by using the  key, refer to "Monitor of running status" in Running mode in Figure 3.1.

Table 3.3 Monitoring Items



Monitor items	Display sample on the LED monitor *1	LED indicator ■: ON, □: OFF	Unit	Meaning of displayed value	Function code data for E43
Speed monitor	Function code E48 specifies what to be displayed on the LED monitor and LED indicators.				0
Output frequency (before slip compensation)	50.00	■Hz □A □kW	Hz	Frequency actually being output	(E48 = 0)
Output frequency (after slip compensation)	50.00	■Hz □A □kW	Hz	Frequency actually being output	(E48 = 1)
Reference frequency	50.00	■Hz □A □kW	Hz	Reference frequency being set	(E48 = 2)
Motor speed	1500	■Hz ■A □kW	r/min	Output frequency (Hz) × $\frac{120}{P01}$ For motor 2, read P01 as A15.	(E48 = 3)
Load shaft speed	300.0	■Hz ■A □kW	r/min	Output frequency (Hz) × E50	(E48 = 4)
Line speed	300.0	□Hz ■A ■kW	m/min	Output frequency (Hz) × E50	(E48 = 5)
Constant feeding rate time	50	□Hz □A □kW	min	$\frac{E50}{\text{Output frequency (Hz)} \times E39}$	(E48 = 6)
Output current	12.34	□Hz ■A □kW	A	Current output from the inverter in RMS	3
Output voltage *2	200V	□Hz □A □kW	V	Voltage output from the inverter in RMS	4
Calculated torque	50	□Hz □A □kW	%	Motor output torque in % (Calculated value)	8
Input power	10.25	□Hz □A ■kW	kW	Input power to the inverter	9

Table 3.3 Monitoring Items (Continued)

Monitor items	Display sample on the LED monitor *1	LED indicator ■: ON, □: OFF	Unit	Meaning of displayed value	Function code E43
PID command *3, *4	10.00	□Hz □A □kW	—	PID command/feedback amount transformed to that of virtual physical value of the object to be controlled (e.g. temperature) Refer to function codes E40 and E41 for details.	10
PID feedback amount *3, *5	5.00	□Hz □A □kW	—		12
Timer (Timer operation)*3	50	□Hz □A □kW	min	Remaining time of timer operation	13
PID output *3, *4	100.0	□Hz □A □kW	%	PID output in % as the maximum frequency (F03) being at 100% For motor 2, read F03 as A01.	14
Load factor *6	50	□Hz □A □kW	%	Load factor of the motor in % as the rated output being at 100%	15
Motor output *7	5.85	□Hz □A ■kW	kW	Motor output in kW	16







- *1 A value exceeding 9999 cannot be displayed on the 4-digit LED monitor screen, so "E 3" appear instead.
- *2 When the LED monitor displays an output voltage, the 7-segment letter *V* in the lowest digit stands for the unit of the voltage "V."
- *3 These PID related items appear only when the inverter PID-controls the motor according to a PID command specified by function code J01 (= 1, 2 or 3).
The Timer item appears only when the timer operation is enabled with function code C21.
When the PID control or timer operation is disabled, "----" appear.
- *4 When the LED monitor displays a PID command or its output amount, the dot (decimal point) attached to the lowest digit of the 7-segment letter blinks.
- *5 When the LED monitor displays a PID feedback amount, the dot (decimal point) attached to the lowest digit of the 7-segment letter lights.
- *6 When the LED monitor displays a load factor, the 7-segment letter *L* in the lowest digit stands for "%."
- *7 When the LED monitor displays the motor output, the unit LED indicator "kW" blinks.

3.3.2 Setting up frequency and PID commands
















You can set up the desired frequency and PID commands by using  and  keys on the keypad. It is also possible to set up the frequency command as load shaft speed, motor speed etc. by setting function code E48.

■ Setting up a frequency command

Using  and  keys (Factory default)

- (1) Set function code F01 to "0:  /  keys on keypad." This can be done only when the inverter is in Running mode.
- (2) Press the  /  key to display the current reference frequency. The lowest digit will blink.
- (3) If you need to change the frequency command, press the  /  key again. The new setting will be automatically saved into the inverter's internal memory and retained even when the power is off. When the power is turned ON next time, the setting will be used as an initial reference frequency.







- If you have set function code F01 to "0:  /  keys on keypad" but have selected a frequency command source other than frequency command 1 (i.e., frequency command 2, frequency command via communication, or multi-frequency command), then the  and  keys are disabled to change the current frequency command even in Running mode. Pressing either of these keys just displays the current reference frequency.
- When you start specifying the reference frequency or any other parameter with the  /  key, the least significant digit on the display blinks; that is, the cursor lies in the least significant digit. Holding down the  /  key changes data in the least significant digit and generates a carry, while the cursor remains in the least significant digit.
- After the least significant digit blinks by pressing the  /  key, holding down the  key for more than 1 second moves the cursor from the least significant digit to the most significant digit. Further holding it down moves the cursor to the next lower digit. This cursor movement allows you to easily move the cursor to the desired digit and change the data in higher digits.
- By setting function code C30 to "0:  /  keys on keypad" and selecting frequency command 2, you can also specify or change the frequency command in the same manner using the  /  key.

You can set a reference frequency not only with the frequency (Hz) but also with other menu items (motor speed, load shaft speed, line speed and constant feeding rate time) depending on the setting of function code E48 (= 3, 4, 5 or 6) as listed in Table 3.3.











■ Settings under PID process control

To enable the PID process control, you need to set function code J01 to "1" or "2."



Under the PID control, the items that can be specified or checked with  and  keys are different from those under regular frequency control, depending upon the current LED monitor setting. If the LED monitor is set to the speed monitor (E43 = 0), you can access manual speed commands (frequency command) with  and  keys; if it is set to any other, you can access the PID process command with those keys.

 Refer to the FRENIC-Multi User's Manual for the details of the PID control.

Setting the PID process command with the and keys

- (1) Set function code J02 to "0":  /  keys on keypad."
- (2) Set the LED monitor to something other than the speed monitor (E43=0) when the inverter is in Running mode. When the keypad is in Programming or Alarm mode, you cannot modify the PID process command with the  /  key. To enable the PID process command to be modified with the  /  key, first switch to Running mode.
- (3) Press the  /  key to display the PID process command. The lowest digit of the displayed command and its decimal point blink.
- (4) To change the PID process command, press the  /  key again. The PID process command you have specified will be automatically saved into the inverter's internal memory. It is retained even if you temporarily switch to another PID process command source and then go back to the via-keypad PID process command. Also, it is retained in the memory even while the inverter is powered off, and will be used as the initial PID process command next time the inverter is powered ON.



- Even if multi-frequency is selected as a PID process command (**SS4** or **SS8** = ON), you still can set the process command using the keypad.
- When function code J02 is set to any value other than "0," pressing the  /  key displays, on the 7-segment LED monitor, the PID process command currently selected, while you cannot change the setting.
- On the 7-segment LED monitor, the decimal point of the lowest digit is used to characterize what is displayed. The decimal point of the lowest digit blinks when a PID process command is displayed; the decimal point lights when a PID feedback amount is displayed.

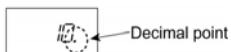




Table 3.4 PID process Command Manually Set with  /  Key and Requirements

PID control (Mode selection) J01	PID control (Remote command SV) J02	LED monitor E43	Multi-frequency SS4 , SS8	With  /  key
1 or 2	0	Other than 0	ON or OFF	PID process command <u>by keypad</u>
	Other than 0			PID process command <u>currently selected</u>

Setting up the frequency command with \wedge and \vee keys under PID process control

When function code F01 is set to "0" (\wedge / \vee keys on keypad) and frequency command 1 is selected as a manual speed command (when disabling the frequency setting command via communications link or multi-frequency command), switching the LED monitor to the speed monitor in Running mode enables you to modify the frequency command with the \wedge / \vee keys.

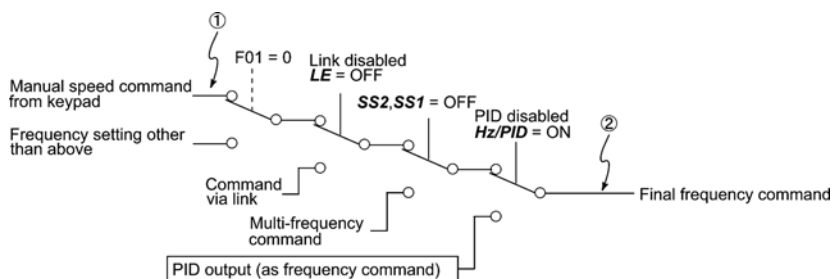
In Programming or Alarm mode, the \wedge / \vee keys are disabled to modify the frequency command. You need to switch to Running mode.

Table 3.5 lists the combinations of the commands and the figure illustrates how the manual speed command ① entered via the keypad is translated to the final frequency command ②.

The setting procedure is the same as that for setting of a usual frequency command.

Table 3.5 Manual Speed (Frequency) Command Specified with \wedge / \vee Keys and Requirements

PID control (Mode selection) J01	LED monitor E43	Frequency command 1 F01	Multi-frequency SS2	Multi-frequency SS1	Communications link operation LE	Cancel PID control Hz/PID	Pressing \wedge / \vee keys controls:	
1 or 2	0	0	OFF	OFF	OFF	OFF (PID enabled)	PID output (as final frequency command)	
						ON (PID disabled)	Manual speed (frequency) command set by keypad	
		Other than the above					OFF (PID enabled)	PID output (as final frequency command)
							ON (PID disabled)	Manual speed (frequency) command currently selected



■ Settings under PID dancer control

To enable the PID dancer control, you need to set function code J01 to "3."

Under the PID control, the items that can be specified or checked with \triangle and ∇ keys are different from those under the regular frequency control, depending upon the current LED monitor setting. If the LED monitor is set to the speed monitor (E43 = 0), the item accessible is the primary frequency command; if it is set to any other data, it is the PID dancer position command.

 Refer to the FRENIC-Multi User's Manual for the details of the PID control.

Setting the PID dancer position command with the \triangle and ∇ keys

- (1) Set function code J02 to "0: \triangle / ∇ keys on keypad."
- (2) Set the LED monitor to something other than the speed monitor (E43=0) when the inverter is in Running mode. When the keypad is in Programming or Alarm mode, you cannot modify the PID command with the \triangle / ∇ key. To enable the PID dancer position command to be modified with the \triangle / ∇ key, first switch to Running mode.
- (3) Press the \triangle / ∇ key to display the PID dancer position command. The lowest digit of the displayed command and its decimal point blink.
- (4) To change the command, press the \triangle / ∇ key again. The command you have specified will be automatically saved into the inverter's internal memory as function code J57 data. It is retained even if you temporarily switch to another PID command source and then go back to the via-keypad PID command. Furthermore, you can directly configure the command with function code J57.



- Even if multi-frequency is selected as a PID command (**SS4** or **SS8** = ON), you still can set the PID dancer position command using the keypad.
- When function code J02 is set to any value other than "0," pressing the \triangle / ∇ key displays, on the 7-segment LED monitor, the PID command currently selected, while you cannot change the setting.
- On the 7-segment LED monitor, the decimal point of the lowest digit is used to characterize what is displayed. The decimal point of the lowest digit blinks when a PID command is displayed; the decimal point lights when a PID feedback amount is displayed.

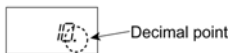


Table 3.6 PID Command Manually Set with \triangle / ∇ Key and Requirements

PID control (Mode selection) J01	PID control (Remote command SV) J02	LED monitor E43	Multi-frequency SS4 , SS8	With \triangle / ∇ key
3	0	Other than 0	ON or OFF	PID command <u>by keypad</u>
	Other than 0			PID command <u>currently selected</u>

Setting up the primary frequency command with \wedge and \vee keys under PID dancer control

When function code F01 is set to "0" (\wedge / \vee keys on keypad) and frequency command 1 is selected as a primary frequency command (when disabling the frequency setting command via communications link and multi-frequency command), switching the LED monitor to the speed monitor in Running mode enables you to modify the frequency command with the \wedge / \vee keys.

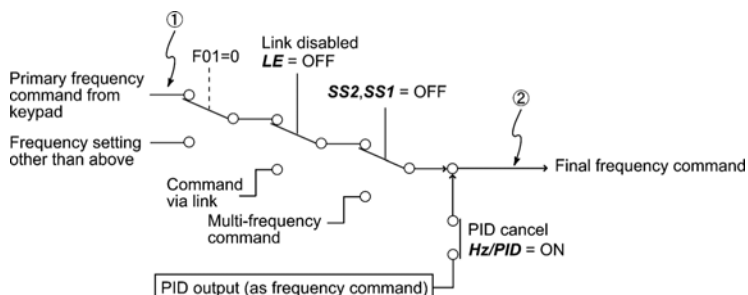
In Programming or Alarm mode, the \wedge / \vee keys are disabled to modify the frequency command. You need to switch to Running mode.

Table 3.7 lists the combinations of the commands and the figure illustrates how the primary frequency command ① entered via the keypad is translated to the final frequency command ②.

The setting procedure is the same as that for setting of a usual frequency command.

Table 3.7 Primary Frequency Command Specified with \wedge / \vee Keys and Requirements

PID control (Mode selection) J01	LED monitor E43	Frequency command 1 F01	Multi-frequency SS2	Multi-frequency SS1	Communications link operation LE	Cancel PID control Hz/PID	Pressing \wedge / \vee keys controls:	
3	0	0	OFF	OFF	OFF	OFF (PID enabled)	Final frequency command modified by PID output	
						ON (PID disabled)	Keypad primary command (Frequency)	
		Other than the above					OFF (PID enabled)	Final frequency command modified by PID output
							ON (PID disabled)	Current primary command (Frequency)



3.3.3 Running/stopping the motor

By factory default, pressing the **RUN** key starts running the motor in the forward direction and pressing the **STOP** key decelerates the motor to stop. The **RUN** key is enabled only in Running mode.

The motor rotational direction can be selected by changing the setting of function code F02.

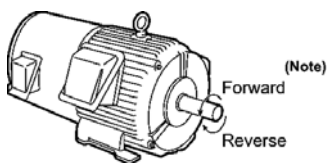


■ Operational relationship between function code F02 (Operation method) and **RUN** key

Table 3.8 lists the relationship between function code F02 settings and the **RUN** key, which determines the motor rotational direction.

Table 3.8 Motor Rotational Direction Specified by F02

Data for F02	Pressing the RUN key runs the motor:
0	In the direction commanded by the terminal [FWD] or [REV]
1	RUN key disabled (The motor is driven by terminal [FWD] or [REV] command.)
2	In the forward direction
3	In the reverse direction



(Note) The rotational direction of IEC-compliant motors is opposite to that of the motor shown here.

For the details on operations with function code F02, refer to Chapter 5 "FUNCTION CODES."

Note When the keypad is in use for specifying the frequency settings or driving the motor, do not disconnect the keypad from the inverter when the motor is running. Doing so may stop the inverter.

3.4 Programming Mode

The Programming mode provides you with these functions--setting and checking function code data, monitoring maintenance information and checking input/output (I/O) signal status. The functions can be easily selected with the menu-driven system. Table 3.9 lists menus available in Programming mode. The leftmost digit (numerals) of each letter string on the LED monitor indicates the corresponding menu number and the remaining three digits indicate the menu contents.

When the inverter enters Programming mode from the second time on, the menu selected last in Programming mode will be displayed.

Table 3.9 Menus Available in Programming Mode

Menu #	Menu	LED monitor shows:	Main functions	Refer to:
0	"Quick Setup"	<i>QFnc</i>	Displays only basic function codes to customize the inverter operation.	Section 3.4.1
1	"Data Setting"	<i>f--</i>	F codes (Fundamental functions)	Selecting each of these function codes enables its data to be displayed/changed.
		<i>E--</i>	E codes (Extension terminal functions)	
		<i>C--</i>	C codes (Control functions)	
		<i>P--</i>	P codes (Motor 1 parameters)	
		<i>H--</i>	H codes (High performance functions)	
		<i>R--</i>	A codes (Motor 2 parameters)	
		<i>J--</i>	J codes (Application functions)	
		<i>y--</i>	y codes (Link functions)	
		<i>o--</i>	o codes (Optional function)	
2	"Data Checking"	<i>crEP</i>	Displays only function codes that have been changed from their factory defaults. You can refer to or change those function code data.	Section 3.4.3
3	"Drive Monitoring"	<i>3drE</i>	Displays the running information required for maintenance or test running.	Section 3.4.4
4	"I/O Checking"	<i>4. io</i>	Displays external interface information.	Section 3.4.5
5	"Maintenance Information"	<i>5. tHE</i>	Displays maintenance information including cumulative run time.	Section 3.4.6
6	"Alarm Information"	<i>6. AL</i>	Displays the recent four alarm codes. You can refer to the running information at the time when the alarm occurred.	Section 3.4.7

(Note 1) Mounting an optional multi-function keypad (TP-G1) adds the data copying function to the menu, enabling reading, writing, and verifying of function code data.

(Note 2) The o codes are displayed only when the corresponding option is mounted. For details, refer to the Instruction Manual for the corresponding option.




■ Selecting menus to display

The menu-driven system allows you to cycle through menus. To cycle through necessary menus only for simple operation, use function code E52 that provides a choice of three display modes as listed below.

The factory default (E52 = 0) is to display only two menus--Menu #0 "Quick Setup" and Menu #1 "Data Setting," allowing no switching to any other menu.

Table 3.10 Keypad Display Mode Selection – Function Code E52

Data for E52	Mode	Menus selectable
0	Function code data editing mode (factory default)	Menu #0 "Quick Setup" Menu #1 "Data Setting"
1	Function code data check mode	Menu #2 "Data Checking"
2	Full-menu mode	Menus #0 through #6

Tip Pressing the  /  key will cycle through the menu. With the  key, you can select the desired menu item. Once the entire menu has been cycled through, the display will return to the first menu item.

3.4.1 Setting up basic function codes quickly -- Menu #0 "Quick Setup" --

Menu #0 "Quick Setup" in Programming mode allows you to quickly display and set up a basic set of function codes specified in Chapter 5, Section 5.1, "Function Code Tables."

To use Menu #0 "Quick Setup," you need to set function code E52 to "0" (Function code data editing mode) or "2" (Full-menu mode).


The predefined set of function codes that are subject to quick setup are held in the inverter.


Listed below are the function codes (including those not subject to quick setup) available on the FRENIC-Multi.

Table 3.11 Function Codes Available on FRENIC-Multi

Function code group	Function codes	Function	Description
F codes	F00 to F51	Fundamental functions	Functions concerning basic motor running
E codes	E01 to E99	Extension terminal functions	Functions concerning the assignment of control circuit terminals Functions concerning the display of the LED monitor
C codes	C01 to C53	Control functions	Functions associated with frequency settings
P codes	P01 to P99	Motor 1 parameters	Functions for setting up characteristics parameters (such as capacity) of the motor
H codes	H03 to H98	High performance functions	Highly added-value functions Functions for sophisticated control
A codes	A01 to A46	Motor 2 parameters	Functions for setting up characteristics parameters (such as capacity) of the motor
J codes	J01 to J92	Application functions	Functions for applications such as PID control
y codes	y01 to y99	Link functions	Functions for controlling communication
o codes	o01 to o59	Optional functions	Functions for options (Note)

(**Note**) The o codes are displayed only when the corresponding option is mounted. For details of the o codes, refer to the Instruction Manual for the corresponding option.

 For the list of function codes subject to quick setup and their descriptions, refer to Chapter 5, Section 5.1 "Function Code Tables."

 Through a multi-function keypad, you can add or delete function codes that are subject to Quick Setup. For details, refer to the "Multi-function Keypad Instruction Manual."

Once you have added or deleted function codes for Quick Setup through a multi-function keypad, they will remain valid even after you switch to a standard keypad. To restore the function code settings subject to Quick Setup to their factory defaults, initialize the whole data using function code H03 (data = 1).

Figure 3.2 shows the menu transition in Menu #0 "Quick Setup."

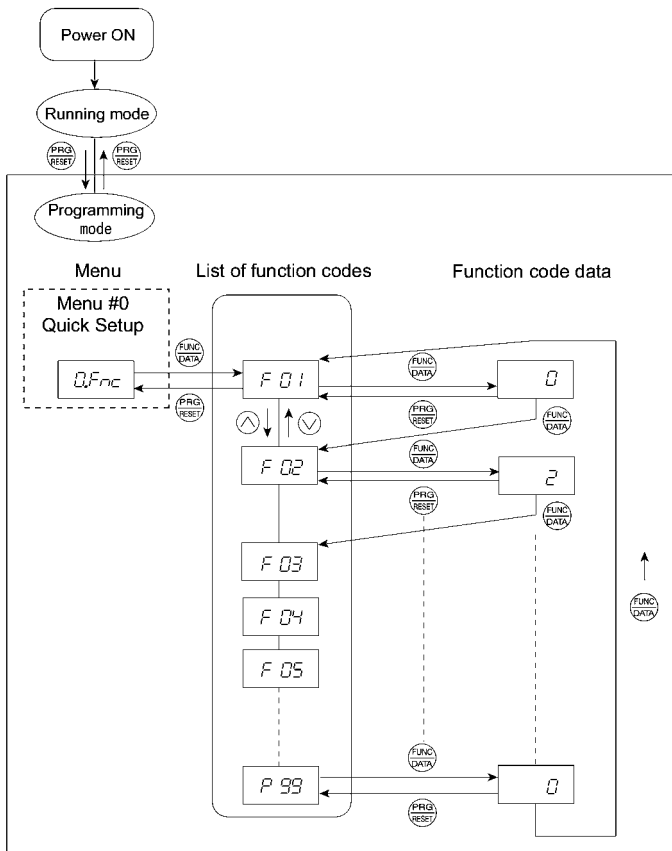


Figure 3.2 Menu Transition in Menu #0 "Quick Setup"

Basic key operation

This section gives a description of the basic key operation, following the example of the function code data changing procedure shown in Figure 3.3.

This example shows you how to change function code F01 data from the factory default "∧/∨" keys on keypad (F01 = 0) to "Current input to terminal [C1] (C1 function) (4 to 20 mA DC) (F01 = 2)."

- (1) Turn the inverter ON. It automatically enters Running mode. In that mode, press the key to switch to Programming mode. The function selection menu appears. (In this example, *Func* is displayed.)
- (2) If anything other than *Func* is displayed, use the and keys to display *Func*.
- (3) Press the key to proceed to a list of function codes.
- (4) Use the and keys to display the desired function code (*F 01* in this example), then press the key.
The data of this function code appears. (In this example, data *0* of *F 01* appears.)

- (5) Change the function code data using the Δ and ∇ keys. (In this example, press the Δ key two times to change data 0 to 2.)
- (6) Press the FUNC DATA key to establish the function code data.
 The *SAVE* appears and the data will be saved in the memory inside the inverter. The display will return to the function code list, then move to the next function code. (In this example, *F 02*.)
 Pressing the FUNC RESET key instead of the FUNC DATA key cancels the change made to the data. The data reverts to the previous value, the display returns to the function code list, and the original function code reappears.
- (7) Press the FUNC RESET key to return to the menu from the function code list.



Tip Cursor movement

You can move the cursor when changing function code data by holding down the FUNC DATA key for 1 second or longer in the same way as with the frequency settings. This action is called "Cursor movement."

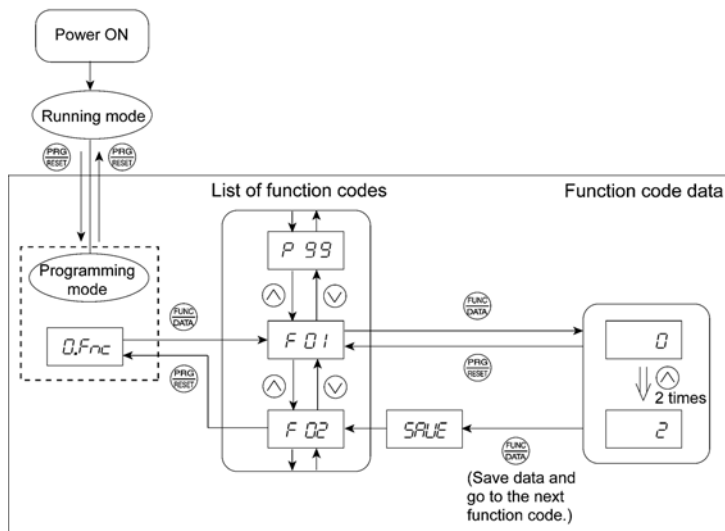


Figure 3.3 Example of Function Code Data Changing Procedure

3.4.2 Setting up function codes -- Menu #1 "Data Setting" --

Menu #1 "Data Setting" in Programming mode allows you to set up function codes for making the inverter functions match your needs.

To set function codes in this menu, it is necessary to set function code E52 to "0" (Function code data editing mode) or "2" (Full-menu mode).

Basic key operation

For details of the basic key operation, refer to Menu #0 "Quick Setup" in Section 3.4.1.

3.4.3 Checking changed function codes -- Menu #2 "Data Checking" --

Menu #2 "Data Checking" in Programming mode allows you to check function codes that have been changed. Only the function codes whose data has been changed from the factory defaults are displayed on the LED monitor. You can refer to the function code data and change it again if necessary. The menu transition in Menu #2 "Data Checking" is as same as its of Menu #0 "Quick Setup."

Basic key operation

For details of the basic key operation, refer to Menu #0 "Quick Setup" in Section 3.4.1.

Tip To check function codes in Menu #2 "Data Checking," it is necessary to set function code E52 to "1" (Function code data check mode) or "2" (Full-menu mode).

3.4.4 Monitoring the running status -- Menu #3 "Drive Monitoring" --

Menu #3 "Drive Monitoring" is used to monitor the running status during maintenance and trial running. The display items for "Drive Monitoring" are listed in Table 3.12. Figure 3.4 shows the menu transition in Menu #3 "Drive Monitoring."

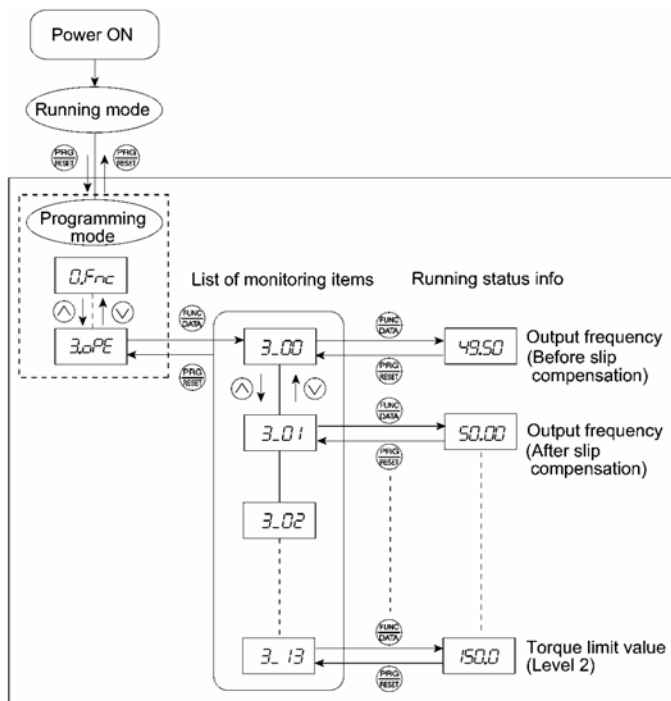


Figure 3.4 Menu Transition in Menu #3 "Drive Monitoring"

Basic key operation

To monitor the running status on the drive monitor, set function code E52 to "2" (Full-menu mode) beforehand.












- Turn the inverter ON. It automatically enters Running mode. In that mode, press the  key to switch to Programming mode. The function selection menu appears.
- Use the  and  keys to display "Drive Monitoring" (3.0PE).
- Press the  key to proceed to a list of monitoring items (e.g. 3.00).
- Use the  and  keys to display the desired monitoring item, then press the  key. The running status information for the selected item appears.
- Press the  key to return to a list of monitoring items. Press the  key again to return to the menu.

Table 3.12 Drive Monitor Display Items

LED monitor shows:	Item	Unit	Description
3.00	Output frequency	Hz	Output frequency before slip compensation
3.01	Output frequency	Hz	Output frequency after slip compensation
3.02	Output current	A	Output current
3.03	Output voltage	V	Output voltage
3.04	Calculated torque	%	Calculated output torque of the motor in %
3.05	Reference frequency	Hz	Frequency specified by a frequency command
3.06	Rotational direction	N/A	Rotational direction being outputted F: forward, r: reverse, ----: stop
3.07	Running status	N/A	Running status in hexadecimal format Refer to "■ Displaying running status" on the next page.
3.08	Motor speed	r/min	Display value = (Output frequency Hz) × $\frac{120}{(\text{Function code P01})}$ For motor 2, read P01 as A15.
3.09	Load shaft speed or Line speed	r/min m/min	Display value = (Output frequency Hz) × (Function code E50) The 7-segment letters  appear for 10000 (r/min) or more. If  appear, decrease function code E50 data so that the LED monitor displays 9999 or below, referring to the above equation.
3.10	PID command	N/A	Virtual physical value (e.g., temperature or pressure) of the object to be controlled, which is converted from the PID command using function code E40 and E41 data (PID display coefficients A and B) Display value = (PID command) × (Coefficient A - B) + B If PID control is disabled, "----" appears.
3.11	PID feedback amount	N/A	Virtual physical value (e.g., temperature or pressure) of the object to be controlled, which is converted from the PID command using function code E40 and E41 data (PID display coefficients A and B) Display value = (PID feedback amount) × (Coefficient A - B) + B If PID control is disabled, "----" appears.
3.12	Torque limit value	%	Driving torque limit value A (based on motor rated torque)
3.13	Torque limit value	%	Braking torque limit value B (based on motor rated torque)

■ Displaying running status

To display the running status in hexadecimal format, each state has been assigned to bits 0 to 15 as listed in Table 3.13. Table 3.14 shows the relationship between each of the status assignments and the LED monitor display. Table 3.15 gives the conversion table from 4-bit binary to hexadecimal.

Table 3.13 Running Status Bit Assignment

Bit	Notation	Content	Bit	Notation	Content
15	BUSY	"1" when function code data is being written.	7	VL	"1" under voltage limiting control.
14	WR	Always "0."	6	TL	"1" under torque limiting control.
13		Always "0."	5	NUV	"1" when the DC link bus voltage is higher than the undervoltage level.
12	RL	"1" when communication is enabled (when ready for run and frequency commands via communications link).	4	BRK	"1" during braking.
11	ALM	"1" when an alarm has occurred.	3	INT	"1" when the inverter output is shut down.
10	DEC	"1" during deceleration.	2	EXT	"1" during DC braking.
9	ACC	"1" during acceleration.	1	REV	"1" during running in the reverse direction.
8	IL	"1" under current limiting control.	0	FWD	"1" during running in the forward direction.

Table 3.14 Running Status Display

LED No.	LED4				LED3				LED2				LED1												
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0									
Notation	BUSY	WR	RL	ALM	DEC	ACC	IL	VL	TL	NUV	BRK	INT	EXT	REV	FWD										
Example	Binary	1	0	0	0	0	0	1	1	0	0	1	0	0	0	0	1								
	Hexadecimal on the LED monitor	<table style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th></th> <th>LED4</th> <th>LED3</th> <th>LED2</th> <th>LED1</th> </tr> </thead> <tbody> <tr> <td style="font-size: 2em; border: 1px solid black; padding: 5px;">8</td> <td style="font-size: 2em; border: 1px solid black; padding: 5px;">3</td> <td style="font-size: 2em; border: 1px solid black; padding: 5px;">2</td> <td style="font-size: 2em; border: 1px solid black; padding: 5px;">1</td> <td></td> </tr> </tbody> </table>																LED4	LED3	LED2	LED1	8	3	2	1
	LED4	LED3	LED2	LED1																					
8	3	2	1																						

■ Hexadecimal expression

A 4-bit binary number can be expressed in hexadecimal format (1 hexadecimal digit). Table 3.15 shows the correspondence between the two notations. The hexadecimals are shown as they appear on the LED monitor.

Table 3.15 Binary and Hexadecimal Conversion

Binary				Hexadecimal	Binary				Hexadecimal
0	0	0	0	0	1	0	0	0	1
0	0	0	1	1	1	0	0	1	5
0	0	1	0	2	1	0	1	0	A
0	0	1	1	3	1	0	1	1	b
0	1	0	0	4	1	1	0	0	C
0	1	0	1	5	1	1	0	1	d
0	1	1	0	6	1	1	1	0	E
0	1	1	1	7	1	1	1	1	F

3.4.5 Checking I/O signal status -- Menu #4 "I/O Checking" --

Using Menu #4 "I/O Checking" displays the I/O status of external signals including digital and analog I/O signals without using a measuring instrument. Table 3.16 lists check items available. The menu transition in Menu #4 "I/O Checking" is shown in Figure 3.5.

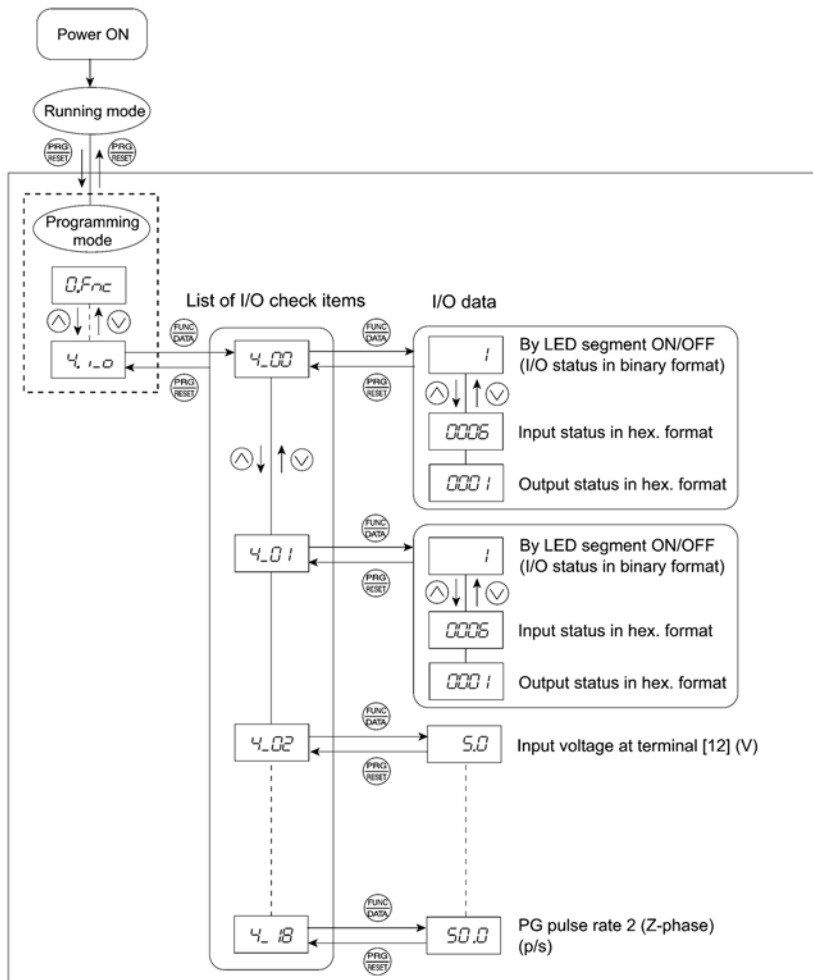


Figure 3.5 Menu Transition in Menu #4 "I/O Checking"

Basic key operation

To check the status of the I/O signals, set function code E52 to "2" (Full-menu mode) beforehand.












- (1) Turn the inverter ON. It automatically enters Running mode. In that mode, press the  key to switch to Programming mode. The function selection menu appears.
- (2) Use the  and  keys to display "I/O Checking" (4, I, C).
- (3) Press the  key to proceed to a list of I/O check items (e.g. 4_00).
- (4) Use the  and  keys to display the desired I/O check item, then press the  key.
The corresponding I/O check data appears. For the item 4_00 or 4_01, using the  and  keys switches the display method between the segment display (for external signal information in Table 3.17) and hexadecimal display (for I/O signal status in Table 3.18).
- (5) Press the  key to return to a list of I/O check items. Press the  key again to return to the menu.

Table 3.16 I/O Check Items

LED monitor shows:	Item	Description
4_00	I/O signals on the control circuit terminals	Shows the ON/OFF state of the digital I/O terminals. Refer to " ■ Displaying control I/O signal terminals " on the next page for details.
4_01	I/O signals on the control circuit terminals under communications control	Shows the ON/OFF state of the digital I/O terminals that received a command via RS-485 and optional communications. Refer to " ■ Displaying control I/O signal terminals " and " ■ Displaying control I/O signal terminals under communications control " on the following pages for details.
4_02	Input voltage on terminal [12]	Shows the input voltage on terminal [12] in volts (V).
4_03	Input current on terminal [C1]	Shows the input current on terminal [C1] in milliamperes (mA).
4_04	Output voltage to analog meters [FM]	Shows the output voltage on terminal [FM] in volts (V).
4_05	Pulse rate of [FM]	Shows the output pulse rate on terminal [FM] in pulses per second (p/s).
4_07	Input voltage on terminal [C1]	Shows the input voltage on terminal [C1] (V2 function assigned) in volts (V).
4_10	Option control circuit terminal (I/O)	Shows the ON/OFF state of the digital I/O terminals on the digital I/O interface option. Refer to " ■ Displaying control I/O signal terminals on digital I/O interface option " on page 3-22 for details.
4_15	PG pulse rate 1 (A/B phase)	Shows the PG pulse rate inputted when the PG interface is installed. Displayed value = Pulse rate (p/s) ÷ 1000
4_16	PG pulse rate 1 (Z phase)	Shows the pulse rate (p/s) in Z phase when the PG interface is installed.
4_17	PG pulse rate 2 (A/B phase)	Shows the second PG pulse rate inputted when two PG interfaces are installed. Displayed value = Pulse rate (p/s) ÷ 1000
4_18	PG pulse rate 2 (Z phase)	Shows the second PG pulse rate (p/s) in Z phase when two PG interfaces are installed.

■ Displaying control I/O signal terminals

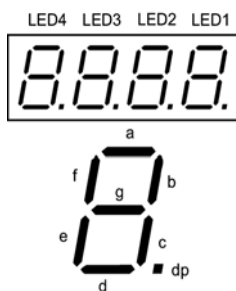
The status of control I/O signal terminals may be displayed with ON/OFF of the LED segment or in hexadecimal display.

- Display I/O signal status with ON/OFF of each LED segment

As shown in Table 3.17 and the figure below, each of segments "a" to "g" on LED1 lights when the corresponding digital input terminal circuit ([FWD], [REV], [X1], [X2], [X3], [X4] or [X5]) is closed; it goes off when it is open. Segment "a" and "b" on LED3 light when the circuit between output terminal [Y1] or [Y2] and terminal [CMY], and do not light when the circuit is open. Segment "a" on LED4 is for terminals [30A/B/C]. Segment "a" on LED4 lights when the circuit between terminals [30C] and [30A] is short-circuited (ON) and does not light when it is open.

Tip If all terminal input signals are OFF (open), segment "g" on all of LED1 to LED4 will light ("-----").

Table 3.17 Segment Display for External Signal Information



Segment	LED4	LED3	LED2	LED1
a	30A/B/C	Y1-CMY	—	FWD
b	—	Y2-CMY	—	REV
c	—	—	—	X1
d	—	—	—	X2
e	—	—	—	X3
f	—	—	(XF)*	X4
g	—	—	(XR)*	X5
dp	—	—	(RST)*	—

—: No corresponding control circuit terminal exists

* (XF), (XR), and (RST) are assigned for communication. Refer to "■ Displaying control I/O signal terminals under communications control" on the next page.

- Displaying I/O signal status in hexadecimal format

Each I/O terminal is assigned to bit 15 through bit 0 as shown in Table 3.18. An unassigned bit is interpreted as "0." Allocated bit data is displayed on the LED monitor as four hexadecimal digits (16 to F each).

With the FRENIC-Multi, digital input terminals [FWD] and [REV] are assigned to bit 0 and bit 1, respectively. Terminals [X1] through [X5] are assigned to bits 2 through 6. The bit is set to "1" when the corresponding input terminal is short-circuited (ON), and is set to "0" when it is open (OFF). For example, when [FWD] and [X1] are ON (short-circuited) and all the others are OFF (open), 0005 is displayed on LED4 to LED1.

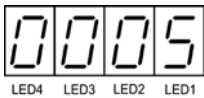
Digital output terminal [Y1] and [Y2] are assigned to bits 0 and 1. Each bit is set to "1" when the terminal is short-circuited with [CMY], and "0" when it is open.

The status of the relay contact output terminal [30A/B/C] is assigned to bit 8. It is set to "1" when the circuit between output terminals [30A] and [30C] is closed, and "0" when the circuit between [30A] and [30C] is open.

For example, if [Y1] is ON, [Y2] is OFF, and the circuit between [30A] and [30C] is closed, then "1011" is displayed on the LED4 to LED1.

Table 3.18 presents an example of bit assignment and corresponding hexadecimal display on the 7-segment LED.

Table 3.18 Segment Display for I/O Signal Status in Hexadecimal Format

LED No.		LED4				LED3				LED2				LED1			
Bit		15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Input terminal		(RST)*	(XR)*	(XF)*	-	-	-	-	-	-	X5	X4	X3	X2	X1	REV	FWD
Output terminal		-	-	-	-	-	-	-	30 A/B/C	-	-	-	-	-	-	Y2	Y1
Example	Binary	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
	Hexadecimal on the LED monitor																

– No corresponding control circuit terminal exists.

* (XF), (XR), and (RST) are assigned for communication. Refer to "■ [Displaying control I/O signal terminals under communications control](#)" below.

■ [Displaying control I/O signal terminals under communications control](#)

Under communications control, input commands (function code S06) sent via RS-485 or other optional communications can be displayed in two ways: "with ON/OFF of each LED segment" and "in hexadecimal format." The content to be displayed is basically the same as that for the control I/O signal terminal status display; however, (XF), (XR), and (RST) are added as inputs. Note that under communications control, the I/O display is in normal logic (using the original signals not inverted).

📖 Refer to the RS-485 Communication User's Manual for details on input commands sent through RS-485 communications and the instruction manual of communication-related options as well.

■ [Displaying control I/O signal terminals on digital I/O interface option](#)

The LED monitor can also show the signal status of the terminals on the digital I/O interface option, just like the control circuit terminals.

Table 3.19 lists the assignment between LED segments and I/O signals.

Table 3.19 Segment Display for External Signal Information

Segment	LED4	LED3	LED2	LED1
a	—	O1	I9	I1
b	—	O2	I10	I2
c	—	O3	I11	I3
d	—	O4	I12	I4
e	—	O5	SEL	I5
f	—	O6	—	I6
g	—	O7	—	I7
dp	—	O8	—	I8



LED No.		LED4				LED3				LED2				LED1			
Bit		15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Input terminal		-	-	-	SEL	I12	I11	I10	I9	I8	I7	I6	I5	I4	I3	I2	I1
Output terminal		-	-	-	-	-	-	-	-	O8	O7	O6	O5	O4	O3	O2	O1

3.4.6 Reading maintenance information -- Menu #5 "Maintenance Information" --

Menu #5 "Maintenance Information" contains information necessary for performing maintenance on the inverter. The menu transition in Menu #5 "Maintenance information" is as same as its of in Menu #3 "Drive Monitoring."

Basic key operation

To view the maintenance information, set function code E52 to "2" (Full-menu mode) beforehand.










- Turn the inverter ON. It automatically enters Running mode. In that mode, press the  key to switch to Programming mode. The function selection menu appears.
- Use the  and  keys to display "Maintenance Information" (S.L.H.E.).
- Press the  key to proceed to a list of maintenance item codes (e.g. 5.00).
- Use the  and  keys to display the desired maintenance item, then press the  key. The data of the corresponding maintenance item appears.
- Press the  key to return to a list of maintenance items. Press the  key again to return to the menu.

Table 3.20 Display Items for Maintenance Information

LED Monitor shows:	Item	Description
5_00	Cumulative run time	Shows the content of the cumulative power-ON time counter of the inverter. Unit: thousands of hours. (Display range: 0.001 to 9.999, 10.00 to 65.53) When the total ON-time is less than 10000 hours (display: 0.001 to 9.999), data is shown in units of one hour (0.001). When the total time is 10000 hours or more (display: 10.00 to 65.53), it is shown in units of 10 hours (0.01). When the total time exceeds 65535 hours, the counter will be reset to 0 and the count will start again.
5_01	DC link bus voltage	Shows the DC link bus voltage of the inverter main circuit. Unit: V (volts)
5_03	Max. temperature of heat sink	Shows the maximum temperature of the heat sink for every hour. Unit: °C (Temperatures below 20°C are displayed as 20°C.)
5_04	Max. effective output current	Shows the maximum current in RMS for every hour. Unit: A (amperes)
5_05	Capacitance of the DC link bus capacitor	Shows the current capacitance of the DC link bus capacitor (reservoir capacitor) in %, based on the capacitance when shipping as 100%. Refer to Chapter 7 "MAINTENANCE AND INSPECTION" for details. Unit: %
5_06	Cumulative run time of electrolytic capacitors on the printed circuit boards	Shows the content of the cumulative run time counter of the electrolytic capacitors mounted on the printed circuit boards. Unit: thousands of hours. (Display range: 0.001 to 99.99) Shown in units of 10 hours. When the total time exceeds 99990 hours, the count stops and the display remains at 99.99.
5_07	Cumulative run time of the cooling fan	Shows the content of the cumulative run time counter of the cooling fan. This counter does not work when the cooling fan ON/OFF control (function code H06) is enabled and the fan is stopped. Unit: thousands of hours. (Display range: 0.001 to 99.99) Shown in units of 10 hours. When the total time exceeds 99990 hours, the count stops and the display remains at 99.99.

Table 3.20 Display Items for Maintenance Information (Continued)

LED Monitor shows:	Item	Description
5_08	Number of startups	Shows the content of the cumulative counter of times the inverter is started up (i.e., the number of run commands issued). 1.000 indicates 1000 times. When any number from 0.001 to 9.999 is displayed, the counter increases by 0.001 per startup, and when any number from 10.00 to 65.53 is counted, the counter increases by 0.01 every 10 startups. When the counted number exceeds 65535, the counter will be reset to 0 and the count will start again.
5_09	Input watt-hour	Shows the input watt-hour of the inverter. Unit: 100 kWh (Display range: 0.001 to 9999) Depending on the value of integrated input watt-hour, the decimal point on the LED monitor shifts to show it within the LED monitor's resolution (e.g. the resolution varies between 0.001, 0.01, 0.1 or 1). To reset the integrated input watt-hour and its data, set function code E51 to "0.000." When the input watt-hour exceeds 1000000 kWh, it returns to "0."
5_10	Input watt-hour data	Shows the value expressed by "input watt-hour (kWh) × E51 (whose data range is 0.000 to 9999)." Unit: None. (Display range: 0.001 to 9999. The data cannot exceed 9999. (It will be fixed at 9999 once the calculated value exceeds 9999.)) Depending on the value of integrated input watt-hour data, the decimal point on the LED monitor shifts to show it within the LED monitors' resolution. To reset the integrated input watt-hour data, set function code E51 to "0.000."
5_11	Number of RS-485 errors (standard)	Shows the total number of errors that have occurred in <i>standard</i> RS-485 communication (via the RJ-45 connector as standard) since the power is turned ON. Once the number of errors exceeds 9999, the count returns to 0.
5_12	Content of RS-485 communication s error (standard)	Shows the most recent error that has occurred in <i>standard</i> RS-485 communication in decimal format. For error contents, refer to the RS-485 Communication User's Manual.
5_13	Number of option errors	Shows the total number of optional communications card errors since the power is turned ON. Once the number of errors exceeds 9999, the count returns to 0.
5_14	Inverter's ROM version	Shows the inverter's ROM version as a 4-digit code.
5_15	Keypad's ROM version	Shows the keypad's ROM version as a 4-digit code.
5_17	Number of RS-485 errors (option)	Shows the total number of errors that have occurred in <i>optional</i> RS-485 communication since the power is turned ON. Once the number of errors exceeds 9999, the count returns to 0.
5_18	Content of RS-485 communication s error (option)	Shows the most recent error that has occurred in <i>optional</i> RS-485 communication in decimal format. For error contents, refer to the RS-485 Communication User's Manual.
5_19	Option's ROM version	Shows the option's ROM version as a 4-digit code.
5_23	Cumulative motor run time	Shows the content of the cumulative power-ON time counter of the motor. The display method is the same as for "Cumulative run time" (5_00) above.

3.4.7 Reading alarm information -- Menu #6 "Alarm Information" --

Menu #6 "Alarm Information" shows the causes of the past 4 alarms in alarm code. Further, it is also possible to display alarm information that indicates the status of the inverter when the alarm occurred. Figure 3.6 shows the menu transition in Menu #6 "Alarm Information" and Table 3.21 lists the details of the alarm information.

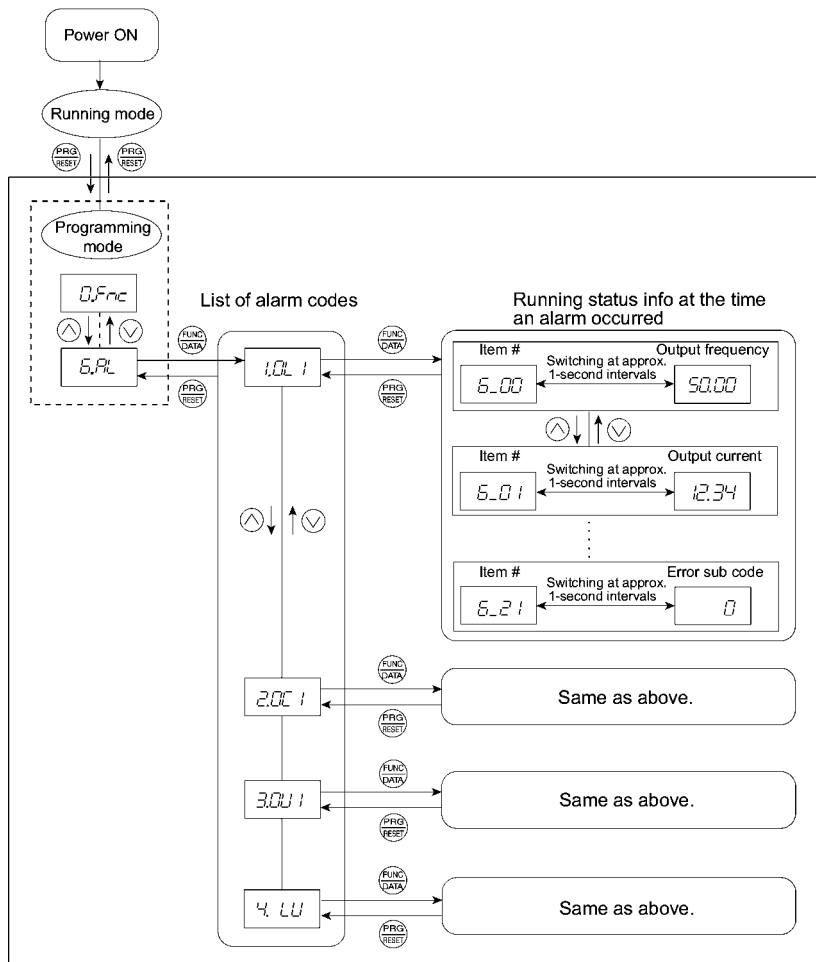


Figure 3.6 "Alarm Information" Menu Transition

Basic key operation

To view the alarm information, set function code E52 to "2" (Full-menu mode) beforehand.












- Turn the inverter ON. It automatically enters Running mode. In that mode, press the  key to switch to Programming mode. The function selection menu appears.
- Use the  and  keys to display "Alarm Information" (E₅FL).
- Press the  key to proceed to a list of alarm codes (e.g. 1.0L 1).
In the list of alarm codes, the alarm information for the last 4 alarms is saved as an alarm history.
- Each time the  or  key is pressed, the last 4 alarms are displayed in order from the most recent one as 1, 2, 3, and 4.
- While the alarm code is displayed, press the  key to have the corresponding alarm item number (e.g. E_00) and data (e.g. Output frequency) displayed alternately in intervals of approximately 1 second. You can also have the item number (e.g. E_01) and data (e.g. Output current) for any other item displayed using the  and  keys.
- Press the  key to return to a list of alarm codes. Press the  key again to return to the menu.

Table 3.21 Alarm Information Displayed

LED monitor shows: (item No.)	Item displayed	Description
E_00	Output frequency	Output frequency
E_01	Output current	Output current
E_02	Output voltage	Output voltage
E_03	Calculated torque	Calculated motor output torque
E_04	Reference frequency	Frequency specified by frequency command
E_05	Rotational direction	This shows the rotational direction being output. F: forward, r: reverse, - - - : stop
E_06	Running status	This shows the running status in hexadecimal. Refer to "■ Displaying running status" in Section 3.4.4.
E_07	Cumulative run time	Shows the content of the cumulative power-ON time counter of the inverter. Unit: thousands of hours. (Display range: 0.001 to 9.999, 10.00 to 65.53) When the total ON-time is less than 10000 hours (display: 0.001 to 9.999), data is shown in units of one hour (0.001). When the total time is 10000 hours or more (display: 10.00 to 65.53), it is shown in units of 10 hours (0.01). When the total time exceeds 65535 hours, the counter will be reset to 0 and the count will start again.
E_08	No. of startups	Shows the content of the cumulative counter of times the inverter is started up (i.e., the number of run commands issued). 1.000 indicates 1000 times. When any number from 0.001 to 9.999 is displayed, the counter increases by 0.001 per startup, and when any number from 10.00 to 65.53 is counted, the counter increases by 0.01 every 10 startups. When the counted number exceeds 65535, the counter will be reset to 0 and the count will start again.
E_09	DC link bus voltage	Shows the DC link bus voltage of the inverter main circuit. Unit: V (volts)

Table 3.21 Alarm Information Displayed (Continued)

LED monitor shows: (item No.)	Item displayed	Description
5_11	Max. temperature of heat sink	Shows the temperature of the heat sink. Unit: °C
5_12	Terminal I/O signal status (displayed with the ON/OFF of LED segments)	Shows the ON/OFF status of the digital I/O terminals. Refer to "■ <u>Displaying control I/O signal terminals</u> " in Section 3.4.5 "Checking I/O signal status" for details.
5_13	Terminal input signal status (in hexadecimal format)	
5_14	Terminal output signal status (in hexadecimal format)	
5_15	No. of consecutive occurrences	This is the number of times the same alarm occurs consecutively.
5_16	Multiple alarm 1	Simultaneously occurring alarm codes (1) ("----" is displayed if no alarms have occurred.)
5_17	Multiple alarm 2	Simultaneously occurring alarm codes (2) ("----" is displayed if no alarms have occurred.)
5_18	Terminal I/O signal status under communications control (displayed with the ON/OFF of LED segments)	Shows the ON/OFF status of the digital I/O terminals under RS-485 communications control. Refer to "■ <u>Displaying control I/O signal terminals under communications control</u> " in Section 3.4.5 "Checking I/O signal status" for details.
5_19	Terminal input signal status under communications control (in hexadecimal format)	
5_20	Terminal output signal status under communications control (in hexadecimal format)	
5_21	Error sub code	Secondary error code for the alarm.



When the same alarm occurs repeatedly in succession, the alarm information for the first occurrences will be preserved and the information for other occurrences in-between will be discarded. The number of consecutive occurrences will be preserved as the first alarm information.



3.5 Alarm Mode

If an abnormal condition arises, the protective function is invoked and issues an alarm, then the inverter automatically enters Alarm mode. At the same time, an alarm code appears on the LED monitor.

■ Releasing the alarm and switching to Running mode

Remove the cause of the alarm and press the  key to release the alarm and return to Running mode. The alarm can be removed using the  key only when the latest alarm code is displayed.

■ Displaying the alarm history

It is possible to display the most recent 3 alarm codes in addition to the one currently displayed. Previous alarm codes can be displayed by pressing the  /  key while the current alarm code is displayed.

■ Displaying the status of inverter at the time of alarm

When the alarm code is displayed, you may check various running status information (output frequency and output current, etc.) by pressing the key. The item number and data for each running information will be displayed alternately.

Further, you can view various pieces of information on the running status of the inverter using the / key. The information displayed is the same as for Menu #6 "Alarm Information" in Programming mode. Refer to Table 3.21 in Section 3.4.7, "Reading alarm information."

Pressing the key while the running status information is displayed returns the display to the alarm codes.

Note When the running status information is displayed after removal of the alarm cause, pressing the key twice returns to the alarm code display and releases the inverter from the alarm state. This means that the motor starts running if a run command has been received by this time.

■ Switching to Programming mode

You can also switch to Programming mode by pressing + keys simultaneously with the alarm displayed, and modify the function code data.

Figure 3.7 summarizes the possible transitions between different menu items.

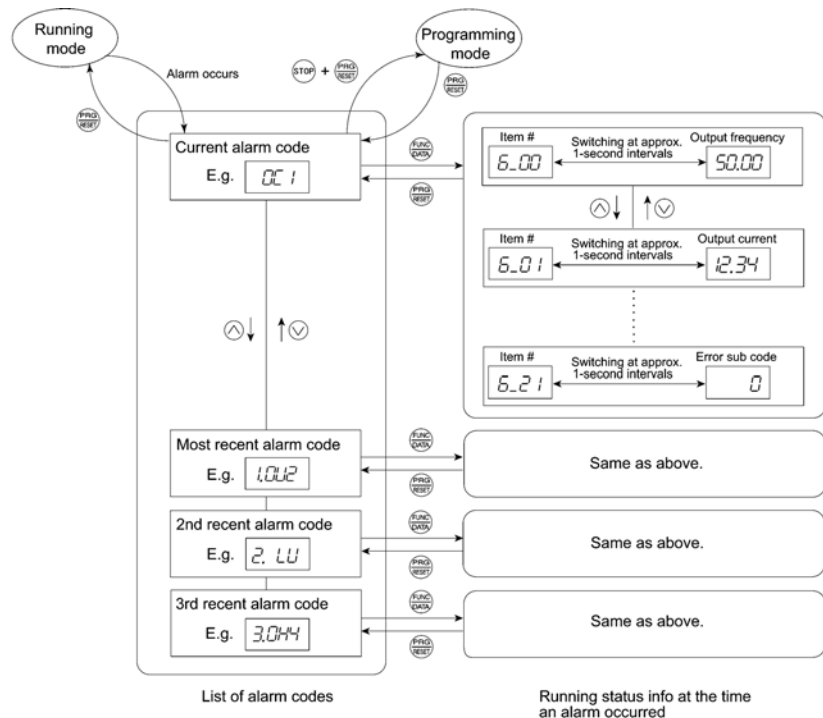


Figure 3.7 Menu Transition in Alarm Mode