⚠ WARNING

Electrical Shock Prevention

1. Do not remove the front cover when input power is applied. Doing so can result in electric shock.
2. Do not operate the inverter with the front cover removed. Electric shock can occur due to the exposed high voltage terminals and capacitor.
3. Do not remove the cover except for routine inspections or wiring, even if the input power is not applied. The capacitor will remain charged for a long time even when the power is not applied.
4. Wiring and routine checkups should be performed 10 minutes after disconnecting the input power and after checking to see whether the DC voltage is discharged with a tester. (Below DC 30V)
5. Do not use a higher grounding method than the Type 3 grounding method.
6. Only authorized personnel may perform wiring and inspections.
7. Wire the inverter after the inverter installation.
8. Do not operate the switches with wet hands. Doing so may result in electrical shock.
9. Electrical shock may occur if the cable insulation is damaged. Insure proper mounting of equipment to minimize excess stress on power cables.

⚠ CAUTION

Fire Prevention

1. Install the inverter on a non-combustible surface. Installing the inverter on or near combustible materials can result in fire.
2. Disconnect the inverter when the inverter is damaged. Failure to do so could lead to a secondary accident and fire.
3. Do not connect a resistance directly between the DC terminals P. N. Doing so can result in fire.

Damage Prevention

1. Do not apply voltages higher than the values specified in this manual to the terminals. Doing so can damage the inverter.
2. Incorrect terminal connection may damage the inverter.
3. Incorrectly connecting the polarity (+/-) of the terminals can damage the inverter.
4. After disconnecting, the inverter may still be hot. Use caution to prevent the possibility of personal injury.

Other Important Precautions

Pay attention to the following items. Failure to do so can result in damage of inverter and/or electrical shock.

▸ Handling and installation

1. Handle according to the weight of product. Failure to do so can result in damage to product.
2. Do not stack inverters beyond listed specifications.
3. Install according to specifications listed within this manual.
4. Do not apply power to a damaged inverter or to an inverter with missing components.
5. Do not open front cover while carrying inverter.
6. Do not place heavy items on inverter.
7. Installation orientation must follow specifications listed within this manual.
8. Do not allow conducted material such as screws, metal objects, water, or oil to enter interior of inverter.
9. Do not drop or inflict intense impact to inverter.
10. Install and operate inverter only under specified conditions.

▸ Wiring

1. Do not connect Power Factor capacitors, surge suppressors, or RFI filters to output circuits.
2. Connect the output terminals (U, V, W) according to specifications.

▸ Operation

1. CAUTION: When the retry function is selected the inverter restarts after an alarm stop.
2. Stop key on keypad can only be used when stop key function is set. Install separate emergency stop switch if required.
3. When run signal is received, inverter restarts only when alarm contents have been reset. Verify run signal before resetting alarm.
4. Do not start or stop inverter using electromagnetic switch installed in power input circuit.
5. Do not modify or alter anything inside inverter.
6. CAUTION: Motor might not be protected by electronic thermal function of inverter.
7. Install noise filter to minimize potential noise interference on equipment installed near inverter.
8. In case of input voltage unbalance, install AC reactor. Power Factor capacitors and generators may become overheated and damaged due to potential high frequency noise transmitted from inverter.
9. Use an insulation-rectified motor or take measures to suppress the micro surge voltage when driving 400V class motor with inverter. A micro surge voltage attributable to wiring constant is generated at motor terminals, and may deteriorate insulation and damage motor
10. Before operating unit and prior to user programming, reset user parameters to default settings
11. Inverter can easily be set to high-speed operations, Verify capability of motor or machinery prior to operating unit.
12. Stopping torque is not produced when using the DC-Break function. Install separate equipment when stopping torque is needed.

▸ Fault Prevention Precautions

Install additional safety equipment, such as emergency brakes, to prevent uncontrolled machine operation from a damaged inverter.

▸ Maintenance, Inspection, and Exchanging Components

1. Do not conduct megger test (insulation resistance measurement) of control circuitry in inverter.
2. Refer to Chapter 7 for routine inspection methods.

▸ General Precautions

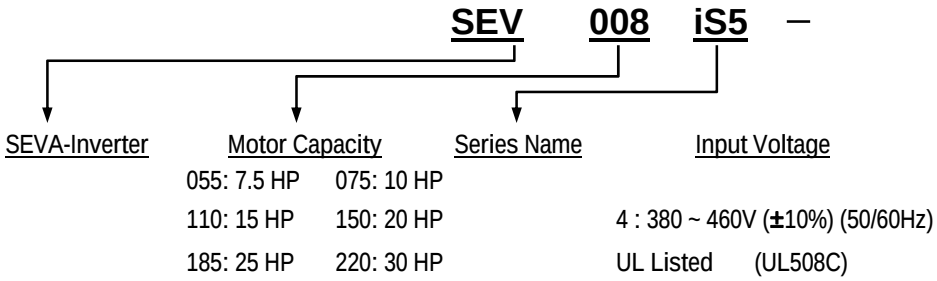
The diagrams in this manual may show removed inverter covers and removed circuit breakers. Prior to operating unit, be sure to restore covers and circuit breakers according to specifications.

CONTENTS

CHAPTER 1 - INSTALLATION

1.1 Inspection

- ✓ Inspect the inverter for any damage that may have occurred during shipping.
- ✓ Check the nameplate on the inverter. Verify the inverter unit is the correct one for the application. The numbering system for the inverter is as shown below.

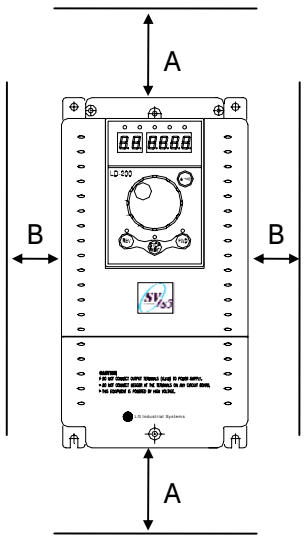


1.2 Environmental Conditions

- ✓ Verify ambient condition for the mounting location.
  - Ambient temperature should not be below 14ºF (-10ºC) or exceed 104ºF (40ºC).
  - Relative humidity should be less than 90% (non-condensing).
  - Altitude should be below 3,300ft (1,000m).
- ✓ Do not mount the inverter in direct sunlight and isolate it from excessive vibration.

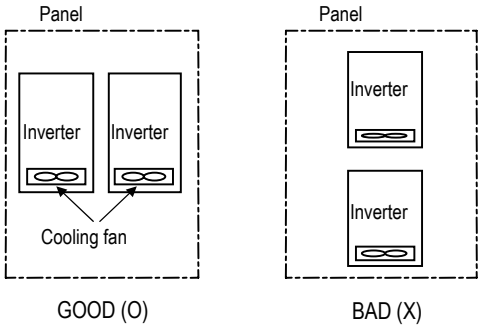
1.3 Mounting

- ✓ The inverter must be mounted vertically with sufficient horizontal and vertical space between adjacent equipment (A= Over 6" (150mm), B= Over 2" (50mm)).

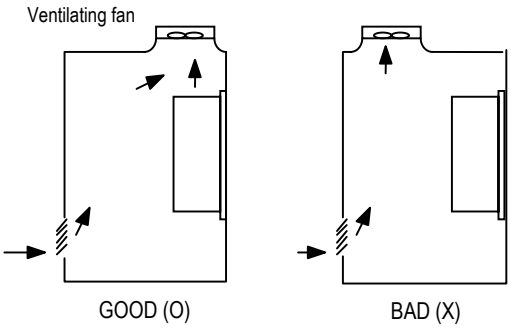


1.4 Other Precautions

- ✓ Do not carry the inverter by the front cover.
- ✓ Do not install the inverter in a location where excessive vibration is present. Be cautious when installing on presses or moving equipment.
- ✓ The life span of the inverter is greatly affected by the ambient temperature. Install in a location where temperature are within permissible limits (- 10 ~ 40 ℃).
- ✓ The inverter operates at high-temperatures - install on a non-combustible surface.
- ✓ Do not install the inverter in high-temperature or high-humidity locations.
- ✓ Do not install the inverter in a location where oil mist, combustible gas, or dust is present. Install the inverter in a clean location or in an enclosed panel, free of foreign substance.
- ✓ When installing the inverter inside a panel with multiple inverters or a ventilation fan, use caution. If installed incorrectly, the ambient temperature may exceed specified limits.



[When installing several inverters in a panel]

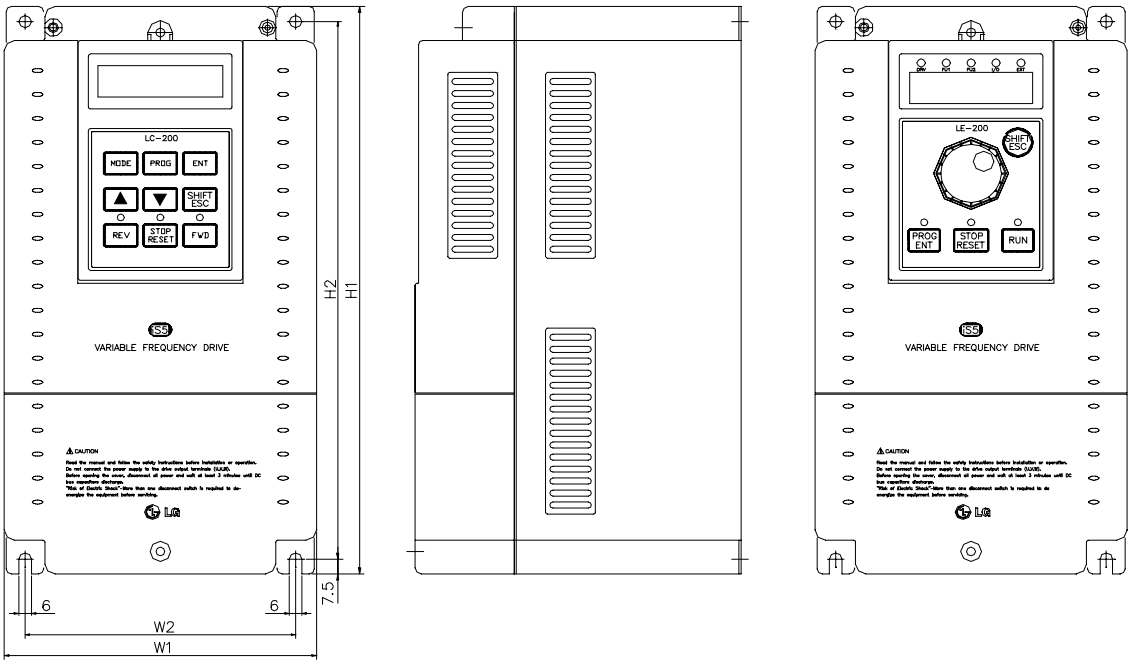


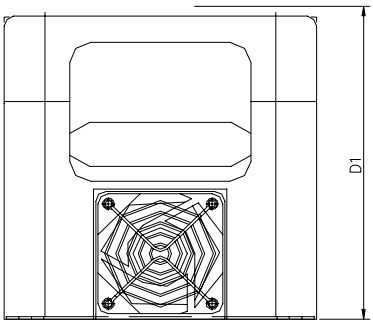
[When installing a ventilating fan in a panel]

- ✓ Install the inverter using screws or bolts to insure the inverter is firmly fastened.

1.5 Dimensions

- **Frame # 1**: 1 ~ 5 HP
- **Frame # 2**: 7.5 ~ 10 HP

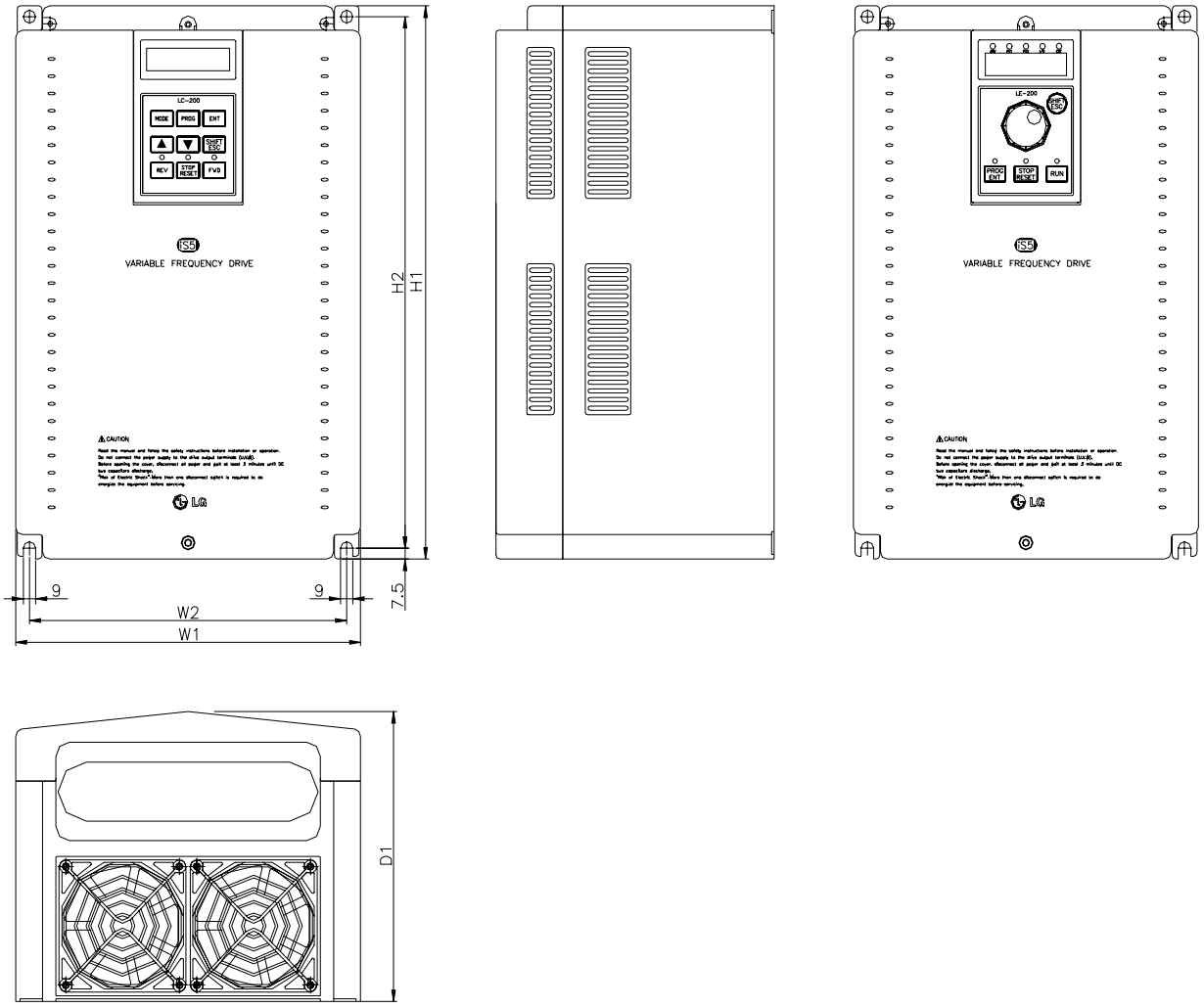




mm (inches)

Frame	HP	Model Number	W1	W2	H1	H2	D1
Frame # 1	1	SV008iS5-2/4	150 (5.91)	130 (5.12)	284 (11.18)	269 (10.69)	156.5 (6.16)
	2	SV015iS5-2/4					
	3	SV022iS5-2/4					
	5	SV037iS5-2/4					
Frame # 2	7.5	SV055iS5-2/4	200 (7.87)	180 (7.09)	355 (13.98)	340 (13.39)	182.5 (7.19)
	10	SV075iS5-2/4					

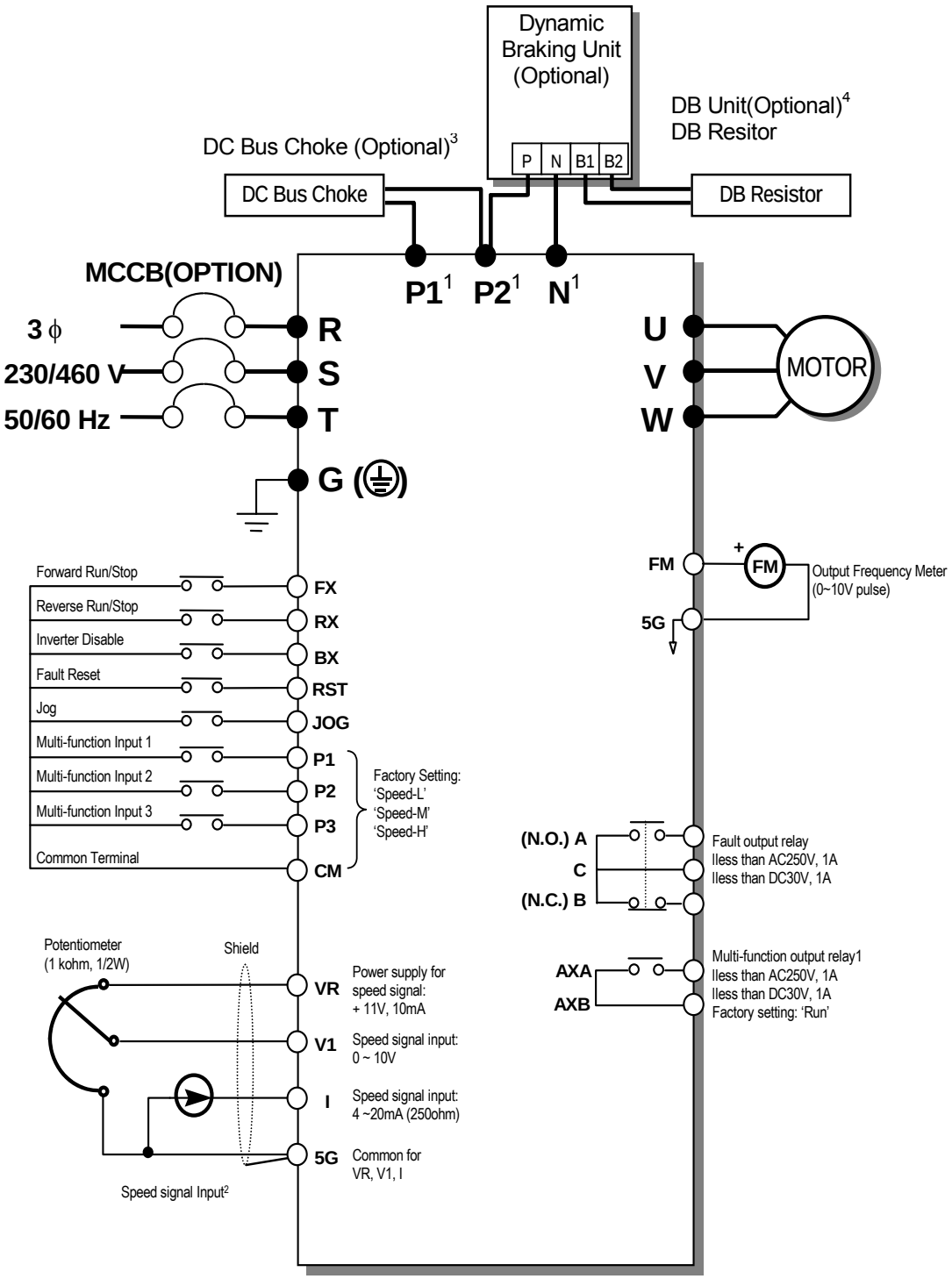
- **Frame # 3**: 15 ~ 20 HP
- **Frame # 4**: 25 ~ 30 HP



mm (inches)

Frame	HP	Model Number	W1	W2	H1	H2	D1
Frame # 3	15	SV110iS5-2/4	250 (9.84)	230 (9.06)	385 (15.16)	370 (14.57)	201 (7.91)
	20	SV150iS5-2/4					
Frame # 4	25	SV185iS5-2/4	304 (11.97)	284 (11.18)	460 (18.11)	445 (17.52)	234 (9.21)
	30	SV220iS5-2/4					

1.6 Basic Wiring



Note) ● Main Circuit Terminals ○ Control Circuit Terminals.

1. The terminal configuration varies depend on the model number. Please refer to the '1.7 Power terminals'.
2. Analog speed command may be set by Voltage, Current or both.
3. When installing the DC Reactor, the Common Busbar between P1 and P2 must be removed.
4. 1 ~ 10 HP inverters have on-board braking circuit. Braking resistors are only included for 1 ~ 5 inverters.
   15 ~ 30 HP inverters need optional braking unit and resistor for dynamic braking.

1.7 Power Terminals

- **Type A Configuration: 1 ~ 5 HP** (SV008iS5-2, SV015iS5-2, SV022iS5-2, SV037iS5-2, SV008iS5-4, SV015iS5-4, SV022iS5-4, SV037iS5-4)

- **Type B Configuration: 7.5 ~ 10 HP** (SV055iS5-2, SV075iS5-2, SV055iS5-4, SV075iS5-4)

- **Type C Configuration: 15 ~ 30 HP** (SV110iS5-2, SV150iS5-2, SV185iS5-2, SV220iS5-2, SV110iS5-4, SV150iS5-4, SV185iS5-4, SV220iS5-4)

Symbols	Functions
R	AC Line Voltage Input (3 Phase, 200 ~ 230VAC or 380 ~ 460VAC)
S	
T	
G	Earth Ground
P	*Positive DC Bus Terminal* DB Unit (P-P[5]) Connection Terminals (DB Unit may be added when more braking duty (More than 30%ED) is required)
P1	External DC Reactor (P1-P2) and DB Unit (P2-P[1]) Connection Terminals
P2	
N	*Negative DC Bus Terminal* DB Unit (N-N[2]) Connection Terminal
B1	Dynamic Braking Resistor (B1-B2) Terminals
B2	
U	3-Phase Power Output Terminals to Motor (3 Phase, 200 ~ 230VAC or 380 ~ 460VAC)
V	
W	

[1] This P terminal is provided on optional Dynamic Braking Unit.

[2] This N terminal is provided on optional Dynamic Braking Unit.

1.7.1 Type A Configuration

As standard on the iS5 inverter, this type of configuration has internal dynamic braking resistor of 3% ED. When an application requires more braking duty, an external dynamic braking resistor may be connected instead of the internal resistor.

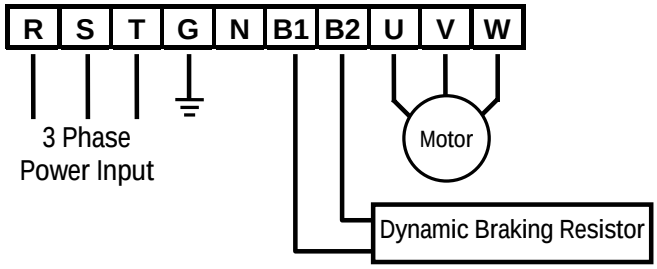


Figure 1 – Type A Dynamic Braking Resistor Installation

1.7.2 Type B Configuration

A Dynamic Braking Resistor or a Dynamic Braking Unit may be added to iS5 series inverters that have a Type B configuration power terminal strip. As standard, this type of configuration has in

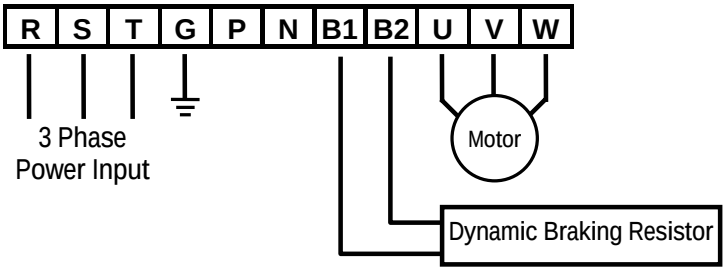


Figure 2 – Type B Dynamic Braking Resistor Installation

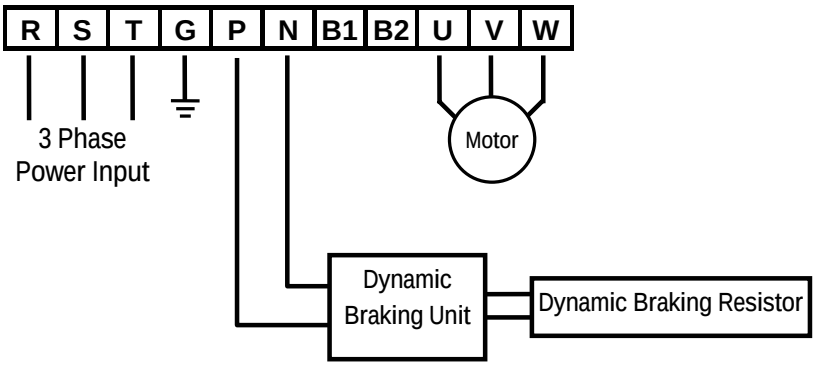


Figure 3 – Type B Additional Dynamic Braking Unit and Resistor Installation

1.7.3 Type C Configuration

A Dynamic Braking Unit or a DC Bus Choke or both of them may be added to iS5 series inverters that have a Type A Configuration power terminal strip.

⚠ Jumper Between P1 and P2 Must Be Removed In Order To Install a DC Bus Choke.

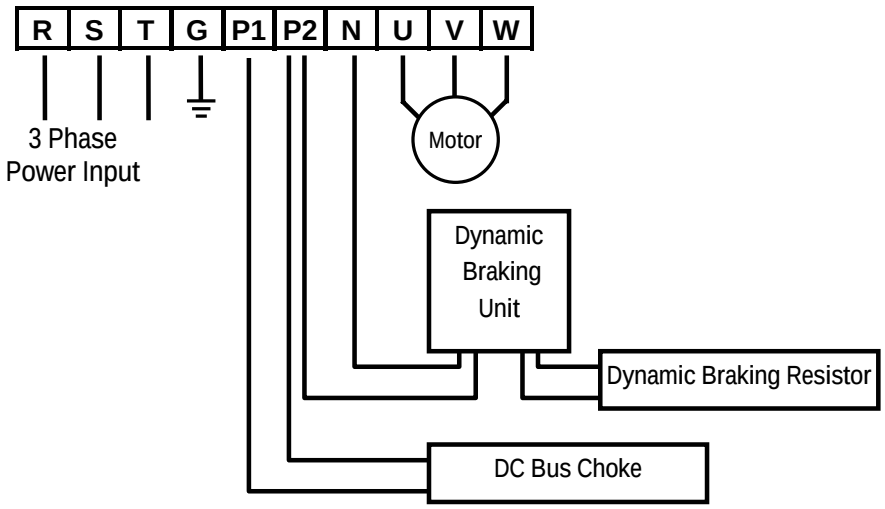


Figure 4 – Type C Dynamic Braking Unit, DC Bus Choke Installation

⚠ WARNING

Normal stray capacitance between the inverter chassis and the power devices inside the inverter and AC line can provide a high impedance shock hazard. Refrain from applying power to the inverter if the inverter frame (Power terminal G) is not grounded.

1.7.4 Wiring Power Terminals

■ **Wiring Precautions**

- ✓ The internal circuits of the inverter will be damaged if the incoming power is connected and applied to output terminals (U, V, W).
- ✓ Use ring terminals with insulated caps when wiring the input power and motor wiring.
- ✓ Do not leave wire fragments inside the inverter. Wire fragments can cause faults, breakdowns, and malfunctions.
- ✓ For input and output, use wires with sufficient size to ensure voltage drop of less than 2%. Motor torque may drop of operating at low frequencies and a long wire run between inverter and motor.
- ✓ Do not use a 3-wire cable for long distances. Due to increased leakage capacitance between wires, over-current protective feature may operate or equipment connected to the output side may malfunction.
- ✓ Never short between B1 and B2 terminals of the inverter.
- ✓ The main circuit of the inverter contains high frequency noise, and can hinder communication equipment near the inverter. To reduce noise, install line noise filters on the input side of the inverter.
- ✓ Do not use power factor capacitor, surge killers, or RFI filters on the output side of the inverter. Doing so may damage these components.
- ✓ Always check whether the LCD and the charge lamp for the power terminal are OFF before wiring terminals. The charge capacitor may hold high-voltage even after the power is disconnected. Use caution to prevent the possibility of personal injury.

■ **Grounding**

- ✓ The inverter is a high switching device, and leakage current may flow. Ground the inverter to avoid electrical shock. Use caution to prevent the possibility of personal injury.
- ✓ Connect only to the dedicated ground terminal of the inverter. Do not use the case or the chassis screw for grounding.
- ✓ When installing, grounding wire should be connected first and removed last.
- ✓ Grounding wire should be at least the size listed in the following table and be as short as possible.

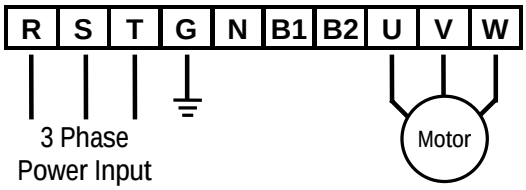
Inverter Capacity	Grounding wire dimensions, AWG (mm²)	
	200V class	400Vclass
Below 5 HP	12 ((3.5)	14 (2)
7.5 ~ 10 HP	10 (5.5)	12 (3.5)
15 ~ 20 HP	6 (14)	8 (8)
25 ~ 30 HP	4 (22)	6 (14)

■ Wires and Terminal Lugs

Refer to the following table for wires, terminal lugs, and screws used to connect the inverter power input (R, S, T) and output (U, V, W).

Inverter Capacity		Terminal Screw Size	Screw Torque[3] (Kgf·cm)	Ring Terminals		Wire[4]			
						mm²		AWG	
				R,S,T	U,V,W	R,S,T	U,V,W	R,S,T	U,V,W
200V Class	1 ~ 3 HP	M3.5	15	2-4	2-4	2	2	14	14
	5 HP	M3.5	15	2-4	2-4	3.5	3.5	12	12
	7.5 HP	M4	15	5.5-5	5.5-5	5.5	5.5	10	10
	10 HP	M4	15	14-5	8-5	14	8	6	8
	15 HP	M5	26	14-5	14-5	14	14	6	6
	20 HP	M5	26	22-6	22-6	22	22	4	4
	25 HP	M6	45	38-8	38-8	30	30	2	2
	30 HP	M6	45	38-8	38-8	38	30	2	2
400V Class	1 ~ 5 HP	M3.5	15	2-4	2-4	2	2	14	14
	7.5 HP	M4	15	5.5-5	5.5-5	3.5	2	12	14
	10 HP	M4	15	14-5	8-5	3.5	3.5	12	12
	15 HP	M5	26	14-5	14-5	5.5	5.5	10	10
	20 HP	M5	26	22-6	22-6	14	8	6	8
	25 HP	M6	45	38-8	38-8	14	8	6	8
	30 HP	M6	45	38-8	38-8	22	14	4	6

■ Power and Motor Connection



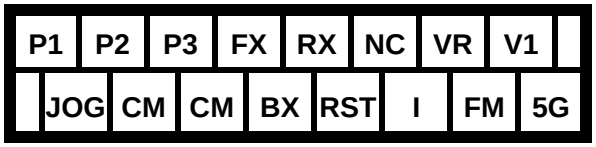
Power supply must be connected to the R, S, and T terminals. Connecting it to the U, V, and W terminals causes internal damages to the inverter. Arranging the phase sequence is not necessary.

Motor should be connected to the U, V, and W terminals.
If the forward command (FX) is on, the motor should rotate counter clockwise when viewed from the load side of the motor. If the motor rotates in the reverse, switch the U and V terminals.

[3] Apply the rated torque to terminal screws. Loose screws can cause of short circuit or malfunction. Tightening the screws too much can damage the terminals and cause a short circuit or malfunction.

[4] Use copper wires with 600V, 75℃ ratings for wiring.

1.8 Control Terminals



Type		Symbol	Name	Description
Input signal	Starting Contact Function Select	P1, P2, P3	Multi-Function input 1, 2, 3	Used for Multi-Function Input Terminal. (Factory default is set to "Step Frequency 1, 2, 3".)
		FX	Forward Run Command	Forward Run When Closed and Stopped When Open.
		RX	Reverse Run Command	Reverse Run When Closed and Stopped When Open.
		JOG	Jog Frequency Reference	Runs at Jog Frequency when the Jog Signal is ON. The Direction is set by the FX (or RX) Signal.
		BX	Emergency Stop ⚠	When the BX Signal is ON the Output of the Inverter is Turned Off. When Motor uses an Electrical Brake to Stop, BX is used to Turn Off the Output Signal. When BX Signal is OFF (Not Turned Off by Latching) and FX Signal (or RX Signal) is ON, Motor continues to Run.
		RST	Fault Reset	Used for Fault Reset.
		CM	Sequence Common	Common Terminal for Contact Inputs.
	Analog frequency setting	NC	-	Not Used.
		VR	Frequency Setting Power (+10V)	Used as Power for Analog Frequency Setting. Maximum Output is +12V, 100mA.
		V1	Frequency Reference (Voltage)	Used for 0-10V Input Frequency Reference. Input Resistance is 20 KΩ
		I	Frequency Reference (Current)	Used for 4-20mA Input Frequency Reference. Input Resistance is 250 Ω
		5G	Frequency Setting Common Terminal	Common Terminal for Analog Frequency Reference Signal and FM (For Monitoring).
Output signal	Pulse	FM	PWM Output (For External Monitoring)	Outputs One of the Following: Output Frequency, Output Current, Output Voltage, DC Link Voltage. Default is set to Output Frequency. Maximum Output Voltage and Output Current are 0-12V and 1mA. Output Frequency is Set at 500Hz.
	Contact	30A 30C 30B	Fault Contact Output	Activates when Protective Function is Operating. AC250V, 1A or less; DC30V, 1A or less. Fault: 30A-30C Closed (30B-30C Open) Normal: 30B-30C Closed (30A-30C Open)
		AXA, AXC	Multi-Function Output Relay	Use after Defining Multi-Function Output Terminal. AC250V, 1A or less; DC30V, 1A or less.
Comm.		CN3	Communication Port	Keypad Connection Port.

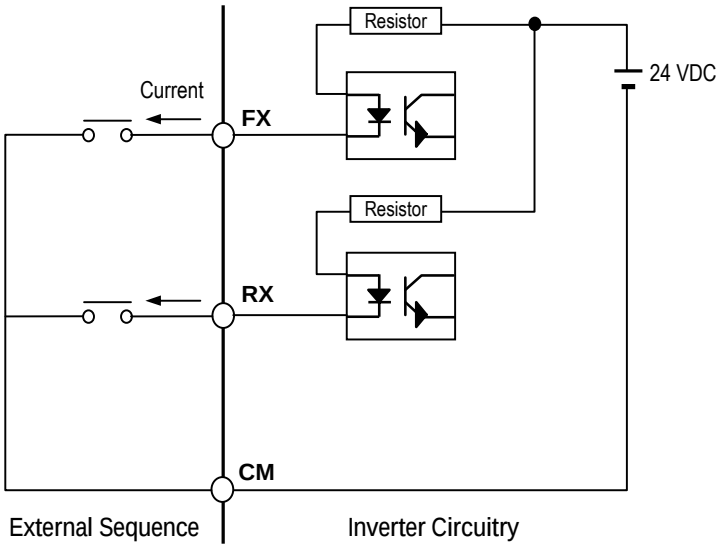
1.8.1 Wiring Control Terminals

■ **Wiring Precautions**

- ✓ CM and 5G terminals are insulated to each other. Do not connect these terminals with each other and do not connect these terminals to the power ground.
- ✓ Use shielded wires or twisted wires for control circuit wiring, and separate these wires from the main power circuits and other high voltage circuits.
- ✓ Use 1.25mm²(22AWG) stranded cables for control terminal connection.

■ **Control Circuit Terminal**

The control input terminal of the control circuit is ON when the circuit is configured to the current flows out of the terminal, as shown in the following illustration. CM terminal is the common terminal for the contact input signals.

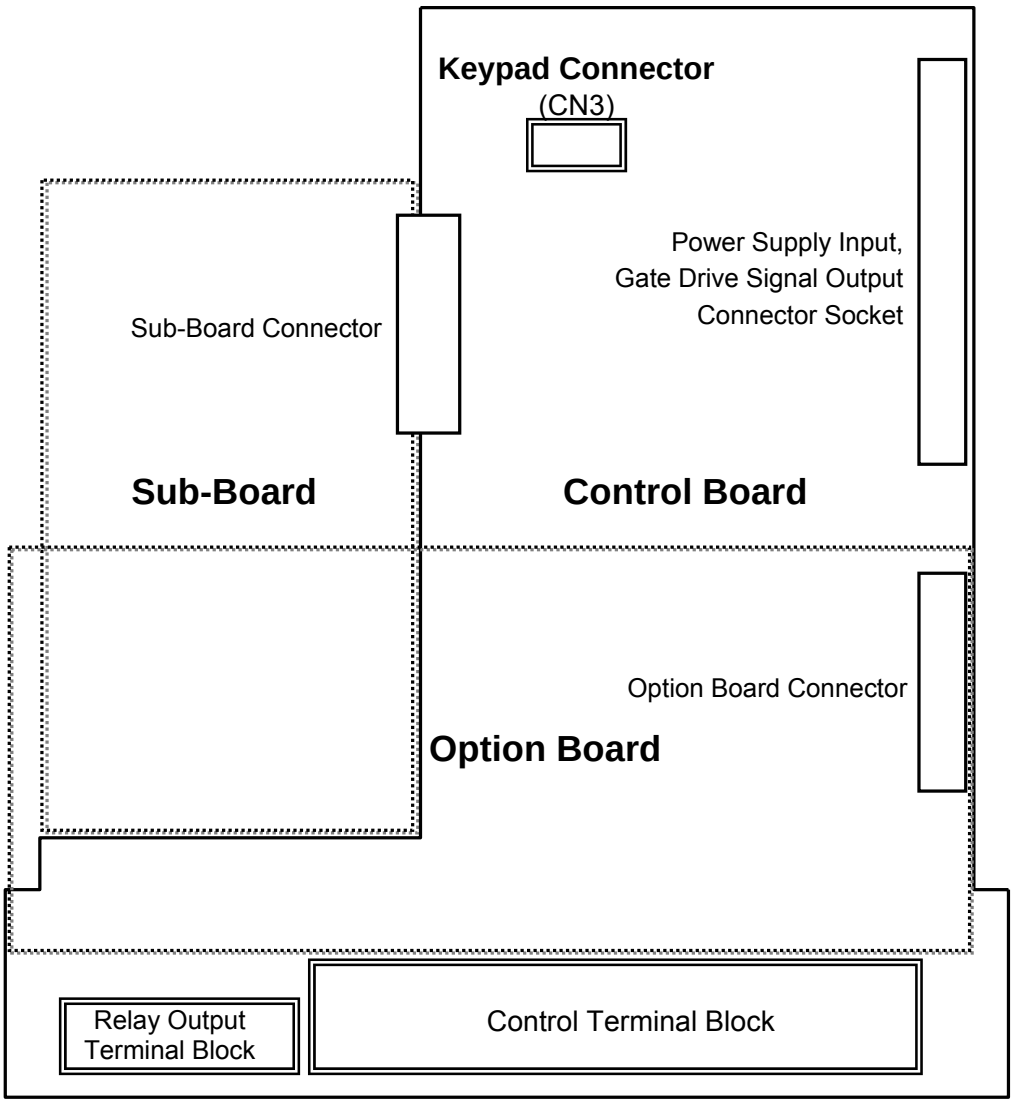


⚠ CAUTION

Do not apply voltage to any control input terminals (FX, RX, P1, P2, P3, JOG, BX, RST, CM).

1.8.2 Keypad Connection

Connect keypad to the keypad connector as illustrated below. The LCD output will not be displayed on the keypad if the keypad is not connected properly.



CHAPTER 2 - OPERATION

The iS5 series inverter has seven parameter groups separated according to their applications as indicated in the following table.
The iS5 series inverter provides two kinds of keypad. One is of 32-character alphanumeric LCD keypad and the other is of 7-Segment LED keypad.

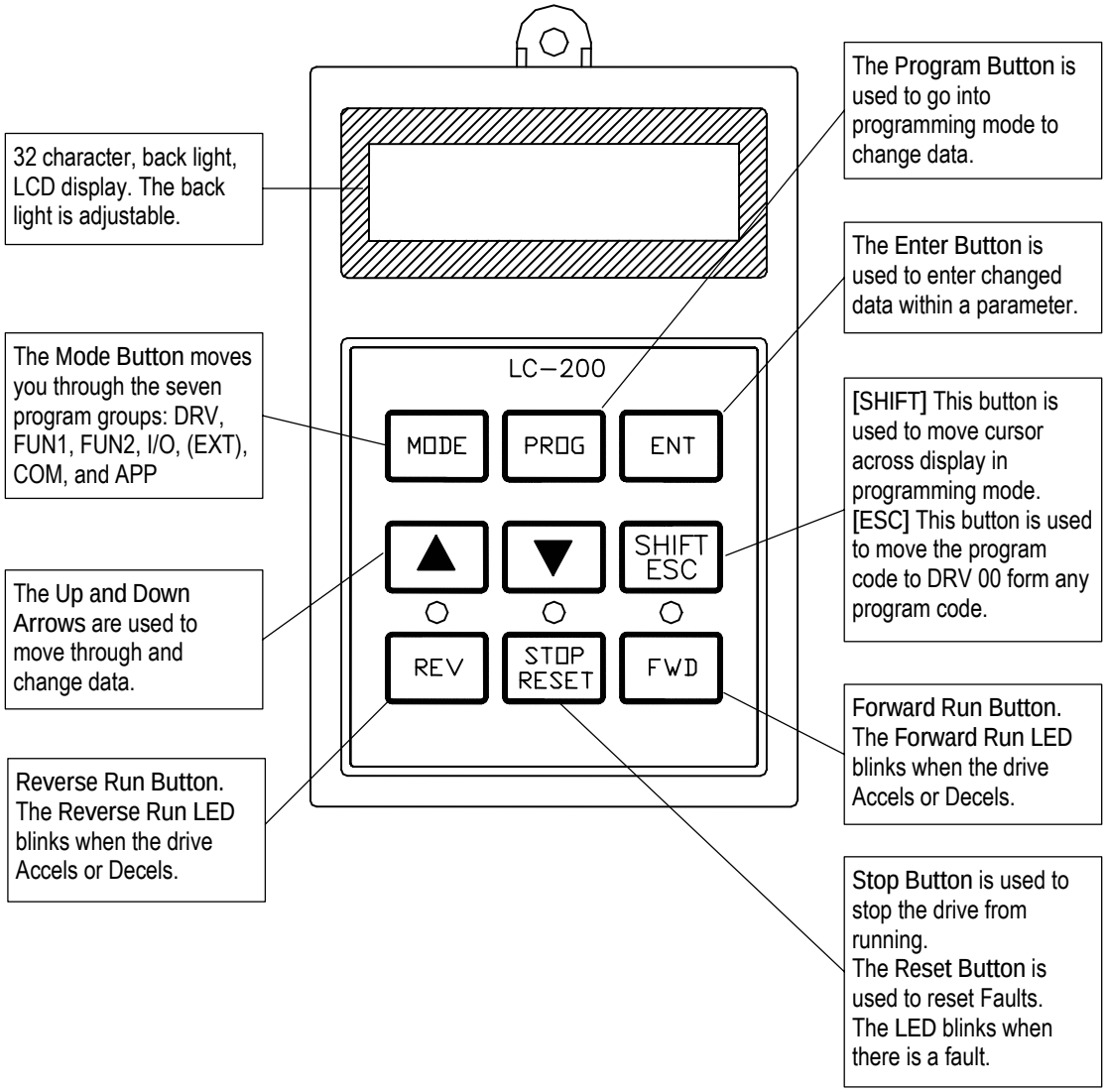
2.1 Parameter Groups

Parameter Group	LCD Keypad (Upper left Corner)	7-segment Keypad (LED is lit)	Description
Drive Group	DRV	'DRV' LED	Command Frequency, Accel/Decel Time etc. Basic Parameters
Function 1 Group	FU1	'FU1' LED	Max. Frequency, Amount of Torque Boost etc. Basic Related Parameters
Function 2 Group	FU2	'FU2' LED	Frequency Jumps, Max./Min. Frequency Limit etc. Basic Application Related Parameters
Input / Output Group	I/O	'I/O' LED	Multi-Function Terminal Setting, Auto Operation etc. Parameters needed for Sequence Operation
Sub-Board Group	EXT	'EXT' LED	Displayed when Sub-Board is Installed.
Option Group	COM	'I/O' + 'EXT' LED	Displayed when Option Board is Installed.
Application Group	APP	'FU2' + 'I/O' + 'EXT' LED	Traverse, MMC (Multi-Motor Control), Draw etc. Application Related Parameters

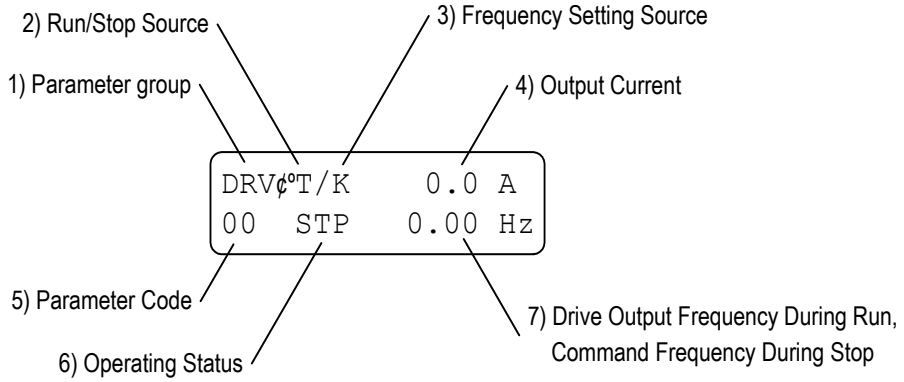
Refer to the function descriptions in chapter 5 for detailed description of each group.

2.2 LCD Keypad

LCD keypad can display up to 32 alphanumeric characters, and various settings can be checked directly from the display. The following is an illustration of the keypad.



2.2.1 LCD Keypad Display



Displays	Description
1) Parameter Group	Displays the parameter group. There are DRV, FU1, FU2, I/O, EXT, COM, APP groups.
2) Run/Stop Source	Displays the source of motor Run and Stop K: Run/Stop using FWD, REV buttons on keypad T: Run/Stop using control terminal input FX, RX O: Run/Stop via option board
3) Frequency Setting Source	Displays the source of command frequency setting K: Frequency setting using keypad V: Frequency setting using V1 (0 ~10V) or V1 + I terminal I: Frequency setting using I (4 ~ 20mA) terminal U: Up terminal input when Up/Down operation is selected D: Down terminal input when Up/Down operation is selected S: Stop status when Up/Down operation is selected O: Frequency setting via Option board X: Frequency setting via Sub board J: Jog terminal input 1 ~ 8: Step frequency operation ** During Auto operation, 2) and 3) display the 'sequence number/step'.*
4) Output Current	Displays the Output Current during operation.
5) Parameter Code	Displays the code of a group. Use the ▲ (Up), ▼ (Down) key to move through 0~99 codes.
6) Operating Status	Displays the operation information. STP: Stop Status FWD: During Forward operation REV: During Reverse operation DCB: During DC Braking LOP: Loss of Reference from Option Board (DPRAM fault) LOR: Loss of Reference from Option Board (Communication network fault) LOV: Loss of Analog Frequency Reference (V1: 0~10V) LOI: Loss of Analog Frequency Reference (I: 4~20mA) LOS: Loss of Reference from Sub-Board
7) Drive Output Frequency Command Frequency	Displays the Output Frequency during run. Displays the Command Frequency during stop.

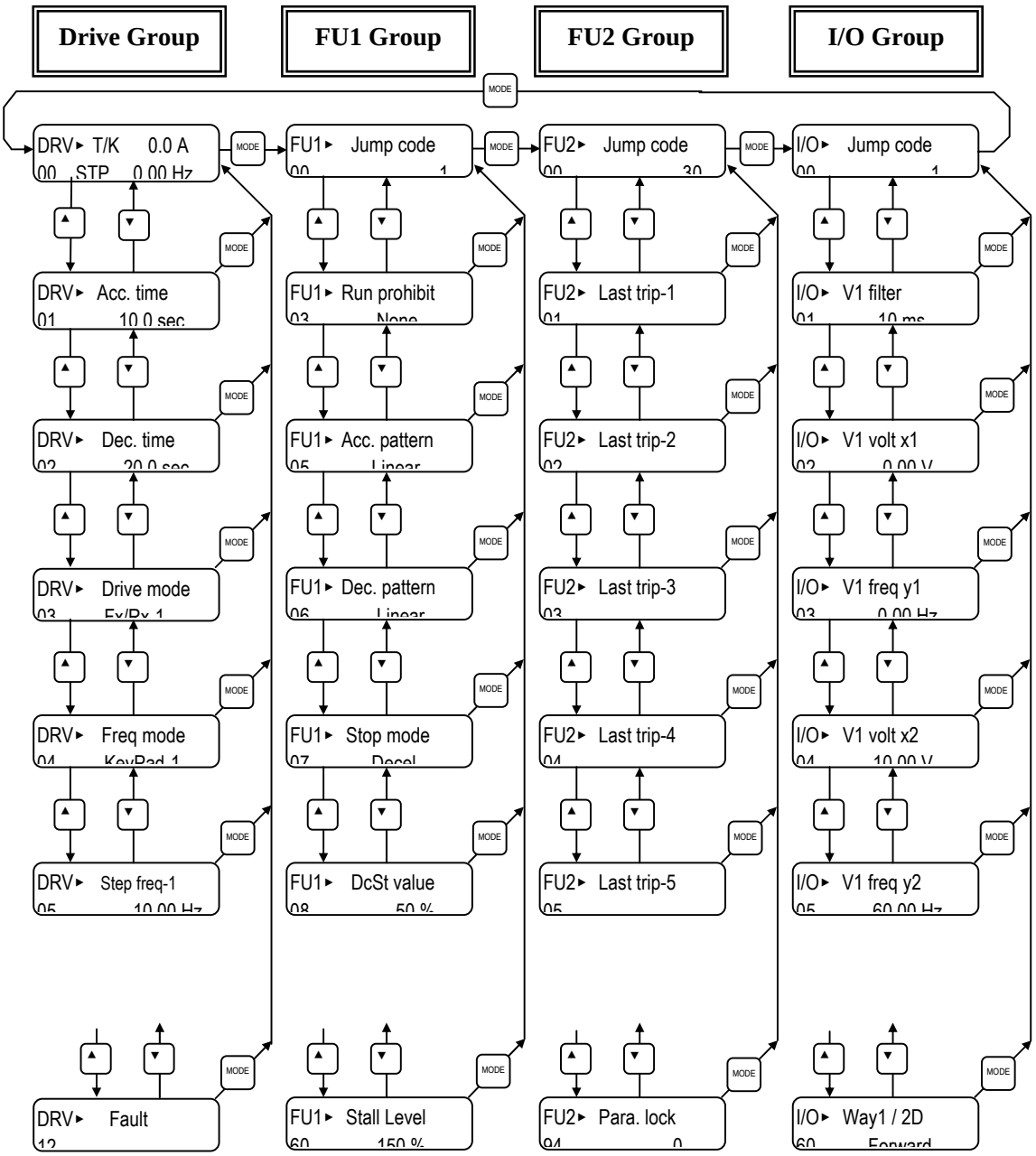
2.2.2 Procedure for Setting Data (LCD Keypad)

1. Press MODE key until the desired parameter group is displayed.
2. Press ▲ or ▼ keys to move to the desired parameter code. If you know the desired parameter code, you can set the code number of each parameter group in “Jump code”, except DRV group.
3. Press PROG key to go into the programming mode, the cursor starts blinking.
4. Press SHIFT/ESC key to move the cursor to the desired digit.
5. Press ▲ or ▼ keys to change the data.
6. Press ENT key to enter the data. The cursor stops blinking.

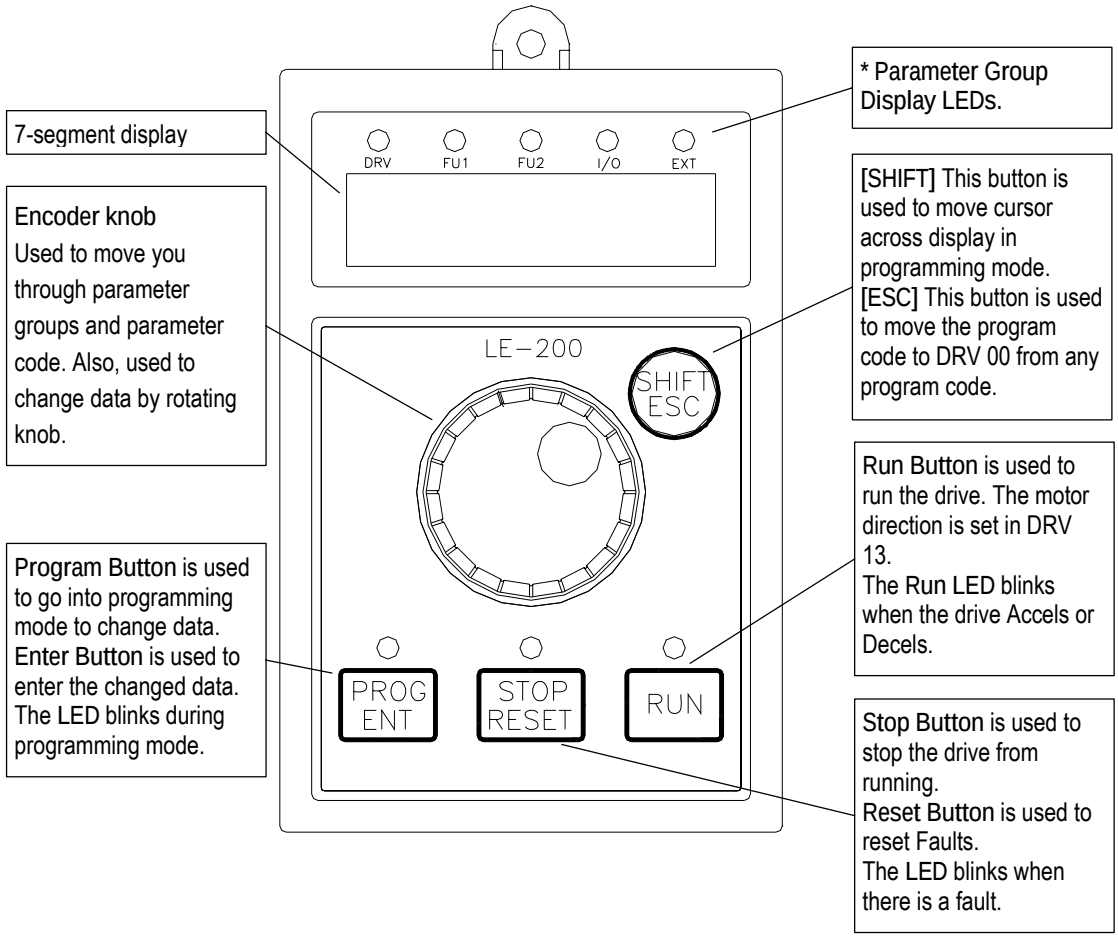
- **Note:** Data cannot be changed when:
  1) The parameter is not adjustable during the inverter is running. (Refer to the function table in Chapter 5), or,
  2) Parameter Lock function is activated in FU2-94 [Parameter Lock].

2.2.3 Parameter Navigation (LCD Keypad)

The parameter group moves directly to DRV group by pressing SHIFT/ESC key in any parameter code.



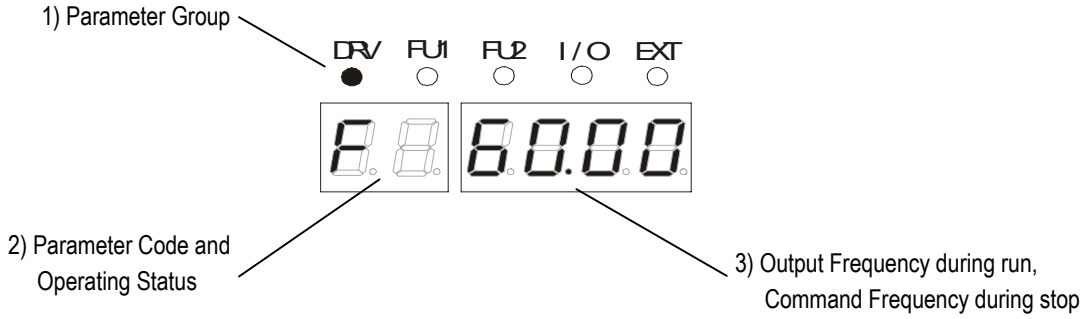
2.3 7-Segment Keypad



* Parameter Group Display LEDs – When parameter code is located on DRV 20, DRV 21, DRV 22 and DRV 23, respectively, by rotating the encoder knob, the parameter group display LEDs of DRV, FUN1, FUN2, I/O, EXT blink.

LED	Parameter Group	Description
DRV	Drive Group	Lit in Drive group.
FU1	FUNCTION 1 Group	Blinks when the parameter code is located on DRV 20 [FUN1]. Lit when FUNCTION 1 group is selected.
FU2	FUNCTION 2 Group	Blinks when the parameter code is located on DRV 21 [FUN2]. Lit when FUNCTION 2 group is selected.
I/O	Input/Output Group	Blinks when the parameter code is located on DRV 22 [I/O]. Lit when Input/Output group is selected
EXT	Sub-Board Group	Blinks when the parameter code is located on DRV 23 [EXT]. Lit when Sub-Board group is selected. This group appears only when a Sub-Board is installed.
I/O + EXT	Option Group	Blinks when the parameter code is located on DRV 24 [EXT]. Lit when Option group is selected. This group appears only when an Option Board is installed.
FU2 + I/O + EXT	Application Group	Blinks when the parameter code is located on DRV 25 [FUN2].

2.3.1 7-Segment Keypad Display



Display	Description
1) Parameter Group	Displays the parameter groups of DRV, FU1, FU2, I/O, EXT, COM, APP groups. Each LED is lit when its parameter group is selected and blinks when the parameter code is located on DRV 20, DRV 21, DRV 22, DRV 23, DRV 24, and DRV 25.
2) Parameter Code and Operating Status	Displays the code of a group. Rotate the encoder knob to move through 0 ~ 99 codes. Displays the operation information. [First digit] F: Forward operation r: Reverse operation [Second digit] d: DC Braking J: Jog Terminal Input 1~8: Step Frequency Input (Displays the Step of the Auto operation) [Two digits] - when the reference is lost. LP: Loss of Reference from the Option Board (DPRAM fault) Lr: Loss of Reference from the Option Board (Communication network fault) Lv: Loss of Analog Frequency Reference (V1: 0~10V) LI: Loss of Analog Frequency Reference (I: 4~20mA) LX: Loss of Reference from the Sub-Board
3) Output Frequency, Command Frequency	Displays the Output Frequency during run. Displays the Command Frequency during stop.

2.3.2 Procedure for Setting Data (7-Segment Keypad)

■ **In DRV Group:**

1. Rotate the encoder knob until the desired parameter code is displayed.
2. Press PROG/ENT key to go into the programming mode, then the display blinks.
3. Press SHIFT/ESC key to move the cursor to the desired digit.
4. Rotate the encoder knob to change the data.
5. Press PROG/ENT key to enter the changed data.

■ **In FUN1 Group:**

1. Rotate the encoder knob until parameter code ‘20’ is displayed in drive group.
2. Press PROG/ENT key to go into the FUN1 group.
3. Rotate the encoder knob until the desired parameter code is displayed.
4. Press PROG/ENT key to go into the programming mode, then the display blinks.
5. Press SHIFT/ESC key to move the cursor to the desired digit.
6. Rotate the encoder knob to change the data.
7. Press PROG/ENT key to enter the changed data.

■ **In FUN2 Group:**

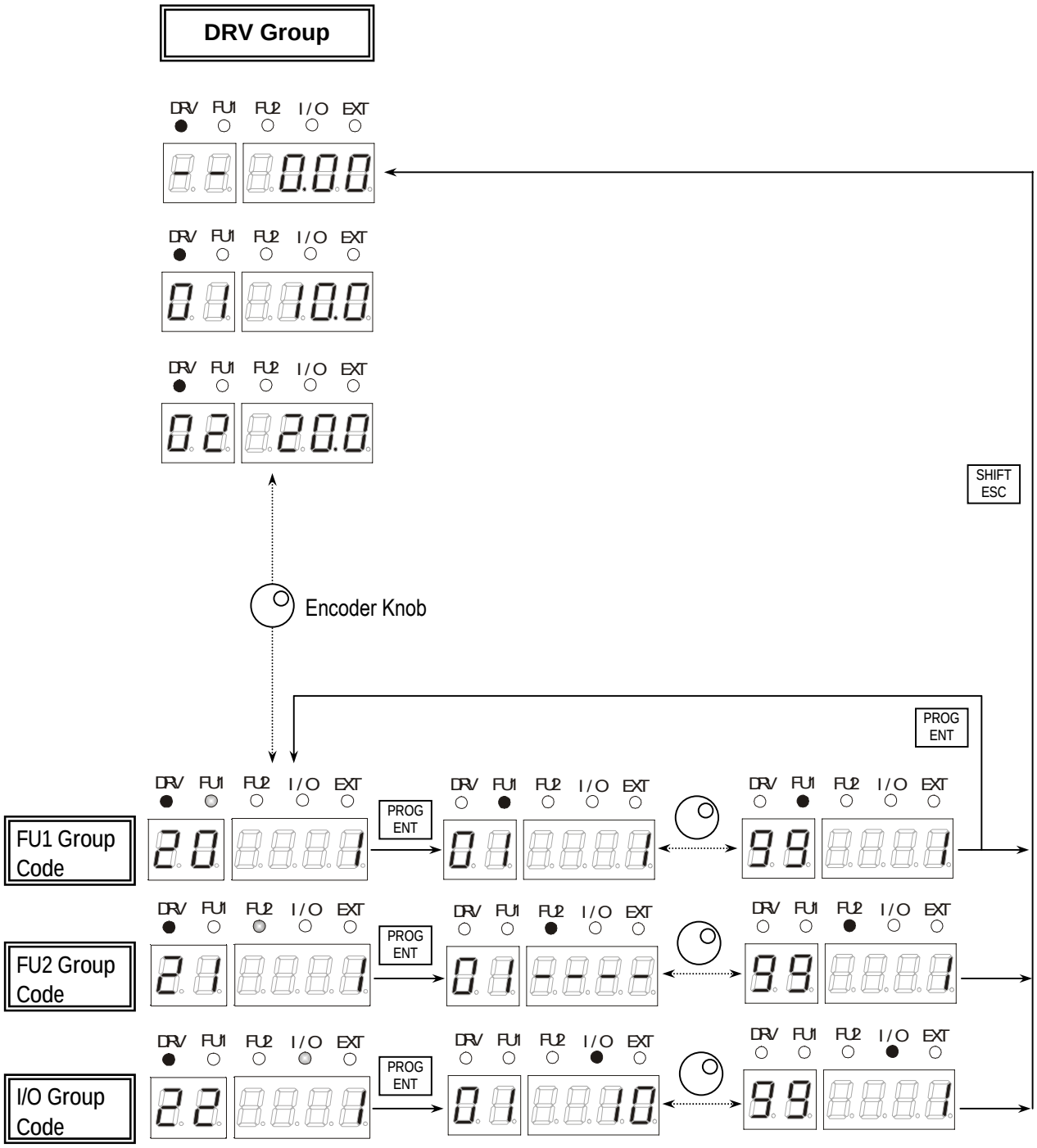
1. Rotate the encoder knob until parameter code ‘21’ is displayed in drive group.
2. Go to step 2 of ‘In FUN1 Group’ above, and follow the rest procedure.

■ **In I/O Group:**

1. Rotate the encoder knob until parameter code ‘22’ is displayed in drive group.
2. Go to step 2 of ‘In FUN1 Group’ above, and follow the rest procedure.

2.3.3 Parameter Navigation (7-Segment Keypad)

The parameter group moves directly to DRV group by pressing SHIFT/ESC key in any parameter code.



2.4 Operation Method

The iS5 has several operation methods as shown below.

Operation Method	Function	Function Setting
Operation using Keypad	Run/Stop command and frequency are set only through the keypad.	DRV 03: Keypad DRV 04: Keypad-1 or -2
Operation using Control Terminals	Closing FX or RX terminal performs Run/Stop. Frequency reference is set through V1 or I or V1+I terminal.	DRV 03: Fx/Rx-1 or -2 DRV 04: V1 or I or V1+I
Operation using both Keypad and Control Terminals	Run/Stop is performed by the keypad. Frequency reference is set through the V1 or I or V1+I terminal.	DRV 03: Keypad-1 or -2 DRV 04: V1 or I or V1+I
	Closing FX or RX terminal performs Run/Stop. Frequency reference is set through the keypad.	DRV 03: Fx/Rx-1 or -2 DRV 04: Keypad-1 or -2
Operation using Option Board	Operation using option board. The iS5 has five option boards and three sub-boards. Option Boards: RS485, Device-Net, F-Net, ProfiBus and ModBus Sub-Boards: Sub-A Board, Sub-B Board and Sub-C Board (Please refer to 'Chapter 6 - Options' for more information.)	

CHAPTER 3 - QUICK-START PROCEDURES

These Quick-Start Up instructions are for those applications where:

- The user wants to get the iS5 inverter started quickly
- The factory-preset values are suitable for the user application

The factory-preset values are shown on the 'Chapter 4 - Parameter List'. The iS5 inverter is configured to operate a motor at 60Hz (base frequency). If the application requires coordinated control with other controllers, it is recommended the user become familiar with all parameters and features of the inverter before applying AC power.

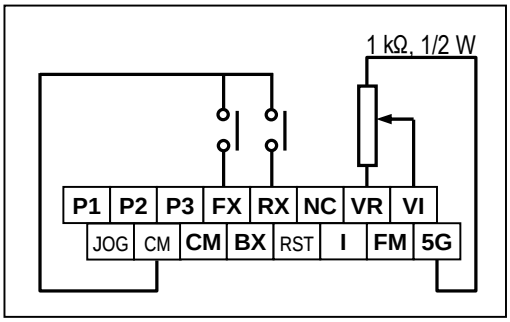
1. Mounting the inverter (mount the inverter as described in '1.3 Mounting')
   - Install in a clean, dry location
   - Allow a sufficient clearance around top and sides of inverter
   - The ambient temperature should not exceed 40°C (104°F)
   - If two or more inverters are installed in an enclosure, add additional cooling

2. Wiring the inverter (connect wiring as described in '1.7 Power Terminals')
   - AC power should be turned OFF
   - Verify the AC power matches the nameplate voltage
   - Remove the screw on the bottom front cover of the inverter for terminal board access (For terminal board access on 15~ 30HP inverters you must disconnect the keypad cable from the inverter and fully removed the cover)

3.1 Operation using Keypad

	LCD Display	7-Segment Display
1. Apply AC power.	DRV▶T/K 0.0 A 00 STP 0.00Hz	F 0.00 The DRV LED is ON.
2. **LCD:** Press ▲ key three times. **7-Seg:** Rotate the encoder knob until '03' is displayed.	DRV▶ Drive mode 03 Fx/Rx-1	03 1 The DRV LED is turned ON.
3. **LCD:** Press PROG key. **7-Seg:** Press PROG/ENT key.	DRV▶ Drive mode 03 Fx/Rx-1	03 1 The PROG/ENT LED turned ON.
4. **LCD:** Press ▼ key one time. **7-Seg:** Rotate the encoder knob left.	DRV▶ Drive mode 03 Keypad	03 0 The PROG/ENT LED is turned ON.
5. **LCD:** Press PROG key. **7-Seg:** Press PROG/ENT key.	DRV▶ Drive mode 03 Keypad	03 0
6. Press PROG/ENT key.	DRV▶K/K 0.0 A 00 STP 0.00Hz	F 0.00
7. **LCD :** Press PROG key. **7-Seg :** Press PROG/ENT key.	DRV▶ Cmd. freq 00 0.00Hz	00 00.00 The PROG/ENT LED is turned ON.
8. **LCD:** Press SHIFT/ESC key and press ▲ key to increase the command frequency. **7-Seg:** Rotate the encoder knob right to change the command frequency. The changing digit moves by pressing the SHIFT/ESC key.	DRV▶ Cmd. freq 00 60.00Hz	00 60.00 The PROG/ENT LED is turned ON.
9. **LCD:** Press ENT key to save the data. **7-Seg:** Press PROG/ENT key to save the data.	DRV▶K/K 0.0 A 00 STP 60.00Hz	F 60.00
10. **LCD:** Press FWD or REV key to start motor. **7-Seg:** Press RUN key to start motor.	The FWD or REV LED starts blinking.	The RUN LED starts blinking. To change the motor running direction, change DRV 13 to '1'.
11. Press STOP/RESET key to stop motor.	The STOP/RESET LED starts blinking.	The STOP/RESET LED starts blinking.

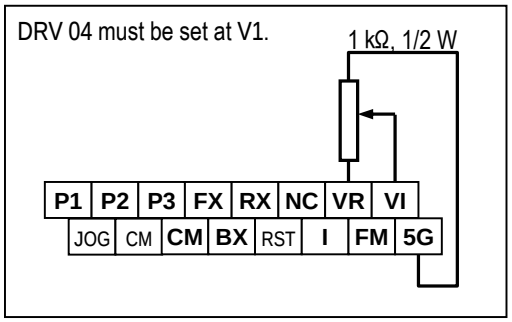
3.2 Operation using Control Terminals

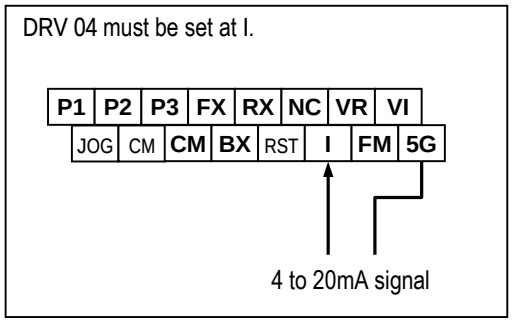
	LCD Display	7-Segment Display
1. Install a potentiometer on terminals V1, VR, 5G and connect wiring as shown below. 		
2. Apply AC power.	DRV▶T/K 0.0 A 00 STP 0.00Hz	F 0.00 The DRV LED is ON.
3. Confirm that the DRV 03 is set at 'Fx/Rx-1'.	DRV▶ Drive mode 03 Fx/Rx-1	03 1
4. **LCD:** Press [▲] key to move DRV 04. **7-Seg:** Rotate encoder knob until '04' is displayed.	DRV▶ Freq mode 04 Keypad-1	04 0
5. **LCD:** Press [PROG] key. **7-Seg:** Press [PROG/ENT] key.	DRV▶ Freq mode 04 Keypad-1	04 0 The PROG/ENT LED is turned ON.
6. **LCD:** Press [▲] key and set at 'V1'. **7-Seg:** Rotate encoder knob and set at '2'.	DRV▶ Freq mode 04 V1	04 2 The PROG/ENT LED is turned ON.
7. **LCD:** Press [ENT] key. **7-Seg:** Press [PROG/ENT] key.	DRV▶ Freq mode 04 V1	04 2 The PROG/ENT LED is turned OFF.
8. Press [SHIFT/ESC] key.	DRV▶T/V 0.0 A 00 STP 0.00Hz	F 0.00
9. Set the frequency by rotating the potentiometer.	DRV▶T/V 0.0 A 00 STP 60.00Hz	F 60.00
10. Close the FX or RX contact to run the motor.	The FWD or REV LED starts blinking.	The RUN LED starts blinking.
11. Open the FX or RX contact to stop the motor.	The STOP/RESET LED starts blinking.	The STOP/RESET LED starts blinking.

3.3 Operation using Keypad and Control Terminals

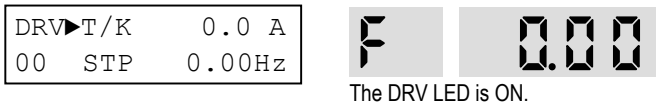
3.3.1 Frequency set by External Source and Run/Stop by Keypad

1. Install a potentiometer on terminals V1, VR, 5G and connect wiring as shown below left.
   When a '4 to 20mA' current source is used as the frequency reference, use terminals I and 5G as shown below right.





2. Apply AC power.



The DRV LED is ON.

3. **LCD:** Press ▲ key to move DRV 03.
   7-Seg: Rotate encoder knob until '03' is displayed.

4. **LCD:** Press PROG key.
   7-Seg: Press PROG/ENT key.

The PROG/ENT LED is turned ON.

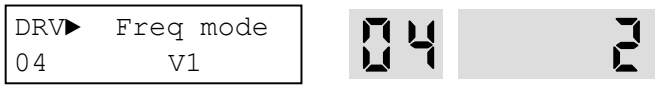
5. **LCD:** Press ▲ key one time.
   7-Seg: Rotate encoder knob and set at '0'.

The PROG/ENT LED is turned ON.

6. **LCD:** Press ENT key.
   7-Seg: Press PROG/ENT key.

The PROG/ENT LED is turned OFF.

7. Confirm that the DRV 04 is set at 'V1'.



The PROG/ENT LED is turned ON.

8. Press SHIFT/ESC key.
   Set the frequency by rotating the potentiometer.

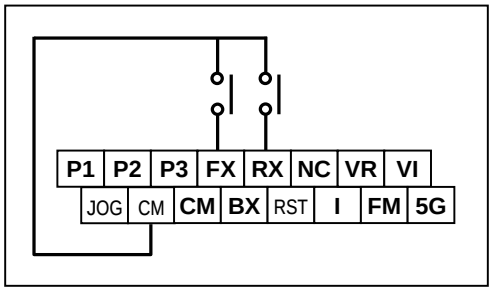
9. **LCD:** Press FWD or REV key.
   7-Seg: Press RUN key.

The FWD or REV LED starts blinking.

The RUN LED starts blinking.
To change the motor running direction, change DRV 13 to '1'.

3.3.2 Frequency set by Keypad and Run/Stop by External Source.

		LCD Display	7-Segment Display
1.	Connect wiring as shown below.		



2.	Apply AC power.	DRV▶T/K 0.0 A 00 STP 0.00Hz	F 0.00 The DRV LED is ON.
3.	Confirm that the DRV 03 is set at 'Fx/Rx-1'.	DRV▶ Drive mode 03 Fx/Rx-1	03 1
4.	Confirm that the DRV 04 is set at 'Keypad-1'.	DRV▶ Freq mode 04 Keypad-1	04 0
5.	Press SHIFT/ESC key.	DRV▶T/K 0.0 A 00 STP 0.00Hz	F 0.00
6.	**LCD:** Press PROG key. **7-Seg:** Press PROG/ENT key.	DRV▶ Cmd. freq 00 0.00Hz	00 0.00 The PROG/ENT LED is turned ON.
7.	**LCD:** Set the frequency using SHIFT/ESC and ▲ key. **7-Seg:** Set the frequency by rotating the encoder knob.	DRV▶ Cmd. freq 00 60.00Hz	00 60.00 The PROG/ENT LED is turned ON.
8.	**LCD:** Press ENT key to save the data. **7-Seg:** Press PROG/ENT key to save the data.	DRV▶T/V 0.0 A 00 STP 60.00Hz	F 60.00
9.	Close the FX or RX contact to run the motor.	The FWD or REV LED starts blinking.	The RUN LED starts blinking.
10.	Open the FX or RX contact to stop the motor.	The STOP/RESET LED starts blinking.	The STOP/RESET LED starts blinking.

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CHAPTER 4 - PARAMETER LIST

4.1 Drive Group [DRV]

Code	Description	Keypad Display		Setting Range		Units	Factory Default	Adj. During Run	Page
		LCD	7-Segment	LCD	7-Segment				
DRV-00	Output Frequency or Reference Frequency, Output Current (LCD)	Cmd. freq	**F** or **r** (DRV-13)	0 to FU1-20 (Max. freq)		0.01	0.00 [Hz]	Yes	Fehler! Textmarke nicht definiert.
DRV-01	Acceleration Time	Acc. time	**01**	0 to 6000		0.1	10.0 [sec]	Yes	Fehler! Textmarke nicht definiert.
DRV-02	Deceleration Time	Dec. time	**02**	0 to 6000		0.1	20.0 [sec]	Yes	Fehler! Textmarke nicht definiert.
DRV-03	Drive Mode (Run/Stop Method)	Drive mode	**03**	Keypad	**0**	-	Fx/Rx-1	No	Fehler! Textmarke nicht definiert.
				Fx/Rx-1	**1**				
				Fx/Rx-2	**2**				
DRV-04	Frequency Mode (Freq. setting Method)	Freq mode	**04**	Keypad-1	**0**	-	Keypad-1	No	Fehler! Textmarke nicht definiert.
				Keypad-2	**1**				
				V1	**2**				
				I	**3**				
				V1+I	**4**				

DRV-05	Step Frequency 1	Step freq-1	**05**	FU1-22 to FU1-20 (Starting freq to Max. freq)	0.01	10.00 [Hz]	Yes	Fehler! Textmarke nicht definiert.
DRV-06	Step Frequency 2	Step freq-2	**06**			20.00 [Hz]		
DRV-07	Step Frequency 3	Step freq-3	**07**			30.00 [Hz]		
DRV-08	Output Current	Current	**08**	The Load Current in RMS	-	[A]	-	Fehler! Textmarke nicht definiert.
DRV-09	Motor Speed	Speed	**09**	The Motor Speed in rpm	-	[rpm]	-	Fehler! Textmarke nicht definiert.
DRV-10	DC link Voltage	DC link Vtg	**10**	The DC Link Voltage inside inverter	-	[V]	-	Fehler! Textmarke nicht definiert.
DRV-11	User Display Selection	User disp	**11**	Selected in FU2-73 (User Disp)	-	-	-	Fehler! Textmarke nicht definiert.

DRV-12	Fault Display	Fault	**12**	-	**-**	-	None **n0n**	-	Fehler! Textmarke nicht definiert.
DRV-13	Motor Direction Set	Not displayed in LCD keypad	**13**	Not available	**0** [Forward] **1** [reverse]	-	**0**	Yes	Fehler! Textmarke nicht definiert.
DRV-14	Target/Output Frequency Display	TAR OUT	**14**	-	**-**	-	0.00 [Hz]	Yes	Fehler! Textmarke nicht definiert.
DRV-15[5]	Reference/Feedback Frequency Display	REF FBK	**15**	-	**-**	-	0.00 [Hz]	Yes	Fehler! Textmarke nicht definiert.
DRV-20	FU1 Group Selection	Not displayed in LCD keypad	**20**	Not available	Press [PROG/ENT] key	-	**1**	Yes	Fehler! Textmarke nicht definiert.

[5] Code DRV-15 appears only when FU2-47 is set to 'Yes'.

DRV-21	FU2 Group Selection		**21**						Fehler! Textmarke nicht definiert.
DRV-22	I/O Group Selection		**22**						Fehler! Textmarke nicht definiert.
DRV-23[6]	EXT Group Selection		**23**						Fehler! Textmarke nicht definiert.
DRV-24	COM Group Selection		**24**			-	**1**	Yes	Fehler! Textmarke nicht definiert.
DRV-25	APP Group Selection		**25**			-	**1**	Yes	Fehler! Textmarke nicht definiert.

[6] Code DRV-23 through DRV-24 appears only when a Sub-Board or an Option Board is installed.

4.2 Function 1 Group [FU1]

Code	Description	Keypad Display		Setting Range		Units	Factory Default	Adj. During Run	Page
		LCD	7-Segment	LCD	7-Segment				
FU1-00	Jump to Desired Code #	Jump code	Not displayed	1 to 60	Not available	1	1	Yes	Fehler! Textmarke nicht definiert.
FU1-03	Run Prevention	Run Prev.	**03**	None Forward Prev Reverse Prev	**0** **1** **2**	-	None	No	Fehler! Textmarke nicht definiert.
FU1-05	Acceleration Pattern	Acc. pattern	**05**	Linear S-curve U-curve Minimum Optimum	**0** **1** **2** **3** **4**	-	Linear	No	Fehler! Textmarke nicht definiert.
FU1-06	Deceleration Pattern	Dec. pattern	**06**	Linear S-curve U-curve Minimum Optimum	**0** **1** **2** **3** **4**	-	Linear	No	Fehler! Textmarke nicht definiert.
FU1-07	Stop Mode	Stop mode	**07**	Decel DC-brake Free-run	**0** **1** **2**	-	Decel	No	Fehler! Textmarke nicht definiert.

Code	Description	Keypad Display		Setting Range		Units	Factory Default	Adj. During Run	Page
		LCD	7-Segment	LCD	7-Segment				
FU1-08[7]	DC Injection Braking Frequency	DcBr freq	**08**	FU1-22 to 60 [Hz]		0.01	5.00 [Hz]	No	Fehler! Textmarke nicht definiert.
FU1-09	DC Injection Braking On-delay Time	DcBlk time	**09**	0 to 60 [sec]		0.01	0.1 [sec]	No	
FU1-10	DC Injection Braking Voltage	DcBr value	**10**	0 to 200 [%]		1	50 [%]	No	
FU1-11	DC Injection Braking Time	DcBr time	**11**	0 to 60 [sec]		0.1	1.0 [sec]	No	
FU1-12	Starting DC Injection Braking Voltage	DcSt value	**12**	0 to 200 [%]		1	50 [%]	No	Fehler! Textmarke nicht definiert.
FU1-13	Starting DC Injection Braking Time	DcSt time	**13**	0 to 60 [sec]		0.1	0.0 [sec]	No	
FU1-20	Maximum Frequency	Max freq	**20**	40 to 400 [Hz]		0.01	60.00 [Hz]	No	Fehler! Textmarke nicht definiert.
FU1-21	Base Frequency	Base freq	**21**	30 to FU1-20		0.01	60.00 [Hz]	No	
FU1-22	Starting Frequency	Start freq	**22**	0.1 to 10 [Hz]		0.01	0.50 [Hz]	No	
FU1-23	Frequency Limit selection	Freq limit	**23**	No Yes	**0** **1**	-	No	No	Fehler! Textmarke nicht definiert.
FU1-24[8]	Low Limit Frequency	F-limit Lo	**24**	FU1-22 to FU1-25		0.01	0.50 [Hz]	No	
FU1-25	High Limit Frequency	F-limit Hi	**25**	FU1-24 to FU1-20		0.01	60.00 [Hz]	No	
FU1-26	Manual/Auto Torque Boost Selection	Torque boost	**26**	Manual Auto	**0** **1**	-	Manual	No	Fehler! Textmarke nicht definiert.

[7] Code FU1-08 through FU1-11 appears only when FU1-07 is set to 'DC-Brake'.

[8] Code FU1-24 through FU1-25 appears only when FU1-23 is set to 'Yes'.

Code	Description	Keypad Display		Setting Range		Units	Factory Default	Adj. During Run	Page
		LCD	7-Segment	LCD	7-Segment				
FU1-27	Torque Boost in Forward Direction	Fwd boost	**27**	0 to 15 [%]		0.1	2.0 [%]	No	Fehler! Textmarke nicht definiert.
FU1-28	Torque Boost in Reverse Direction	Rev boost	**28**	0 to 15 [%]		0.1	2.0 [%]	No	
FU1-29	Volts/Hz Pattern	V/F pattern	**29**	Linear Square User V/F	**0** **1** **2**	-	Linear	No	Fehler! Textmarke nicht definiert.
FU1-30[9]	User V/F – Frequency 1	User freq 1	**30**	0 to FU1-20		0.01	15.00 [Hz]	No	Fehler! Textmarke nicht definiert.
FU1-31	User V/F – Voltage 1	User volt 1	**31**	0 to 100 [%]		1	25 [%]	No	
FU1-32	User V/F – Frequency 2	User freq 2	**32**	0 to FU1-20		0.01	30.00 [Hz]	No	
FU1-33	User V/F – Voltage 2	User volt 2	**33**	0 to 100 [%]		1	50 [%]	No	
FU1-34	User V/F – Frequency 3	User freq 3	**34**	0 to FU1-20		0.01	45.00 [Hz]	No	
FU1-35	User V/F – Voltage 3	User volt 3	**35**	0 to 100 [%]		1	75 [%]	No	
FU1-36	User V/F – Frequency 4	User freq 4	**36**	0 to FU1-20		0.01	60.00 [Hz]	No	
FU1-37	User V/F – Voltage 4	User volt 4	**37**	0 to 100 [%]		1	100 [%]	No	
FU1-38	Output Voltage Adjustment	Volt control	**38**	40 to 110 [%]		0.1	100.0 [%]	No	Fehler! Textmarke nicht definiert.
FU1-39	Energy Save Level	Energy save	**39**	0 to 30 [%]		1	0 [%]	Yes	Fehler! Textmarke nicht definiert.
FU1-50	Electronic Thermal Selection	ETH select	**50**	No Yes	**0** **1**	-	No	Yes	Fehler!

[9] Code FU1-30 through FU1-37 appears only when FU1-29 is set to 'User V/F'.

Code	Description	Keypad Display		Setting Range		Units	Factory Default	Adj. During Run	Page
		LCD	7-Segment	LCD	7-Segment				
FU1-51[10]	Electronic Thermal Level for 1 Minute	ETH 1 min	**51**	FU1-52 to 200 [%]		1	150 [%]	Yes	Textmarke nicht definiert.
FU1-52	Electronic Thermal Level for Continuous	ETH cont	**52**	50 to FU1-51		1	100 [%]	Yes	
FU1-53	Electronic Thermal Characteristic Selection (Motor Type)	Motor type	**53**	Self-cool Forced-cool	**0** **1**	-	Self-cool	Yes	
FU1-54	Overload Warning Level	OL level	**54**	30 to 150 [%]		1	150 [%]	Yes	Fehler! Textmarke nicht definiert.
FU1-55	Overload Warning Hold Time	OL time	**55**	0 to 30 [sec]		0.1	10.0 [sec]	Yes	
FU1-56	Overload Trip Selection	OLT select	**56**	No Yes	**0** **1**	-	Yes	Yes	Fehler! Textmarke nicht definiert.
FU1-57	Overload Trip Level	OLT level	**57**	30 to 150 [%]		1	180 [%]	Yes	
FU1-58	Overload Trip Delay Time	OLT time	**58**	0 to 60 [sec]		1	60.0 [sec]	Yes	
FU1-59	Stall Prevention Mode Selection	Stall prev.	**59**	000 to 111 (Bit Set)		bit	000	No	Fehler! Textmarke nicht definiert.
FU1-60	Stall Prevention Level	Stall level	**60**	30 to 150 [%]		1	150 [%]	No	
FU1-99	Return Code	Not displayed	**99**	Not available	[PROG/ENT] or [SHIFT/ESC]	-	-	-	Fehler! Textmarke nicht definiert.

4.3 Function 2 Group [FU2]

Code	Description	Keypad Display	Setting Range	Units	Factory	Adj.	Page

[10] Code FU1-51 through FU1-53 appears only when FU1-50 is set to 'Yes'.

		LCD	7-Segment	LCD	7-Segment				
FU2-00	Jump to desired code #	Jump code	Not displayed	1 to 94	Not available	1	1	Yes	Fehler! Textmarke nicht definiert.
FU2-01	Previous Fault History 1	Last trip-1	**01**	By pressing [PROG] and [▲] key, the frequency, current, and operational status at the time of fault can be seen.		-	None	-	Fehler! Textmarke nicht definiert.
FU2-02	Previous Fault History 2	Last trip-2	**02**						
FU2-03	Previous Fault History 3	Last trip-3	**03**						
FU2-04	Previous Fault History 4	Last trip-4	**04**						
FU2-05	Previous Fault History 5	Last trip-5	**05**						
FU2-06	Erase Fault History	Erase trips	**06**	No Yes	**0** **1**	-	No	Yes	
FU2-07	Dwell Frequency	Dwell freq	**07**	FU1-22 to FU1-20		0.01	5.00 [Hz]	No	Fehler! Textmarke nicht definiert.
FU2-08	Dwell Time	Dwell time	**08**	0 to 10 [sec]		0.1	0.0 [sec]	No	
FU2-10	Frequency Jump Selection	Jump freq	**10**	No Yes	**0** **1**	-	No	No	Fehler! Textmarke nicht definiert.
FU2-11[11]	Jump Frequency 1 Low	Jump lo 1	**11**	FU1-22 to FU2-12		0.01	10.00 [Hz]	No	
FU2-12	Jump Frequency 1 High	Jump Hi 1	**12**	FU2-11 to FU1-20		0.01	15.00 [Hz]	No	
FU2-13	Jump Frequency 2 Low	Jump lo 2	**13**	FU1-22 to FU2-14		0.01	20.00 [Hz]	No	
FU2-14	Jump Frequency 2 High	Jump Hi 2	**14**	FU2-13 to FU1-20		0.01	25.00 [Hz]	No	
FU2-15	Jump Frequency 3 Low	Jump lo 3	**15**	FU1-22 to FU2-16		0.01	30.00 [Hz]	No	
FU2-16	Jump Frequency 3 High	Jump Hi 3	**16**	FU2-15 to FU1-20		0.01	35.00 [Hz]	No	
FU2-17	Start Curve for S-Curve Accel/Dedel Pattern	Start Curve	**17**	0 to 100%		1	40%	No	Fehler! Textmarke nicht definiert.

[11] Code FU2-11 through FU2-16 appears only when FU2-10 is set to 'Yes'.

Code	Description	Keypad Display		Setting Range		Units	Factory Default	Adj. During Run	Page
		LCD	7-Segment	LCD	7-Segment				
FU2-18	End Curve for S-Curve Accel/Dedel Pattern	End Curve	**18**	0 to 100%		1	40%	No	Fehler! Textmarke nicht definiert.
FU2-19	Input/Output Phase Loss Protection	Trip select	**19**	00 to 11 (Bit Set)		-	00	Yes	Fehler! Textmarke nicht definiert.
FU2-20	Power ON Start Selection	Power-on run	**20**	No Yes	**0** **1**	-	No	Yes	Fehler! Textmarke nicht definiert.
FU2-21	Restart after Fault Reset	RST restart	**21**	No Yes	**0** **1**	-	No	Yes	Fehler! Textmarke nicht definiert.
FU2-22	Speed Search Selection	Speed Search	**22**	0000 to 1111 (Bit Set)		-	0000	No	Fehler! Textmarke nicht definiert.
FU2-23	Current Limit Level During Speed Search	SS Sup-Curr	**23**	80 to 200 [%]		1	100 [%]	Yes	Fehler!

Code	Description	Keypad Display		Setting Range		Units	Factory Default	Adj. During Run	Page
		LCD	7-Segment	LCD	7-Segment				
FU2-24	P Gain During Speed Search	SS P-gain	**24**	0 to 30000		1	100	Yes	Text mark e nicht definiert.
FU2-25	I Gain During speed search	SS I-gain	**25**	0 to 30000		1	1000	Yes	
FU2-26	Number of Auto Restart Attempt	Retry number	**26**	0 to 10		1	0	Yes	Fehler! Text mark e nicht definiert.
FU2-27	Delay Time Before Auto Restart	Retry Delay	**27**	0 to 60 [sec]		0.1	1.0 [sec]	Yes	Fehler! Text mark e nicht definiert.
FU2-30	Rated Motor Selection	Motor select	**30**	0.75kW 1.5kW 2.2kW 3.7kW 5.5kW 7.5kW 11.0kW 15.0kW 18.5kW 22.0kW	**0** **1** **2** **3** **4** **5** **6** **7** **8** **9**	-	[12]	No	Fehler! Text mark e nicht definiert.
FU2-31	Number of Motor Poles	Pole number	**31**	2 to 12		1	4	No	Fehler! Text mark e nicht definiert.

[12] The rated motor is automatically set according to the inverter model name. If different, set the motor capacity connected.

Code	Description	Keypad Display		Setting Range		Units	Factory Default	Adj. During Run	Page
		LCD	7-Segment	LCD	7-Segment				
FU2-32	Rated Motor Slip	Rated-Slip	**32**	0 t o10 [Hz]		0.01		No	Fehler! Textmarke nicht definiert.
FU2-33	Rated Motor Current (RMS)	Rated-Curr	**33**	1 to 200 [A]		1		No	Fehler! Textmarke nicht definiert.
FU2-34[14]	No Load Motor Current (RMS)	Noload-Curr	**34**	0.5 to 200 [A]		1	[13]	No	Fehler! Textmarke nicht definiert.
FU2-36	Motor Efficiency	Efficiency	**36**	70 to 100 [%]		1		No	Fehler! Textmarke nicht definiert.
FU2-37	Load Inertia	Inertia rate	**37**	0 to 1		1	0	No	Fehler! Textmarke nicht definiert.

[13] This value is automatically entered according to the rated motor set in FU2-30. If different, set the correct value of the motor.

[14] Code FU2-34 appears only when FU2-40 is set to 'Slip comp'.

Code	Description	Keypad Display		Setting Range		Units	Factory Default	Adj. During Run	Page
		LCD	7-Segment	LCD	7-Segment				
FU2-39	Carrier Frequency	Carrier freq	**38**	1 to 15 [kHz]		1	5 [kHz]	Yes	Fehler! Textmarke nicht definiert.
FU2-40	Control Mode Selection	Control mode	**40**	V/F Slip comp Sensorless	**0** **1** **3**	-	V/F	No	Fehler! Textmarke nicht definiert.
FU2-41	Auto Tuning	Auto tuning	**41**	No Yes	**0** **1**	-	No	No	Fehler! Textmarke nicht definiert.
FU2-42	Stator Resistance of Motor	Rs	**42**	0 to 5 [ohm]		0.001	[15]	No	
FU2-43[16]	Rotor Resistance of Motor	Rr	**43**	0 to 5 [ohm]		0.001		No	
FU2-44	Leakage Inductance of Motor	Lsigma	**44**	0 to 30 [mH]		0.001		No	
FU2-45	P Gain for Sensorless Control	SL P-gain	**45**	0 to 32767		1	32767	Yes	Fehler! Textmarke nicht definiert.
FU2-46	I Gain for Sensorless Control	SL I-gain	**46**	0 to 32767		1	3276	Yes	Fehler! Textmarke nicht definiert.

[15] This value is automatically entered according to the rated motor set in FU2-30. If different, set the correct value of the motor.

[16] Code FU2-43 through FU2-46 appears only when FU2-40 is set to 'Sensorless'.

Code	Description	Keypad Display		Setting Range		Units	Factory Default	Adj. During Run	Page
		LCD	7-Segment	LCD	7-Segment				
FU2-47	PID Operation Selection	Proc PI mode	**47**	No Yes	**0** **1**	-	No	No	Fehler! Textmarke nicht definiert.
FU2-48[17]	PID Reference Frequency Selection	PID Ref	**48**	Ramp freq. Target freq.	**0** **1**	-	Ramp freq.	No	Fehler! Textmarke nicht definiert.
FU2-49	PID Reference Mode Selection	PID Ref Mode	**49**	Freq mode Keypad-1 Keypad-2 V1 I V1+I	**0** **1** **2** **3** **4** **5**	-	Freq mode	No	Fehler! Textmarke nicht definiert.
FU2-50	PID Output Direction Selection	PID Out Dir	**50**	Ramp freq. Target freq.	**0** **1**	-	Ramp freq.	No	Fehler! Textmarke nicht definiert.
FU2-51	PID Feedback Signal Selection	PID F/B	**51**	I V1 V2	**0** **1** **2**	-	I	No	Fehler! Textmarke nicht definiert.
FU2-52	P Gain for PID Control	PID P-gain	**52**	0 to 999.9 [%]		0.1	300.0 [%]	Yes	
FU2-53	I Gain for PID Control	PID I-time	**53**	0 to 32.0 [sec]		0.1	30 [sec]	Yes	
FU2-54	D Gain for PID Control	PID D-time	**54**	0 to 999.9 [msec]		0.1	0.0 [msec]	Yes	
FU2-55	High Limit Frequency for PID Control	PID +limit	**55**	0 to FU1-20		0.01	60.00 [Hz]	Yes	
FU2-56	Low Limit Frequency for PID Control	PID -limit	**56**	0 to FU1-20		0.01	60.00 [Hz]	Yes	

[17] Code FU2-48 through FU2-60 appears only when FU2-47 is set to 'Yes'.

Code	Description	Keypad Display		Setting Range		Units	Factory Default	Adj. During Run	Page
		LCD	7-Segment	LCD	7-Segment				
FU2-57	PID Output Inversion	PID Out Inv.	**57**	No Yes	**0** **1**	-	No	No	Fehler! Textmarke nicht definiert.
FU2-58	PID Output Scale	PID OutScale	**58**	0 to 999.9 [%]		0.1	100 [%]	No	Fehler! Textmarke nicht definiert.
FU2-59	PID P2 Gain	PID P2-gain	**59**	0 to 100 [%]		0.1	100 [%]	No	Fehler! Textmarke nicht definiert.
FU2-60	P Gain Scale	P-gain Scale	**60**	0 to 100 [%]		0.1	100 [%]	No	Fehler! Textmarke nicht definiert.
FU2-69	Accel/Decel Change Frequency	Acc/Dec ch F	**69**	0 to FU1-20				No	Fehler! Textmarke nicht definiert.
FU2-70	Reference Frequency for	Acc/Dec freq	**70**	Max freq	**0**	-	Max freq	No	Fehle

Code	Description	Keypad Display		Setting Range		Units	Factory Default	Adj. During Run	Page
		LCD	7-Segment	LCD	7-Segment				
	Accel and Decel			Delta freq	1				Fehler! Textmarke nicht definiert.
FU2-71	Accel/Decel Time Scale	Time scale	71	0.01 [sec] 0.1 [sec] 1 [sec]	0 1 2	-	0.01 [sec]	Yes	Fehler! Textmarke nicht definiert.
FU2-72	Power On Display	PowerOn disp	72	0 to 12		1	0	Yes	Fehler! Textmarke nicht definiert.
FU2-73	User Display Selection	User disp	73	Voltage Watt Torque	0 1 2	-	Voltage	Yes	Fehler! Textmarke nicht definiert.
FU2-74	Gain for Motor Speed Display	RPM factor	74	1 to 1000 [%]		1	100 [%]	Yes	Fehler! Textmarke nicht definiert.
FU2-75	DB (Dynamic Braking) Resistor Mode Selection	DB mode	75	None Int. DB-R	0 1	-	Int. DB-R	Yes	Fehler!

Code	Description	Keypad Display		Setting Range		Units	Factory Default	Adj. During Run	Page
		LCD	7-Segment	LCD	7-Segment				
				Ext. DB-R	**2**				Text mark e nicht definiert.
FU2-76[18]	Duty of Dynamic Braking Resistor	DB %ED	**76**	0 to 30 [%]		1	10 [%]	Yes	Fehler! Text mark e nicht definiert.
FU2-79	Software Version	S/W version	**79**	Ver 1.05		-	-	-	Fehler! Text mark e nicht definiert.
FU2-81[19]	2nd Acceleration Time	2nd Acc time	**81**	0 to 6000 [sec]		0.1	5.0 [sec]	Yes	Fehler! Text mark e nicht definiert.
FU2-82	2nd Deceleration Time	2nd Dec time	**82**	0 to 6000 [sec]		0.1	10.0 [sec]	Yes	
FU2-83	2nd Base Frequency	2nd BaseFreq	**83**	30 to FU1-20		0.01	60.00 [Hz]	No	
FU2-84	2nd V/F Pattern	2nd V/F	**84**	Linear Square User V/F	**0** **1** **2**	-	Linear	No	
FU2-85	2nd Forward Torque Boost	2nd F-boost	**85**	0 to 15 [%]		0.1	2.0 [%]	No	
FU2-86	2nd Reverse Torque Boost	2nd R-boost	**86**	0 to 15 [%]		0.1	2.0 [%]	No	
FU2-87	2nd Stall Prevention Level	2nd Stall	**87**	30 to 150 [%]		1	150[%]	No	
FU2-88	2nd Electronic Thermal Level for 1 minute	2nd ETH 1min	**88**	FU2-89 to 200 [%]		1	150 [%]	Yes	
FU2-89	2nd Electronic Thermal Level for continuous	2nd ETH cont	**89**	50 to FU2-88 (Maximum 150%)		1	100 [%]	Yes	
FU2-90	2nd Rated Motor Current	2nd R-Curr	**90**	1 to 200 [A]		0.1	3.6 [A]	No	
FU2-91	Read Parameters into Keypad from Inverter	Para. Read	**91**	No Yes	**0** **1**	-	No	No	Fehler! Text
FU2-92	Write Parameters to	Para. Write	**92**	No	**0**	-	No	No	

[18] Code FU2-76 appears only when FU2-75 is set to 'Ext. DB-R'.

[19] Code FU2-81 through FU2-90 appear only when one of I/O-12 ~ I/O-14 is set to '2nd function'.

Code	Description	Keypad Display		Setting Range		Units	Factory Default	Adj. During Run	Page
		LCD	7-Segment	LCD	7-Segment				
	Inverter from Keypad			Yes	**1**				marke nicht definiert.
FU2-93	Initialize Parameters	Para. Init	**93**	No All Groups DRV FU1 FU2 I/O EXT	**0** **1** **2** **3** **4** **5** **6**	-	No	No	Fehler! Textmarke nicht definiert.
FU2-94	Parameter Write Protection	Para. Lock	**94**	0 to 255		1	0	Yes	Fehler! Textmarke nicht definiert.
FU2-99	Return Code	Not displayed	**99**	Not available	[PROG/ENT] or [SHIFT/ESC]	-	1	Yes	Fehler! Textmarke nicht definiert.

4.4 Input/Output Group [I/O]

Code	Description	Keypad Display		Setting Range		Units	Factory Default	Adj. During Run	Page
		LCD	7-Segment	LCD	7-Segment				
I/O-00	Jump to Desired Code #	Jump code	Not displayed	1 to 84	Not available	1	1	Yes	Fehler! Textmarke nicht definiert.
I/O-01	Filtering Time Constant for V1 Signal Input	V1 filter	**01**	0 to 10000 [ms]		1	10 [ms]	Yes	Fehler!

Code	Description	Keypad Display		Setting Range		Units	Factory Default	Adj. During Run	Page
		LCD	7-Segment	LCD	7-Segment				
I/O-02	V1 Input Minimum Voltage	V1 volt x1	**02**	0 to 10 [V]		0.01	0.00 [V]	Yes	Text marke nicht definiert.
I/O-03	Frequency Corresponding to V1 Input Minimum Voltage	V1 freq y1	**03**	0 to FU1-20		0.01	0.00 {Hz}	Yes	
I/O-04	V1 Input Maximum Voltage	V1 volt x2	**04**	0 to 10 [V]		0.01	10.00 [V]	Yes	
I/O-05	Frequency Corresponding to V1 Input Maximum Voltage	V1 freq y2	**05**	0 to FU1-20		0.01	60.00 [Hz]	Yes	
I/O-06	Filtering Time Constant for I Signal Input	I filter	**06**	0 to 10000 [ms]		1	10 [ms]	Yes	Fehler! Text marke nicht definiert.
I/O-07	I Input Minimum Current	I curr x1	**07**	0 to 20 [mA]		0.01	4.00 [mA]	Yes	
I/O-08	Frequency Corresponding to I Input Minimum Current	I freq y1	**08**	0 to FU1-20		0.01	0.00 [Hz]	Yes	
I/O-09	I Input Maximum Current	I curr x2	**09**	0 to 20 [mA]		0.01	20.00 [mA]	Yes	Fehler! Text marke nicht definiert.
I/O-10	Frequency Corresponding to I Input Maximum Current	I freq y2	**10**	0 to FU1-20		0.01	60.00 [Hz]	Yes	
I/O-11	Criteria for Analog Input Signal Loss	Wire broken	**11**	None half x1 below x1	**0** **1** **2**	-	None	Yes	Fehler! Text marke nicht definiert.
I/O-12	Multi-Function Input Terminal 'P1' Define	P1 define	**12**	Speed-L Speed-M Speed-H XCEL-L XCEL-M XCEL-H Dc-brake 2nd Func Exchange - Reserved - Up Down	**0** **1** **2** **3** **4** **5** **6** **7** **8** **9** **10** **11**	-	Speed-L	Yes	Fehler! Text marke nicht definiert.

Code	Description	Keypad Display		Setting Range		Units	Factory Default	Adj. During Run	Page
		LCD	7-Segment	LCD	7-Segment				
				3-Wire	12				
				Ext Trip-A	13				
				Ext Trip-B	14				
				iTerm Clear	15				
				Open-loop	16				
				Main-drive	17				
				Analog hold	18				
				XCEL stop	19				
				P Gain2	20				
				SEQ-L	21				
				SEQ-M	22				
				SEQ-H	23				
				Manual	24				
				Go step	25				
				Hold step	26				
				Trv Off.Lo	27				
				Trv Off.Hi	28				
				Interlock1	29				
				Interlock2	30				
				Interlock3	31				
				Interlock4	32				
I/O-13	Multi-function Input Terminal 'P2' Define	P2 define	13	Same as Above		-	Speed-M	Yes	Fehler! Textmarke nicht definiert.
I/O-14	Multi-function Input Terminal 'P3' Define	P3 define	14			-	Speed-H	Yes	
I/O-15	Terminal Input Status	In status	15	000000000 to 111111111		-	-	-	Fehler! Textmarke nicht definiert.
I/O-16	Terminal Output Status	Out status	16	0000 to 1111		-	-	-	

Code	Description	Keypad Display		Setting Range		Units	Factory Default	Adj. During Run	Page
		LCD	7-Segment	LCD	7-Segment				
I/O-17	Filtering Time Constant for Multi-Function Input Terminals	Ti Filt Num	**17**	2 to 50		1	15	Yes	Fehler! Textmarke nicht definiert.
I/O-20	Jog Frequency Setting	Jog freq	**20**	FU1-22 to FU1-20		0.01	10.00 [Hz]	Yes	Fehler! Textmarke nicht definiert.
I/O-21	Step Frequency 4	Step freq-4	**21**				40.00 [Hz]	Yes	Fehler! Textmarke nicht definiert.
I/O-22	Step Frequency 5	Step freq-5	**22**				50.00 [Hz]	Yes	
I/O-23	Step Frequency 6	Step freq-6	**23**				40.00 [Hz]	Yes	
I/O-24	Step Frequency 7	Step freq-7	**24**				30.00 [Hz]	Yes	
I/O-25	Acceleration Time 1 for Step Frequency	Acc time-1	**25**	0 to 6000 [sec]		0.1	20.0 [sec]	Yes	Fehler! Textmarke nicht definiert.
I/O-26	Deceleration Time 1 for Step Frequency	Dec time-1	**26**	0 to 6000 [sec]		0.1	20.0 [sec]	Yes	
I/O-27	Acceleration Time 2	Acc time-2	**27**	0 to 6000 [sec]		0.1	30.0 [sec]	Yes	
I/O-28	Deceleration Time 2	Dec time-2	**28**	0 to 6000 [sec]		0.1	30.0 [sec]	Yes	
I/O-29	Acceleration Time 3	Acc time-3	**29**	0 to 6000 [sec]		0.1	40.0 [sec]	Yes	
I/O-30	Deceleration Time 3	Dec time-3	**30**	0 to 6000 [sec]		0.1	40.0 [sec]	Yes	
I/O-31	Acceleration Time 4	Acc time-4	**31**	0 to 6000 [sec]		0.1	50.0 [sec]	Yes	
I/O-32	Deceleration Time 4	Dec time-4	**32**	0 to 6000 [sec]		0.1	50.0 [sec]	Yes	
I/O-33	Acceleration Time 5	Acc time-5	**33**	0 to 6000 [sec]		0.1	40.0 [sec]	Yes	
I/O-34	Deceleration Time 5	Dec time-5	**34**	0 to 6000 [sec]		0.1	40.0 [sec]	Yes	
I/O-35	Acceleration Time 6	Acc time-6	**35**	0 to 6000 [sec]		0.1	30.0 [sec]	Yes	
I/O-36	Deceleration Time 6	Dec time-6	**36**	0 to 6000 [sec]		0.1	30.0 [sec]	Yes	
I/O-37	Acceleration Time 7	Acc time-7	**37**	0 to 6000 [sec]		0.1	20.0 [sec]	Yes	
I/O-38	Deceleration Time 7	Dec time-7	**38**	0 to 6000 [sec]		0.1	20.0 [sec]	Yes	
I/O-40	FM (Frequency Meter) Output Selection	FM mode	**40**	Frequency Current Voltage	**0** **1** **2**	-	Frequency	Yes	Fehler! Text

Code	Description	Keypad Display		Setting Range		Units	Factory Default	Adj. During Run	Page
		LCD	7-Segment	LCD	7-Segment				
I/O-41	FM Output Adjustment	FM adjust	**41**	10 to 200 [%]		1	100 [%]	Yes	mark e nicht defini ert.
I/O-42	Frequency Detection Level	FDT freq	**42**	0 to FU1-20		0.01	30.00 [Hz]	Yes	Fehle r! Text mark e nicht defini ert.
I/O-43	Frequency Detection Bandwidth	FDT band	**43**	0 to FU1-20		0.01	10.00 [Hz]	Yes	
I/O-44	Multi-Function Auxiliary Contact Output Define (AXA, AXC)	Aux mode	**44**	FDT-1	**0**	-	Run	Yes	Fehle r! Text mark e nicht defini ert.
				FDT-2	**1**				
				FDT-3	**2**				
				FDT-4	**3**				
				FDT-5	**4**				
				OL	**5**				
				IOL	**6**				
				Stall	**7**				
				OV	**8**				
				LV	**9**				
				OH	**10**				
				Lost Command	**11**				
				Run	**12**				
				Stop	**13**				
				Steady	**14**				
				INV line	**15**				
				COMM line	**16**				
				Ssearch	**17**				
				Step pulse	**18**				
				Seq pulse	**19**				
				Ready	**20**				
				Trv. ACC	**21**				
				Trv. DEC	**22**				
				MMC	**23**				

Code	Description	Keypad Display		Setting Range		Units	Factory Default	Adj. During Run	Page
		LCD	7-Segment	LCD	7-Segment				
I/O-45	Fault Output Relay Setting (30A, 30B, 30C)	Relay mode	**45**	000 to 111 (Bit Set)		-	010	Yes	Fehler! Textmarke nicht definiert.
I/O-46[20]	Inverter Number	Inv No.	**46**	1 to 31		1	1	Yes	Fehler! Textmarke nicht definiert.
I/O-47	Baud Rate	Baud rate	**47**	1200 bps 2400 bps 4800 bps 9600 bps 19200 bps	**0** **1** **2** **3** **4**	-	9600 bps	Yes	Fehler! Textmarke nicht definiert.
I/O-48	Operating selection at Loss of Freq. Reference	Lost command	**48**	None FreeRun Stop	**0** **1** **2**	-	None	Yes	Fehler! Textmarke nicht definiert.
I/O-49	Waiting Time after Loss of Freq. Reference	Time out	**49**	0.1 to 120 [sec]		0.1	1.0 [sec]	Yes	
I/O-50	Auto (Sequence) Operation selection	Auto mode	**50**	None Auto-A Auto-B	**0** **1** **2**	-	None	No	Fehler! Textmarke nicht definiert.
I/O-51	Sequence Number Selection	Seq select	**51**	1 to 5		1	1	Yes	
I/O-52	The Number of Steps of Sequence Number #	Step number	**52**	1 to 8		1	2	Yes	

[20] Code I/O-46 through I/O-49 are used in Option Board like RS485, Device, Net and F-net etc.

Code	Description	Keypad Display		Setting Range		Units	Factory Default	Adj. During Run	Page
		LCD	7-Segment	LCD	7-Segment				
I/O-53[21]	1st Step Frequency of Sequence 1	Seq1 / 1F	**53**	0.01 to FU1-20		0.01	11.00 [Hz]	Yes	Fehler! Textmarke nicht definiert.
I/O-54	Transient Time to 1st Step of Sequence 1	Seq1 / 1T	**54**	0.1 to 6000 [sec]		0.1	1.1 [sec]	Yes	
I/O-55	Steady Speed Time at 1st Step of Sequence 1	Seq1 / 1S	**55**	0.1 to 6000 [sec]		0.1	1.1 [sec]	Yes	
I/O-56	Motor Direction of 1st Step of Sequence 1	Seq1 / 1D	**56**	Reverse Forward	**0** **1**	-	Forward	Yes	
I/O-57	1st Step Frequency of Sequence 2	Seq1 / 2F	**57**	0.01 to FU1-20		0.01	21.00 [Hz]	Yes	
I/O-58	Transient Time to 1st Step of Sequence 2	Seq1 / 2T	**58**	0.1 to 6000 [sec]		0.1	1.1 [sec]	Yes	Fehler! Textmarke nicht definiert.
I/O-59	Steady Speed Time at 1st Step of Sequence 2	Seq1 / 2S	**59**	0.1 to 6000 [sec]		0.1	1.1 [sec]	Yes	
I/O-60	Motor Direction of 1st Step of Sequence 2	Seq1 / 2D	**60**	Reverse Forward	**0** **1**	-	Forward	Yes	
I/O-99	Return Code	Not displayed	**99**	Not available	[PROG/ENT] or [SHIFT/ESC]	-	1	Yes	

4.5 External Group [EXT]

EXT group appears only when the corresponding Sub-Board is installed.

Code	Description	Keypad Display		Setting Range		Units	Factory Default	Adj. During Run	Page
		LCD	7-Segment	LCD	7-Segment				
EXT-00	Jump to Desired Code #	Jump code	Not displayed	0 to 99	Not available	1	1	Yes	Fehler! Textmarke nicht definiert.
EXT-01	Sub Board Type Display	Sub B/D	**01**	None SUB-A SUB-B SUB-C SUB-D	**0** **1** **2** **3** **4**	-	None	Automatically set	Fehler! Textmarke

[21] The 'Seq#' of code I/O-53 through I/O-60 varies according to the sequence number selected in I/O-51.
The parameter code may be extended to I/O-84 depending the number of steps set in I/O-52 because the steps can be set up to 8.

Code	Description	Keypad Display		Setting Range		Units	Factory Default	Adj. During Run	Page
		LCD	7-Segment	LCD	7-Segment				
				SUB-E	**5**				nicht definiert.
				SUB-F	**6**				
				SUB-G	**7**				
				SUB-H	**8**				
EXT-02	Multi-Function Input Terminal 'P4' Define	P4 define	**02**	Speed-L	**0**	-	XCEL-L	Yes	Fehler! Textmarke nicht definiert.
				Speed-M	**1**				
				Speed-H	**2**				
				XCEL-L	**3**				
				XCEL-M	**4**				
				XCEL-H	**5**				
				Dc-brake	**6**				
				2nd Func	**7**				
				Exchange	**8**				
				- Reserved -	**9**				
				Up	**10**				
				Down	**11**				
				3-Wire	**12**				
				Ext Trip-A	**13**				
				Ext Trip-B	**14**				
				iTerm Clear	**15**				
				Open-loop	**16**				
				Main-drive	**17**				
				Analog hold	**18**				
				XCEL stop	**19**				
				P Gain2	**20**				
				SEQ-L	**21**				
				SEQ-M	**22**				
				SEQ-H	**23**				
				Manual	**24**				
				Go step	**25**				
				Hold step	**26**				
				Trv Off.Lo	**27**				
				Trv Off.Hi	**28**				
				Interlock1	**29**				
				Interlock2	**30**				
				Interlock3	**31**				
				Interlock4	**32**				
EXT-03	Multi-Function Input Terminal 'P5' Define	P5 define	**03**	Same as Above		-	XCEL-M	Yes	Fehler!

Code	Description	Keypad Display		Setting Range		Units	Factory Default	Adj. During Run	Page
		LCD	7-Segment	LCD	7-Segment				
EXT-04	Multi-Function Input Terminal 'P6' Define	P6 define	**04**			-	XCEL-H	Yes	Text mark e nicht defini ert.
EXT-05	V2 Mode Selection	V2 mode	**05**	None Override Reference	**0** **1** **2**	-	None	No	Fehle r! Text mark e nicht defini ert.
EXT-06	Filtering Time Constant for V2 Input Signal	V2 filter	**06**	0 to 10000 [ms]		1	10 [ms]	Yes	Fehle r! Text mark e nicht defini ert.
EXT-07	V2 Input Minimum Voltage	V2 volt x1	**07**	0 to 10 [V]		0.01	0.00 [V]	Yes	
EXT-08	Frequency Corresponding to V2 Input Minimum Voltage	V2 freq y1	**08**	0 to FU1-20		0.01	0.00 [Hz]	Yes	
EXT-09	V2 Input Maximum Voltage	V2 volt x2	**09**	0 to 10 [V]		0.01	10.00 [V]	Yes	
EXT-10	Frequency Corresponding to V2 Input Maximum Voltage	V2 freq y2	**10**	0 to FU1-20		0.01	60.00 [Hz]	Yes	
EXT-14	Usage of Pulse Input Signal	F mode	**14**	None Feed-back Reference	**0** **1** **2**	-	None	No	Fehle r! Text mark e nicht defini ert.
EXT-15	Pulse Input Signal Selection	F pulse set	**15**	A+B A	**0** **1**	-	A+B	Yes	Fehle r! Text mark e nicht defini ert.

Code	Description	Keypad Display		Setting Range		Units	Factory Default	Adj. During Run	Page
		LCD	7-Segment	LCD	7-Segment				
EXT-16	Encoder Pulse Number	F pulse num	**16**	360 to 4096		1	1024	No	Fehler! Textmarke nicht definiert.
EXT-17	Filtering Time Constant for Pulse Input Signal	F filter	**17**	0 to 10000 [ms]		1	10 [ms]	Yes	Fehler! Textmarke nicht definiert.
EXT-18	Pulse Input Minimum Frequency	F pulse x1	**18**	0 to 100 [kHz]		0.01	0.00 [kHz]	Yes	Fehler! Textmarke nicht definiert.
EXT-19	Frequency Output Corresponding to Pulse Input Minimum Frequency	F freq y1	**19**	0 to FU1-20		0.01	0.00 [Hz]	Yes	Fehler! Textmarke nicht definiert.
EXT-20	Pulse Input Maximum Frequency	F pulse x2	**20**	0 to 100 [kHz]		0.01	10.00 [kHz]	Yes	
EXT-21	Frequency Output Corresponding to Pulse Input Maximum Frequency	F freq y2	**21**	0 to FU1-20		0.01	60.00 [Hz]	Yes	
EXT-22	P-Gain for 'Sub-B'	PG P-gain	**22**	0 to 30000		1	3000	Yes	Fehler! Textmarke nicht definiert.
EXT-23	I-Gain for 'Sub-B'	PG I-gain	**23**	0 to 30000		1	300	Yes	

Code	Description	Keypad Display		Setting Range		Units	Factory Default	Adj. During Run	Page
		LCD	7-Segment	LCD	7-Segment				
EXT-24	Slip Frequency for 'Sub-B' Board	PG Slip freq	**24**	0 to 200 [%]		1	100 [%]	Yes	Fehler! Textmarke nicht definiert.
EXT-30	Multi-Function Output Terminal 'Q1' Define	Q1 define	**30**	FDT-1	**0**	-	FDT-1	Yes	Fehler! Textmarke nicht definiert.
				FDT-2	**1**				
				FDT-3	**2**				
				FDT-4	**3**				
				FDT-5	**4**				
				OL	**5**				
				IOL	**6**				
				Stall	**7**				
				OV	**8**				
				LV	**9**				
				OH	**10**				
				Lost Command	**11**				
				Run	**12**				
				Stop	**13**				
				Steady	**14**				
				INV line	**15**				
				COMM line	**16**				
				Ssearch	**17**				
				Step pulse	**18**				
				Seq pulse	**19**				
				Ready	**20**				
				Trv. ACC	**21**				
				Trv. DEC	**22**				
				MMC	**23**				
EXT-31	Multi-function Output Terminal 'Q2' Define	Q2 define	**31**	Same as Above		-	FDT-2	Yes	Fehler! Textmarke nicht definiert.
EXT-32	Multi-function Output Terminal 'Q3' Define	Q3 define	**32**			-	FDT-3	Yes	
EXT-34	LM (Load Meter) Output Selection	LM mode	**34**	Frequency	**0**	-	Current	Yes	Fehler! Text
				Current	**1**				
				Voltage	**2**				

Code	Description	Keypad Display		Setting Range		Units	Factory Default	Adj. During Run	Page
		LCD	7-Segment	LCD	7-Segment				
				DC link Vtg	**3**				mark e nicht defini ert.
EXT-35	LM Output Adjustment	LM adjust	**35**	100 to 200 [%]		1	100 [%]	Yes	Fehle r! Text mark e nicht defini ert.
EXT-40	AM1 (Analog Meter 1) Output Selection	AM1 mode	**40**	Frequency Current Voltage DC link Vtg	**0** **1** **2** **3**	-	Frequency	Yes	Fehle r! Text mark e nicht defini ert.
EXT-41	AM1 Output Adjustment	AM1 adjust	**41**	100 to 200 [%]		1	100 [%]	Yes	
EXT-42	AM2 (Analog Meter 2) Output Selection	AM2 mode	**42**	Frequency Current Voltage DC link Vtg	**0** **1** **2** **3**	-	DC link Vtg	Yes	
EXT-43	AM2 Output Adjustment	AM2 adjust	**43**	100 to 200 [%]		1	100 [%]	Yes	
EXT-99	Return Code	Not displayed	**99**	Not available	[PROG/ENT] or [SHIFT/ESC]	-	1	Yes	

4.6 Communication Group [COM]

COM group appears only when the corresponding Option Boards are installed. Please refer to the option manual for detail.

Code	Description	Keypad Display		Setting Range		Units	Factory Default	Adj. During Run	Page
		LCD	7-Segment	LCD	7-Segment				
COM-00	Jump to Desired Code #	Jump code	Not displayed	0 to 99	Not available	1	1	Yes	
COM-01	Option Board Type	Opt B/D	**01**	None Device Net Synchro PLC-GF Profibus-DP Digital-In RS485 Modbus-RTU	**0** **1** **2** **3** **4** **5** **6** **7**	-	None	Yes	

Code	Description	Keypad Display		Setting Range		Units	Factory Default	Adj. During Run	Page
		LCD	7-Segment	LCD	7-Segment				
COM-02	Option Mode	Opt Mode	**02**	None Command Freq Cmd + Freq	**0** **1** **2** **3**	-	None	No	
COM-03	Option Version	Opt Version	**03**	-	**-**	-	-	No	
COM-04	Binary Option Input Selection	D-In Mode	**04**	8 Bit Bin 8 BCD 1% 8 BCD 1Hz 12 Bit Bin 12 BCD 0.1% 12 BCD 0.1Hz 12 BCD 1Hz	**0** **1** **2** **3** **4** **5** **6**	-	8 Bit Bin	No	
COM-05	Binary Input Filter Value	Digital Ftr	**05**	2-50		1	15	Yes	
COM-10	Device Net ID	MAC ID	**10**	0-63		1	0	Yes	
COM-11	Device Net Communication Speed	Baud Rate	**11**	125 kbps 250 kbps 500 kbps	**0** **1** **2**	-	125 kbps	Yes	
COM-12	Device Net Output Instance	Out Instance	**12**	20 21 100 101	**0** **1** **2** **3**	-	20	No	
COM-13	Device Net Input Instance	In Instance	**13**	70 71 110 111	**0** **1** **2** **3**	-	70	No	
COM-17	PLC Option Station Number	Station ID	**17**	0 to 63		1	1	Yes	
COM-20	Profibus ID	Profi MAC ID	**20**	0 to 127		1	1	Yes	
COM-30	Output Number	Output Num	**30**	0 to 8		1	3	Yes	
COM-31	Output 1	Output 1	**31**	0000-57FF(HEX)			000A(HEX)	Yes	
COM-32	Output 2	Output 2	**32**	0000-57FF(HEX)			000E(HEX)	Yes	
COM-33	Output 3	Output 3	**33**	0000-57FF(HEX)			000F(HEX)	Yes	
COM-34	Output 4	Output 4	**34**	0000-57FF(HEX)			0000(HEX)	Yes	
COM-35	Output 5	Output 5	**35**	0000-57FF(HEX)			0000(HEX)	Yes	
COM-36	Output 6	Output 6	**36**	0000-57FF(HEX)			0000(HEX)	Yes	
COM-37	Output 7	Output 7	**37**	0000-57FF(HEX)			0000(HEX)	Yes	
COM-38	Output 8	Output 8	**38**	0000-57FF(HEX)			0000(HEX)	Yes	
COM-40	Input Number	Input Num	**40**	0 to 8		1	2	Yes	
COM-41	Input 1	Input 1	**41**	0000-57FF(HEX)			0005(HEX)	Yes	
COM-42	Input 2	Input 2	**42**	0000-57FF(HEX)			0006(HEX)	Yes	
COM-43	Input 3	Input 3	**43**	0000-57FF(HEX)			0000(HEX)	Yes	
COM-44	Input 4	Input 4	**44**	0000-57FF(HEX)			0000(HEX)	Yes	

Code	Description	Keypad Display		Setting Range		Units	Factory Default	Adj. During Run	Page
		LCD	7-Segment	LCD	7-Segment				
COM-45	Input 5	Input 5	**45**	0000-57FF(HEX)			0000(HEX)	Yes	
COM-46	Input 6	Input 6	**46**	0000-57FF(HEX)			0000(HEX)	Yes	
COM-47	Input 7	Input 7	**47**	0000-57FF(HEX)			0000(HEX)	Yes	
COM-48	Input 8	Input 8	**48**	0000-57FF(HEX)			0000(HEX)	Yes	
COM-52	ModBus Option Selection	ModBus Mode	**52**	ModBus RTU			ModBus RTU	Yes	
COM-99	Return Code	Not displayed	**99**	Not available	[PROG/ENT] or [SHIFT/ESC]	-	1	Yes	

4.7 Application Group [APP]

Code	Description	Keypad Display		Setting Range		Units	Factory Default	Adj. During Run	Page
		LCD	7-Segment	LCD	7-Segment				
APP-00	Jump to Desired Code #	Jump code	Not displayed	0 to 99	Not available	1	1	Yes	Fehler! Textmarke nicht definiert.
APP-01	Application Mode Selection	App Mode	**01**	None Traverse MMC DRAW	**0** **1** **2** **3**	-	None	No	Fehler! Textmarke nicht definiert.
APP-02[22]	Traverse Amplitude	Trv. Amp	**02**	0.0 to 20.0 [%]		0.1	0.0 [%]	Yes	Fehler! Textmarke nicht definiert.

[22] Code APP-02 through APP-07 appears only when APP-01 is set to 'Traverse'.

Code	Description	Keypad Display		Setting Range		Units	Factory Default	Adj. During Run	Page
		LCD	7-Segment	LCD	7-Segment				
APP-03	Traverse Scramble Amplitude	Trv. Scr	**03**	0.0 to 50.0 [%]		0.1	0.0 [%]	Yes	Fehler! Textmarke nicht definiert.
APP-04	Traverse Accel Time	Trv Acc Time	**04**	0 to 6000 [sec]		0.1	2.0 [sec]	Yes	Fehler! Textmarke nicht definiert.
APP-05	Traverse Decel Time	Trv Dec Time	**05**	0 to 6000 [sec]		0.1	3.0 [sec]	Yes	Fehler! Textmarke nicht definiert.
APP-06	Traverse Offset (Hi) Setting	Trv Off Hi	**06**	0.0 to 20.0 [%]		0.1	0.0 [%]	Yes	Fehler! Textmarke nicht definiert.
APP-07	Traverse Offset (Lo) Setting	Trv Off Lo	**07**	0.0 to 20.0 [%]		0.1	0.0 [%]	Yes	Fehler! Textmarke nicht definiert.

Code	Description	Keypad Display		Setting Range		Units	Factory Default	Adj. During Run	Page
		LCD	7-Segment	LCD	7-Segment				
APP-08[23]	Running Auxiliary Motor Number Display	Aux Mot Run	**08**	-		-	-	-	Fehler! Textmarke nicht definiert.
APP-09	Starting Aux. Motor Selection	Starting Aux	**09**	1 to 4		1	1	Yes	Fehler! Textmarke nicht definiert.
APP-10	Operation Time Display on Auto Change	Auto Op Time	**10**	-		-	-	-	Fehler! Textmarke nicht definiert.
APP-11	Start Frequency of Aux. Motor 1	Start freq 1	**11**	0 to FU1-20		0.01	49.99 [Hz]	Yes	Fehler! Textmarke nicht definiert.
APP-12	Start Frequency of Aux. Motor 2	Start freq 2	**12**	0 to FU1-20		0.01	49.99 [Hz]	Yes	
APP-13	Start Frequency of Aux. Motor 3	Start freq 3	**13**	0 to FU1-20		0.01	49.99 [Hz]	Yes	
APP-14	Start Frequency of Aux. Motor 4	Start freq 4	**14**	0 to FU1-20		0.01	49.99 [Hz]	Yes	
APP-15	Stop Frequency of Aux. Motor 1	Stop freq 1	**15**	0 to FU1-20		0.01	15.00 [Hz]	Yes	Fehler! Textmarke nicht definiert.
APP-16	Stop Frequency of Aux. Motor 2	Stop freq 2	**16**	0 to FU1-20		0.01	15.00 [Hz]	Yes	
APP-17	Stop Frequency of Aux. Motor 3	Stop freq 3	**17**	0 to FU1-20		0.01	15.00 [Hz]]	Yes	
APP-18	Stop Frequency of Aux. Motor 4	Stop freq 4	**18**	0 to FU1-20		0.01	15.00 [Hz]	Yes	
APP-19	Delay Time before Operating Aux Motor	Aux start DT	**19**	0 to 9999 [sec]		0.1	60.0 [sec]	Yes	Fehler!

[23] Code APP-08 through APP-31 appears only when APP-01 is set to 'MMC'.

Code	Description	Keypad Display		Setting Range		Units	Factory Default	Adj. During Run	Page
		LCD	7-Segment	LCD	7-Segment				
APP-20	Delay Time before Stopping Aux Motor	Aux stop DT	**20**	0 to 9999 [sec]		0.1	60.0 [sec]	Yes	Textmarke nicht definiert.
APP-21	The Number of Aux Motor	Nbr Aux's	**21**	0 to 4		1	4	Yes	Fehler! Textmarke nicht definiert.
APP-22	PID Bypass Selection	Regul Bypass	**22**	No Yes	**0** **1**	-	No	Yes	Fehler! Textmarke nicht definiert.
APP-23	Sleep Delay Time	Sleep Delay	**23**	0 to 9999 [sec]		0.1	60.0 [sec]	Yes	Fehler! Textmarke nicht definiert.
APP-24	Sleep Frequency	Sleep Freq	**24**	0 to FU1-20		0.01	19.00 [Hz]	Yes	Fehler! Textmarke nicht definiert.

Code	Description	Keypad Display		Setting Range		Units	Factory Default	Adj. During Run	Page
		LCD	7-Segment	LCD	7-Segment				
APP-25	Wake-Up Level	WakeUp Level	**25**	0 to 100 [%]		1	35 [%]	Yes	Fehler! Textmarke nicht definiert.
APP-26	Auto Change Mode Selection	AutoCh-Mode	**26**	0 to 2		1	1	Yes	Fehler! Textmarke nicht definiert.
APP-27	Auto Change Time	AutoEx-intv	**27**	00:00 to 99:00		00:01	70:00	Yes	Fehler! Textmarke nicht definiert.
APP-28	Auto Change Level	AutoEx-level	**28**	0 to 100 [%]		0.1	20 [%]	Yes	
APP-29	Inter-Lock Selection	Inter-lock	**29**	No Yes	**0** **1**	-	No	Yes	Fehler! Textmarke nicht definiert.
APP-30	Actual Value Display	Actual Value	**30**	-		-	-	Yes	Fehler! Textmarke nicht definiert.

Code	Description	Keypad Display		Setting Range		Units	Factory Default	Adj. During Run	Page
		LCD	7-Segment	LCD	7-Segment				
APP-31	Actual Value Display in Percentage	Actual Perc	**31**	-		-	-	Yes	Fehler! Textmarke nicht definiert.
APP-32[24]	Draw Mode Selection	Draw Mode	**32**	None V1_Draw I_Draw V2_Draw	**0** **1** **2** **3**	-	None	Yes	Fehler! Textmarke nicht definiert.
APP-33	Draw Size Setting	DrawPerc	**33**	0 to 150 [%]		0.1	100 [%]	Yes	Fehler! Textmarke nicht definiert.

[24] Code APP-32 through APP-33 appears only when APP-01 is set to 'Draw'.

4.8 Sub-Board Selection Guide According To Function

Code	Function Description	LCD Display	Sub-Board Type		
			SUB-A Board	SUB-B Board	SUB-C Board
EXT-02	Multi-function Input Terminal 'P4'	P4 define	√		√
EXT-03	Multi-function Input Terminal 'P5'	P5 define	√		√
EXT-04	Multi-function Input Terminal 'P6'	P6 define	√		√
EXT-05	V2 Mode Selection	V2 mode	√		√
EXT-06	Filtering Time Constant for V2 Input Signal	V2 filter	√		√
EXT-07	V2 Input Minimum Voltage	V2 volt x1	√		√
EXT-08	Frequency Corresponding to V2 Input Minimum Voltage	V2 freq y1	√		√
EXT-09	V2 Input Maximum Voltage	V2 volt x2	√		√
EXT-10	Frequency Corresponding to V2 Input Maximum Voltage	V2 freq y2	√		√
EXT-14	Usage for Pulse Input Signal	F mode		√	
EXT-15	Pulse Input Signal Selection	F pulse set		√	
EXT-16	Encoder Pulse Selection	F pulse num		√	
EXT-17	Filtering Time Constant for Pulse Input Signal	F filter		√	
EXT-18	Pulse Input Minimum Frequency	F pulse x1		√	
EXT-19	Frequency Output corresponding to Pulse Input Minimum Frequency	F freq y1		√	
EXT-20	Pulse Input Maximum Frequency	F pulse x2		√	
EXT-21	Frequency Output corresponding to Pulse Input Maximum Frequency	F freq y2		√	
EXT-22	P-Gain for PG Option	PG P-gain		√	
EXT-23	I-Gain for PG Option	PG I-gain		√	
EXT-24	Slip Frequency for PG Option	PG Slip freq		√	
EXT-30	Multi-function Output Terminal 'Q1'	Q1 define	√		√
EXT-31	Multi-function Output Terminal 'Q2'	Q2 define	√		
EXT-32	Multi-function Output Terminal 'Q3'	Q3 define	√		
EXT-34	LM (Load Meter) Output Selection	LM mode	√		
EXT-35	LM Output Adjustment	LM adjust	√		
EXT-40	AM1 (Analog Meter 1) Output Selection	AM1 mode			√
EXT-41	AM1 Output Adjustment	AM1 adjust			√
EXT-42	AM2 (Analog Meter 2) Output Selection	AM2 mode			√
EXT-43	AM2 Output Adjustment	AM2 adjust			√

CHAPTER 5 - TROUBLESHOOTING & MAINTENANCE

5.1 Fault Display

When a fault occurs, the inverter turns off its output and displays the fault status in DRV-07. The last 5 faults are saved in FU2-01 through FU2-05 with the operation status at the instance of fault.

Keypad Display		Protective Function	Description
LCD	7-Segment		
Over Current 1	**OC1**	Over Current Protection	The inverter turns off its output when the output current of the inverter flows more than 200% of the inverter rated current.
Ground Fault	**GF**	Ground Fault Protection	The inverter turns off its output when a ground fault occurs and the ground fault current is more than the internal setting value of the inverter. Over current trip function may protect the inverter when a ground fault occurs due to a low ground fault resistance.
Over Voltage	**OV**	Over voltage protection	The inverter turns off its output if the DC voltage of the main circuit increases higher than the rated value when the motor decelerates or when regenerative energy flows back to the inverter due to a regenerative load. This fault can also occur due to a surge voltage generated at the power supply system.
Over Load	**OLT**	Current Limit Protection (Overload Protection)	The inverter turns off its output if the output current of the inverter flows at 180% of the inverter rated current for more than the current limit time (S/W).
Fuse Open	**FUSE**	Fuse Open	The inverter turns off its output by opening the fuse when something is wrong with the main circuit IGBT to protect the wiring from being damaged from short currents.
Over Heat	**OH**	Heat Sink Over Heat	The inverter turns off its output if the heat sink over heats due to a damaged cooling fan or an alien substance in the cooling fan by detecting the temperature of the heat sink.
E-Thermal	**ETH**	Electronic Thermal	The internal electronic thermal of the inverter determines the over heating of the motor. If the motor is overloaded the inverter turns off the output. The inverter cannot protect the motor when driving a multi-pole motor or when driving multiple motors, so consider thermal relays or other thermal protective devices for each motor. Overload capacity: 150% for 1 min
External-A	**EXTA**	External fault A	Use this function if the user needs to turn off the output by an external fault signal. (Normal Open Contact)
External-B	**EXTB**	External fault B	Use this function if the user needs to tuen off the output by an external fault signal. (Normal Close Contact)
Low Voltage	**LV**	Low Voltage Protection	The inverter turns off its output if the DC voltage is below the detection level because insufficient torque or over heating of the motor can occurs when the input voltage of the inverter drops.
Over Current 2	**OC2**	IGBT Short	The inverter turns off the output if an IGBT short through or an output short occurs.
Phase Open	**PO**	Output Phase open	The inverter turns off its output when the one or more of the output (U, V, W) phase is open. The inverter detects the output current to check the phase open of the output.
BX	**BX**	BX Protection (Instant Cut Off)	Used for the emergency stop of the inverter. The inverter instantly turns off the output when the BX terminal is turned ON, and returns to regular operation when the BX terminal is turned OFF. Take caution when using this function.
Option (**)	**OPT**	Option Fault	Fault at the internal option of the inverter.

Keypad Display		Protective Function	Description
LCD	7-Segment		
HW-Diag	**HW**	Inverter H/W Fault	A fault signal is output when an error occurs to the control circuitry of the inverter. There are the Wdog error, the EEP error, and the ADC Offset for this fault
COM Error CPU Error	**Err**	Communication Error	This fault is displayed when the inverter cannot communicate with the keypad.
LOP LOR LOV LOI LOX	**LP** **LR** **LV** **LI** **LX**	Operating Method when the Frequency Reference is Lost	According to the I/O-48 [Operating Method when the Frequency Reference is Lost] setting, there are three modes: continue operation, decelerate and stop, and free run, LOP: Displayed when option frequency reference is lost (DPRAM time out) LOR: Displayed when option frequency reference is lost (Communication network fault) LOV: Displayed when 'V1' analog frequency reference is lost. LOI: Displayed when 'I' analog frequency reference is lost. LOX: Displayed when sun-board (V2, ENC) analog frequency reference is lost.
Inv. OLT	**IOLT**	Inverter Overload	The inverter turns off its output when the output current of the inverter flows more than the rated level (150% for 1 minute, 200% for 0.5 seconds).
NTC open	**NTC**	Thermal Sensor Opened	Inverter uses NC thermal sensor for detecting heat sink temperature. If this message is displayed, the thermal sensor wire may be cut. (Inverter keeps operating)

To reset fault, Press RESET key, Close RST-CM terminals or connect input power.
If a problem persists, please contact the factory or your local distributor.]

5.2 Fault Remedy

Protective Function	Cause	Remedy
Over Current Protection	1) Acceleration/Deceleration time is too short compared to the GD²of the load 2) Load is larger than the inverter rating 3) Inverter turns output on when the motor is free running. 4) Output short or ground fault has occurred 5) Mechanical brake of the motor is operating too fast 6) Components of the main circuit have overheated due to a faulty cooling fan	1) Increase Accel/Decel time 2) Increase inverter capacity. 3) Operate after motor has stopped 4) Check output wiring 5) Check mechanical brake operation 6) Check cooling fan (Caution) Operating inverter prior to correcting fault may damage the IGBT
Ground Current Protection	1) Ground fault has occurred at the output wiring of inverter. 2) The insulation of the motor is damaged due to heat.	1) Investigate the output wiring of inverter 2) Exchange motor
Over Voltage Protection	1) Acceleration time is too short compared to the GD²of load 2) Regenerative load at the output 3) Line voltage high	1) Increase deceleration time 2) Use regenerative resistor option 3) Check line voltage
Current Limit Protection (Overload Protection)	1) Load is larger than the inverter rating 2) Selected incorrect inverter capacity 3) Set incorrect V/F pattern	1) Increase capacity of motor and inverter 2) Select correct inverter capacity 3) Select correct V/F pattern
Fuse Damage	1) Damage due to repeated over current protection 2) Damage due to instant deceleration when motor is at an excessive excitation status.	Exchange the fuse (Caution) The IGBT receives damages on many occasions when Fuse Open Trip occurs
Heat Sink Overheat	1) Cooling fan damaged or an alien substance inserted 2) Cooling system has faults 3) Ambient temperature high	1) Exchange cooling fans and/or eliminate alien substance 2) Check for alien substances in the heat sink 3) Keep ambient temperature under 40 ℃
Electronic Thermal	1) Motor has overheated 2) Load is larger than inverter rating 3) ETH level too low 4) Selected incorrect inverter capacity 5) Set incorrect V/F pattern 6) Operated too long at low speeds	1) Reduce load and/or running duty 2) Increase inverter capacity 3) Adjust ETH level to an appropriate level 4) Select correct inverter capacity 5) Select correct V/F pattern 6) Install a cooling fan with a separate power supply
External fault A	External fault has occurred	Eliminate fault at circuit connected to external fault terminal or cause of external fault input
External fault B	External fault has occurred	Eliminate fault at circuit connected to external fault terminal or cause of external fault input
Low Voltage Protection	1) Line voltage low 2) Load larger than line capacity is connected to line (welding machine, motor with high starting current connected to the commercial line) 3) Faulty magnetic switch at the input side of the inverter	1) Check line voltage 2) Increase line capacity 3) Exchange magnetic switch
Over Current 2	1) Short has occurred between the upper and lower IGBT. 2) Short has occurred at the output of the inverter 3) Acceleration/Deceleration time is too short compared to the GD²of load	1) Check IGBT 2) Check output wiring of inverter 3) Increase acceleration time
Output Phase Open	1) Faulty contact of magnetic switch at output 2) Faulty output wiring	1) Check magnetic switch at output of inverter 2) Check output wiring
Option Fault	Faulty option connector connection	Check option connection

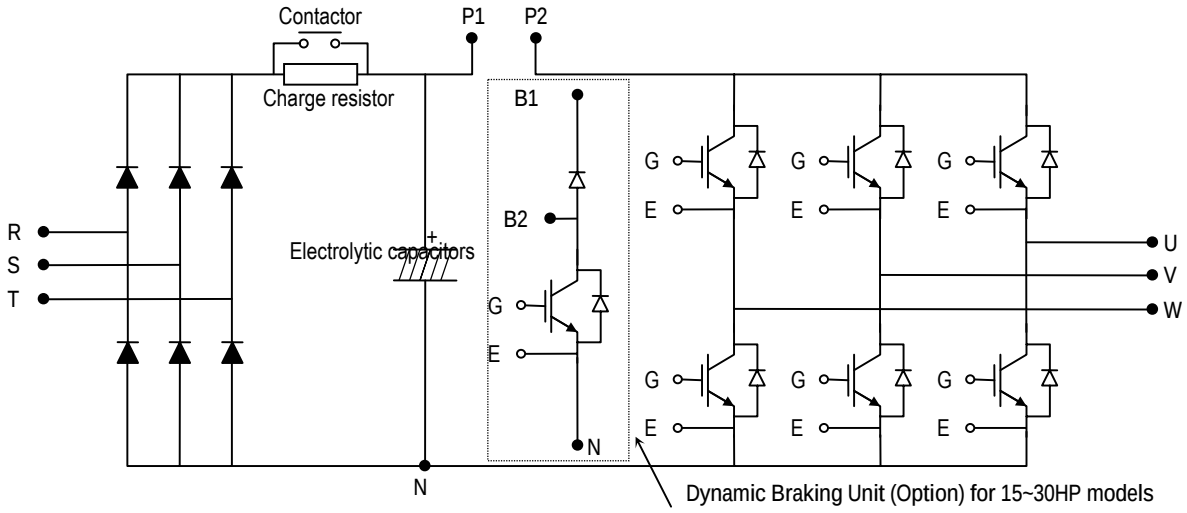
Protective Function	Cause	Remedy
H/W Fault	1) Wdog error (CPU fault) 2) EEP error (memory fault) 3) ADC Offset (current feedback circuit fault)	Exchange inverter
Communication Fault	1) Faulty connection between inverter and keypad 2) Inverter CPU malfunction	1) Check connector 2) Exchange inverter
Operating Method when the Speed Reference is Lost	LOP (Loss of reference from the Option), LOR (Remote) LOV (V1), LOI (I), LOX (Sub-V2, ENC)	Eliminate cause of fault
Inverter Overload	1) Load is larger than inverter rating 2) Selected incorrect inverter capacity	1) Increase motor and/or inverter capacity 2) Select correct inverter capacity

5.3 Troubleshooting

Condition	Check Point
The Motor Does Not Rotate	1) Main circuit inspection: ☞ Is the input (line) voltage normal? (Is the LED in the inverter is lit?) ☞ Is the motor connected correctly? 2) Input signal inspection: ☞ Check the operating signal input to the inverter. ☞ Check the forward and the reverse signal input simultaneously to the inverter? ☞ Check the command frequency signal input to the inverter. 3) Parameter setting inspection: ☞ Is the reverse prevention (FU1-03) function set? ☞ Is the operation mode (FU1-01) set correctly? ☞ Is the command frequency set to 0? 4) Load inspection: ☞ Is the load too large or is the motor jammed? (Mechanical brake) 5) Other: ☞ Is the alarm displayed on the keypad or is the alarm LED lit? (STOP LED blinks)
The Motor Rotates in Opposite Directions	☞ Is the phase sequence of the output terminal U, V, W correct? ☞ Is the starting signal (forward/reverse) connected correctly?
The Difference Between the Rotating Speed and the Reference is Too Large	☞ Is the frequency reference signal correct? (Check the level of the input signal) ☞ Is the following parameter setting is correct? Lower Limit Frequency (FU1-24), Upper Limit Frequency (FU1-25), Analog Frequency Gain (I/O-1~10) ☞ Is the input signal line influenced by external noise? (Use a shielded wire)
The Inverter Does Not Accelerate or Decelerate Smoothly	☞ Is the acceleration/deceleration time is set too short a period of time? ☞ Is the load too large? ☞ Is the Torque Boost (FU1-27, 28) value is too high that the current limit function and the stall prevention function do not operate?
The Motor Current is Too High	☞ Is the load too large? ☞ Is the Torque Boost Value (manual) too high?
The Rotating Speed Does Not Increase	☞ Is the Upper Limit Frequency (FU1-25) value correct? ☞ Is the load too large? ☞ Is the Torque Boost (FU1-27, 28) value too high that the stall prevention function (FU1-59, 60) does not operate?
The Rotating Speed Oscillates When the Inverter is Operating.	1) Load inspection: ☞ Is the load oscillating? 2) Input signal inspection: ☞ Is the frequency reference signal oscillating? 3) Other: ☞ Is the wiring too long when the inverter is using V/F control? (over 500m)

5.4 How to Check Power Components

Before checking the power components, be sure to disconnect AC Input supply and wait until the Main Electrolytic Capacitors (DCP-DCN) discharge.



■ Diode Module Check

Check point	*Resistance to be Good*
R, S, T – P1	50 k ohms or more
R, S, T – N	50 k ohms or more

■ Charge Resistor Check

Check point	*Resistance to be Good*
Contactor terminals	Depending on model

■ DB (Dynamic Braking) IGBT (Option)

Check point	*Resistance to be Good*
B2 - N	50 k ohms or more
G - N	A few kilo ohms

■ IGBT Module Check

Check point	*Resistance to be Good*
B2 - N	50 k ohms or more
G - N	A few kilo ohms

5.5 Maintenance

The iS5 series is an industrial electronic product with advanced semiconductor elements. However, temperature, humidity, vibration and aging parts may still affect it. To avoid this, it is recommended to perform routine inspections.

5.5.1 Precautions

- Be sure to remove the drive power input while performing maintenance.
- Be sure to perform maintenance only after checking that the bus has discharged. The bus capacitors in the electronic circuit can still be charged even after the power is turned off.
- The correct output voltage can only be measured by using a rectifier voltage meter. Other voltage meters, including digital voltage meters, are likely to display incorrect values caused by the high frequency PWM output voltage of the drive.

5.5.2 Routine Inspection

Be sure to check the following before operation:
- The conditions of the installation location
- The conditions of the drive cooling
- Abnormal vibration
- Abnormal heating

5.5.3 Periodical Inspection

- Are there any loose bolt, nut or rust caused by surrounding conditions? If so, tighten them up or replace them.
  Tighten up or replace.
- Are there any deposits inside the drive-cooling fan? If so, remove using air.
- Are there any deposits on the drive's PCB (Printed Circuit Boards)? If so, remove using air.
- Are there any abnormalities in the various connectors of the drive's PCB? If so, check the condition of the connector in question.
- Check the rotating condition of the cooling fan, the size and condition of the capacitors and the connections with the magnetic contactor. Replace them if there are any abnormalities.

5.5.4 Internal Fuse Replacement

When the internal fuse is opened the IGBT's should be checked thoroughly before replacing the fuse.
Contact the factory for replacement fuse information.

5.6 Daily and Periodic Inspection Items

Inspection Location	Inspection Item	Inspection	Period			Inspection Method	Criterion	Measuring Instrument
			Daily	1 year	2 year			
All	Ambient Environment	Is there any dust? Is the ambient temperature and humidity adequate?	O			Refer to the precautions	Temperature: -10~+40 no freezing. Humidity: Under 50% no dew	Thermometer, Hygrometer, Recorder
	Equipment	Is there any abnormal oscillation or noise	O			Use sight and hearing	No abnormality	
	Input Voltage	Is the input voltage of the main circuit normal	O			Measure the voltage between the terminals R, S, T		Digital Multi-Meter/Tester
Main Circuit	All	Megger check (between the main circuit and the ground) Are any fixed parts removed? Are there any traces of overheating at each component's cleaning?		O O O	O	Undo the inverter connections short the terminals R, S, T, U, V, W and measure between these parts and the ground. Tighten the screws. Visual check.	Over 5MΩ No fault	DC 500V class Megger
	Conductor/ Wire	Is the conductor rusty? Is the wire coating damaged?		O O		Visual check	No fault	
	Terminal	Is there any damage?		O		Visual check	No fault	
	IGBT Module /Diode Module	Check the resistance between each of the terminals.			O	Undo the inverter connection and measure the resistance between R, S, T ⇔ P, N and U, V, W ⇔ P, N with a tester.	(Refer 'How to Check Power Components")	Digital Multi-Meter/Analog Tester
	Smoothing Capacitor	Is there any liquid coming out? Is the safety pin out, and is there any swelling? Measure the capacitance.	O O	O		Visual check. Measure with a capacitance measuring device.	No fault Over 85% of the rated capacity	Capacitance Measuring Device
	Relay	Is there any chattering noise during operation? Is there any damage to the contact		O O		Auditory check. Visual check.	No fault	
	Resistor	Is there any damage to the resistor insulation? Is the wiring in the resistor damaged (open)?		O O		Visual check. Disconnect one of the connections and measure with a tester.	No fault Error must be within ±10% the displayed resistance	Digital Multi-Meter/Analog Tester
Control Circuit Protective Circuit	Operation Check	Is there any unbalance between each phases of the output voltage? Nothing must be wrong with display circuit after executing the sequence protective operation		O O		Measure the voltage between the output terminals U, V and W. Short and open the inverter protective circuit output.	The voltage balance between the phases for 200V (800V) class is under 4V (8V). The fault circuit operates according to the sequence.	Digital Multi-Meter/Rectifying Voltmeter
Cooling System	Cooling Fan	Is there any abnormal oscillation or noise? Is the connection area loose?	O	O		Turn OFF the power and turn the fan by hand. Tighten the connections.	Must rotate smoothly. No fault	
Display	Meter	Is the displayed value correct?	O	O		Check the meter reading at the exterior of the panel	Check the specified and management values.	Voltmeter/ Ammeter etc.
Motor	All	Are there any abnormal vibrations or noise? Is there any unusual odor?	O O			Auditory, sensory, visual check. Check for overheat and damage.	No fault	
	Insulation Resistor	Megger check (between the output terminals and the ground terminal)			O	Undo the U, V and W connections and tie the motor wiring.	Over 5MΩ	500V class Megger

Note: Values in ( ) is for the 400V class inverters.

APPENDIX A - FUNCTIONS BASED ON USE

Set the function properly according to the load and operating conditions. Application and related functions are listed in the following table.

Use	Related Parameter Code
Accel/Decel Time, Pattern Adjustment	DRV-01 [Acceleration Time], DRV-02 [Deceleration Time], FU1-05 [Acceleration Pattern], FU1-06 [Deceleration Pattern]
Reverse Rotation Prevention	FU1-03 [Forward, Reverse Prevention]
Minimum Accel/Decel Time	FU1-05 [Acceleration Pattern], FU1-06 [Deceleration Pattern]
Accel/Decel at Continuous Rating Range	FU1-05 [Acceleration Pattern], FU1-06 [Deceleration Pattern]
Braking Operation Adjustment	FU1-0 7[Stop Method], FU1-08~11 [DC Braking], FU1-12~13 [DC braking at start]
Operations for Frequencies Over 60 Hz	FU1-20 [Maximum Frequency], FU1-25 [Frequency Upper Limit], I/O-05 [Frequency Corresponding to Max. Voltage of V1], I/O-10 [Frequency Corresponding to Max. Current of I]
Selecting an Appropriate Output Characteristics for the Load	FU1-20 [Maximum Frequency], FU1-21 [Base Frequency]
Motor Output Torque Adjustment	FU1-22 [Starting Frequency], FU1-26~28 [Torque Boost], FU1-59~60 [Stall Prevention], FU2-30 [Rated Motor]
Output Frequency Limit	FU1-23~25 [Frequency Upper/Lower Limit], I/O-1~10 [Analog Frequency Setting]
Motor Overheat Protection	FU1-50~53 [Electronic Thermal], FU2-30 [Rated Motor]
Multi Step Operation	I/O-12~14 [Define the Multi Function Input Terminals], I/O-20~27 [Jog, Multi Step Frequency], FU1-23~25 [Frequency Upper/Lower Limit]
Jog Operation	I/O-20 [Jog Frequency]
Frequency Jump Operation	FU2-10~16 [Frequency Jump]
Timing the Electronic Brake Operation	I/O-42~43 [Frequency Detection Level], I/O-44 [Multi Function Output]
Displaying the Rotating Speed	DRV-04 [Motor Speed], FU2-74 [Motor RPM Display Gain]
Function Alteration Prevention	FU2-94 [Parameter Lock]
Energy Saving	FU1-39 [Energy Saving]
Auto Restart Operation After Alarm Stop	FU2-27~28 [Auto Retry]
2nd Motor Operation	FU2-81~90 [2nd Function]
PID Feedback Operation	FU2-50~54 [PID Operation]
Frequency Reference Signal and Output Adjusting	I/O-01~10 [Analog Frequency Setting]
Define the Multi-Function Input Terminals	I/O-12~14 [Define the Multi-Function Input Terminals]
Define the Multi-Function Input Terminals	I/O-44 [Multi Function Auxiliary Contact Output Setting]
Commercial Line ⇔ inverter Switchover Operation	I/O-12~14 [Define the Multi-Function Input Terminals], I/O-44 [Multi-Function Auxiliary Contact Output Setting]
Frequency Meter Calibration	I/O-40~41 [FM Output]
Operate by Communicating with a Computer	I/O-46 [Inverter No.], I/O-47 [communication Speed], I/O-48~49 [Loss of Reference]

APPENDIX B - PARAMETERS BASED ON APPLICATION

Intention	Parameter Code
DRV Group	
When you want to change the frequency setting	DRV-00
When you want to change the acceleration and deceleration time of the motor	DRV-01, DRV-02
When you want to change the run/stop method	DRV-03
When you want to change the frequency reference source	DRV-04
When you want to set the multi-function	DRV-005 ~ 07
When you want to see the output current, motor speed and the DC link voltage of inverter	DRV-08 ~ 10
When you want to see the output voltage, output power, output torque from the user display	DRV-11
When you want to check the fault of the inverter	DRV-12
FU1 Group	
When you want to use the Jump Code	FU1-00
When you want to prevent the motor from rotating at opposite directions	FU1-03
When you want to select the acceleration and deceleration pattern suitable for your application	FU1-05 ~ 06
When you want to change the stopping method	FU1-07
When you want to change the stopping accuracy for steady stop	FU1-08 ~ 11
When DC injection braking is required before starting	FU1-12 ~ 13
When you want to set the maximum frequency and the base frequency according to the rated torque of the motor	FU1-20 ~ 21
When you want to adjust the starting frequency	FU1-22
When you want to limit the mechanical rotating speed to a fixed value	FU1-23 ~ 25
When a large starting torque is needed for loads such as elevators (Manual/Auto Torque Boost)	FU1-26 ~ 28
When you want to select an appropriate output characteristic (V/F characteristic) according to loads	FU1-29
When you want to se up your own V/F pattern	FU1-30 ~ 37
When you want to adjust the output voltage of the inverter	FU1-38
When you want to use the energy saving function	FU1-39
When you want to protect the motor from overheating	FU1-50 ~ 53
When you want to output a signal when the overload condition lasts more than a fixed amount of time	FU1-54 ~ 55
When you want to cut off the output when the overload condition lasts more than a fixed amount of time	FU1-56 ~ 58
When you want to set the stall prevention function	FU1-59 ~ 60
FU2 Group	
When you want to check the fault history of the inverter	FU2-01 ~ 06
When you want to use dwell function	FU2-07 ~ 08
When you want to prevent the resonance from the oscillating characteristics of a machine	FU2-10 ~ 16
When you want to protect inverter from input/output phase loss	FU2-19
When you want to start the inverter as soon as the power is turned ON	FU2-20
When you want to restart the inverter by resetting the fault when a fault occur	FU2-21
When you want to use the instant power failure restart function (Speed Search)	FU2-22 ~ 25
When you want to use the retry function	FU2-26 ~ 27
When you want to enter the motor constants	FU2-30 ~ 37
When you want to reduce noise or leakage current by changing the PWM carrier frequency	FU2-39
When you want to change the control method (V/F, slip compensation, PID, or sensorless operation)	FU2-40

Intention	Parameter Code
When you want to use the auto tuning function	FU2-41 ~ 44
When you want to operate using PID feedback	FU2-50 ~ 54
When you want to change the reference frequency for acceleration and deceleration	FU2-70
When you want to change the acceleration and deceleration time scale	FU2-71
When you want to set the initial keypad display that is displayed when the power is turned ON	FU2-72
When you want to set the user defined display	FU2-73
When you want to adjust the gain for the motor RPM display	FU2-74
When you want to set the dynamic braking (DB) resistor mode	FU2-75 ~ 76
When you want to verify the inverter software version	FU2-79
When you want to change the connection from one motor to the other motor which use difference parameters	FU2-81 ~ 90
When you want to copy the inverter parameter to another inverter	FU2-91 ~ 92
When you want to initialize the parameters	FU2-93
When you want to prevent the parameters from being changed	FU2-94
I/O Group	
When you want to set the analog voltage or current for the frequency reference	I/O-01 ~ 10
When you want to set the operating method when the frequency reference is lost	I/O-11
When you want to change the functions for the input terminals P1, P2, and P3	I/O-12 ~ 14
When you want to check the status of the input/output terminals	I/O-15 ~ 16
When you want to change the response time of the input terminals	I/O-17
When you want to use the JOG and multi step speed operation	I/O-20 ~ 24
When you want to change the 1st ~ 7th acceleration/deceleration time	I/O-25 ~ 38
When you want to use the FM meter terminal output	I/O-40 ~ 41
When you want to set the frequency detection level	I/O-42 ~ 43
When you want to change the functions of the multi function auxiliary contact output (AXA-AXC)	I/O-44
When you want to exchange the motor to commercial power line from inverter or the opposite	I/O-44
When you want to use the fault relay (30A, 30B, 30C) functions	I/O-45
When you want to use RS232/485 communication	I/O-46 ~ 47
When you want to set the operating method when the frequency reference is lost	I/O-48 ~ 49
When you want to use the auto (sequence) operation	I/O-50 ~ 84
EXT Group (When a Sub-board and/or an option board is installed)	
When you want to define the functions for the input terminals P4, P5, P6 (SUB-A, SUB-C)	EXT-02 ~ 04
When you want to use the analog voltage (V2) input (SUB-A, SUB-C)	EXT-05 ~ 10
When you want to use the encoder pulse for feedback to control the motor speed, or use the pulse input for frequency reference (SUB-B)	EXT-14 ~ 24
When you want to change the functions of the output terminals Q1, Q2, Q3 (SUB-A, SUB-C)	EXT-30 ~ 32
When you want to use the LM meter terminal output (SUB-A, SUB-C)	EXT-34 ~ 35
When you want to use the analog outputs (AM1, AM2 terminals)	EXT-40 ~ 43

APPENDIX C- PERIPHERAL DEVICES

Inverter Models	Motor [HP]	MCCB, ELB	Magnetic Contactor	Wire, mm^2 (AWG)			AC Input Fuse	AC Reactor	DC Reactor
				R, S, T	U, V, W	Ground			
SV055iS5-4	7.5	ABS33a, EBS33	SMC-20P	3.5 (12)	2 (14)	3.5 (12)	20 A	1.22 mH, 15 A	5.34 mH, 14 A
SV075iS5-4	10	ABS33a, EBS33	SMC-20P	3.5 (12)	3.5 (12)	3.5 (12)	30 A	1.14 mH, 20 A	4.04 mH, 19 A
SV110iS5-4	15	ABS53a, EBS53	SMC-20P	5.5 (10)	5.5 (10)	8 (8)	35 A	0.81 mH, 30 A	2.76 mH, 29 A
SV150iS5-4	20	ABS63a, EBS63	SMC-25P	14 (6)	8 (8)	8 (8)	45 A	0.61 mH, 38 A	2.18 mH, 36 A
SV185iS5-4	25	ABS103a, EBS103	SMC-35P	14 (6)	8 (8)	14 (6)	60 A	0.45 mH, 50 A	1.79 mH, 48 A
SV220iS5-4	30	ABS103a, EBS103	SMC-50P	22 (4)	14 (6)	14 (6)	70 A	0.39 mH, 58 A	1.54 mH, 55 A

DECLARATION OF CONFORMITY

Council Directive(s) to which conformity is declared:

CD 73/23/EEC and CD 89/336/EEC

Units are certified for compliance with:

EN50178 (1997)
EN 50081-2 (1993)
EN 55011 (1994)
EN 50082-2 (1995)
EN 61000-4-2 (1995)
ENV 50140 (1993) & ENV 50204 (1995)
EN 61000-4-4 (1995)
ENV 50141 (1993)
EN 61000-4-8 (1993)

Type of Equipment:	**Inverter (Power Conversion Equipment)**
Model Name:	**SV - iS5 Series**
Address:	SEVA Schulz GmbH **Lether Gewerbe Str. 10,** **26197 Ahlhorn,** **Germany**