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# SV-iE5 User Manual

0.1 ~ 0.4 kW (200V)



## Safety Instructions

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


**LS** Industrial Systems


Thank you for purchasing LS Variable Frequency Drives!

## SAFETY INSTRUCTIONS


Safety instructions are prepared to use the product safely and correctly by preventing any accident or risk beforehand, so they should be always kept.

- In this manual, safety instructions are divided into two classes; each has the following meaning.

 **WARNING** Improper operation may result in serious personal injury or death

 **CAUTION** Improper operation may result in slight to medium personal injury or property damage

- Throughout this manual, we use the following two illustrations to make you aware of safety considerations.

 identifies potential hazards under certain conditions.

 identifies shock hazards under certain conditions.

- After reading this manual, keep it handy for any user to quickly refer to
- Read this manual carefully to use SV-iE5 Series Inverter's functions appropriately and safely.

### **Warning**

- Do not remove the cover while the power is applied or the unit is in operation.  
Or, it may cause electric shock.
- Do not run the inverter with the front cover removed.  
Or, it may cause an electric shock due to high voltage terminals or charged capacitor exposure.
- Do not remove the cover except for periodic inspections or wiring, even if the input power is not applied.  
Or, it may cause an electric shock due to charged capacitor exposure even if the power is cut off.
- Wiring and periodic inspections should be performed at least 10 minutes after disconnecting the input power and after checking the DC link voltage is discharged with a meter (below DC 30V).  
Or, it may cause an electric shock (below DC 30V)
- Operate the switches with dry hands.  
Or, it may cause an electric shock.
- Do not use the cable when its insulating tube is damaged.  
Or, it may cause an electric shock.
- Do not subject the cables to any heavy load stressful to them.  
Or, it may cause an electric shock due to damaged cable.

 **Caution**

- Install the inverter on a non-flammable surface.  
Or, it may cause a fire if being installed on or closely to a flammable material.
- Disconnect the input power if the inverter gets damaged.  
Or, it may result in a secondary accident and fire.
- After the input power is applied or removed, the inverter will remain hot for a couple of minutes.  
Otherwise, you get bodily injuries such as skin-burn or damage.
- Do not apply power to a damaged inverter or an inverter with parts missing even if the installation is complete.  
Or, it may cause an electric shock.
- Do not allow screw, metal chips, water drops, oil or other impurities into the inverter.  
Or, it may cause a fire.

**Operating Precautions**

(1) Transport and installation

- Carry it correctly according to the specified weight.
- Do not stack the inverter boxes higher than recommended.
- Install according to instruction specified in this manual.
- Do not open the cover during transport.
- Do not place any heavy load on the inverter.
- Check whether the inverter mounting direction is correct.
- Do not drop the inverter, or subject it to impact.
- Follow your national electrical code for grounding(200V).
- As soon as detaching PCB(Printed Circuit Board) for installation or repair, make sure to place it on conductor.  
Otherwise, it may cause destruction due to static electricity.
- Use the inverter under the following environmental conditions.

|             |                     |   |
|-------------|---------------------|---|
| Environment | Ambient temperature | - 10 ~ 40 °C (non-freezing)   |
|             | Relative humidity   | 90% RH or less (non-condensing)   |
|             | Storage temperature | - 20 ~ 65 °C  |
|             | Service condition   | Free of any corrosive gas, combustible gas, oil mist or dust            |
|             | Altitude, vibration | Max. 1,000m above the sea level · 5.9m/sec <sup>2</sup> (=0.6g) or less |

### (2) Wiring

- Do not connect a power factor correction capacitor, surge suppressor, or RFI filter to the output of the inverter.
- The connection orientation of the output cables should be in good order of U, V, W.
- Incorrect terminal wiring could result in the equipment damage.
- Reversing the polarity (+/-) of the terminals could damage the inverter.
- The only authorized and skilled person should perform wiring and inspections.
- Always install the inverter before wiring.

### (3) Trial run

- Check all parameters during operation. Changing parameter values might be required depending on the load.
- Always apply permissible range of voltage to the each terminal as indicated in this manual. Otherwise, it could lead to inverter damage.

### (4) Operation precautions

- Note that if the Auto restart function is selected, you must stay away from the equipment as a motor will restart suddenly after an alarm stop.
- The Stop key on the keypad is activated only when the setting has been made. Prepare an emergency stop switch separately.
- If any fault is reset with the reference signal present, a sudden start will automatically occur. Check that the reference signal is turned off in advance. Otherwise an accident could occur.
- Do not modify or alter the inverter without permission.
- Do not use a magnetic contactor on the inverter input for frequent starting/stopping of the inverter.
- Use a noise filter to reduce the effect of electromagnetic interference. Otherwise nearby electronic equipment may be affected.
- 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.
- Before operating unit and prior to user programming, reset user parameters to default settings.
- Inverter can easily be set to high-speed operations, Verify capability of motor or machinery prior to operating unit.
- Stopping torque is not produced when using the DC-Break function. Install separate equipment when stopping torque is needed.

### (5) Fault prevention precautions

- Provide a safety backup such as an emergency brake which will prevent the machine and equipment from hazardous conditions if the inverter fails.

### (6) Maintenance, inspection and parts replacement

- Do not conduct a megger (insulation resistance) test on the control circuit of the inverter.
- Refer to Chapter 13 for periodic inspection (parts replacement).

(7) Disposal

- Dispose of the inverter as treating industrial waste.

(8) General instructions

- Many of the diagrams and drawings in this instruction manual show the inverter without a circuit breaker, a cover or partially open. Never run the inverter like this. Always place the cover with circuit breakers and follow this instruction manual when operating the inverter.

## Instructions

### User's Manual

- The purpose of this manual is to provide the user with the necessary information to install, program, start up and maintain the SV-iE5 series inverter.
- To assure successful installation and operation of the SV-iE5 series inverter, the material presented must be thoroughly read and understood before proceeding
- This manual contains...

| Ch. | Title                           | Description   |
|-----|---------------------------------|---|
| 1   | Basic information & Precautions | Provides general information and precautions for safe use of the inverter.                      |
| 2   | Installation                    | Provides instructions on how to install the SV-iE5 inverter.                                    |
| 3   | Wiring                          | Provide the information on how to wire the input power and signal terminal strip                |
| 4   | Peripheral                      | Describes how to connect the optional peripheral devices to the inverter.                       |
| 5   | Loader                          | Illustrates keypad features and display.  |
| 6   | Basic Operation                 | Provides instructions for quick start of the inverter.  |
| 7   | Function List                   | Summarized table of functions.  |
| 8   | Control Block Diagram           | Shows control flow to help users easily understand operation mode.                              |
| 9   | Basic Functions                 | Provides information on basic functions such as frequency setup and operation commands.         |
| 10  | Advanced Functions              | Indicates advanced functions used for system application.                                       |
| 11  | Monitoring                      | Gives information on the operating status and fault information.                                |
| 12  | Protective Functions            | Outlines protective functions of the motor and the inverter.                                    |
| 13  | Troubleshooting & Maintenance   | Provides information on potential troubles or abnormal situations.                              |
| 14  | COM Options                     | Gives information on the inverter mounting with communication options.                          |
| 15  | Specifications                  | Gives information on Input/Output rating, control type and more details of the SV-iE5 inverter. |

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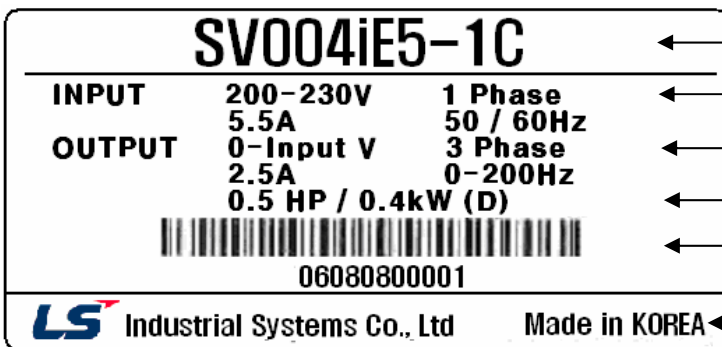
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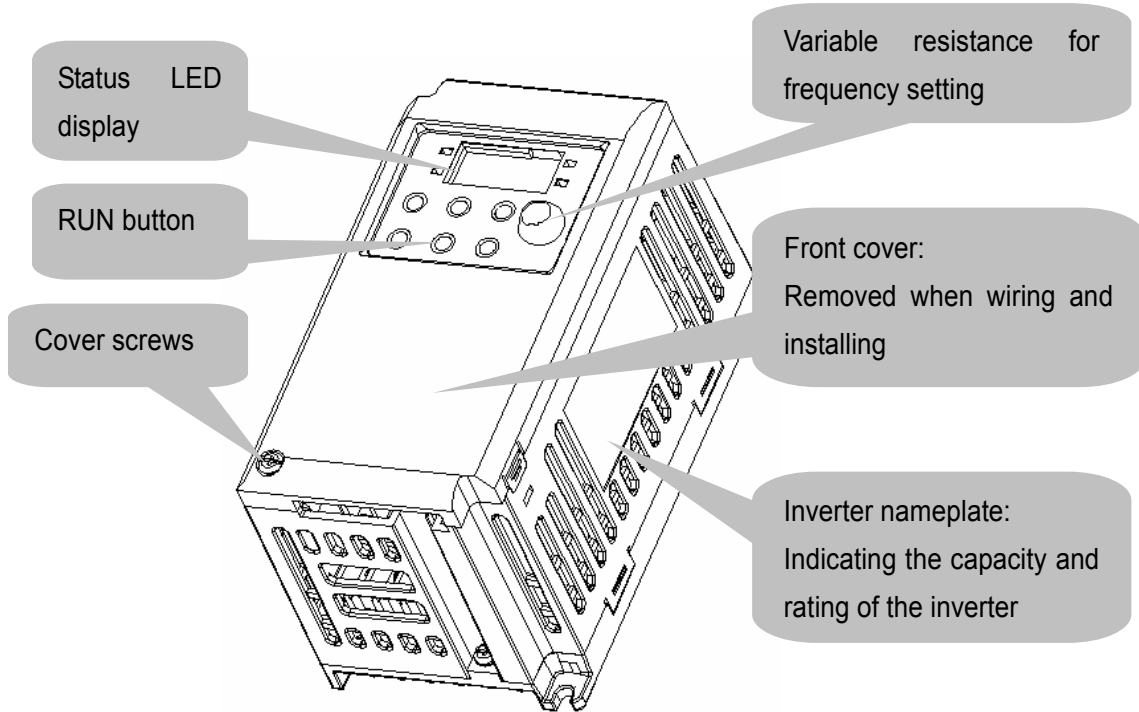
## 1. Basic Information & Precaution

### 1.1 Important precautions

| <p>Unpacking &amp; Inspection</p>                                   | <p>Unpack the package and check the inverter type, output ratings on the nameplate and whether the inverter is intact. In addition, inspect the inverter for any damage that may have occurred during shipping.</p> <div style="text-align: center;">  </div> <p style="text-align: center;">SV 004                      iE5                      - 1                      C</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2">Motor rating</th> <th>Series name</th> <th colspan="2">Input power</th> <th colspan="2">RS-485 option</th> </tr> </thead> <tbody> <tr> <td>001</td> <td>0.1 [kW]</td> <td rowspan="3">Extra small commercial inverter</td> <td>1</td> <td>Single phase 200V</td> <td>C</td> <td>No option</td> </tr> <tr> <td>002</td> <td>0.2 [kW]</td> <td>2</td> <td>3 Phases 200V</td> <td>-</td> <td>No option</td> </tr> <tr> <td>004</td> <td>0.4 [kW]</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p>● Accessories</p> <p>If you have found any discrepancy, damage, etc., contact your dealer or sales representative (refer to the rear cover page of this manual).</p> | Motor rating                    |             | Series name       | Input power   |           | RS-485 option |  | 001 | 0.1 [kW] | Extra small commercial inverter | 1 | Single phase 200V | C | No option | 002 | 0.2 [kW] | 2 | 3 Phases 200V | - | No option | 004 | 0.4 [kW] |  |  |  |  |
|---|--|---------------------------------|-------------|-------------------|---------------|-----------|---------------|--|-----|----------|---------------------------------|---|-------------------|---|-----------|-----|----------|---|---------------|---|-----------|-----|----------|--|--|--|--|
| Motor rating  |  | Series name                     | Input power |                   | RS-485 option |           |               |  |     |          |                                 |   |                   |   |           |     |          |   |               |   |           |     |          |  |  |  |  |
| 001   | 0.1 [kW]   | Extra small commercial inverter | 1           | Single phase 200V | C             | No option |               |  |     |          |                                 |   |                   |   |           |     |          |   |               |   |           |     |          |  |  |  |  |
| 002   | 0.2 [kW]   |                                 | 2           | 3 Phases 200V     | -             | No option |               |  |     |          |                                 |   |                   |   |           |     |          |   |               |   |           |     |          |  |  |  |  |
| 004   | 0.4 [kW]   |                                 |             |                   |               |           |               |  |     |          |                                 |   |                   |   |           |     |          |   |               |   |           |     |          |  |  |  |  |
| <p>Preparations of instruments and parts required for operation</p> | <p>Instruments and parts to be prepared depend on how the inverter is operated. Prepare optional (additional) equipments and parts as necessary.</p>   |                                 |             |                   |               |           |               |  |     |          |                                 |   |                   |   |           |     |          |   |               |   |           |     |          |  |  |  |  |
| <p>Installation</p>   | <p>To operate the inverter with high performance for a long time, install the inverter considering a proper place and the correct direction with proper clearances.</p>  |                                 |             |                   |               |           |               |  |     |          |                                 |   |                   |   |           |     |          |   |               |   |           |     |          |  |  |  |  |
| <p>Wiring</p>   | <p>Connect the power supply, motor and operation signals (control signals) to the terminal block. Note that incorrect connection may damage the inverter and peripheral devices.</p>   |                                 |             |                   |               |           |               |  |     |          |                                 |   |                   |   |           |     |          |   |               |   |           |     |          |  |  |  |  |

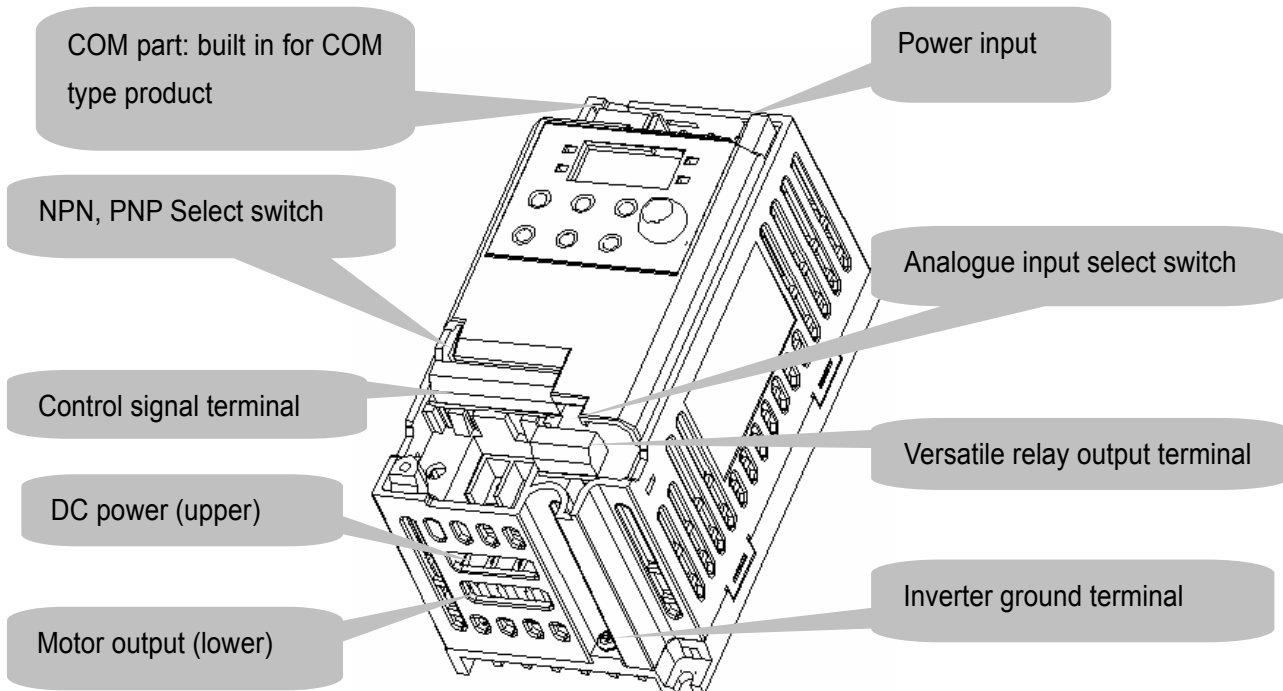
### 1.2 Parts' Names & Details

#### ● Appearance



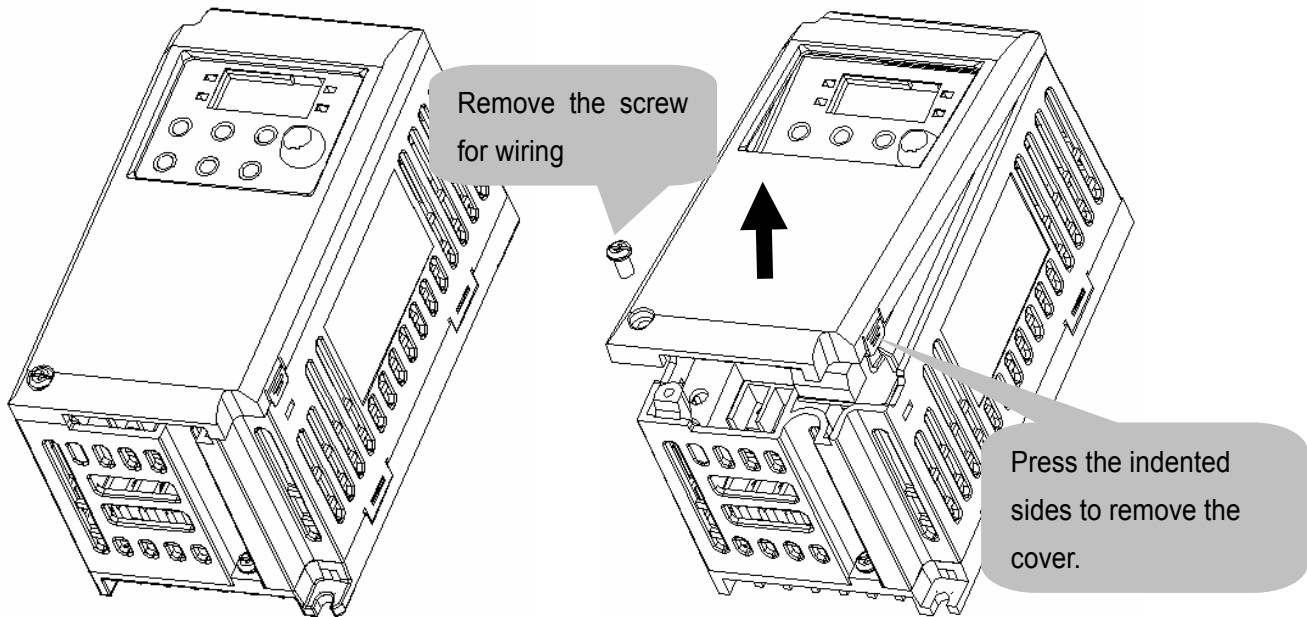
#### ● Inside view with front cover removed

Refer to 1.3 for details when remove front cover.

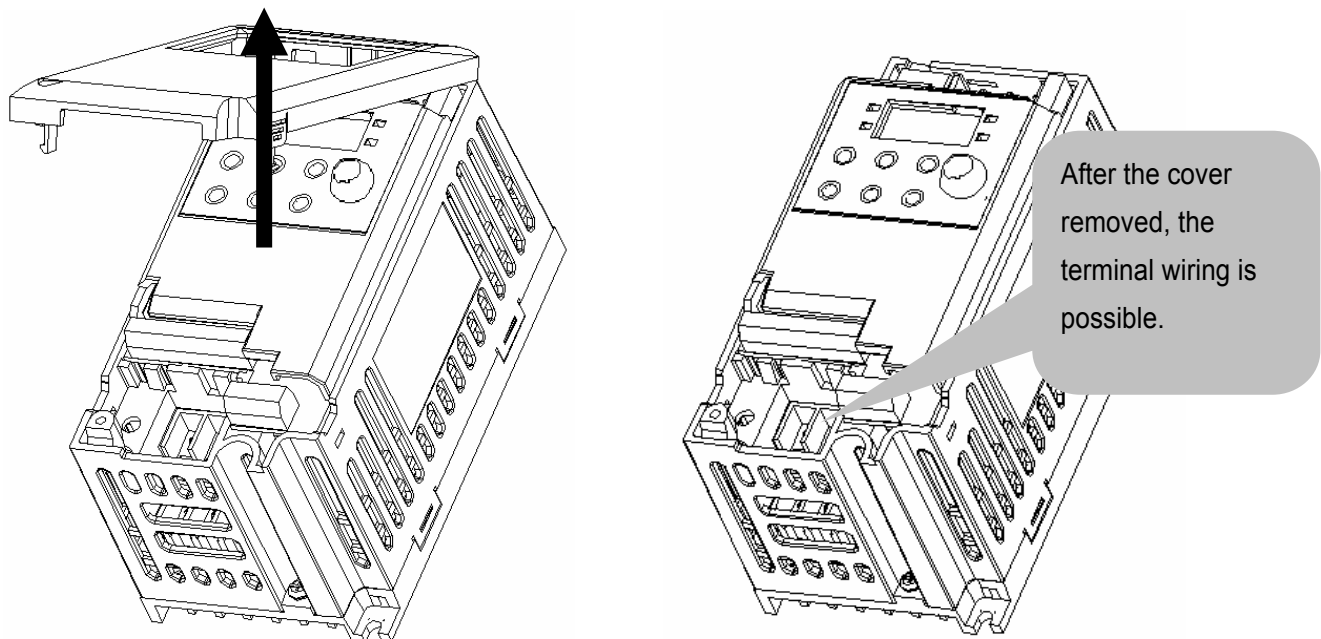



### 1.3 Assembling & Disassembling

- To remove the front cover, press both indented sides of the cover lightly and pull it up.



- The front cover is completely removed if lifting it up and removing the fixed part. Wiring and installation is available only with the cover removed.



|  |   |
|--|---|
|  <b>Caution</b> | For the control terminal, use the cables presented in this manual. Using a thicker one than the reference type may interfere with assembling or subject the cable sheath to damage. |
|--|---|

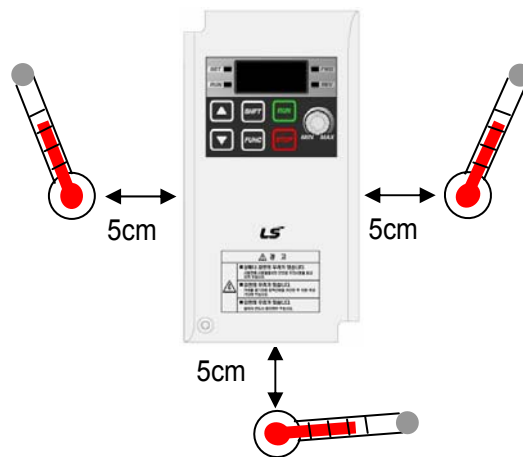


## 2. Installation

### 2.1 Installation precautions

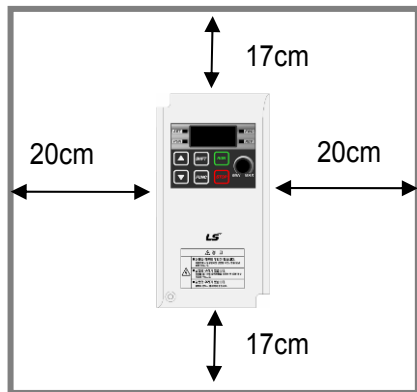
#### ! CAUTION

- Handle the inverter with care to prevent the plastic components damaged.
- Avoid installing the inverter in a place where vibration from bogie or press exists.
- Install in a location where ambient air temperature is within the permissible range (-10 ~ 40°C).
- Maximum Surrounding Air Temperature of 40 °C (UL508C)

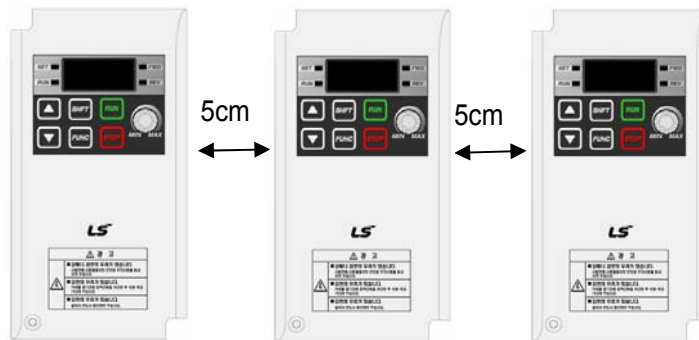


< Ambient air Temp Checking Location >

- The inverter will be very hot during operation. Install it on a flame-retardant surface.
- Inverter is a heating source, so the installation place needs enough space for proper heat dissipation
- In case installed in a panel without ventilating opening, secure space as presented in Figure 1.
- If the inverters are installed in a row, make sure to leave space between and among them as seen in Figure 2.  
Note that side space may vary depending on a panel's cooling efficiency.



[Figure 1]

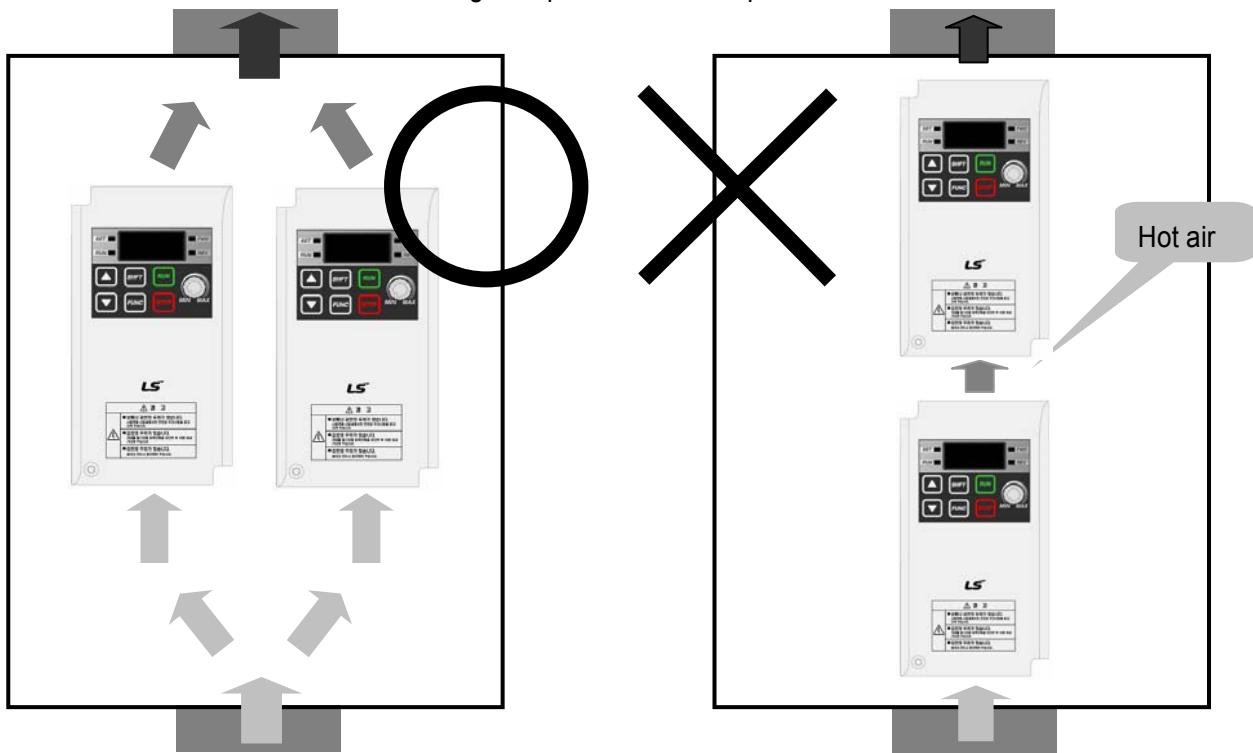



[Figure 2]

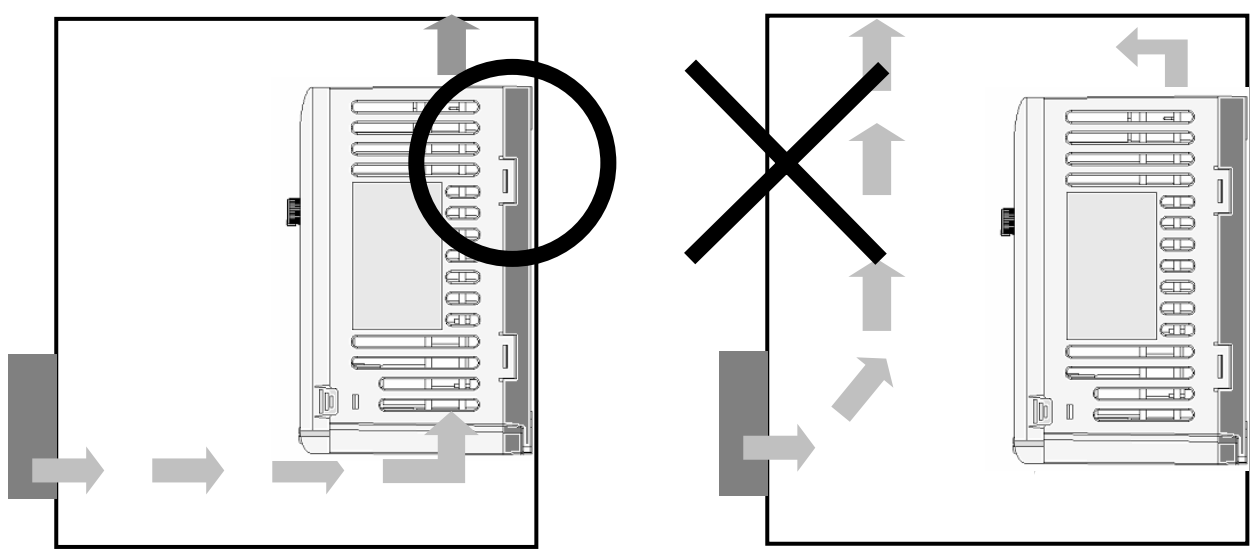
- Protect from high temperature and high moisture and/or direct sunlight.
- Install the inverter inside a “totally enclosed” panel to protect against oil mist, water or dust.


- When two or more inverters are installed inside a panel, the inverters and fans must be installed in proper positions with extreme care.
- Install the inverter using screws or bolts to insure the inverter is firmly fastened.

< For installing multiple inverters in a panel >



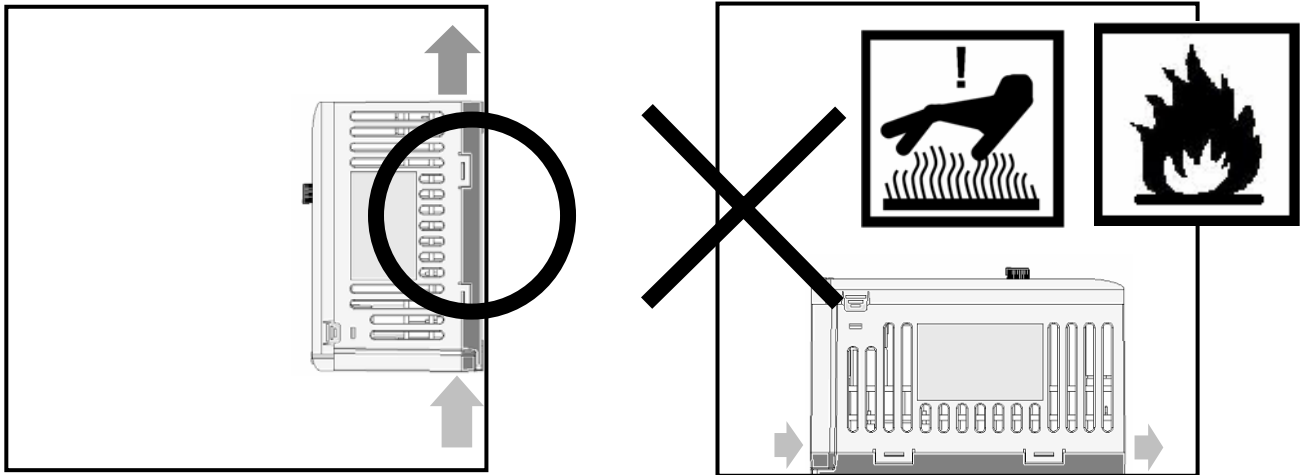
 **Caution** Arrange hot air from the inverters is discharged when installing them on a panel. 'X' shows incorrect layout example.



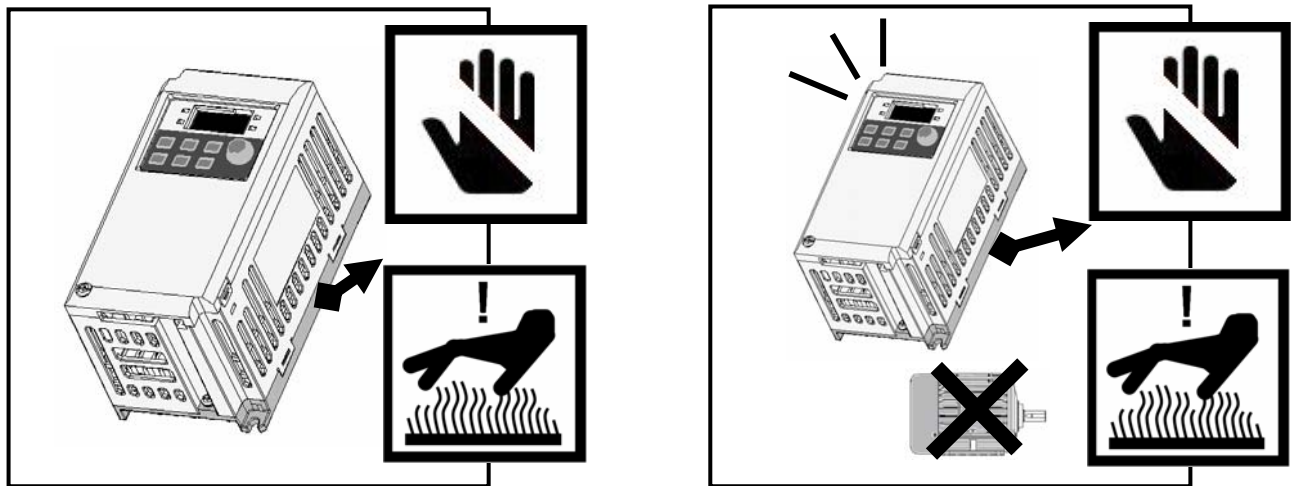
 **Caution** A fan is to be installed so that the air inside the inverter is well discharged as seen in the left figure. 'X' shows an example of reduced cooling effect, possibly causing the inverter to overheat.

**Warning**

- Follows procedure below when Install the inverter for successful operation.



**Caution** iE5 has self cooling structure using air. Therefore install the inverter vertically possible to air circulation. Malfunction or fire may be caused when installed horizontally.

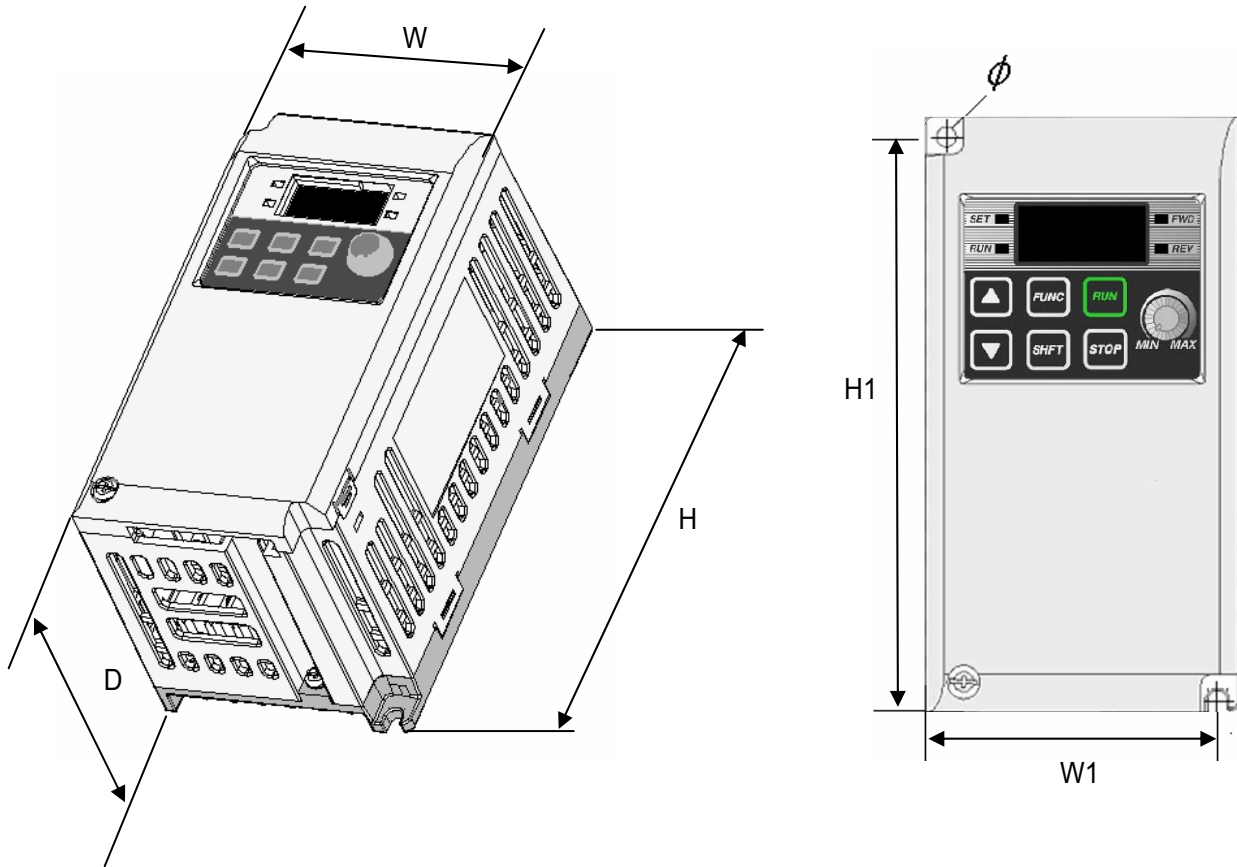


**Caution**

- Heat protection pin of iE5 is a high heating element. Caution to contact while operate the products.
- Since switching heat occurs when inverter output without connection motors, Do not operate inverter independently. Skin burn or malfunction may be caused.



2.2 Dimensions



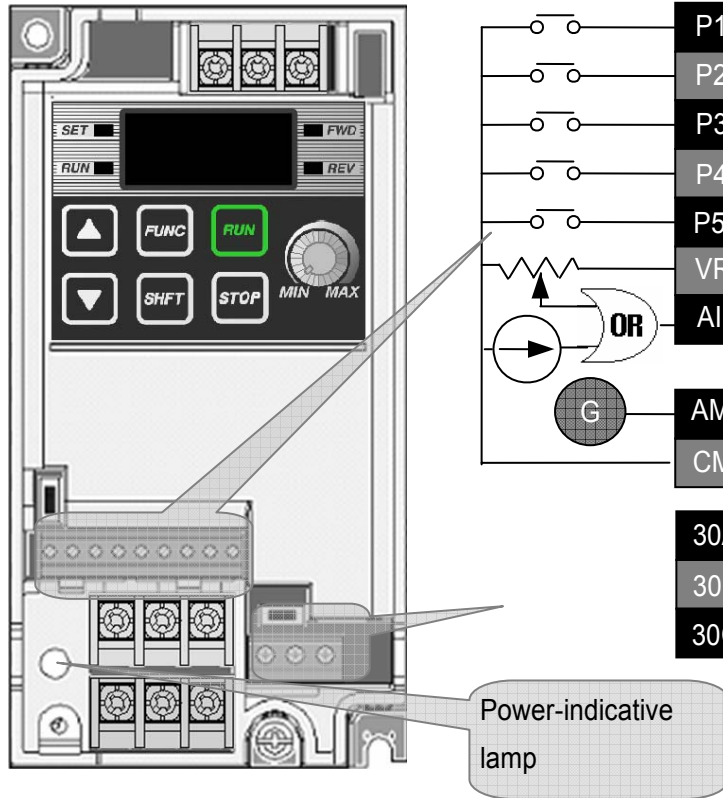
| Inverter   | 001iE5-1 | 002iE5-1 | 004iE5-1 | 001iE5-2 | 002iE5-2 | 004iE5-2 |
|------------|----------|----------|----------|----------|----------|----------|
| W          | 68       | 68       | 68       | 68       | 68       | 68       |
| H          | 128      | 128      | 128      | 128      | 128      | 128      |
| D          | 85       | 85       | 115      | 85       | 85       | 115      |
| H1         | 124      | 124      | 124      | 124      | 124      | 124      |
| W1         | 64       | 64       | 64       | 64       | 64       | 64       |
| φ          | 4.2      | 4.2      | 4.2      | 4.2      | 4.2      | 4.2      |
| Weight(kg) | 0.44     | 0.46     | 0.68     | 0.43     | 0.45     | 0.67     |

**Note**

Use M4 screw for fixing the inverter on a panel.

### 3. Wiring

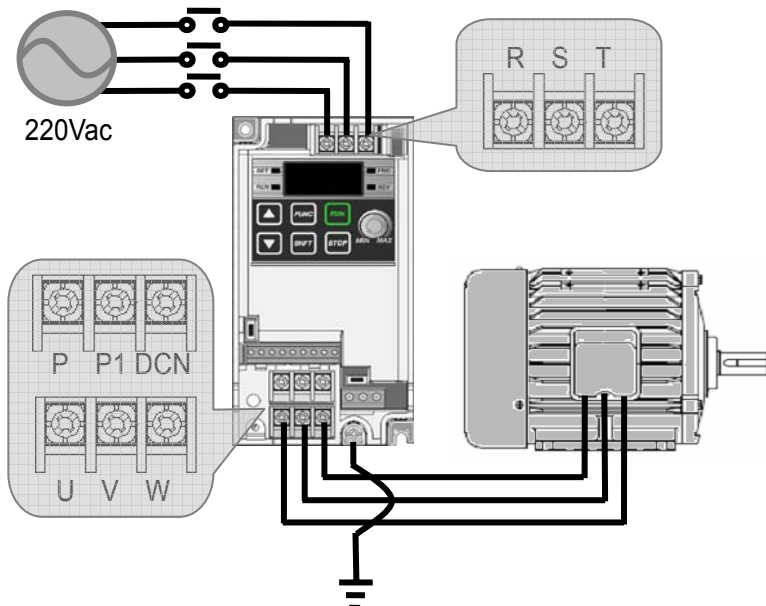
#### 3.1 Control Terminal Wiring Diagram



| T/M | Description                                  |                      |
|-----|--|----------------------|
| P1  | Multi function terminal                      | FX : forward run     |
| P2  |  | RX : reverse run     |
| P3  |  | EST : emergency stop |
| P4  |  | RST : trip reset     |
| P5  |  | JOG : jog operation  |
| VR  | 12V power(12V,100mA) for external volume     |                      |
| AI  | Analogue frequency input(Voltage or current) |                      |
| AM  | Analogue output: 0 ~ 10V                     |                      |
| CM  | Input signal common                          |                      |
| 30A | Multi function relay output terminal         | A contact output     |
| 30B |  | B contact output     |
| 30C |  | A/B contact common   |

**Note**  
Refer to page 3-3 for the dimensions of the control terminal

#### 3.2 Power Terminal Wiring Diagram



| 0.1~0.4kW IE5 Power Terminal Spec. |                                       |
|------------------------------------|---------------------------------------|
| I wire thickness                   | 16AWG, 1.25 mm <sup>2</sup>           |
| O wire thickness                   | 16AWG, 1.25 mm <sup>2</sup>           |
| G wire thickness                   | 14AWG, 1.25 mm <sup>2</sup>           |
| I/O terminal                       | 16AWG, 1.25 mm <sup>2</sup><br>/3.5 φ |
| Terminal torque                    | 3.5 lb-in                             |

**Caution** In case of single phase, the input power should be connected to R, S terminals. If connected to T phase, the inverter does not work.

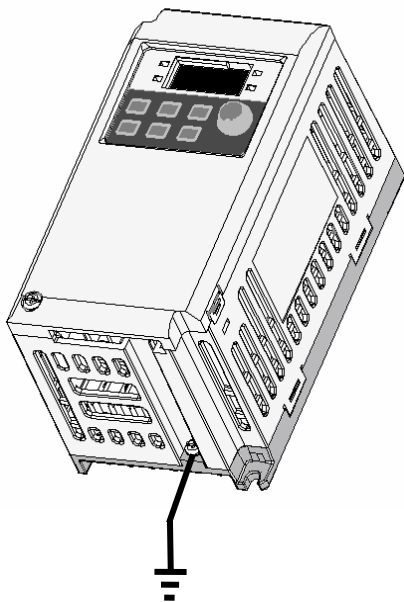
**CAUTION**

- Suitable For Use On A Circuit Capable of Delivering Not More Than 5000 RMS Symmetrical Amperes, 240 Volts Maximum. (UL508C)
- Use Copper Conductors Only, 75 °C only with a torque rating. (UL508C)
- Make sure the input power is off before wiring.
- When the inverter's input power is cut off after operation, wire it after DC circuit voltage inside the inverter is fully discharged by measuring P1 and N with a tester (voltmeter). If there is no tester, wire it after the power lamp is completely out.
- Applying input power supply to the output terminals U, V and W causes internal inverter damage.
- Use ring terminals with insulated caps when wiring the input power and motor wiring
- Do not leave wire fragments inside the inverter. it can cause faults, breakdowns and malfunctions.
- Never short P1 or P with N. Shorting terminals may cause internal inverter damage
- Do not connect static condenser, surge killer or radio noise filter to the output of the inverter. Otherwise, the inverter's protection function starts working or it may cause condenser or surge suppressor broken.
- The inverter is delivered that P~P1 are connected to short circuit

**3.3 Grounding Specification**

**WARNING**

- Use the Type 3 grounding method (Ground impedance: Below 100Ω).
- Use the dedicated ground terminal to ground the inverter. Do not use the screw in the case or chassis, etc for grounding.



**Note**

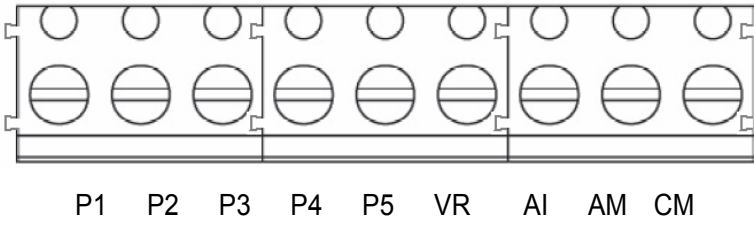
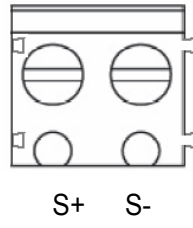
- Grounding procedure
  - 1) Remove the front cover.
  - 2) Connect the Grounding wire to the ground terminal as shown above

**CAUTION**

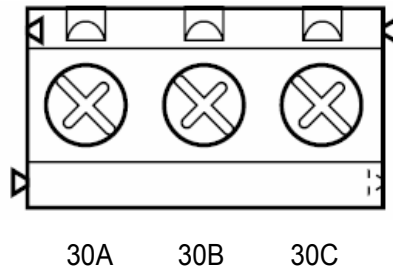
Follow the grounding specifications.

|                  |                              |
|------------------|------------------------------|
| Inverter Cap.    | 001iE5, 002iE5, 004iE5 – 1,2 |
| Wire size        | 14AWG, 2mm <sup>2</sup>      |
| Lug spec.        | 14AWG, 2mm <sup>2</sup> , 4φ |
| Grounding method | Special type 3               |


3.4 Control Terminal Wiring Specification

| Terminal description   |  |                            | COM optional terminal   |         |
|--|--|----------------------------|---|---------|
|  |  |                            |  |         |
| T/M  | Terminal description                     | Wire size                  | Torque [lb-in]  | Remarks |
| P1~P5  | Multi-function input T/M 1-5             | 22 AWG,0.3 mm <sup>2</sup> | 3.0   |         |
| VR   | Power T/M for external volume resistance | 22 AWG,0.3 mm <sup>2</sup> | 3.0   |         |
| AI   | Analogue frequency input T/M             | 22 AWG,0.3 mm <sup>2</sup> | 3.0   |         |
| AM   | Multi-function output T/M                | 22 AWG,0.3 mm <sup>2</sup> | 3.0   |         |
| CM   | Common terminal                          | 22 AWG,0.3 mm <sup>2</sup> | 3.0   |         |

Multi-function Relay T/M Spec.



| T/M | Terminal description                  | Wire size                  | Torque[lb-in] | Remarks |
|-----|---------------------------------------|----------------------------|---------------|---------|
| 30A | Multi-function relay output A contact | 20 AWG,0.5 mm <sup>2</sup> | 4.5           |         |
| 30B | Multi-function relay output B contact | 20 AWG,0.5 mm <sup>2</sup> | 4.5           |         |
| 30C | Common for Multi-function relays      | 20 AWG,0.5 mm <sup>2</sup> | 4.5           |         |

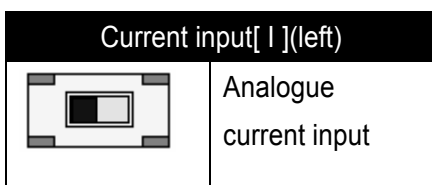
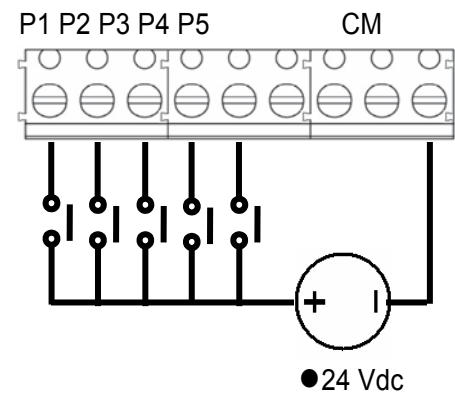
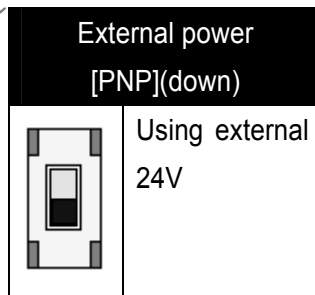
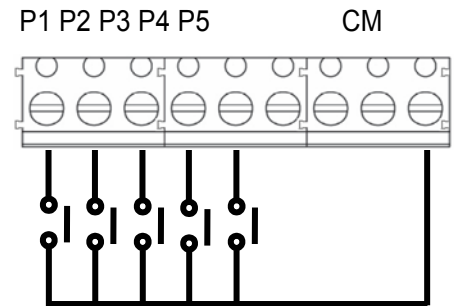
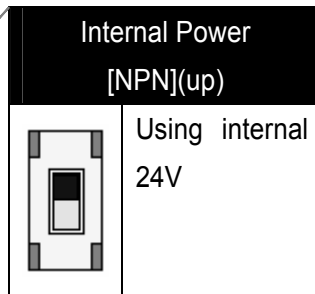
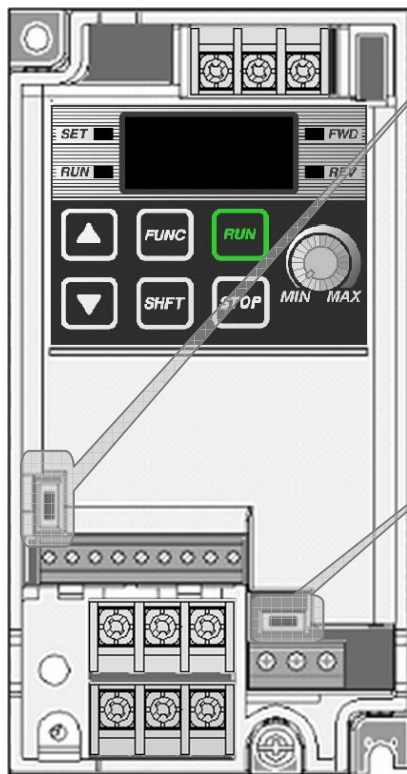
 **CAUTION**

Tie the control wires more than 15cm away from the control terminals. Otherwise, it interferes with front cover reinstallation.

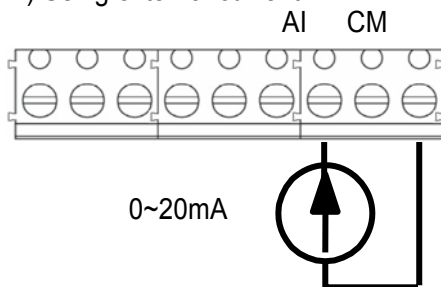
**Note**

When you use external power supply (24V) for multi-function input terminal (P1~P5), terminals will be active above 12V level. Take caution not to drop the voltage below 12V.

### 3.5 PNP/NPN Modes Switch

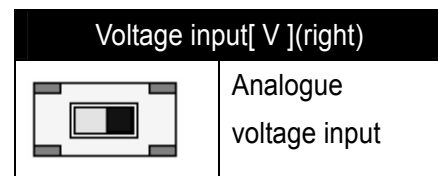


1) Using external current

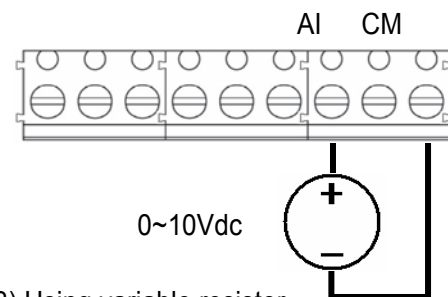


**Note**

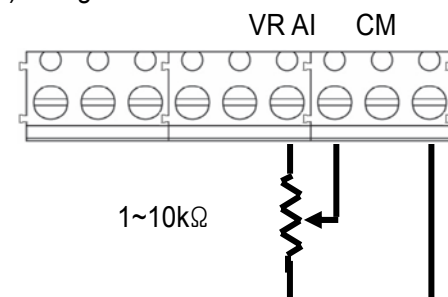
The setting direction of switch in the above figure is in black.



2) Using external voltage



3) Using variable resistor




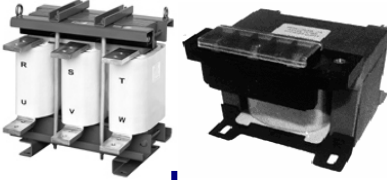




## 4. Peripheral

### 4.1 Configuration of Peripherals

Correct peripherals must be selected and properly connected. An incorrectly applied or installed inverter may result in system malfunction or reduction in product life as well as component damage. You must read and understand this manual thoroughly before proceeding.

● AC power input

| Peripheral  | Name                    | Caution  |
|---|-------------------------|--|
|    | Input power             | Use the power supply within the permissible range of inverter input power rating (Refer to Page 15-1).   |
|   | MCCB or ELB             | Select circuit breakers with care. A large inrush current may flow in the inverter at power on.  |
|  | Magnetic contactor      | Install it if necessary. When installed, do not use it for the purpose of starting or stopping. Otherwise, it may cause the reduction of product life.   |
|  | AC or DC reactors       | The reactors must be used when the power factor is to be improved or the inverter is installed near a large power supply system (20times and more than its cap. and wiring distance within 10m). |
|  | Installation and wiring | Maintain the ambient temperature within the permissible range because the life is sensitive to the temperature. Incorrect terminal wiring could result in equipment damage.                      |
|  | Inverter output         | Do not connect a static condenser, surge suppressor or radio noise filter to the output side of the inverter.  |

**4.2 Recommended MCCB and Magnetic Contactor**

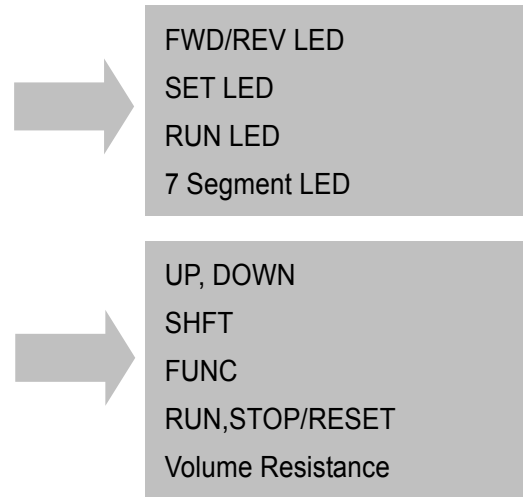
| Model    | MCCB   | ELB(LS) |        | MC  |        | Remarks |
|----------|--------|---------|--------|-----|--------|---------|
| 001iE5-1 | ABS33b | 5A      | EBS33b | 5A  | GMC- 9 | 7A      |
| 002iE5-1 |        | 10A     |        | 10A | GMC-12 | 9A      |
| 004iE5-1 |        | 15A     |        | 15A | GMC-18 | 13A     |
| 001iE5-2 |        | 3A      |        | 3A  | GMC- 9 | 7A      |
| 002iE5-2 |        | 5A      |        | 5A  | GMC- 9 | 7A      |
| 004iE5-2 |        | 10A     |        | 10A | GMC-12 | 9A      |

**4.3 Recommended Reactors**

| Model    | AC Input fuse | AC reactor  | DC reactor |
|----------|---------------|-------------|------------|
| 001iE5-1 | 20A           | 4.2mH, 3.5A | 10mH, 3A   |
| 002iE5-1 | 20A           | 4.2mH, 3.5A | 10mH, 3A   |
| 004iE5-1 | 20A           | 5.1mH, 5.4A | 7mH, 5A    |
| 001iE5-2 | 20A           | 4.2mH, 3.5A | 10mH, 3A   |
| 002iE5-2 | 20A           | 4.2mH, 3.5A | 10mH, 3A   |
| 004iE5-2 | 20A           | 4.2mH, 3.5A | 7mH, 5A    |

## 5. Loader

### 5.1 Configuration



**Note**

STOP key of the inverter iE5 also contains reset function, which is used to cancel trip. Trip may be cancelled by using this key.

| Display    | Description   |                            |
|------------|---|----------------------------|
| FWD        | 'On' during forward run                               | Blinks when a fault occurs |
| REV        | 'On' during reverse run                               |                            |
| SET        | 'On' during parameter setting                         |                            |
| RUN        | 'On' during inverter operation                        |                            |
| 7 Segments | Displaying operation status and parameter information |                            |

| Key               | Name     | Description   |
|-------------------|----------|---|
| ▲                 | Up       | Scroll through codes or increase parameter value                      |
| ▼                 | Down     | Scroll through codes or decrease parameter value                      |
| RUN               | Run      | Operation command   |
| STOP              | Stop     | STOP : stop during operation, RST : reset in case of fault            |
| FUNC              | Function | Edit parameters or save edited parameter values                       |
| SHFT              | Shift    | Move among groups/the number of ciphers left during parameter setting |
| Volume resistance |          | Used to change driving frequency                                      |



### 5.2 Alpha-numeric view on the LED

Refer to the below table summarizing the characters displayed on the LED.

| Inverter LED | No. | Inverter LED | Eng | Inverter LED | Eng | Inverter LED | Eng |
|--------------|-----|--------------|-----|--------------|-----|--------------|-----|
| 0            | 0   | A            | A   | K            | K   | U            | U   |
| 1            | 1   | b            | B   | L            | L   | v            | V   |
| 2            | 2   | c            | C   | m            | M   | w            | W   |
| 3            | 3   | d            | D   | n            | N   | x            | X   |
| 4            | 4   | E            | E   | o            | O   | y            | Y   |
| 5            | 5   | F            | F   | p            | P   | z            | Z   |
| 6            | 6   | G            | G   | q            | Q   |              |     |
| 7            | 7   | H            | H   | r            | R   |              |     |
| 8            | 8   | i            | I   | s            | S   |              |     |
| 9            | 9   | J            | J   | t            | T   |              |     |

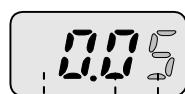
**Note**

Inverter iE5 uses 7-segment display. Therefore, it displays numbers and alphabet as the above table. Make sure to fully comprehend them for reading the fault messages/functional information.

**Note**

The 7-Segment operates in three statuses; on, off and blink. Throughout this manual, on is in black, blank is in grey and off is not separately presented.

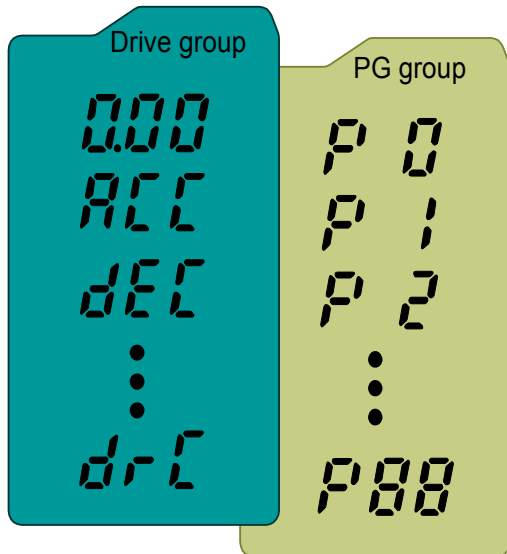
i.e.)



OFF ON Blink

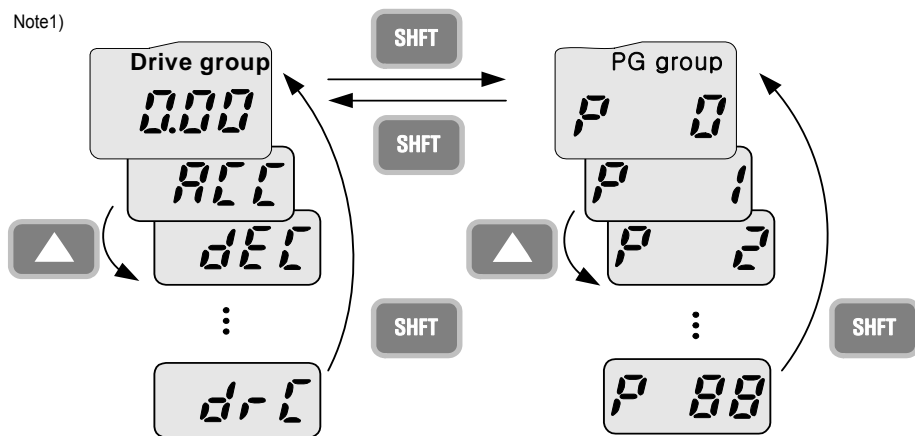
### 5.3 Moving to other groups

- There are two different parameter groups in SV-iE5 series as shown below.



| Type        | Description   |
|-------------|---|
| Drive group | Basic parameters necessary to operate the inverter; target frequency, acceleration/deceleration time and etc. |
| PG group    | Parameter group for additional functions  |

#### Moving to the other parameter group



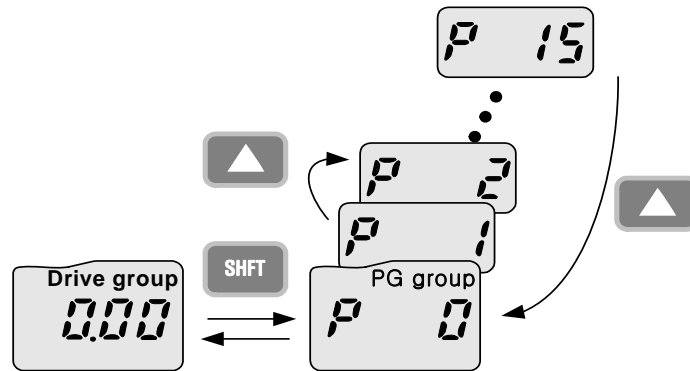
Can move between groups if pressing SHFT key in code 0 of Drive Group/PG Group as shown in the figure. If pressing SHFT in other codes but 0, it moves to the first code of a selected group and it moves between groups if pressing SHFT once more.

1) Target frequency is set in the first code of Drive Group. It is delivered with 0.00 set as the default and any differently changed driving frequency is displayed once a user changes it.

### 5.4 How to move among codes in a group

● Moving between groups

**Moving from 15 of PG Group to Drive Group**



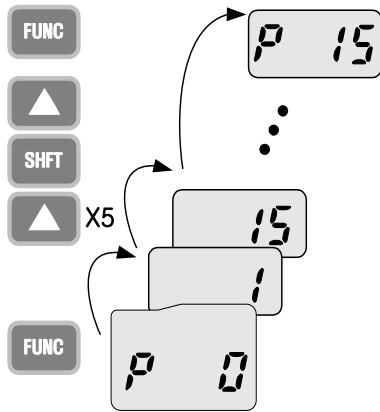
|   |  |  |
|---|--|--|
| 1 |  | - . Display Code 15 of PG Group.<br>- . Press SHFT key.                |
| 2 |  | - . It displays F0, the first code of PG Group.<br>- . Press SHFT key. |
| 3 |  | - . It displays 0.00, the first code of Drive Group.                   |

● Code change in Drive Group

|             |   |  |   |
|-------------|---|--|---|
|             | 1 |  | - . It displays 0.00, the 1st code of Drive Group.<br>- . Press UP(▲) key.                                  |
|             | 2 |  | - . It displays ACC, the 2nd code of Drive Group.<br>- . Press UP(▲) key.                                   |
|             | 3 |  | - . It displays dEC, the 3rd code of Drive Group.<br>- . Keep pressing UP(▲) key.                           |
|             | 4 |  | - . It displays drC, the final code of Drive Group<br>- . Press UP(▲) key in the final code of Drive Group. |
|             | 5 |  | - . It returns to the 1st code of Drive Group.  |
| <b>Note</b> |   |  | For moving reversely, use DOWN(▼) key.  |

● Code jump

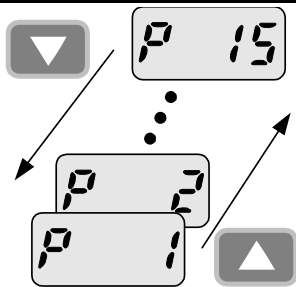
Moving from code 1(P 0) to the code15(P15) in PG Group



|   |  |   |
|---|--|---|
| 1 |  | - It displays P0, the 1st code of Drive Group.<br>- Press FUNC key.   |
| 2 |  | - SET lamp lights up. Changeable number blinks<br>- It shows moving to Code 1 is possible. Set 5 using UP(▲) key.                     |
| 3 |  | - The 1st digit is changed to 5.<br>- Press SHFT key.<br>- Blinking cursor moves and 05 is displayed. Change it to 1 using UP(▲) key. |
| 4 |  | - It shows moving to Code 15 is possible.<br>- Pressing FUNC key enters 15.   |
| 5 |  | - SET lamp is out.<br>- It displays Code 15 of PG Group.  |

● Code change in PG Group

Moving from code 1 to code 15 in PG group



|   |  |   |
|---|--|---|
| 1 |  | - It displays Code 1 of PG Group.<br>- Keep pressing UP(▲) key until P 15 is displayed. |
| 2 |  | - It displays Code 15 of PG Group.  |

Note

Some codes will be skipped in the middle of increment (▲)/decrement (▼) for code change in PG Group. That is because it is programmed that some codes are intentionally reserved for later use or the codes user does not use are invisible. For details, refer to the table of functions in Chapter 7.

● Frequency setting

When changing RUN frequency to 30.05 [Hz] in Drive Group



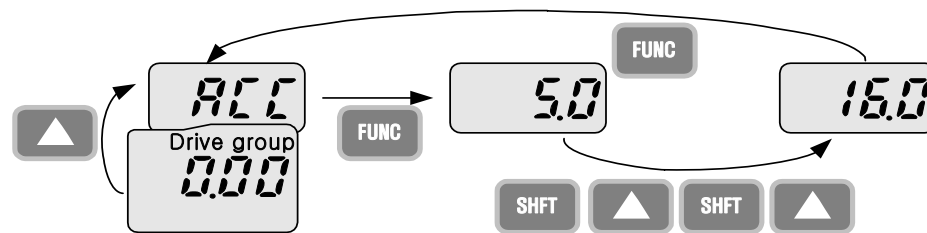
|   |  |   |
|---|--|---|
| 1 |  | - It displays Target Frequency, the 1st code of Drive Group.<br>- Press FUNC key.                               |
| 2 |  | - SET lamp lights up.<br>- The second decimal 0 becomes active.<br>- Press the UP (▲) key until 5 is displayed. |
| 3 |  | - The second decimal is changed to 5.<br>- Press SHFT key.  |
| 4 |  | - The first decimal 0 becomes active.<br>- Press SHFT key twice.  |
| 5 |  | - The first digit 0 becomes active.<br>- Set 3 using UP(▲) key.   |
| 6 |  | - Press FUNC key.   |
| 7 |  | - 30.05 blinks quickly and it asks whether to save the value.<br>- Press FUNC key.                              |
| 8 |  | - SET lamp is out.<br>- Blink stops and the saved target frequency are displayed.                               |

**Note**  
Parameter setting is disabled when pressing other Keys except Function Key(FUNC) in step 6 where 30.05 blinks quickly.

5.5 How to set parameters

●Parameter change in Drive Group

Changing acceleration duration from 5.0 to 16.0 seconds

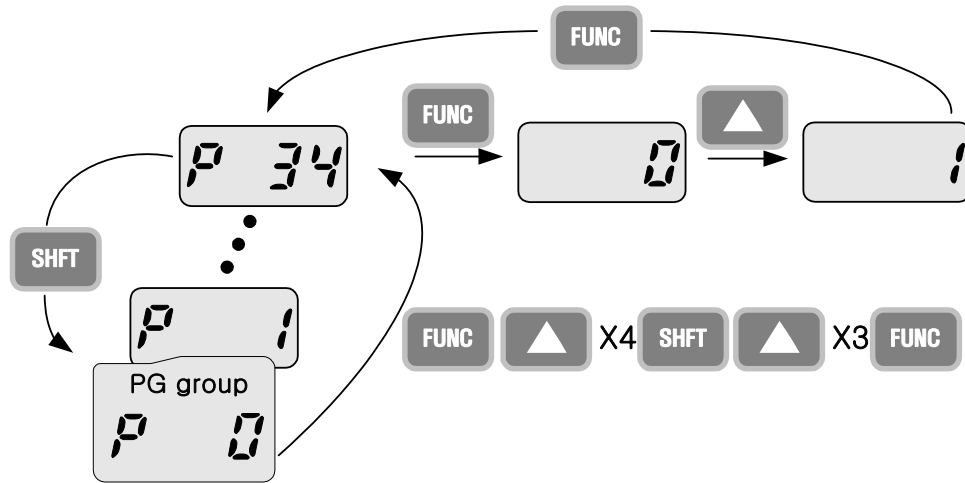


|   |  |   |
|---|--|---|
| 1 |  | - It displays the target frequency, the 1st code of Drive Group.<br>- Press UP(▲) key.  |
| 2 |  | - It displays ACC, the acceleration duration, the 2nd code of Drive Group.<br>- Press Function(FUNC) key.   |
| 3 |  | - SET lamp lights up.<br>- 0 in 5.0 blinks, which means that the digit may be changed.<br>- Press Shift(SHFT) key.  |
| 4 |  | - The digit to change is moved to the first digit.<br>- Press UP(▲) key.  |
| 5 |  | - The digit to change is increased, being changed to 6.0.<br>- Press Shift(SHFT) key.   |
| 6 |  | - The digit to change is moved the tenth digit.<br>- Press UP(▲) key.   |
| 7 |  | - It displays 16.0.<br>- Press Function(FUNC) key.<br>- 16.0 blinks wholly. <sup>1)</sup><br>- Press Function(FUNC) key. ACC duration of 16.0 seconds is entered. |
| 8 |  | - SET lamp is out<br>- It displays ACC. ACC duration is changed to 16.0 seconds.  |

<sup>1)</sup> That every digit blinks quickly while modifying a parameter means asking whether to enter a modified value. At the moment, pressing Function(FUNC) key completes the entry. To cancel it instead of entering a parameter, press any key such as Shift(SHFT), UP(▲) or DOWN(▼) but Function(FUNC) key.

●Parameter change in PG Group

Changing P34, Code 34 of PG Group from 0 to 1

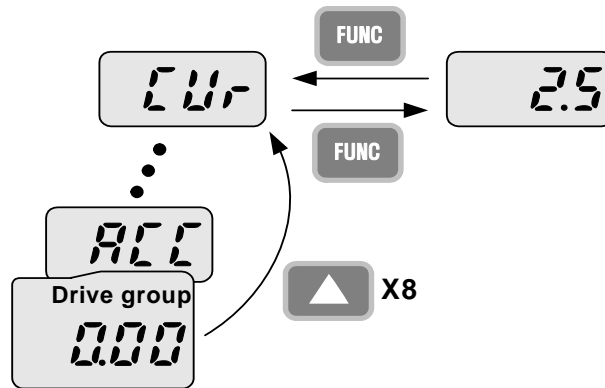


|    |  |  |
|----|--|--|
| 1  |  | - The 1st code of PG Group is displayed.<br>- Press FUNC key.                                      |
| 2  |  | - SET lamp lights up.<br>- Can move to Code 1.<br>- Change it to 4 by using UP(▲) key.             |
| 3  |  | - The first digit is changed to 4<br>- Press SHFT key.   |
| 4  |  | - 0 in 04 is active.<br>- Increase up to 3 by using UP(▲) key.                                     |
| 5  |  | - Can move to Code 34<br>- Press FUNC key.   |
| 6  |  | - SET lamp is out.<br>- It means the current position is Code 34 of PG Group.<br>- Press FUNC key. |
| 7  |  | - SET lamp light up.<br>- Code 34 is set to 0.<br>- Increase it to 1 by using UP(▲) key.           |
| 8  |  | - Press FUNC key.<br>- Press FUNC key once more when 1 blinks.<br>- SET lamp is out.               |
| 9  |  | - Function code change is complete.<br>- Press SHFT key.   |
| 10 |  | - Moved to Code 1 of PG Group.   |

5.6 Monitoring Operation Status

● Displaying Current Output

Monitoring output current in Drive Group



|   |  |  |
|---|--|--|
| 1 |  | - The target frequency, Code 1 of Drive Group is displayed<br>- Press UP(▲) key or DOWN(▼) key until Cur is displayed. |
| 2 |  | - Moved to a code to monitor output current.<br>- Press FUNC key.  |
| 3 |  | - Present output current is 2.5[A].<br>- Press FUNC key.   |
| 4 |  | - Return to the output current monitoring code.  |

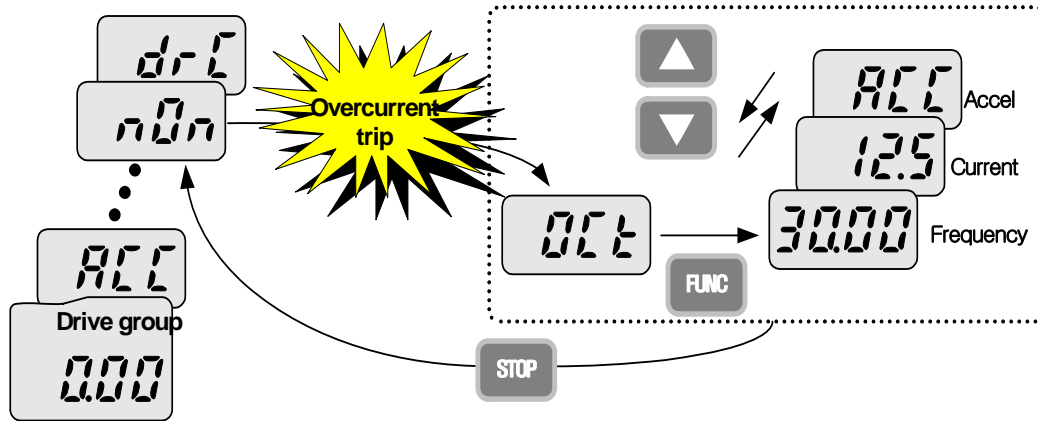
Note

Other parameters in Drive group such as dCL (Inverter DC link voltage) or vOL (Inverter output voltage) can be monitored via the same method.



● Fault display

How to monitor fault condition in Drive Group



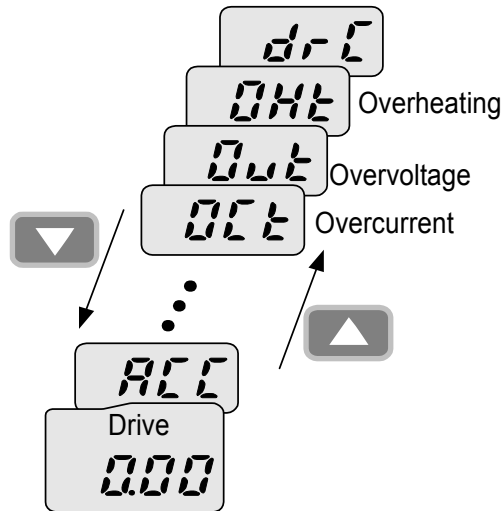
|   |  |  |
|---|--|--|
| 1 |  | <ul style="list-style-type: none"> <li>- OCt appears when an Overcurrent fault occurs.</li> <li>- Press FUNC key.</li> <li>- Press UP(▲) key or DOWN (▼) key.</li> </ul> |
| 2 |  | <ul style="list-style-type: none"> <li>- The run frequency at the time of trip is displayed.</li> <li>- Press UP(▲) key.</li> </ul>                                      |
| 3 |  | <ul style="list-style-type: none"> <li>- The output current at the time of trip is displayed</li> <li>- Press UP(▲) key.</li> </ul>                                      |
| 4 |  | <ul style="list-style-type: none"> <li>- Operating status is displayed. A fault occurred during acceleration</li> <li>- Press STOP key.</li> </ul>                       |
| 5 |  | <ul style="list-style-type: none"> <li>- A fault condition is cleared and "nOn" is displayed.</li> </ul>   |

Note

Trip occurrence is displayed in one of modes like ACC, DEC, Stp or Std. Fault causes may be expected by using the indication.

- When types of faults occur at the same time

When Overcurrent(Oct), overvoltage(Ovt) and overheat(OHt) occur simultaneously



- When various trips occur simultaneously, it shows like the figure above and it can show up to 3 trips.

**Note**

In case inverter trip occurs, it shows the type in the current fault status indication code. In the case, if clearing it away by resetting or turning it off, fault info is moved to fault history(P 1) of PG Group. However, if any, the existing fault history moves from (P 1) to (P 2) or from (P 2) to (P 3); the latest fault info is saved in (P 1) through (P 3).

**MEMO**

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## 6. Basic Operation

### 6.1 Frequency Setting and Basic Operation

**Note**

The following parameters are set to factory defaults. Therefore, results may be different if any parameter is changed by a user. In this case, initialize parameters(see page 10-13) back to factory defaults and follow the instructions below.

- If setting frequency with the loader and commanding operation on the inverter's terminal

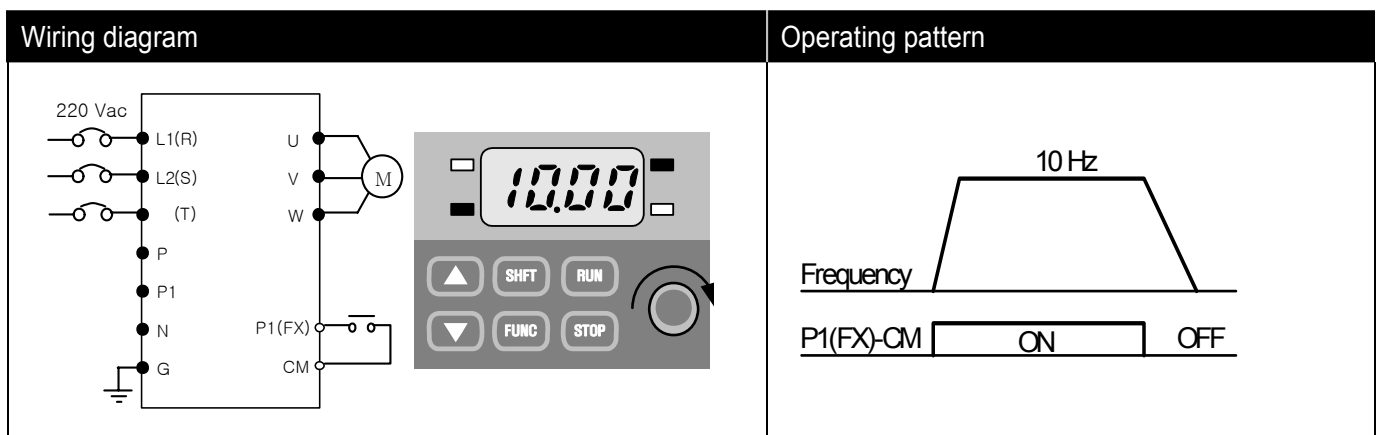
| No. | Indication | Operation & description   |
|-----|------------|---|
| 1   |            | - Target frequency, the first code of Drive Group when turning it on.<br>- Press FUNC key.  |
| 2   |            | - The second decimal, 0 in 0.00 displayed blinks.<br>- Press SHFT three times.  |
| 3   |            | - 00.00 is displayed and the very left 0 blinks.<br>- Press UP(▲) key.  |
| 4   |            | - Confirming 10.00, press FUNC key.<br>- 10.00 blinks quickly as a whole. Press FUNC key once more.   |
| 5   |            | - Target frequency is changed to 10.00Hz.<br>- Turn on the switch between P1(FX) and CM terminals.  |
| 6   |            | - FWD(forward run) lamp of the inverter display blinks and accelerating frequency is displayed on the LED.<br>- When target run frequency 10Hz is reached, 10.00 is displayed.<br>- Turn off the switch between P1 (FX) and CM terminals. |
| 7   |            | - FWD lamp begins to blink and decelerating frequency is displayed on the LED.<br>- When run frequency is reached to 0Hz, RUN and FWD lamp turn off and target frequency (10.00) is displayed.  |

| Wiring diagram | Operating pattern |
|----------------|-------------------|
|                |                   |

## Chapter 6. Basic Operation

- If setting frequency with volume resistance on the loader and commanding operation on the inverter's terminal

| No. | Indication | Operation & description  |
|-----|------------|--|
| 1   |            | - Target frequency, the first code of Drive Group when turning it on.<br>- Press UP(▲) key four times.   |
| 2   |            | - Moved to a code to change a frequency setting mode.<br>- Press FUNC key.   |
| 3   |            | - The current frequency setting mode is set to 0(frequency setting using loader).<br>- Press UP(▲) key two times.  |
| 4   |            | - Check 3(frequency setting by loader's volume resistance).<br>- Press FUNC key.<br>- 3 blinks quickly. Press FUNC key once more.  |
| 5   |            | - Frq is displayed and frequency setting mode is changed to loader volume.<br>- Press SHFT moves to target frequency, the first code of Drive Group.<br>- Turn the loader volume to MAX or MIN to set to 10.00Hz.  |
| 6   |            | - Turn on the switch between P1 (FX) and CM.<br>- FWD(forward run) lamp of the inverter display blinks and accelerating frequency is displayed on the LED.<br>- When run frequency 10Hz is reached, the value is displayed as shown left.<br>- Turn off the switch between P1 (FX) and CM terminals. |
| 7   |            | - FWD(forward run) lamp of the inverter display blinks and decelerating frequency is displayed on the LED.<br>- When run frequency is reached to 0Hz, Run and FWD lamp turn off and target frequency(10.00)is displayed  |



## Chapter 6. Basic Operation

- If setting frq with volume resistance on the loader and commanding operation with RUN key on the loader

| No. | Indication | Operation & description   |
|-----|------------|---|
| 1   |            | - Target frequency, the first code of Drive Group when turning it on.<br>- Press UP(▲) key three times.   |
| 2   |            | - Moved to a code to change a frequency setting mode<br>- Press FUNC key.   |
| 3   |            | - The current frequency setting mode is set to 1(terminal)<br>- Press DOWN (▼) key.   |
| 4   |            | - Operation command mode may be changed to 0(RUN key of the loader).<br>- Press FUNC key twice.   |
| 5   |            | - It displays drv and operation command mode is changed to RUN key.<br>- Press UP(▲) key once.  |
| 6   |            | - Moved to frequency setting mode(Frq) code.<br>- Press FUNC key.   |
| 7   |            | - Frequency setting mode is changed to 0(keypad of the loader).<br>- Press UP(▲) key two times.   |
| 8   |            | - Frequency setting mode may be changed to 3(loader's volume resistance).<br>- Press FUNC key twice.  |
| 9   |            | - It displays Frq and frequency setting mode is changed to loader volume.<br>- Turn the loader volume to set to 10.00 in either Max or Min direction.   |
| 10  |            | - Press RUN key. FWD(forward run) lamp of the inverter display blinks and accelerating frequency is displayed on the LED.<br>- When run frequency 10Hz is reached, it is displayed as shown left.<br>- Press STOP key.                |
| 11  |            | - FWD(forward run) lamp of the inverter display blinks and decelerating frequency is displayed on the LED.<br>- When run frequency 10Hz is reached, FWD(forward run) lamp is out and target frequency(10.00) is displayed on the LED. |

| Wiring diagram | Operating pattern |
|----------------|-------------------|
|                |                   |

# MEMO

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## 7. Function List

## ● Drive Group

| Display              | Name                                | Min/Max range  | Description  | Factory defaults                        | Adj. during run | Page |                                |     |
|----------------------|-------------------------------------|----------------|--|---|-----------------|------|--------------------------------|-----|
| 0.0                  | Frequency command                   | 0 ~ 200 [Hz]   | This parameter sets the operation frequency. During stop, it displays Frequency Command; During run, it shows output frequency. During multi-step operation, it becomes frequency 0. It cannot be set greater than Max frequency(P16). | 0.00                                    | O               | 9-1  |                                |     |
| ACC                  | Acc time                            | 0 ~ 6000 [sec] | During multi-acc/dec operation, this parameter serves as acc/dec time 0.   | 5.0                                     | O               | 9-8  |                                |     |
| dEC                  | Dec time                            |                |  | 10.0                                    | O               | 9-8  |                                |     |
| drv                  | Drive mode                          | 0 ~ 3          | 0  | Operate with RUN/STOP key of the loader | 1               | X    | 9-5                            |     |
|                      |                                     |                | 1  | Terminal operation                      |                 |      | FX: forward run                | 9-6 |
|                      |                                     |                |  |   |                 |      | RX: reverse run                |     |
|                      |                                     |                | 2  |   |                 |      | FX: Run/stop command           |     |
| RX: Reverse rotation |                                     |                |  |   |                 |      |                                |     |
| 3                    | communication: communication option |                |  |   |                 |      |                                |     |
| Frq                  | Frequency setting method            | 0 ~ 4          | 0  | Digital                                 | 0               | X    | 9-1                            |     |
|                      |                                     |                | 1  |   |                 |      | Set loader digital frequency 2 | 9-1 |
|                      |                                     |                | 2  | Analogue                                |                 |      | Terminal AI input              | 9-3 |
|                      |                                     |                | 3  |   |                 |      | Loader volume resistance       | 9-2 |
|                      |                                     |                | 4  |   |                 |      | communication option           |     |
| St1                  | Multi-step frequency 1              | 0 ~ 200 [Hz]   | Set multi-step frequency 1   |   | 10.00           | O    | 9-4                            |     |
| St2                  | Multi-step frequency 2              |                | Set multi-step frequency 2   |   | 20.00           | O    |                                |     |
| St3                  | Multi-step frequency 3              |                | Set multi-step frequency 3   |   | 30.00           | O    |                                |     |



● Drive Group

| Display | Name                                  | Min/Max range | Description  | Factory defaults | Adj. during run | Page |                   |
|---------|---------------------------------------|---------------|--|------------------|-----------------|------|-------------------|
| CUr     | Output current                        | -             | Display output current   | -                | -               | 11-1 |                   |
| rPM     | No. of motor rotation                 | -             | Display the no. of motor rotation(RPM)   | -                | -               | 11-1 |                   |
| dCL     | Inverter DC voltage                   | -             | Display DC voltage inside the inverter   | -                | -               | 11-1 |                   |
| vOL     | Output voltage                        | -             | Display the inverter's output voltage.   | vOL              | -               | 11-2 |                   |
| nOn     | Fault display                         | -             | Display the types of fault, frequency, current and operation status.               | -                | -               | 11-4 |                   |
| drC     | Selection of motor rotation direction | F, r          | If operation command mode(drv) is set to 0, select the direction of motor rotation | P                | O               | 9-7  |                   |
|         |                                       |               | F  |                  |                 |      | Forward operation |
|         |                                       |               | r  |                  |                 |      | Reverse operation |

## ●PG Group

| Display           | Name                                    | Min/Max range | Description  | Factory defaults              | Adj. during run | Page |      |
|-------------------|---|---------------|--|-------------------------------|-----------------|------|------|
| P 0               | Jump code                               | 0 ~ 88        | Sets the code number to jump   | 1                             | O               | 5-5  |      |
| P 1               | Fault log 1                             | -             | It logs the information on the types of faults, and the frequency, current and status such as acceleration, deceleration and stop at the time of trouble. The latest fault is automatically recorded in log 1. | nOn                           | -               | 11-4 |      |
| P 2               | Fault log 2                             | -             |  | nOn                           | -               |      |      |
| P 3               | Fault log 3                             | -             |  | nOn                           | -               |      |      |
| P 4               | Fault log removal                       | 0 ~ 1         | Remove log P1~P3.  | 0                             | O               |      |      |
| P 5               | Prohibition of forward/reverse rotation | 0 ~ 2         | 0  | Both F/R directions available | 0               | X    | 9-7  |
|                   |   |               | 1  | Forward rotation prohibited   |                 |      |      |
|                   |   |               | 2  | Reverse rotation prohibited   |                 |      |      |
| P 6               | Acc pattern                             | 0 ~ 1         | 0  | Linear pattern operation      | 0               | X    | 9-9  |
| P 7               | Dec pattern                             |               | 1  | S-curve pattern operation     |                 |      |      |
| P 8               | Stop mode selection                     | 0 ~ 2         | 0  | Deceleration to stop          | 0               | X    | 9-14 |
|                   |   |               | 1  | DC brake to stop              |                 |      |      |
|                   |   |               | 2  | Free run to stop              |                 |      |      |
| P 9 <sup>1)</sup> | DC brake start frequency                | 0.1 ~ 60 [Hz] | It sets DC brake start frequency. It cannot be set below start frequency(P18).   | 5.00                          | X               | 10-1 |      |
| P10               | DC brake wait time                      | 0 ~ 60 [sec]  | When DC brake frequency is reached, the inverter holds the output for the setting time before starting DC brake.   | 0.10                          | X               |      |      |
| P11               | DC brake voltage amount                 | 0 ~ 200 [%]   | It sets the amount of DC voltage applied to a motor. Motor rated current(P43).   | 50                            | X               |      |      |
| P12               | DC brake time                           | 0 ~ 60 [sec]  | It sets the time taken to apply DC current to a motor.   | 1.0                           | X               |      |      |

<sup>1)</sup> Displayed only when P8 is set to 1(DC brake to stop)

●PG Group

| Display | Name                   | Min/Max range | Description   | Factory defaults    | Adj. during run | Page |      |
|---------|------------------------|---------------|---|---------------------|-----------------|------|------|
| P13     | DC brake start voltage | 0 ~ 200 [%]   | It sets the amount of DC voltage before a motor starts to run. Motor rated current(P43)   | 50                  | X               | 10-2 |      |
| P14     | DC brake start time    | 0 ~ 60 [sec]  | It applies the current to a motor for the set time before motor accelerates.  | 0.0                 | X               |      |      |
| P15     | Jog frequency          | 0 ~ 200 [Hz]  | It sets the frequency for jog operation. It can not be set above the max frequency(P16).  | 10.00               | O               | 10-3 |      |
| P16     | Max frequency          | 40 ~ 200 [Hz] | <p>This parameter sets the upper limit frequency. It is frequency reference for Accel./Decel.</p> <p><b>Note</b></p> <p>If changing the max frequency, all other frequency parameters but P17(base frequency) would be changed to the frequency if they are above the new max. frequency.</p> | 60.00               | X               | 9-8  |      |
|         |                        |               |   |                     |                 |      |      |
| P17     | Base frequency         | 30 ~ 200 [Hz] | The inverter outputs its rated voltage to the motor at this frequency.  | 60.00               | X               | 9-11 |      |
| P18     | Start frequency        | 0.1 ~ 10 [Hz] | The inverter starts to output its voltage at this frequency.<br>It is lower frequency limit of frequency(Hz).   | 0.5                 | X               |      |      |
| P19     | Torque boost selection | 0 ~ 1         | 0   | Manual torque boost | 0               | X    | 9-13 |
|         |                        |               | 1   | Auto torque boost   |                 |      |      |
| P20     | Forward torque boost   | 0 ~ 15 [%]    | Torque boost amount of motor during forward run, based on max. output voltage.  | 5.0                 | X               |      |      |
| P21     | Reverse torque boost   |               | Torque boost amount of motor during reverse run based on max. output voltage.   |                     |                 |      |      |
| P22     | V/F pattern            | 0 ~ 1         | 0   | Linear              | 0               | X    | 9-11 |
|         |                        |               | 1   | Square              |                 |      | 9-12 |

## Chapter 7. Function List

### ●PG Group

| Display           | Name                      | Min/Max range | Description  | Factory defaults | Adj. during run     | Page        |   |   |      |
|-------------------|---------------------------|---------------|--|------------------|---------------------|-------------|---|---|------|
| P23               | Output voltage adjustment | 40 ~ 110 [%]  | It adjusts the amount of output voltage, based on the percentage of input voltage.   | 100              | X                   | 9-12        |   |   |      |
| P24               | Overload trip selection   | 0 ~ 1         | This parameter turns off the inverter output when motor is overloaded. Overload protection function works if it is set to 1.             | 1                | 0                   | 12-1        |   |   |      |
| P25 <sup>1)</sup> | Overload trip level       | 50 ~ 200 [%]  | It sets the amount of overload current, based on the percentage of Motor rated current(P43)  | 180              | 0                   | 12-1        |   |   |      |
| P26               | Overload trip time        | 0 ~ 60 [sec]  | It turns off the inverter output when overload trip level current(P25) flows for overload trip time.                                     | 60               | 0                   |             |   |   |      |
| P27               | Stall prevention select   | 0 ~ 7         | Sets stall prevention function   |                  |                     |             | 0 | X | 12-1 |
|                   |                           |               | Func.  | During dec.      | During constant run | During acc. |   |   |      |
|                   |                           |               | Set  | bit 2            | bit 1               | bit 0       |   |   |      |
|                   |                           |               | 0  | -                | -                   | -           |   |   |      |
|                   |                           |               | 1  | -                | -                   | ✓           |   |   |      |
|                   |                           |               | 2  | -                | ✓                   | -           |   |   |      |
|                   |                           |               | 3  | -                | ✓                   | ✓           |   |   |      |
|                   |                           |               | 4  | ✓                | -                   | -           |   |   |      |
|                   |                           |               | 5  | ✓                | -                   | ✓           |   |   |      |
| 6                 | ✓                         | ✓             | -  |                  |                     |             |   |   |      |
| 7                 | ✓                         | ✓             | ✓  |                  |                     |             |   |   |      |
| P28               | Stall prevention level    | 30 ~ 150 [%]  | It sets the amount of current to activate stall prevention function, based on the percentage of the motor rated current(P43).            | 150              | X                   | 12-1        |   |   |      |
| P29               | Save up/down frequency    | 0 ~ 1         | It decides whether to save the specified frequency during up/down operation.<br>If 1 is selected, the up/down frequency is saved in P30. | 0                | X                   | 10-4        |   |   |      |
| P30 <sup>2)</sup> | Save Up/Down              | -             | It saves the frequency before the inverter stops or decelerated.   | 0.00             | -                   | 10-4        |   |   |      |

<sup>1),2)</sup> Set P24 and P29 to 1 to display this parameter.

## Chapter 7. Function List

### ●PG Group

| Display | Name                                | Min/Max range  | Description   | Factory defaults | Adj. during run | Page |                                 |                                 |                              |                              |  |      |      |      |   |   |   |   |   |  |  |   |   |  |   |  |   |  |   |   |   |   |  |  |   |   |  |   |   |   |   |  |   |   |   |   |
|---------|-------------------------------------|----------------|---|------------------|-----------------|------|---------------------------------|---------------------------------|------------------------------|------------------------------|--|------|------|------|---|---|---|---|---|--|--|---|---|--|---|--|---|--|---|---|---|---|--|--|---|---|--|---|---|---|---|--|---|---|---|---|
| P31     | Dwell frequency                     | 0.1 ~ 200 [Hz] | When run frequency is issued, motor starts to accelerate after dwell frequency is applied to the motor during dwell time(P32).<br>It can be set within max frequency(P16) and start frequency(P18).   | 5.00             | X               | 10-5 |                                 |                                 |                              |                              |  |      |      |      |   |   |   |   |   |  |  |   |   |  |   |  |   |  |   |   |   |   |  |  |   |   |  |   |   |   |   |  |   |   |   |   |
| P32     | Dwell time                          | 0~10 [sec]     | Sets the time for dwell operation.  | 0.0              | X               |      |                                 |                                 |                              |                              |  |      |      |      |   |   |   |   |   |  |  |   |   |  |   |  |   |  |   |   |   |   |  |  |   |   |  |   |   |   |   |  |   |   |   |   |
| P33     | Operator's fault detection          | 0 ~ 7 [bit]    | Sets fault detection items at operator's discretion   | 0                | O               | 12-2 |                                 |                                 |                              |                              |  |      |      |      |   |   |   |   |   |  |  |   |   |  |   |  |   |  |   |   |   |   |  |  |   |   |  |   |   |   |   |  |   |   |   |   |
|         |                                     |                | <table border="1"> <thead> <tr> <th>Func. Set</th> <th>Earth detection during run(GCt)</th> <th>Input phase detection (CoL)</th> <th>Output phase detection (Pot)</th> </tr> <tr> <th></th> <th>bit2</th> <th>bit1</th> <th>bit0</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>-</td> <td>-</td> <td>-</td> </tr> <tr> <td>1</td> <td></td> <td></td> <td>✓</td> </tr> <tr> <td>2</td> <td></td> <td>✓</td> <td></td> </tr> <tr> <td>3</td> <td></td> <td>✓</td> <td>✓</td> </tr> <tr> <td>4</td> <td>✓</td> <td></td> <td></td> </tr> <tr> <td>5</td> <td>✓</td> <td></td> <td>✓</td> </tr> <tr> <td>6</td> <td>✓</td> <td>✓</td> <td></td> </tr> <tr> <td>7</td> <td>✓</td> <td>✓</td> <td>✓</td> </tr> </tbody> </table> |                  |                 |      | Func. Set                       | Earth detection during run(GCt) | Input phase detection (CoL)  | Output phase detection (Pot) |  | bit2 | bit1 | bit0 | 0 | - | - | - | 1 |  |  | ✓ | 2 |  | ✓ |  | 3 |  | ✓ | ✓ | 4 | ✓ |  |  | 5 | ✓ |  | ✓ | 6 | ✓ | ✓ |  | 7 | ✓ | ✓ | ✓ |
|         |                                     |                | Func. Set   |                  |                 |      | Earth detection during run(GCt) | Input phase detection (CoL)     | Output phase detection (Pot) |                              |  |      |      |      |   |   |   |   |   |  |  |   |   |  |   |  |   |  |   |   |   |   |  |  |   |   |  |   |   |   |   |  |   |   |   |   |
|         |                                     |                |   |                  |                 |      | bit2                            | bit1                            | bit0                         |                              |  |      |      |      |   |   |   |   |   |  |  |   |   |  |   |  |   |  |   |   |   |   |  |  |   |   |  |   |   |   |   |  |   |   |   |   |
|         |                                     |                | 0   |                  |                 |      | -                               | -                               | -                            |                              |  |      |      |      |   |   |   |   |   |  |  |   |   |  |   |  |   |  |   |   |   |   |  |  |   |   |  |   |   |   |   |  |   |   |   |   |
|         |                                     |                | 1   |                  |                 |      |                                 |                                 | ✓                            |                              |  |      |      |      |   |   |   |   |   |  |  |   |   |  |   |  |   |  |   |   |   |   |  |  |   |   |  |   |   |   |   |  |   |   |   |   |
|         |                                     |                | 2   |                  |                 |      |                                 | ✓                               |                              |                              |  |      |      |      |   |   |   |   |   |  |  |   |   |  |   |  |   |  |   |   |   |   |  |  |   |   |  |   |   |   |   |  |   |   |   |   |
|         |                                     |                | 3   |                  |                 |      |                                 | ✓                               | ✓                            |                              |  |      |      |      |   |   |   |   |   |  |  |   |   |  |   |  |   |  |   |   |   |   |  |  |   |   |  |   |   |   |   |  |   |   |   |   |
|         |                                     |                | 4   |                  |                 |      | ✓                               |                                 |                              |                              |  |      |      |      |   |   |   |   |   |  |  |   |   |  |   |  |   |  |   |   |   |   |  |  |   |   |  |   |   |   |   |  |   |   |   |   |
|         |                                     |                | 5   |                  |                 |      | ✓                               |                                 | ✓                            |                              |  |      |      |      |   |   |   |   |   |  |  |   |   |  |   |  |   |  |   |   |   |   |  |  |   |   |  |   |   |   |   |  |   |   |   |   |
| 6       | ✓                                   | ✓              |   |                  |                 |      |                                 |                                 |                              |                              |  |      |      |      |   |   |   |   |   |  |  |   |   |  |   |  |   |  |   |   |   |   |  |  |   |   |  |   |   |   |   |  |   |   |   |   |
| 7       | ✓                                   | ✓              | ✓   |                  |                 |      |                                 |                                 |                              |                              |  |      |      |      |   |   |   |   |   |  |  |   |   |  |   |  |   |  |   |   |   |   |  |  |   |   |  |   |   |   |   |  |   |   |   |   |
| P34     | Power On Start Selection            | 0 ~ 1          | It is activated when drv is set to 1 or 2.<br>Motor starts acceleration after AC power is applied while FX or RX terminal is ON.  | 0                | X               | 9-7  |                                 |                                 |                              |                              |  |      |      |      |   |   |   |   |   |  |  |   |   |  |   |  |   |  |   |   |   |   |  |  |   |   |  |   |   |   |   |  |   |   |   |   |
| P35     | Restart after fault reset selection | 0 ~ 1          | It is activated when drv is set to 1 or 2 (Run/Stop via Control terminal).<br>Motor accelerates after the fault condition is reset while the FX or RX terminal is ON.   | 0                | O               | 9-8  |                                 |                                 |                              |                              |  |      |      |      |   |   |   |   |   |  |  |   |   |  |   |  |   |  |   |   |   |   |  |  |   |   |  |   |   |   |   |  |   |   |   |   |

Chapter 7. Function List

●PG Group

| Display | Name                       | Min/Max range | Description  | Factory defaults | Adj. during run | Page  |                      |                                     |                                |             |
|---------|----------------------------|---------------|--|------------------|-----------------|-------|----------------------|-------------------------------------|--------------------------------|-------------|
| P36     | Speed search selection     | 0 ~ 15 [bit]  | It is active to prevent any possible fault when the inverter outputs its voltage to the running motor. | 0                | X               | 10-10 |                      |                                     |                                |             |
|         |                            |               | Func.  |                  |                 |       | Power on start (P34) | Restart after instant power failure | Operation on after fault (P35) | Normal acc. |
|         |                            |               | Set  |                  |                 |       | bit3                 | bit2                                | bit1                           | bit0        |
|         |                            |               | 0  |                  |                 |       | -                    | -                                   | -                              | -           |
|         |                            |               | 1  |                  |                 |       | -                    | -                                   | -                              | ✓           |
|         |                            |               | 2  |                  |                 |       | -                    | -                                   | ✓                              |             |
|         |                            |               | 3  |                  |                 |       | -                    | -                                   | ✓                              | ✓           |
|         |                            |               | 4  |                  |                 |       | -                    | ✓                                   | -                              | -           |
|         |                            |               | 5  |                  |                 |       | -                    | ✓                                   | -                              | ✓           |
|         |                            |               | 6  |                  |                 |       | -                    | ✓                                   | ✓                              | -           |
|         |                            |               | 7  |                  |                 |       | -                    | ✓                                   | ✓                              | ✓           |
|         |                            |               | 8  |                  |                 |       | ✓                    | -                                   | -                              | -           |
|         |                            |               | 9  |                  |                 |       | ✓                    | -                                   | -                              | ✓           |
|         |                            |               | 10   |                  |                 |       | ✓                    | -                                   | ✓                              | -           |
|         |                            |               | 11   |                  |                 |       | ✓                    | -                                   | ✓                              | ✓           |
|         |                            |               | 12   |                  |                 |       | ✓                    | ✓                                   | -                              | -           |
|         |                            |               | 13   |                  |                 |       | ✓                    | ✓                                   | -                              | ✓           |
| 14      | ✓                          | ✓             | ✓  | -                |                 |       |                      |                                     |                                |             |
| 15      | ✓                          | ✓             | ✓  | ✓                |                 |       |                      |                                     |                                |             |
| P37     | Speed Search Current Level |               | Limits the amount of current during speed search operation, based on motor rated current(P43)          | 100              | 0               |       |                      |                                     |                                |             |

●PG Group

| Display | Name                       | Min/Max range  | Description   | Factory defaults | Adj. during run | Page  |
|---------|----------------------------|----------------|---|------------------|-----------------|-------|
| P38     | Number of Auto Restart try | 0 ~ 10         | It sets the number of restart tries after a fault occurs. Auto Restart is deactivated if the fault outnumbers the restart tries. This function is active when [drv] is set to 1 or 2 {Run/Stop via control terminal}.               | 0 <sup>1)</sup>  | O               | 10-12 |
| P39     | Auto Restart time          | 0 ~ 60 [sec]   | Restart tries after auto restart waiting time has passed.   | 1.0              | O               |       |
| P40     | Motor cap. select          | 0.1~ 0.4 [kW]  | Selects the capacity of a motor to use.   | 2)               | X               | 10-6  |
| P41     | Number of motor poles      | 2 ~ 12         | It is displayed via rpm in drive group.   | 4                | X               |       |
| P42     | Rated slip frequency       | 0 ~ 10 [Hz]    | Enter the difference between the input power frequency and the value calculated by converting rpm described in the nameplate to frequency.  | 3)               | X               |       |
| P43     | Motor rated current        | 0.0~ 25.5 [A]  | Enter motor rated current on the nameplate.   | -                | X               |       |
| P44     | No Load Motor Current      | 0.0 ~ 25.5 [A] | Enter the current value detected when the motor is rotating in rated rpm after the load connected to the motor shaft is removed.<br>Enter the 50% of the rated current value when it is difficult to measure No Load Motor Current. | -                | X               |       |
| P45     | Carrier frequency select   | 1 ~ 10 [kHz]   | It selects the audible sound of the motor. If the set value is higher, the inverter sound is quieter but the noise from the inverter and leakage current will become greater.   | 3                | O               | 10-13 |

<sup>1)</sup> No auto restart in case of protection functions such as Oht, Lvt, ESt, HWt.

<sup>2)</sup> P40 initial value is preset based on inverter rating.

<sup>3)</sup> P42 ~ P44 values are changed based on the P40. factory defaults are set based on the inverter capacity.

●PG Group

| Display           | Name                        | Min/Max range  | Description   | Factory defaults   | Adj. during run | Page |      |
|-------------------|-----------------------------|----------------|---|--|-----------------|------|------|
| P46               | Control mode selection      | 0 ~ 2          | 0   | V/F control  | 0               | X    | 9-11 |
|                   |                             |                | 1   | Slip compensation control  |                 |      | 10-6 |
|                   |                             |                | 2   | PI control   |                 |      | 10-8 |
| P47 <sup>1)</sup> | P gain for PI controller    | 0~ 999.9 [%]   | It sets the gains for the PI controller's response characteristics.             | 300.00   | O               |      |      |
| P48               | I time for PI controller    | 0.1~32.0 [sec] |   | 1.00   | O               |      |      |
| P50               | F gain for PI controller    | 0 ~ 99.99 [%]  |   | Feed forward gain for PI controller.   | 0.00            |      | O    |
| P51               | Upper limit of PI frequency | 0.1 ~ 200 [Hz] | It limits the amount of the output frequency through the PI operation.          | 60.00  | O               |      |      |
| P52               | Lower limit of PI frequency | 0.1 ~ 200 [Hz] | It is settable within the range of Max frequency(P16) and Start frequency(P18). | 0.50   | O               |      |      |
| P53               | Power on display            | 0 ~ 15         |   | It selects the parameter to be displayed first on the display of inverter when the power is applied. | 0               | O    | 11-2 |
|                   |                             |                | 0   | Operation frequency  |                 |      |      |
|                   |                             |                | 1   | Acc. time  |                 |      |      |
|                   |                             |                | 2   | Dec. time  |                 |      |      |
|                   |                             |                | 3   | Drive mode   |                 |      |      |
|                   |                             |                | 4   | Frequency mode   |                 |      |      |
|                   |                             |                | 5   | Multi-step frequency 1   |                 |      |      |
|                   |                             |                | 6   | Multi-step frequency 2   |                 |      |      |
|                   |                             |                | 7   | Multi-step frequency 3   |                 |      |      |
|                   |                             |                | 8   | Output current(Cur)  |                 |      |      |
|                   |                             |                | 9   | Motor rpm  |                 |      |      |
|                   |                             |                | 10  | Inverter DC voltage(DCL)   |                 |      |      |
|                   |                             |                | 11  | User display select(vOL)   |                 |      |      |
|                   |                             |                | 12  | Fault display 1  |                 |      |      |
|                   |                             |                | 13  | Direction of motor rotation  |                 |      |      |
| 14                | Output current              |                |   |  |                 |      |      |
| 15                | Motor rpm                   |                |   |  |                 |      |      |

Displayed only when P46 is set to 2(PI control).



●PG Group

| Display | Name                                     | Min/Max range | Description   | Factory defaults | Adj. during run | Page |
|---------|--|---------------|---|------------------|-----------------|------|
| P54     | Gain for Motor rpm display               | 1 ~ 1000 [%]  | It can monitoring on the rpm display code of drive group as converting gear ratio of load system. | 100              | O               | 11-1 |
| P55     | Filter time constant for AI input        | 0 ~ 9999      | Adjusts the responsiveness of analogue input.   | 10               | O               | 9-3  |
| P56     | Min input for AI(vol/cur)                | 0 ~ 100 [%]   | Sets the min value of analogue input as the percentage of the whole input.                        | 0                | O               |      |
| P57     | Frequency corresponding min input for AI | 0 ~ 200 [Hz]  | Frequency in case analogue input is the min value.  | 0.00             | O               |      |
| P58     | AI max input                             | 0 ~ 100 [%]   | Sets the max value of analogue input as the percentage of the whole input.                        | 100              | O               |      |
| P59     | Frequency corresponding to AI max input  | 0 ~ 200 [Hz]  | Frequency in case analogue input is the max. value.   | 60.00            | O               |      |
| P60     | Filter time constant for Volume input    | 0 ~ 9999      | Adjusts the responsiveness of volume input operation.   | 10               | O               | 9-2  |
| P61     | Min value for volume input               | 0 ~ 100 [%]   | Sets the min rpm of volume input as the percentage of the whole input                             | 0                | O               |      |
| P62     | Frequency corresponding to volume input  | 0 ~ 200 [Hz]  | Frequency at minimum current of volume input  | 0.00             | O               |      |
| P63     | Max. value of volume input               | 0 ~ 100 [%]   | Sets the max volume input as the percentage of the whole input.                                   | 100              | O               |      |
| P64     | Frequency corresponding to volume input  | 0 ~ 200 [Hz]  | Frequency at maximum volume input.  | 60.00            | O               |      |
| P65     | Criteria for Analog Input Signal loss    | 0 ~ 2         | 0: Disabled<br>1: activated below half of set value.<br>2: activated below set value.             | 0                | O               | 12-4 |

●PG Group

| Display | Name                                    | Min/Max range | Description |  |                |      |   | Factory defaults | Adj. during run | Page |      |  |
|---------|---|---------------|-------------|--|----------------|------|---|------------------|-----------------|------|------|--|
| P66     | Multi-function input terminal P1 define | 0 ~ 24        | 0           | Forward run command (FX)                           |                |      |   |                  | 0               | O    | 9-6  |  |
|         |   |               | 1           | Reverse run command (RX)                           |                |      |   |                  |                 |      |      |  |
| P67     | Multi-function input terminal P2 define |               | 2           | EST-Emergency Stop Trip : temporary output cut-off |                |      |   |                  | 1               | O    | -    |  |
| P68     | Multi-function input terminal P3 define |               | 3           | Reset when a fault occurs(RST)                     |                |      |   |                  | 2               | O    | -    |  |
|         |   |               | 4           | Jog operation command (JOG)                        |                |      |   |                  |                 |      | 10-3 |  |
| P69     | Multi-function input terminal P4 define |               | 5           | Multi-Step freq – low                              |                |      |   |                  | 3               | O    | 9-5  |  |
|         |   |               | 6           | Multi-Step freq – high                             |                |      |   |                  |                 |      |      |  |
| P70     | Multi-function input terminal P5 define |               | 7           | -  |                |      |   |                  | 4               | O    | -    |  |
|         |   |               | 8           | -  |                |      |   |                  |                 |      | -    |  |
|         |   |               | 9           | -  |                |      |   |                  |                 |      | -    |  |
|         |   |               | 10          | -  |                |      |   |                  |                 |      | -    |  |
|         |   |               | 11          | DC brake during stop                               |                |      |   |                  |                 |      | 10-1 |  |
|         |   |               | 12          | -  |                |      |   |                  |                 |      | -    |  |
|         |   |               | 13          | -  |                |      |   |                  |                 |      | -    |  |
|         |   |               | 14          | -  |                |      |   |                  |                 |      | -    |  |
|         |   |               | 15          | Up-  | Frequency up   |      |   |                  |                 |      | 10-4 |  |
|         |   |               | 16          | down   | Frequency down |      |   |                  |                 |      |      |  |
|         |   |               | 17          | 3-wire operation                                   |                |      |   |                  |                 |      | 10-4 |  |
|         |   |               | 18          | External trip: A Contact (EtA)                     |                |      |   |                  |                 |      | 12-5 |  |
|         |   |               | 19          | External trip: B Contact (EtB)                     |                |      |   |                  |                 |      |      |  |
|         |   |               | 20          | Change from PI operation to general operation      |                |      |   |                  |                 |      | -    |  |
| 21      | -                                       |               |             |  |                | -    |   |                  |                 |      |      |  |
| 22      | Analog Hold                             |               |             |  |                | 9-4  |   |                  |                 |      |      |  |
| 23      | Accel/Decel Disable                     |               |             |  |                | 9-10 |   |                  |                 |      |      |  |
| 24      | Up/Down Save Freq. Initialization       |               |             |  |                | 10-4 |   |                  |                 |      |      |  |
| P71     | Input terminal status display           | BIT4          | BIT3        | BIT2   | BIT1           | BIT0 | - | -                | 11-3            |      |      |  |
|         |   | P5            | P4          | P3   | P2             | P1   |   |                  |                 |      |      |  |

●PG Group

| Display | Name  | Min/Max range | Description   | Factory defaults                    | Adj. during run | Page |      |               |
|---------|---|---------------|---|-------------------------------------|-----------------|------|------|---------------|
| P72     | Filtering time constant for Multi-function Input terminal | 1 ~ 20        | If the value is set higher, the responsiveness of the Input terminal is getting slower. | 3                                   | 0               | -    |      |               |
| P73     | Analog output item select                                 | 0 ~ 3         | Output item   | Output to 10[V]                     | 0               | 0    | 11-5 |               |
|         |   |               | 0   | Output freq.                        |                 |      |      | Max frequency |
|         |   |               | 1   | Output current                      |                 |      |      | 150 %         |
|         |   |               | 2   | Output voltage                      |                 |      |      | 282 V         |
|         |   |               | 3   | Inverter DC link voltage            |                 |      |      | DC 400V       |
| P74     | Analog output level adjustment                            | 10 ~ 200 [%]  | Based on 10V.   | 100                                 | 0               |      |      |               |
| P75     | Frequency detection level                                 | 0 ~ 200 [Hz]  | Used when P77 is set to 0-4.<br>Cannot be set higher than P16.                          | 30.00                               | 0               | 11-7 |      |               |
| P76     | Frequency detection bandwidth                             |               |   | 10.00                               | 0               | 11-9 |      |               |
| P77     | Multi-function relay select                               | 0 ~ 17        | 0   | FDT-1                               | 17              | 0    | 11-7 |               |
|         |   |               | 1   | FDT-2                               |                 |      |      |               |
|         |   |               | 2   | FDT-3                               |                 |      |      | 11-8          |
|         |   |               | 3   | FDT-4                               |                 |      |      |               |
|         |   |               | 4   | FDT-5                               |                 |      |      | 11-9          |
|         |   |               | 5   | -                                   |                 |      |      |               |
|         |   |               | 6   | Inverter Overload (IOLt)            |                 |      |      |               |
|         |   |               | 7   | Motor stall (STALL)                 |                 |      |      |               |
|         |   |               | 8   | Over voltage trip (OVt)             |                 |      |      |               |
|         |   |               | 9   | Low voltage trip (LVt)              |                 |      |      |               |
|         |   |               | 10  | Inverter cooling pin Overheat (OHT) |                 |      |      |               |
|         |   |               | 11  | Command loss                        |                 |      |      | 11-10         |
|         |   |               | 12  | During Run                          |                 |      |      |               |
|         |   |               | 13  | During Stop                         |                 |      |      |               |
|         |   |               | 14  | During constant run                 |                 |      |      |               |
|         |   |               | 15  | During speed searching              |                 |      |      |               |
|         |   |               | 16  | Wait time for run signal input      |                 |      |      |               |
| 17      | Fault output select                                       |               |   |                                     |                 |      |      |               |

●PG Group

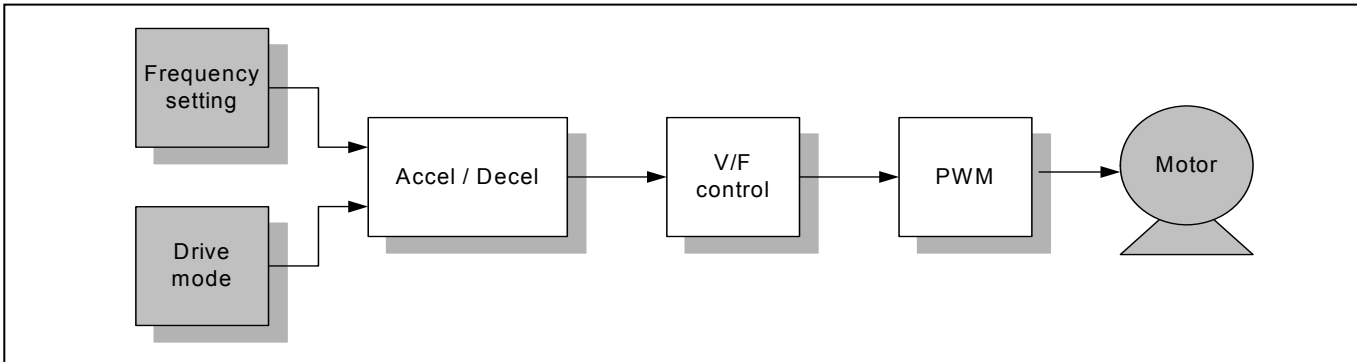
| Display | Name  | Min/Max range   | Description  |   |   |  | Factory defaults | Adj. during run | Page  |
|---------|---|-----------------|--|---|---|--|------------------|-----------------|-------|
| P78     | Fault output select                               | 0 ~ 7 [bit]     | Func.  | Operation when setting the number of auto restart try(P38)        | Operation when the other than low voltage trip occurs | Operation when the low voltage trip occurs | 2                | 0               | 11-10 |
|         |   |                 | Set  | bit 2   | bit 1   | bit 0                                      |                  |                 |       |
|         |   |                 | 0  | -   | -   | -  |                  |                 |       |
|         |   |                 | 1  | -   | -   | ✓  |                  |                 |       |
|         |   |                 | 2  | -   | ✓   | -  |                  |                 |       |
|         |   |                 | 3  | -   | ✓   | ✓  |                  |                 |       |
|         |   |                 | 4  | ✓   | -   | -  |                  |                 |       |
|         |   |                 | 5  | ✓   | -   | ✓  |                  |                 |       |
|         |   |                 | 6  | ✓   | ✓   | -  |                  |                 |       |
|         |   |                 | 7  | ✓   | ✓   | ✓  |                  |                 |       |
| P79     | Inverter number                                   | 1 ~ 250         | Set for RS-485 communication   |   |   |  | 1                | 0               | 14-3  |
| P80     | Baud rate   | 0 ~ 2           | Select the Baud rate of the RS-485.  |   |   |  | 2                | 0               | 14-3  |
|         |   |                 | 0  | 2400 [bps]  |   |  |                  |                 |       |
|         |   |                 | 1  | 4800 [bps]  |   |  |                  |                 |       |
|         |   |                 | 2  | 9600 [bps]  |   |  |                  |                 |       |
| P81     | Drive mode select after loss of frequency command | 0 ~ 2           | It is used when freq command is given via Analog signal(volume/AI) or RS-485.  |   |   |  | 0                | 0               | 12-4  |
|         |   |                 | 0  | Continuous operation at the frequency before its command is lost. |   |  |                  |                 |       |
|         |   |                 | 1  | Free Run stop (Output cut-off)                                    |   |  |                  |                 |       |
|         |   |                 | 2  | Decel to stop   |   |  |                  |                 |       |
| P82     | Wait time after loss of frequency command         | 0.1 ~ 120 [sec] | Time inverter determines whether there is the input frequency command or not. If there is no frequency command input during this time, inverter starts operation via the mode selected at P81. |   |   |  | 1.0              | 0               |       |
| P83     | Communication time setting                        | 2 ~ 100 [ms]    | When RS-485 communication, waiting time from TX to the next TX.  |   |   |  | 5                | 0               |       |

●PG Group

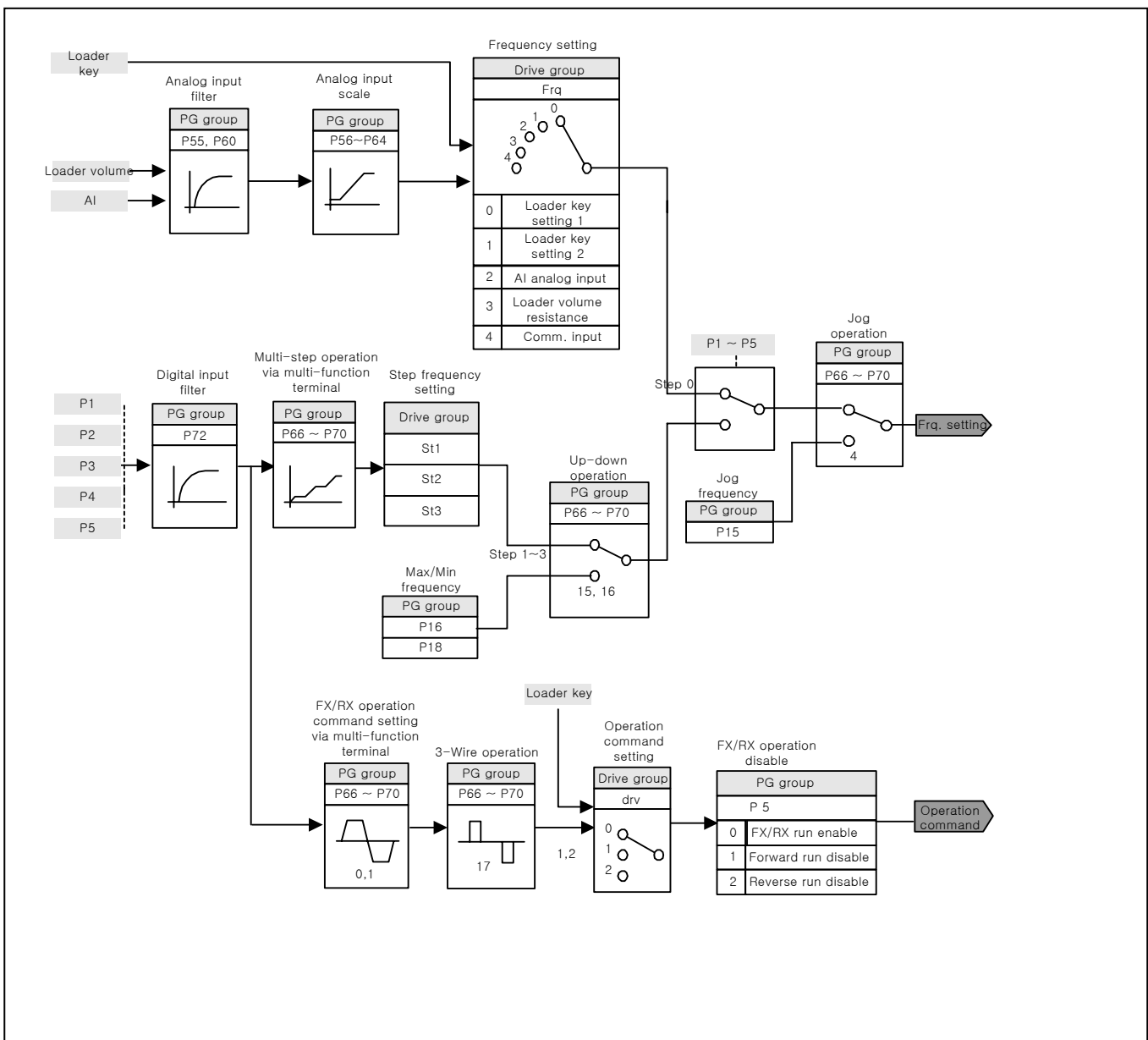
| Display | Name                         | Min/Max range | Description   | Factory defaults         | Adj. during run | Page |            |
|---------|------------------------------|---------------|---|--------------------------|-----------------|------|------------|
| P84     | Parity/stop bit setting      | 0 ~ 3         | Sets communication parity and stop bit.   |                          | 0               | O    |            |
|         |                              |               |   | Parity bit               |                 |      | Stop bit   |
|         |                              |               | 0   | -                        |                 |      | 1 Stop Bit |
|         |                              |               | 1   | -                        |                 |      | 2 Stop Bit |
|         |                              |               | 2   | Odd Parity               |                 |      | 1 Stop Bit |
|         |                              |               | 3   | Even Parity              |                 |      | 1 Stop Bit |
| P85     | Parameter initialization     | 0 ~ 3         | Initialize the parameters set by a user to factory defaults                       |                          | 0               | X    |            |
|         |                              |               | 0   | -                        |                 |      |            |
|         |                              |               | 1   | Initialize both groups   |                 |      |            |
|         |                              |               | 2   | Initialize Drive Group   |                 |      |            |
|         |                              |               | 3   | Initialize PG Group      |                 |      |            |
| P86     | Password registration        | 0 ~ FFFF      | Enter password to prohibit parameter change. Set it as hexadecimal number         |                          | 0               | O    | 10-14      |
| P87     | parameter change prohibition | 0 ~ FFFF      | Prohibit or cancel parameter change prohibition by using the password set in P86. |                          | 0               | O    |            |
|         |                              |               | UL(Unlock)  | Enable parameter change  |                 |      |            |
|         |                              |               | L(Lock)   | Disable parameter change |                 |      |            |
| P88     | Software version             | -             | Display inverter software version. Refer to manual version.                       |                          | -               | X    |            |

## 8. Control Block Diagram

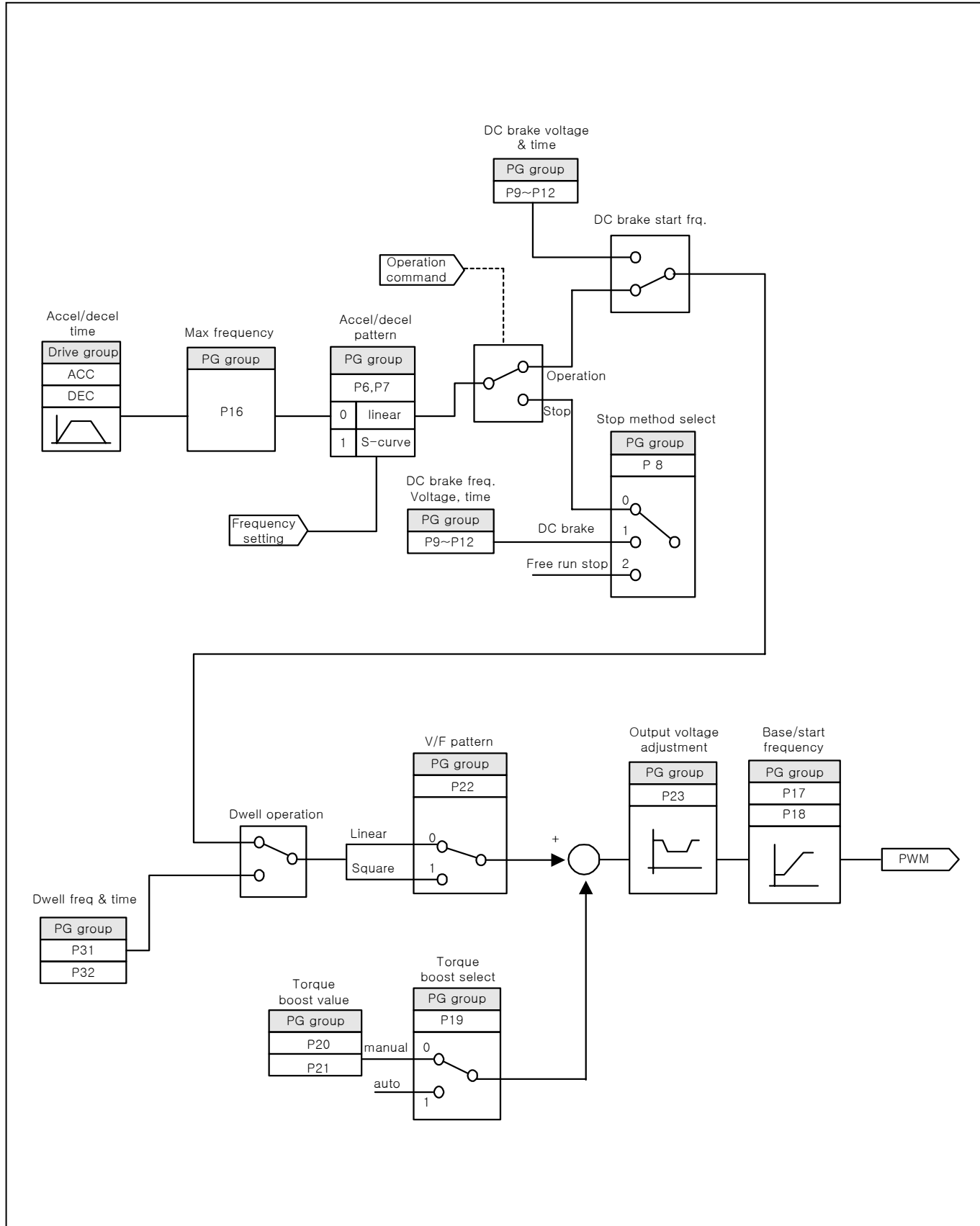
### 8.1 Control Flow



### 8.2 Frequency Setting & Drive Mode Setting



8.3 Frequency Setting, Drive Acc./Dec. Setting and V/F Voltage Control



## 9. Basic Functions

### 9.1 Frequency Setting

● Loader Digital Frequency Setting1

| Group       | Code | Parameter Name    | Setting | Range   | Initial | Unit |
|-------------|------|-------------------|---------|---------|---------|------|
| Drive Group | 0.00 | Frequency command | -       | 0 ~ 200 | 0.0     | Hz   |
|             | Frq  | Frequency mode    | 0       | 0 ~ 4   | 0       |      |

- Set Frq – [Frequency mode] to 0.
- Set the desired frequency in 0.00 and press FUNC key to enter the value into memory.
- The value is settable less than the max. frequency(P16).

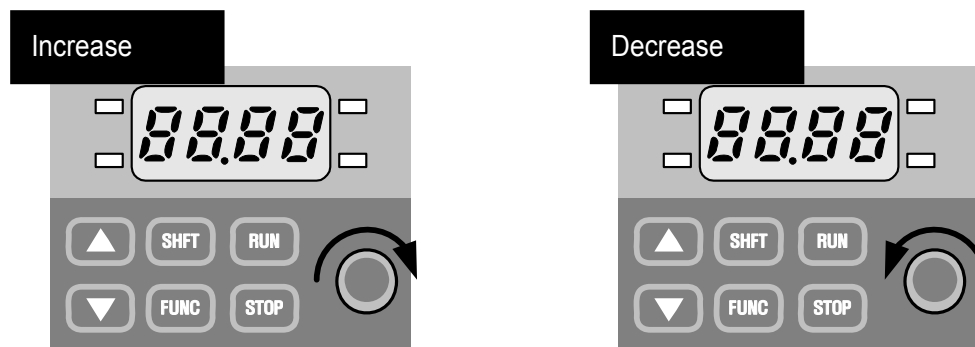
● Loader Digital Frequency Setting2

| Group       | Code | Parameter Name    | Setting | Range   | Initial | Unit |
|-------------|------|-------------------|---------|---------|---------|------|
| Drive Group | 0.00 | Frequency command | -       | 0 ~ 200 | 0.0     | Hz   |
|             | Frq  | Frequency mode    | 1       | 0 ~ 4   | 0       |      |

- Set Frq – [Frequency mode] to 1.
- In 0.00, frequency is changed upon pressing the Up (▲)/Down (▼) key. In this case, UP/Down keys serve as volume resistance.
- The value is settable less than the max. frequency(P16).

● Using Loader's volume resistance(run in case of Frq: 3)

- ▶ SV-iE5 series basically offer volume resistance on the inverter's loader for frequency command. Through this volume resistance, it supplies 0~5 V and enables frequency setting. At the moment, voltage input is indicated as input value.
- ▶ Loader volume is getting larger as it rotates clockwise.



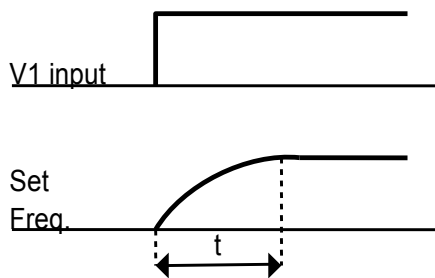


● Frequency setting with the loader's volume resistance(V0)

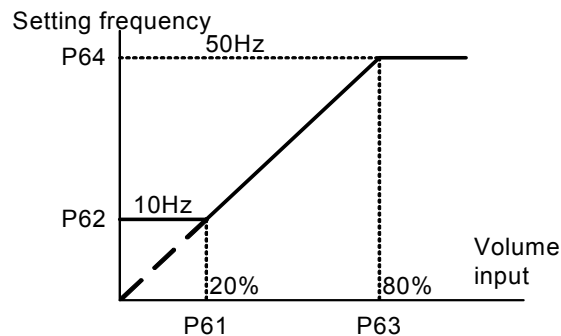
| Group       | Code | Parameter Name                    | Setting | Range    | Initial | Unit |
|-------------|------|-----------------------------------|---------|----------|---------|------|
| Drive Group | 0.0  | Frequency Command                 | -       | -        | -       | Hz   |
|             | Frq  | Frequency setting mode            | 3       | 0 ~ 4    | 0       |      |
| PG Group    | P60  | Filter time constant for V0 input | 10      | 0 ~ 9999 | 10      |      |
|             | P61  | V0 input Min voltage              | -       | 0 ~ 100  | 0       | %    |
|             | P62  | Frequency corresponding to P61    | -       | 0 ~ 200  | 0.00    | Hz   |
|             | P63  | V0 input max voltage              | -       | 0 ~ 100  | 100     | %    |
|             | P64  | Frequency corresponding to P63    | -       | 0 ~ 200  | 60.00   | Hz   |

- Select 3 in Frq code of Drive group
- It is possible to monitor frequency setting in Command Frequency Code(0.0) of Drive Group.

- ▶ P60(Filter time constant for V0 input): Effective for eliminating noise in the frequency setting circuit. Increase the filter time constant if steady operation cannot be performed due to noise. A larger setting results in slower response (t gets longer).



- ▶ P61 ~ P64: Setting input range and corresponding frequency to -10V ~ 0V V1 input voltage.
- ▶ When minimum input voltage is 20% with corresponding frequency 10Hz and Max voltage is 80% with run freq. 50Hz, set as follow.



● Frequency setting using AI(analogue input) terminal

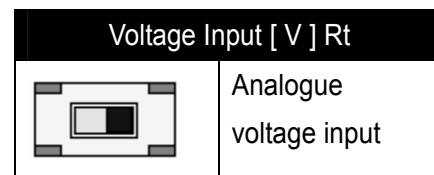
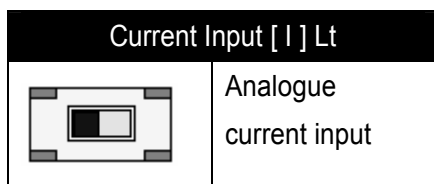
| Group       | Code | Parameter Name                    | Setting | Range    | Initial | Unit |
|-------------|------|-----------------------------------|---------|----------|---------|------|
| Drive Group | 0.0  | Frequency Command                 | -       | -        | -       | Hz   |
|             | Frq  | Frequency setting mode            | 2       | 0 ~ 4    | 0       |      |
| PG Group    | P55  | Input filter time constant for AI | 10      | 0 ~ 9999 | 10      |      |
|             | P56  | Min. input for AI(V/I)            | -       | 0 ~ 100  | 0       | %    |
|             | P57  | Frequency corresponding to P56    | -       | 0 ~ 200  | 0.00    | Hz   |
|             | P58  | Max. input for AI (V/I)           | -       | 0 ~ 100  | 100     | %    |
|             | P59  | Frequency corresponding to P58    | -       | 0 ~ 200  | 60.00   | Hz   |

- Select 2 in Frq code of Drive group.
  - It is possible to use by inputting 0 ~ 10V in an external control or connecting variable resistance to VR,AI,CM terminals of the inverter.
- ▶ Inverter terminal may be wired as follows and see page 9-2 for the functions of P55 through P59.
- ▶ Depending on AI selection switch beside the inverter's control terminal as V, I, it is possible to select one of voltage input and current input.

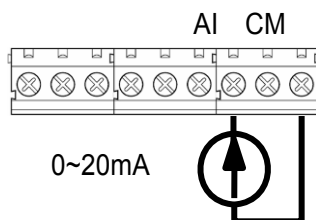
**Caution**

For AI selection, set it accurately according to the current input and voltage input. Incorrect setting may cause the inverter troubled.

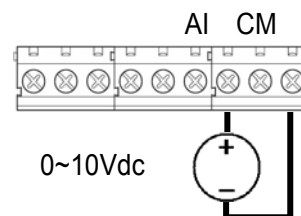
In the below, switch direction is colored in black.



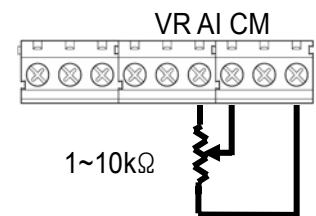
1) Using CI



2) Using Ex. voltage



3) Using V.R

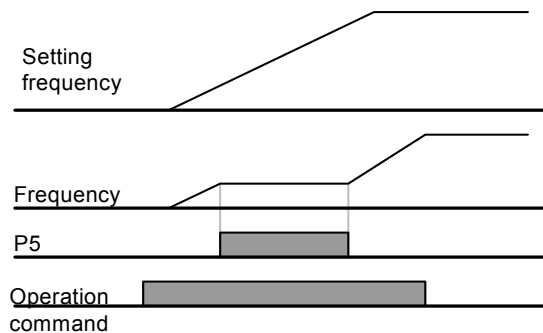


● Analogue frequency command fixed

| Group       | Code | Parameter Name                          | Setting | Range  | Initial | Unit |
|-------------|------|---|---------|--------|---------|------|
| Drive Group | Frq  | Frequency setting mode                  | 2 ~ 3   | 0 ~ 4  | 0       |      |
| PG Group    | P66  | Multi-function input terminal P1 select | -       | 0 ~ 24 | 0       |      |
|             | ~    | ~                                       |         |        |         |      |
|             | P70  | Multi-function input terminal P5 select | 22      |        | 4       |      |

- If Frq code of Drive Group is 2~3, it works.
- Select a terminal to use as analogue frequency command fixed signal among multi-function input terminals(P1 ~ P5).

▶ It works as shown in the below figure if using P5 terminal.

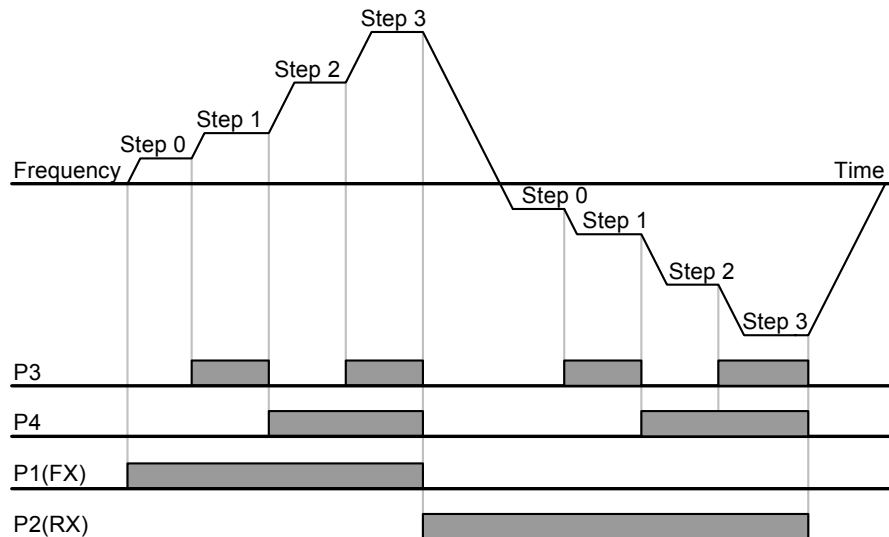


9.2 Multi-Step Frequency Setting

| Group       | Code | Parameter Name                          | Setting | Range   | Initial | Unit |
|-------------|------|---|---------|---------|---------|------|
| Drive Group | 0.0  | Frequency command                       | 5.0     | 0 ~ 200 | 0.0     | Hz   |
|             | Frq  | Frequency setting mode                  | 0       | 0 ~ 4   | 0       | -    |
|             | St1  | Multi-step freq.1                       | -       | 0 ~ 200 | 10.0    | Hz   |
|             | St2  | Multi-step freq.2                       | -       |         | 20.0    |      |
|             | St3  | Multi-step freq.3                       | -       |         | 30.0    |      |
| PG Group    | P68  | Multi-function input terminal P3 define | 5       | 0 ~ 24  | 2       | -    |
|             | P69  | Multi-function input terminal P4 define | 6       |         | 3       | -    |

- Select a terminal to give Multi-step frequency command among P1-P5 terminals.
- If terminals P3-P4 are selected, set P68-79 to 5 - 6 to give Multi-step frequency command.
- Multi-step frequency 0 is settable in [Frequency mode] and [Frequency command(0.0)].
- Multi-step frequency 1-3 are set at St1-St3 in Drive group.

- ▶ If running by using multi-step high/low, it is possible to run from 0 to 3 step in 4 combinations as the below figure.



| Speed | FX/<br>RX | P4 | P3 |
|-------|-----------|----|----|
| 0     | ✓         | -  | -  |
| 1     | ✓         | -  | ✓  |
| 2     | ✓         | ✓  | -  |
| 3     | ✓         | ✓  | ✓  |

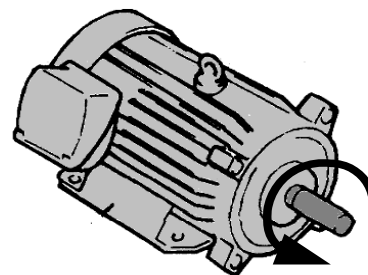
### 9.3 Operating command setting method

- Operation by RUN key and STOP/RST key of the loader

| Group       | Code | Parameter Name                  | Setting | Range | Initial | Unit |
|-------------|------|---------------------------------|---------|-------|---------|------|
| Drive Group | drv  | Drive mode                      | 0       | 0 ~ 3 | 1       |      |
|             | drC  | Motor rotation direction select | -       | F, r  | F       |      |

- Set drive code of Drive Group to 0.
- Acceleration is started upon pressing the Run key while operating frequency is set. Motor decelerates to stop by pressing the STOP/RST key.
- Selecting rotation direction is available at drC - [Direction of motor rotation select] when operating command is set to 0.

| drC | Direction of motor rotation select. | F | Forward |
|-----|-------------------------------------|---|---------|
|     |                                     | r | Reverse |

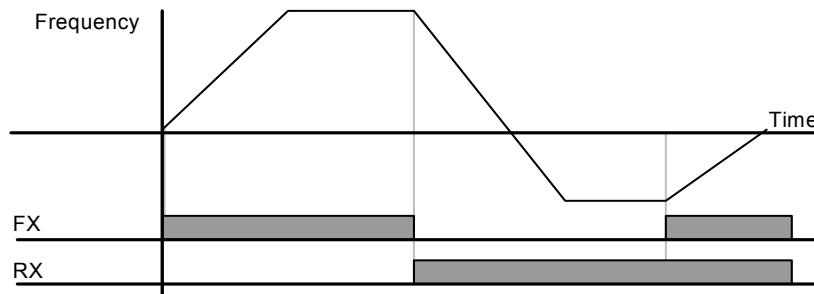


FX : counter clockwise

● Operating command via FX, RX terminal

| Group       | Code | Parameter Name                          | Setting | Range  | Initial | Unit |
|-------------|------|---|---------|--------|---------|------|
| Drive Group | drv  | Drive mode                              | 1       | 0 ~ 3  | 1       |      |
| PG Group    | P66  | Multi-function input terminal P1 define | 0       | 0 ~ 24 | 0       |      |
|             | P67  | Multi-function input terminal P2 define | 1       | 0 ~ 24 | 1       |      |

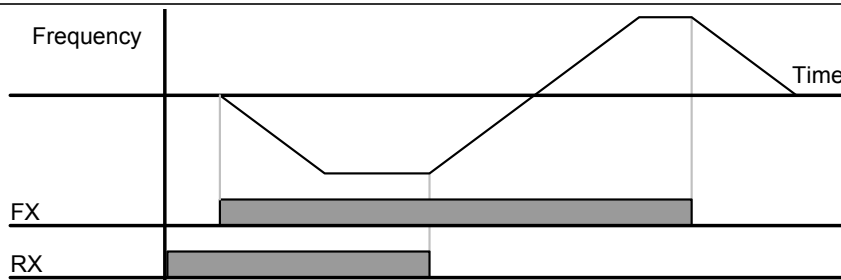
- Set drv code of Drive Group to 1.
- Set P66 and P67 to 0 and 1 to use P1 and P2 as FX and RX terminals.
- FX is forward run command and RX is reverse run command.
  - ▶ Motor is stopped when FX/RX terminal is ON/OFF at the same time.



● Operating command via FX, RX terminal 2

| Group       | Code | Parameter Name                          | Setting | Range  | Initial | Unit |
|-------------|------|---|---------|--------|---------|------|
| Drive Group | drv  | Drive mode                              | 2       | 0 ~ 3  | 1       |      |
| PG Group    | P66  | Multi-function input terminal P1 define | 0       | 0 ~ 24 | 0       |      |
|             | P67  | Multi-function input terminal P2 define | 1       | 0 ~ 24 | 1       |      |

- Set drv code of Drive Group to 2.
- Set P66 and P67 to 0 and 1 to use P1 and P2 as FX and RX terminals.
- FX: Operating command setting. Motor runs in forward direction when RX terminal is OFF.
- RX: Direction of motor rotation select. Motor runs in reverse direction when RX terminal is ON.



●FX/RX Run Disable

| Group       | Code | Parameter Name                     | Setting | Range | Initial | Unit |
|-------------|------|------------------------------------|---------|-------|---------|------|
| Drive Group | drC  | Direction of motor rotation select | -       | F, r  | F       |      |
| PG Group    | P 5  | Forward/Reverse run disable        | -       | 0 ~ 2 | 0       |      |

- Select the direction of motor rotation.
- 0: Forward and Reverse run enable
- 1: Forward run disable
- 2: Reverse run disable

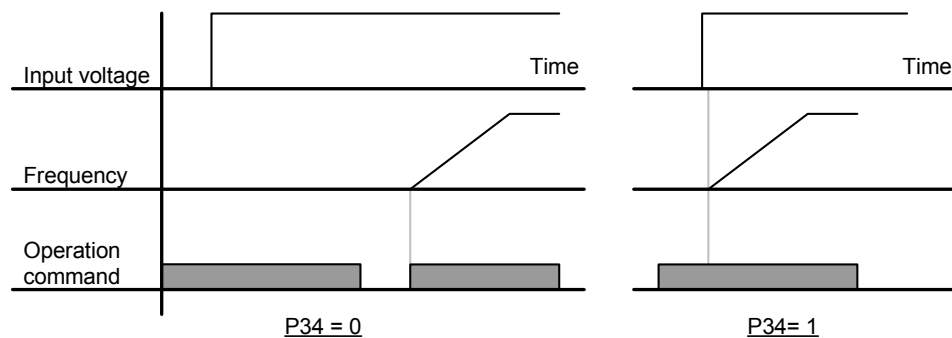
●Power On Start select

| Group       | Code | Parameter Name        | Setting | Range | Initial | Unit |
|-------------|------|-----------------------|---------|-------|---------|------|
| Drive Group | drv  | Drive mode            | 1, 2    | 0 ~ 3 | 1       |      |
| PG Group    | P34  | Power on start select | 1       | 0 ~ 1 | 0       |      |

- Set P34 to 1
- When AC input power is applied to the inverter with drv set to ON, motor starts acceleration.
- It is inactive when it is operated by RUN key.

**! Caution**

Particular attention must be directed to this function due to potential hazard as motor starts to run suddenly upon applying AC input power.



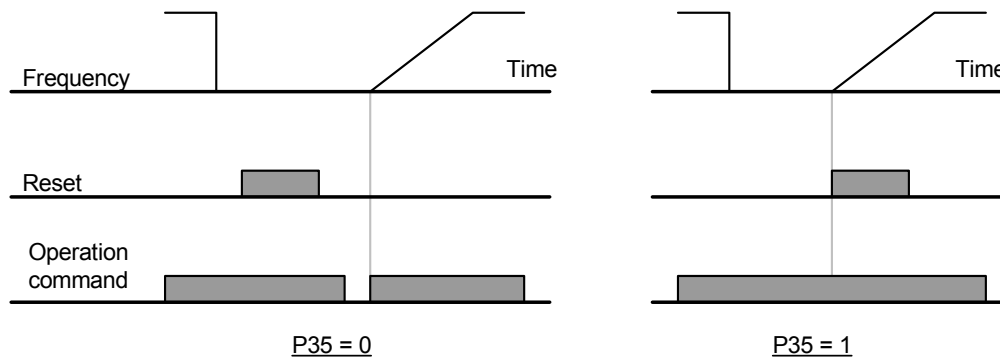
● Restart after fault reset

| Group       | Code | Parameter Name                      | Setting | Range | Initial | Unit |
|-------------|------|-------------------------------------|---------|-------|---------|------|
| Drive Group | drv  | Drive mode                          | 1, 2    | 0 ~ 3 | 1       |      |
| PG Group    | P35  | Restart after fault reset selection | 1       | 0 ~ 1 | 0       |      |

- Set P35 code to 1
- When AC input power is applied to the inverter with drv set to ON, motor starts acceleration.
- It is inactive when it is operated by RUN key

**Caution**

Particular attention must be directed to this function due to potential hazard as motor starts to run suddenly after the fault is cleared.



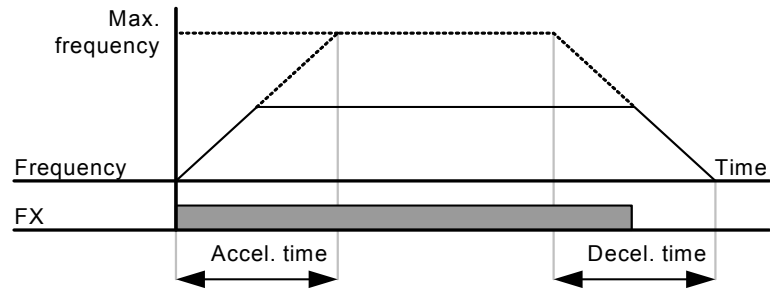
9.4 Accel/Decel time and pattern setting

● Accel/Decel time setting based on Max frequency

| Group       | Code | Parameter Name | Setting | Range    | Initial | Unit |
|-------------|------|----------------|---------|----------|---------|------|
| Drive Group | ACC  | Accel time     | -       | 0 ~ 6000 | 5.0     | Sec  |
|             | dEC  | Decel time     | -       | 0 ~ 6000 | 10.0    | Sec  |
| PG Group    | P16  | Max. freq.     | -       | 0 ~ 200  | 60.0    | Hz   |

- Set the desired Accel/Decel time at ACC/dEC code in Drive group.
- Accel/decel time means the time accelerating/decelerating from starting frequency up to max. frequency and it forms a pattern of accel/decel time with the max. frequency. Therefore, the slope of same accel/decel pattern within a constant max. frequency is uniform regardless of target frequency.

- ▶ Accel/Decel time is set based on max. frequency and 0Hz. For instance, if it is set max. frequency to 60Hz, Accel/Decel time to 5 sec, and run frequency to 30Hz, time to reach 30Hz would be 2.5 sec.



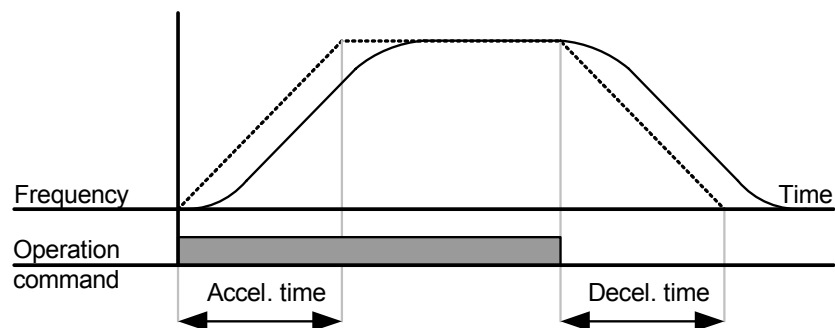
● Accel/Decel pattern setting

| Group    | Code | Parameter Name | Setting | Range               | Initial |
|----------|------|----------------|---------|---------------------|---------|
| PG Group | P 6  | Accel pattern  | 0       | Linear pattern run  | 0       |
|          | P 7  | Decel pattern  | 1       | S-shape pattern run |         |

- Accel/decel patterns may be set in P6 and P7 codes of PG Group, respectively.
- Linear pattern operation: Output frequency linearly increases or decreases at uniform incremental
- S-shape pattern run: Used for applications needing smoothing acceleration/deceleration such as conveyor or elevator door.

**Note**

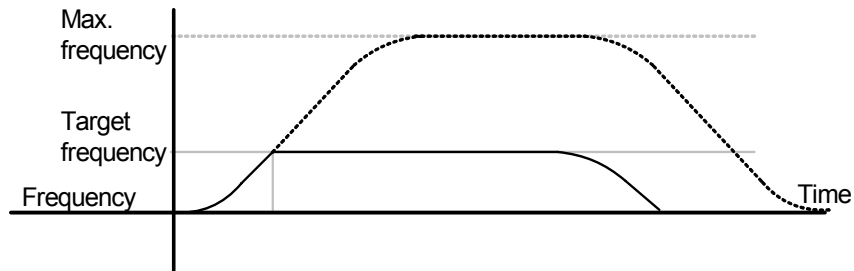
In case of S-shape pattern runs, the accel/decel time is longer than that set by a user. Use linear pattern run in case of application needing accurate accel/decel time.





**Note**

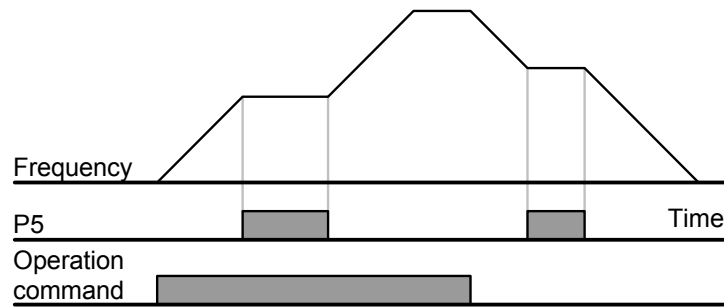
If the target frequency is less than 40% of the max. frequency as below figure, it may not realize a complete s-shape pattern run with the ending partially cut.



● Accel/Decel Disable

| Group    | Code | Parameter Name                          | Setting | Range  | Initial | Unit |
|----------|------|---|---------|--------|---------|------|
| PG Group | P66  | Multi-function input terminal P1 define | -       | 0 ~ 24 | 0       |      |
|          | ~    | ~                                       |         |        |         |      |
|          | P70  | Multi-function input terminal P5 define | 23      |        | 4       |      |

- Select one terminal among Multi-function input terminals P1-P5 to define Accel/Decel disable.
- If P5 is selected, set P70 to 23 to activate this function.



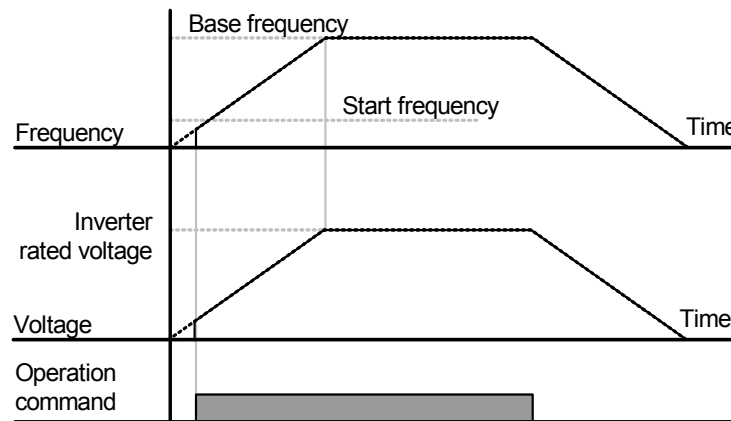
9.5 V/F Control

● Linear V/F pattern operation

| Group    | Code | Parameter Name  | Setting | Range    | Initial | Unit |
|----------|------|-----------------|---------|----------|---------|------|
| PG Group | P17  | Base frequency  | -       | 30 ~ 200 | 60.0    | Hz   |
|          | P18  | Start frequency | -       | 0.1 ~ 10 | 0.5     | Hz   |
|          | P22  | V/F pattern     | 0       | 0 ~ 1    | 0       |      |

- Set P22 code to 0(linear)
- This pattern maintains a linear volts/frequency ratio by voltage/frequency(V/F).

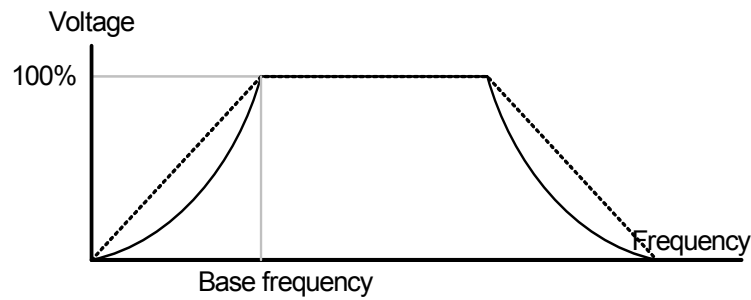
- ▶ Base frequency: Inverter outputs its rated voltage at this level. Enter the motor nameplate frequency.
- ▶ Start frequency: Inverter starts to output its voltage at this level.



● Square V/F pattern

| Group    | Code | Parameter Name | Setting | Range | Initial | Unit |
|----------|------|----------------|---------|-------|---------|------|
| PG Group | P22  | V/F pattern    | 1       | 0 ~ 1 | 0       |      |

- Set P22 code to 1
- This pattern maintains squared volts. Appropriate applications are fans, pumps, etc

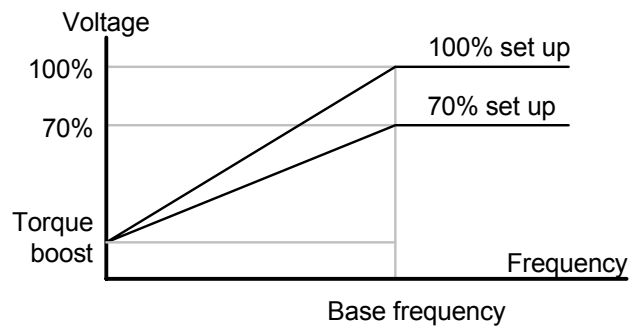


- ▶ In the Squared V/F pattern, to secure operation torque, it is practically realized with approximate value to 1.4 squared.

● Output voltage adjustment

| Group    | Code | Parameter Name            | Setting | Range    | Initial | Unit |
|----------|------|---------------------------|---------|----------|---------|------|
| PG Group | P23  | Output voltage adjustment | -       | 40 ~ 110 | 100     | %    |

- This function is used to adjust the output voltage of the inverter. This is useful when you use a motor that has a rated voltage lower than the input voltage



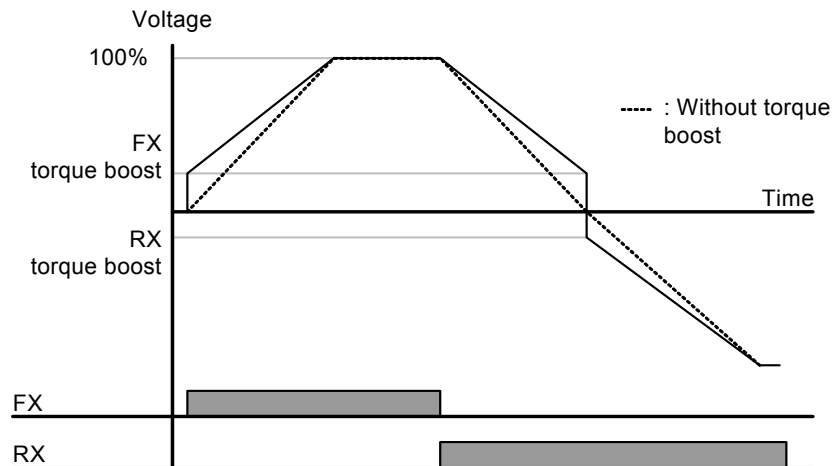
● Manual torque boost

| Group    | Code | Parameter Name                    | Setting | Range  | Initial | Unit |
|----------|------|-----------------------------------|---------|--------|---------|------|
| PG Group | P19  | Torque boost select               | 0       | 0 ~ 1  | 0       |      |
|          | P20  | Torque boost in forward direction | -       | 0 ~ 15 | 5       | %    |
|          | P21  | Torque boost in reverse direction |         |        |         |      |

- Set P19 code of PG Group to 0(manual torque boost).
- The values of Torque boost in forward/reverse direction are set separately in P20 and P21.

**Caution**

If the boost value is set much higher than required, it may cause motor overheating due to over-energizing.



● Auto torque boost

| Group    | Code | Parameter Name        | Setting | Range      | Initial | Unit |
|----------|------|-----------------------|---------|------------|---------|------|
| PG Group | P19  | Torque boost select   | 1       | 0 ~ 1      | 0       |      |
| PG Group | P44  | No load motor current | -       | 0.1 ~ 25.5 | -       | A    |

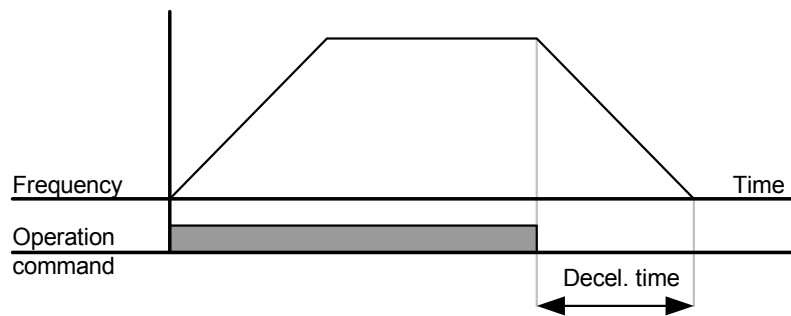
- Set P19 code of PG Group to 1(auto torque boost).
- Inverter automatically calculates torque boost value using motor parameters and outputs the corresponding voltage.

9.6 Stop method select

● Decel to stop

| Group    | Code | Parameter Name   | Setting | Range | Initial | Unit |
|----------|------|------------------|---------|-------|---------|------|
| PG Group | P 8  | Stop mode select | 0       | 0 ~ 2 | 0       |      |

- Set P8 code of PG Group to 0.
- Motor decelerates to 0 Hz and stops during the setting time.



● DC braking to stop

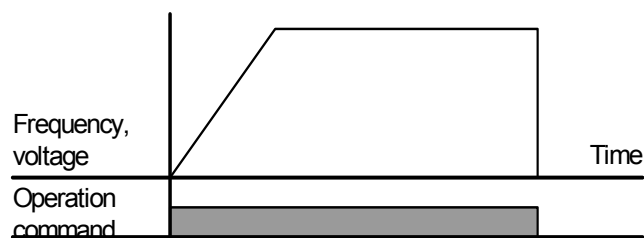
| Group    | Code | Parameter Name   | Setting | Range | Initial | Unit |
|----------|------|------------------|---------|-------|---------|------|
| PG Group | P 8  | Stop mode select | 1       | 0 ~ 2 | 0       |      |

- Select 1(DC brake to stop) in P8 code of PG Group.
- Refer to page 10-1.

● Free run stop

| Group    | Code | Parameter Name   | Setting | Range | Initial | Unit |
|----------|------|------------------|---------|-------|---------|------|
| PG Group | P 8  | Stop mode select | 2       | 0 ~ 2 | 0       |      |

- Select 2(Free run stop) in P8 code of PG Group.
- When operating command is turned OFF, Output Frequency and voltage are shut down.

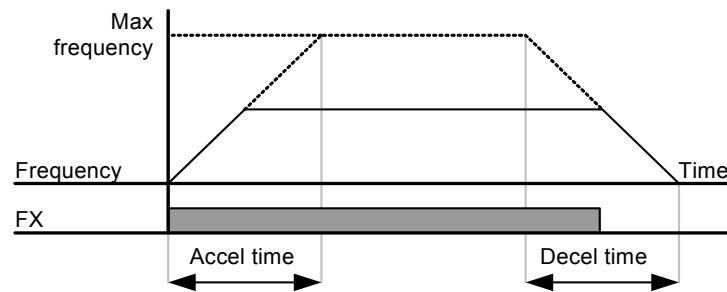


9.7 Frequency limit

● Frequency limit using Max Frequency and Start Frequency

| Group    | Code | Parameter Name  | Setting | Range    | Initial | Unit |
|----------|------|-----------------|---------|----------|---------|------|
| PG Group | P16  | Max frequency   | -       | 0 ~ 200  | 60.0    | Hz   |
|          | P18  | Start frequency | -       | 0.1 ~ 10 | 0.5     | Hz   |

- Max Frequency: Every frequency except P17(base frequency) has upper limit of frequency parameter. Therefore, any frequency cannot be set above the max. frequency.
- Start Frequency: Every frequency has lower limit of frequency parameter.. If a frequency is set lower than this, 0.00 is automatically set.
- Max frequency is the reference frequency serving as the criteria of accel/decel time as well as upper limit. Once max. frequency is changed, accel/decel slope may be changed accordingly.



**M E M O**

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## 10. Advanced Functions

### 10.1 DC Brake

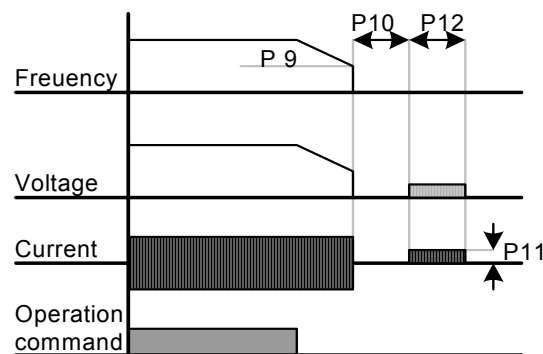
- Stopping motor by DC brake

| Group    | Code | Parameter Name           | Setting | Range   | Initial | Unit |
|----------|------|--------------------------|---------|---------|---------|------|
| PG Group | P 8  | Stop mode select         | 1       | 0 ~ 2   | 0       |      |
|          | P 9  | DC brake start frequency | -       | 0 ~ 60  | 5.0     | Hz   |
|          | P10  | DC brake wait time       | -       | 0 ~ 60  | 0.1     | sec  |
|          | P11  | DC brake voltage         | -       | 0 ~ 200 | 50      | %    |
|          | P12  | DC brake time            | -       | 0 ~ 60  | 1.0     | sec  |

- Select 1 in P8 code(DC brake stopping) of PG Group
- P 9 : The frequency at which the DC brake will become active
- P10 : Inverter output will hold for this time before applying DC brake voltage.
- P11 : Set this value as a percent of Motor rated current.
- P12 : Sets the time for DC brake voltage to be applied to the motor.

### ! Caution

If excessive DC Brake voltage is set or DC Brake time is set too long, it may cause motor overheating and damage to the motor.



- ▶ Setting P11 or P12 to 0 will disable DC brake.
- ▶ DC Brake Wait time: When load inertia is large, DC brake start frequency is high or excessive DC voltage is allowed to motor, over current trip may occur. It can be prevented using P10 before starting DC brake.



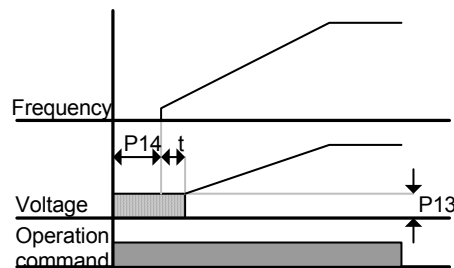
● Starting DC brake

| Group    | Code | Parameter Name         | Setting | Range   | Initial | Unit |
|----------|------|------------------------|---------|---------|---------|------|
| PG Group | P13  | DC brake start voltage | -       | 0 ~ 200 | 50      | %    |
|          | P14  | DC brake start time    | -       | 0 ~ 60  | 0       | sec  |

- P13 : It sets the level as a percent of Motor rated current.
- P14 : Motor accelerates after DC voltage is applied for the set time.

**! Caution**

If excessive DC Brake voltage is set or DC Brake time is set too long, it may cause motor overheating and damage to the motor.



- ▶ Setting P13 or P14 to 0 will disable Starting DC brake.
- ▶ t : After P14, the frequency starts accelerating.

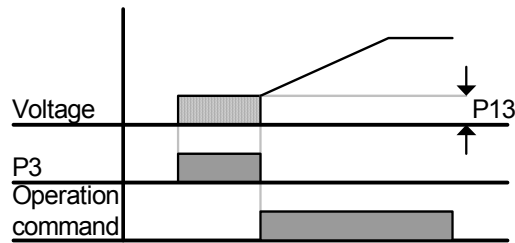
● DC brake at a stop

| Group    | Code | Parameter Name                                   | Setting | Range   | Initial | Unit |
|----------|------|--|---------|---------|---------|------|
| PG Group | P13  | DC brake start voltage                           | -       | 0 ~ 200 | 50      | %    |
| PG Group | P68  | Multi-function input terminal P3 function select | 11      | 0 ~ 24  | 2       |      |

- P13 : It sets the level as a percent of Motor rated current.
- Select a terminal to issue a command of DC brake at a stop among P1 to P5.
- If P3 terminal is set for this function, set P68 to 11(DC brake at a stop).

**! Caution**

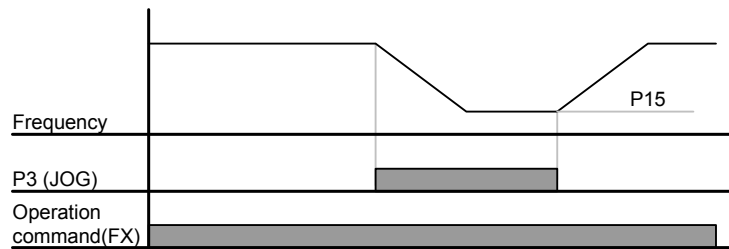
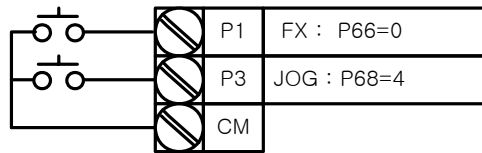
If excessive DC Brake voltage at a stop is set or DC Brake time is set too long, it may cause motor overheating and damage to the motor.



### 10.2 Jog operation

| Group    | Code | Parameter Name                          | Setting | Range   | Initial | Unit |
|----------|------|---|---------|---------|---------|------|
| PG Group | P15  | Jog frequency                           | -       | 0 ~ 200 | 10.0    | Hz   |
| PG Group | P68  | Multi-function input terminal P3 select | 4       | 0 ~ 24  | 2       |      |

- Set a desirable jog frequency in P15 of PG Group.
- Select a terminal from P1 – P5 to use for this setting
- If P3 is set for Jog operation, set P68 to 4(Jog operation).
- Jog frequency can be set within Max frequency(P16) and Start frequency(P18).

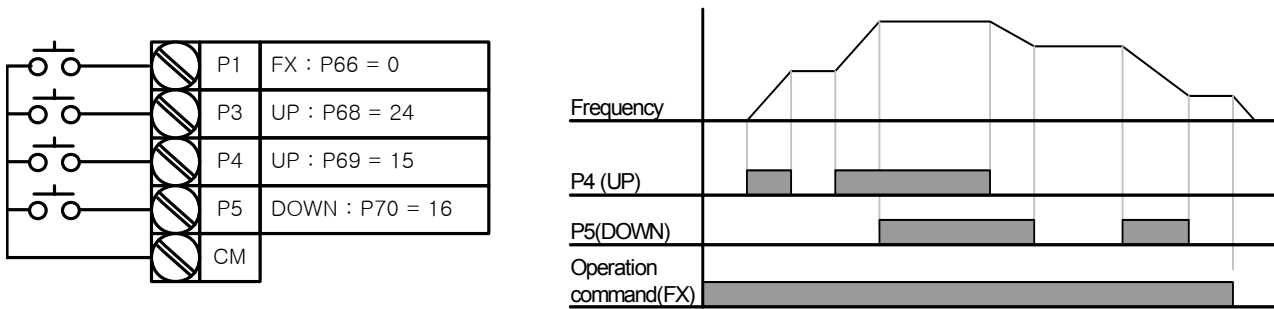


- ▶ Jog operation overrides all other operations except Dwell operation. Therefore, if Jog frequency command is entered in the middle of Multi-Step, Up-Down or 3-wire operation, operation is executed at Jog frequency.
- ▶ The above diagram shows an example when Multi-function input is set to NPN mode.

10.3 UP – DOWN operation

| Group    | Code | Parameter Name                          | Setting | Range  | Initial | Unit |
|----------|------|---|---------|--------|---------|------|
| PG Group | P66  | Multi-function input terminal P1 select | 0       | 0 ~ 24 | 0       |      |
|          | P68  | Multi-function input terminal P3 select | 24      |        | 2       |      |
|          | P69  | Multi-function input terminal P4 select | 15      |        | 3       |      |
|          | P70  | Multi-function input terminal P5 select | 16      |        | 4       |      |

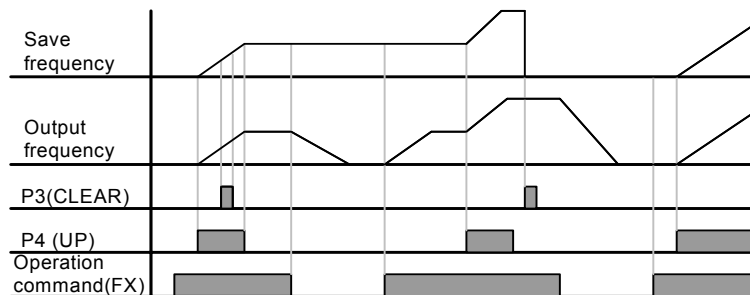
- Select terminals for Up-Down operation from P1-P5.
- If P4 and P5 are selected for Up-Down operation terminals, set P69 and P70 to 15(Frequency Up command) and 16 (Frequency Down command), respectively.



- ▶ Up/down Save function: If P29, 'Save up/down frequency', is set to 1, the frequency before the inverter was stopped or decelerated is saved in P30.

|     |                               |                         |                                 |
|-----|-------------------------------|-------------------------|---------------------------------|
| P29 | Save up/down frequency select | 0                       | Remove 'save up/down frequency' |
|     |                               | 1                       | Set 'save up/down frequency'    |
| P30 | Save up/down frequency        | Up/down frequency saved |                                 |

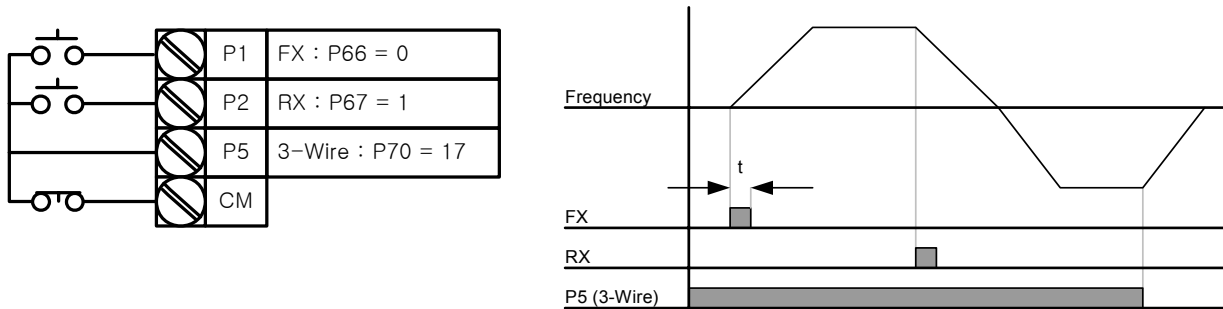
- ▶ The Up/down frequency can be initialized by setting of the multi-function input terminal as 'Up/Down Save Frequency Initialization'.
- ▶ If 'Up/Down Save Frequency Initialization' signal is input while the multi-function input 'Up' or 'Down' function is applied, this signal is ignored.



10.4 3-Wire operation

| Group    | Code | Parameter Name                           | Setting | Range  | Initial | Unit |
|----------|------|--|---------|--------|---------|------|
| PG Group | P66  | Multi-function Input terminal P1 select] | 0       | 0 ~ 24 | 0       |      |
|          | ~    | ~  |         |        |         |      |
|          | P70  | Multi-function Input terminal P5 select  | 17      |        | 4       |      |

- Select a terminal from P1-P5 for use as 3-Wire operation.
- If P5 is selected, set P70 to 17(3-Wire operation).



- ▶ Input signal is latched (saved) in 3-Wire operation. Therefore, inverter can be operated by Push-button switch.
- ▶ The bandwidth of pulse (t) should not be less than 50msec.

10.5 Dwell operation

| Group    | Code | Parameter Name  | Setting | Range   | Initial | Unit |
|----------|------|-----------------|---------|---------|---------|------|
| PG Group | P31  | Dwell frequency | -       | 0 ~ 200 | 5.0     | Hz   |
|          | P32  | Dwell time      | -       | 0 ~ 10  | 0.0     | sec  |

- In this setting, a motor begins to accelerate after dwell operation is executed for dwell time at the specified dwell frequency.
- It is mainly used to release mechanical brake in elevators after operating at dwell frequency.

- ▶ Dwell frequency: This function is used to output torque in an intended direction. It is useful in hoisting applications to get enough torque before releasing a mechanical brake. Rated Slip frequency is calculated by the formula shown below.

$$f_s = f_r - \left( \frac{rpm \times P}{120} \right)$$

where,  $f_s$  = rated slip frequency

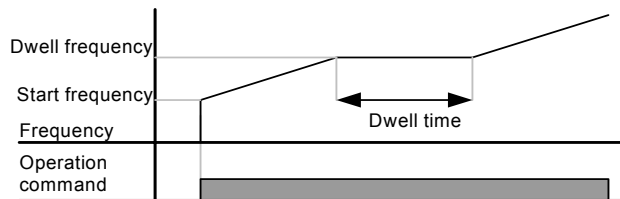
$f_r$  = rated frequency

$rpm$  = motor rated rpm

$P$  = no. of motor poles

i.e.) rated frequency: 60Hz, rated rpm: 1740rpm, No. of poles: 4

$$f_s = 60 - \left( \frac{1740 \times 4}{120} \right) = 2Hz$$



### 10.6 Slip Compensation Control

| Group    | Code | Parameter Name        | Setting | Range      | Initial | Unit |
|----------|------|-----------------------|---------|------------|---------|------|
| PG Group | P40  | Motor type select     | -       | 0.1 ~ 0.4  | -       |      |
|          | P41  | No. of motor poles    | -       | 2 ~ 12     | 4       |      |
|          | P42  | Rated slip frequency  | -       | 0 ~ 10     | -       | Hz   |
|          | P43  | Motor rated current   | -       | 0.0 ~ 25.5 | -       | A    |
|          | P44  | Motor no load current | -       | 0.0 ~ 25.5 | -       | A    |
|          | P46  | Control mode select   | 1       | 0 ~ 2      | 0       |      |

- Set P46 to 1(Slip compensation control).
- This function enables the motor to run in constant speed by compensating inherent slip in an induction motor.

▶ P46: Set the motor type connected to the inverter output side.

|     |                   |     |       |
|-----|-------------------|-----|-------|
| P46 | Motor type select | 0.1 | 0.1kW |
|     |                   | 0.2 | 0.2kW |
|     |                   | 0.4 | 0.4kW |

- ▶ P41 : Enter the pole number on the Motor nameplate.
- ▶ P42 : Enter the slip frequency in accordance with the following formula and motor nameplate.

$$f_s = f_r - \left( \frac{rpm \times P}{120} \right)$$

where,  $f_s$  = rated slip frequency

$f_r$  = rated frequency

$rpm$  = motor rated rpm

$P$  = motor pole number

i.e.) rated freq. : 60Hz, rated rpm: 1740rpm, poles: 4

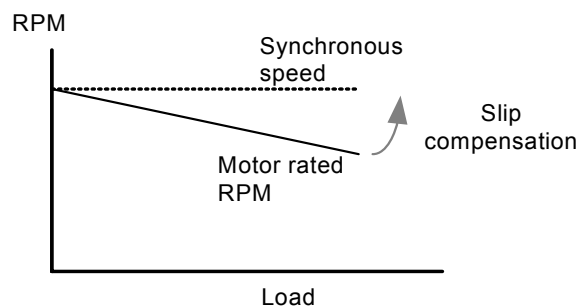
$$f_s = 60 - \left( \frac{1740 \times 4}{120} \right) = 2Hz$$

- ▶ Motor function codes per motor type are summarized as follows. Enter motor parameter if any change is required.

● Factory defaults per motor type

| Motor type [kW] | Rated current [A] | No load current [A] | Rated slip frequency [Hz] |
|-----------------|-------------------|---------------------|---------------------------|
| 0.1             | 0.6               | 0.4                 | 2.0                       |
| 0.2             | 1.1               | 0.7                 | 2.33                      |
| 0.4             | 1.8               | 1.2                 | 3.00                      |

- ▶ P43: Enter the motor nameplate rated current.
- ▶ P44: Enter the measured current when the motor is running at rated frequency after the load is removed. Enter 50% of the rated motor current when it is difficult to measure the motor no load current.
- ▶ Induction motor has a large difference between motor rated rpm and frequency(synchronous speed) depending on load rate. Therefore, it is recommended to use slip compensation control to reduce the difference.
- ▶ Set torque boost within 2% for slip compensation operation. Excessive torque boost may cause a huge error in slip speed because motor may get overexcitation in low speed.



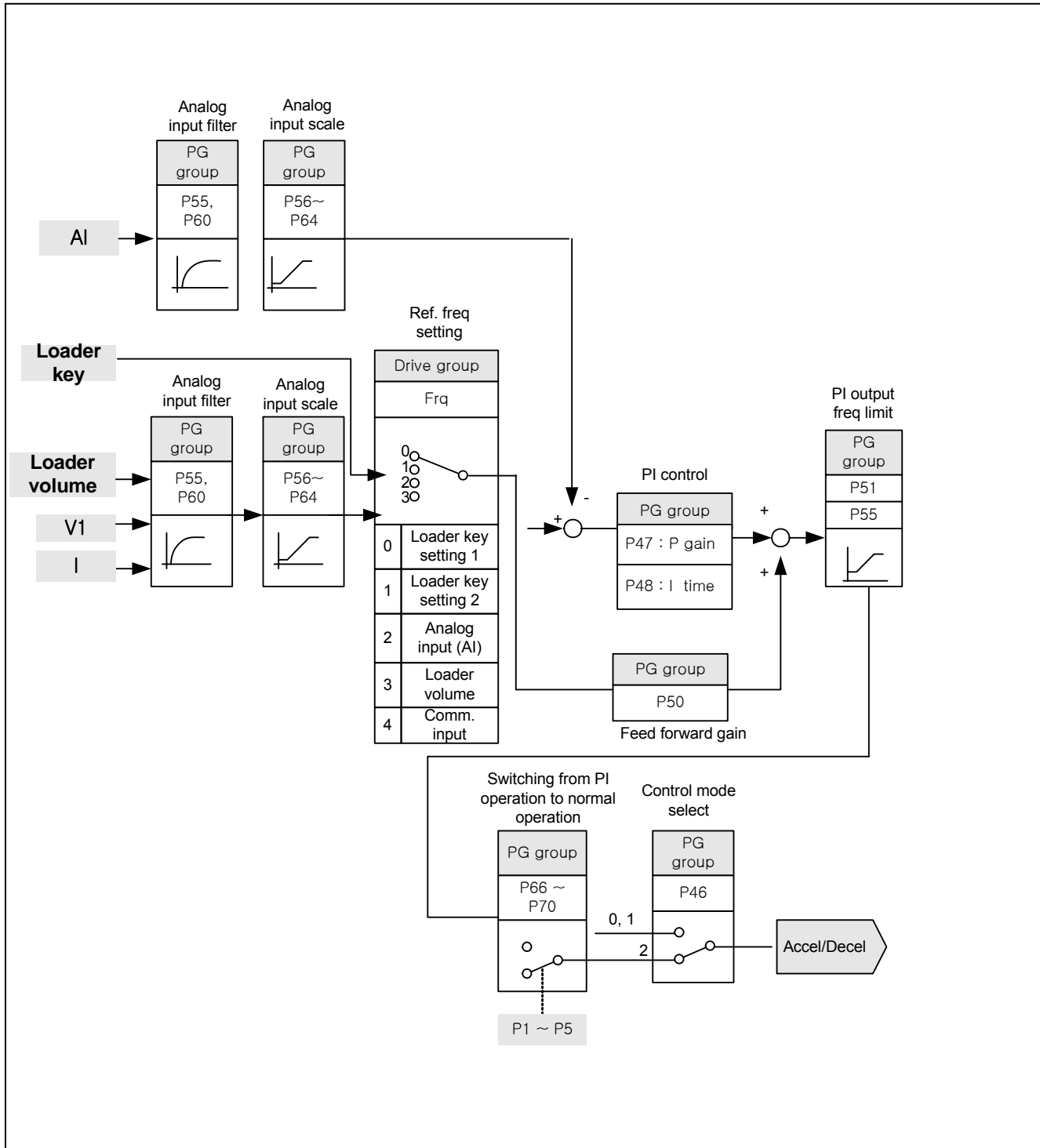
10.7 PI Control

| Group    | Code        | Parameter Name                               | Setting | Range     | Initial | Unit |
|----------|-------------|--|---------|-----------|---------|------|
| PG Group | P46         | Control mode select                          | 2       | 0 ~ 3     | 0       | -    |
|          | P47         | P gain for PI controller                     | -       | 0 ~ 999.9 | 300.0   | %    |
|          | P48         | Differential time for PI controller(I gain)  | -       | 0.1~ 32.0 | 1.0     | sec  |
|          | P50         | Feed forward gain for PI controller          | -       | 0 ~ 999.9 | 0       | %    |
|          | P51         | PI output frequency upper limit              | -       | 0 ~ 200   | 60.0    | Hz   |
|          | P52         | PI output frequency lower limit              | -       | 0 ~ 200   | 0.5     | Hz   |
|          | P66~<br>P70 | Multi-function input terminal P1 ~ P5 define | 20      | 0 ~ 24    | -       | -    |

- Set P46 to 2(PI control).
- Output frequency of the inverter is controlled by PI control for use as constant control of flow, pressure or temperature.

- ▶ P47: Set the percentage of output to error. If P Gain is set to 50%, 50% of the error value will be output. Higher value can reach the target control value faster but it may cause oscillation.
- ▶ P48: Set the time to output the accumulated error value. Set the time required to output 100% when the error value is 100%. If differential time is set to 1 second and error is 100%, it outputs 100% in 1 second. If the value is reduced, response will be faster but setting too low may lead to controller oscillation.
- ▶ P50: Set the gain to add the target value to the PI controller output.
- ▶ P51, P52: It limits the output of the PI controller.
- ▶ P66 ~ P70: To exchange PI to normal operation, set one of P1~P5 terminal to 20 and turn ON.

● PI Control block diagram





10.8 Speed search operation

| Group    | Code | Parameter Name             | Setting | Range    | Initial | Unit |
|----------|------|----------------------------|---------|----------|---------|------|
| PG Group | P36  | Speed search select        | -       | 0 ~ 15   | 0       |      |
|          | P37  | Speed search current level | -       | 80 ~ 200 | 100     | %    |
|          | P77  | Multi-function relay       | 15      | 0~20     | 17      |      |

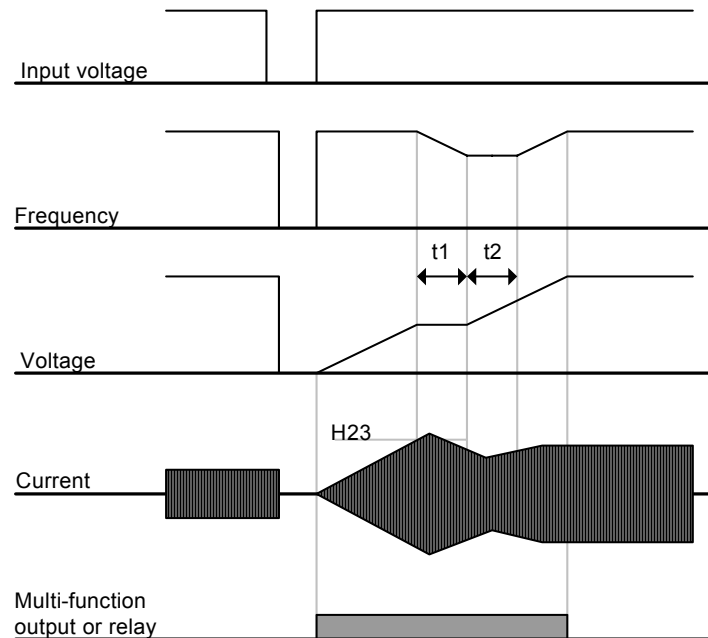
- Used to avoid any possible fault when the inverter outputs the voltage during operation after the load is removed
- The inverter estimates the motor rpm based on output current. Therefore, detecting exact speed is difficult.

●The following table shows 4 types of Speed search selection.

| P36 | Speed search | Set | Speed search during P34(power on start) | Speed search during instant power failure restart | Speed search during P35(restart after fault reset) | Speed search during acceleration |
|-----|--------------|-----|---|---|--|----------------------------------|
|     |              |     | bit 3                                   | bit 2   | bit 1  | bit 0                            |
| 0   | -            | -   | -                                       | -   | -  | -                                |
| 1   | -            | -   | -                                       | -   | -  | ✓                                |
| 2   | -            | -   | -                                       | -   | ✓  | -                                |
| 3   | -            | -   | -                                       | -   | ✓  | ✓                                |
| 4   | -            | -   | -                                       | ✓   | -  | -                                |
| 5   | -            | -   | -                                       | ✓   | -  | ✓                                |
| 6   | -            | -   | -                                       | ✓   | ✓  | -                                |
| 7   | -            | -   | -                                       | ✓   | ✓  | ✓                                |
| 8   | ✓            | -   | -                                       | -   | -  | -                                |
| 9   | ✓            | -   | -                                       | -   | -  | ✓                                |
| 10  | ✓            | -   | -                                       | -   | ✓  | -                                |
| 11  | ✓            | -   | -                                       | -   | ✓  | ✓                                |
| 12  | ✓            | -   | -                                       | ✓   | -  | -                                |
| 13  | ✓            | -   | -                                       | ✓   | -  | ✓                                |
| 14  | ✓            | -   | -                                       | ✓   | ✓  | -                                |
| 15  | ✓            | -   | -                                       | ✓   | ✓  | ✓                                |

- ▶ P37: Limits current during Speed search. Set as the percent of P43.
- ▶ P77: Signal of active Speed search is given to external sequence via multi-function relay output (30AC).

- ▶ The followings show speed search operation during Instant Power Failure restart



- When the input power is cut off due to instant power failure, the inverter outputs Low voltage trip (LV) to hold the output.
- When the power is restored, the inverter outputs the frequency before the low voltage trip and the voltage is increased due to PI control.
- t1: If current is increasing over the preset level in P37, the rise in voltage will stop and the frequency is decreased.
- t2: If current lowers than the level set in P37, the increase in voltage starts again and the decrease in frequency stops decelerating.
- When the frequency and voltage are restored back to the nominal level, acceleration will continue at the frequency before trip.

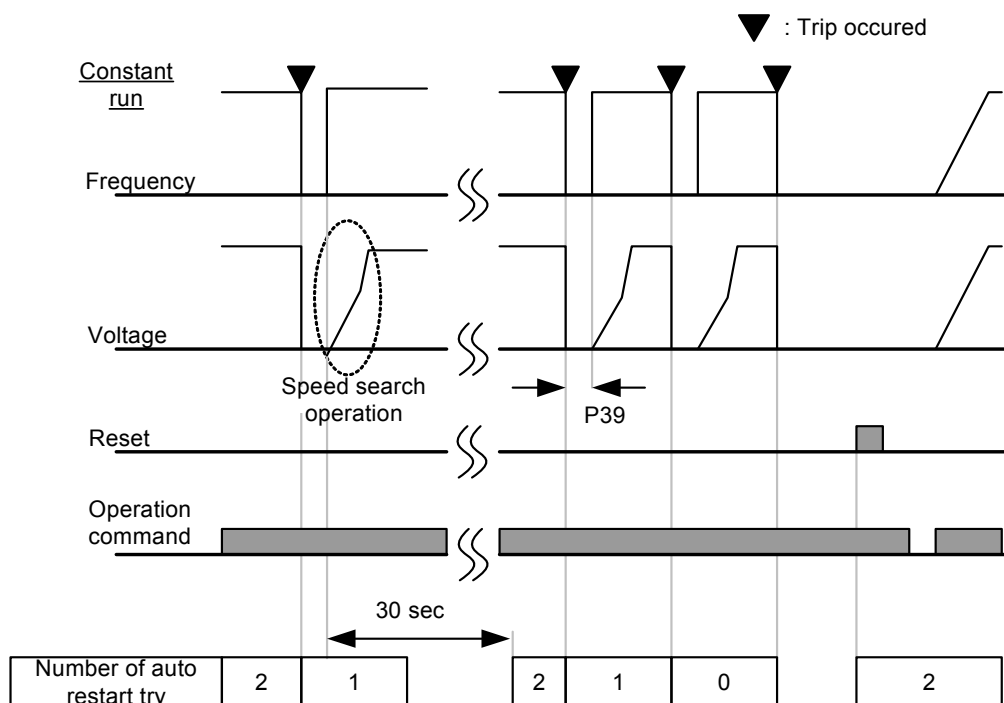
- ▶ Speed search operation is suitable for loads with high inertia. Stop the motor and restart when friction in the load is high.
- ▶ SV-iE5 series keeps normal operation when power is restored in 15msec for the use of its inverter rating if it operates within the rated output(0.1kW, 0.2kW and 0.4kW inverter types).
- ▶ Inverter DC link voltage can vary depending on output load quantity. Therefore, Low Voltage trip(Lvt) may occur when instant power failure is maintained over 15msec or output is higher than its rating.
- ▶ Instant power failure specification is applied when input voltage to Inverter is 200~230V AC.
- ▶ Adjust P37(speed search current level) in accordance with motor inertia to accelerate without trip by detecting idle rotation speed quickly, when operation characteristics would be improved if accurately entering motor no load current.

10.9 Auto Restart Operation

| Group    | Code | Parameter Name          | Setting | Range  | Initial | Unit |
|----------|------|-------------------------|---------|--------|---------|------|
| PG Group | P38  | No. of auto restart try | -       | 0 ~ 10 | 0       |      |
|          | P39  | Auto restart time       | -       | 0 ~ 60 | 1.0     | sec  |

- Set the frequency of auto restart activated in P38.
- Used to avoid system down, which is caused by internal protection function activated by causes such as noise.

- ▶ P38: If run command is entered after trip as inverter prevention function is active, it automatically restarts in the time set in P39. Auto restart will become active after the P38, which is reduced by 1 when it is active. If the trip outnumbers the preset restart try, auto restart function is deactivated. If the setting is reset via the control terminal or the STOP key on the loader, the number of auto restart try set by user is automatically entered.
- ▶ If there is no more trip for 30 sec after Auto restart operation, it increases the preset auto restart value reduced in the inverter.
- ▶ When operation is stopped due to Low voltage {Lvt} or Emergency stop {EST}, Inverter Overheat {Oht}, and Hardware Trip {HWT}, Auto restart will be deactivated.
- ▶ After the auto restart time set in P39, the motor starts acceleration automatically via speed search.
- ▶ The following pattern is shown when the number of auto restart try is set to 2.



**10.10 Operation Sound Select (carrier frequency change)**

| Group    | Code | Parameter Name           | Setting | Range  | Initial | Unit |
|----------|------|--------------------------|---------|--------|---------|------|
| PG Group | P45  | Carrier frequency select | -       | 0 ~ 15 | 3       |      |

- Set the operating sound of the inverter.

▶ Operating sound affects the following advantages/disadvantages.

|     |                                     |                                    |
|-----|-------------------------------------|------------------------------------|
| P45 | When setting carrier frequency high | Motor sound reduced                |
|     |                                     | Inverter heat loss increased       |
|     |                                     | Inverter noise increased           |
|     |                                     | Inverter leakage current increased |

- ▶ iE5 series are designed to monitor the temperature of the inverter's cooling coil(heat sink) in order to automatically adjust carrier frequency in overheating condition. If it is necessary to use high carrier, select inverter type considering ambient temperature and motor load.

**10.11 Parameter initialize/Lock**

●Parameter initialize

| Group    | Code | Parameter Name       | Setting | Range                  |
|----------|------|----------------------|---------|------------------------|
| PG Group | P85  | Parameter initialize | 0       | -                      |
|          |      |                      | 1       | Groups initialize      |
|          |      |                      | 2       | Drive group initialize |
|          |      |                      | 3       | PG group initialize    |

- Select the group to be initialized and perform it in P85 code.

- ▶ It displays P85 after initialization value is entered in P85 code and initialization is complete by pressing FUNC key.

● Password register






| Group    | Code | Parameter Name    | Setting | Range    | Initial | Unit |
|----------|------|-------------------|---------|----------|---------|------|
| PG Group | P86  | Password register | -       | 0 ~ FFFF | 0       |      |
|          | P87  | Parameter lock    | -       | 0 ~ FFFF | 0       |      |

- Register password for parameter lock (P87).
- Password should be hexadecimal (0 ~ 9, A, B, C, D, E, F).

 **Caution**

Use the registered password to cancel parameter lock again after setting parameter lock of P86 using the registered password. Therefore, a user should memorize the registered password. If forgetting the password, you need to get after-sales service.

- ▶ Follow the steps to register password.
- ▶ If password is already set, it is necessary to enter the present password instead of 0000 in step 2.

| No. | Display   | Description   |
|-----|---|---|
| 1   |  | - . Move to P86.<br>- . Pressing FUNC key shows 0000.   |
| 2   |  | - . Enter the present password and press FUNC key. The factory default password is 0000.<br>- . Press FUNC key. |
| 3   |  | - . Register new password(i.e.: A123)<br>- . If pressing FUNC key, A123 blinks.                                 |
| 4   |  | - . Press FUNC key.   |
| 5   |  | - . New password is saved.  |

- ▶ If the present password is incorrectly entered in step 2, it may not go to step 3. Do not forget the registered password.

●Parameter lock

| Group    | Code | Parameter Name    | Setting | Range    | Initial | Unit |
|----------|------|-------------------|---------|----------|---------|------|
| PG Group | P87  | Parameter lock    | -       | 0 ~ FFFF | 0       |      |
|          | P86  | Password register | -       | 0 ~ FFFF | 0       |      |

- Parameter may be protected by using password.

▶ Parameter lock is realized by using the password registered in P86.

| No. | Display | Description   |
|-----|---------|---|
| 1   |         | - . Move to P87.<br>- . Pressing FUNC key shows UL(unlock).   |
| 2   |         | - . Display whether or not function code is changeable.<br>- . UL(unlock) shows that function code is changeable.<br>- . Press FUNC key.              |
| 3   |         | - . Indicating 0000, the present password entry window is displayed.<br>- . Enter the present password(i.e.: A123).                                   |
| 4   |         | - . Press FUNC key.   |
| 5   |         | - . If password is correct, it is changed to L(lock); if incorrect, it shows UL(unlock) again.<br>- . Function code is locked.<br>- . Press FUNC key. |
| 6   |         | - . Initial menu is displayed.  |

- ▶ If the present status is 'lock' in step 2, it shows L(lock); to cancel it, enter the present password, changing it to UL(unlock).

# MEMO

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## 11. Monitoring

### 11.1 Operating Status Monitoring

#### ● Output current

| Group       | Code | Parameter Name | Setting | Range | Initial | Unit |
|-------------|------|----------------|---------|-------|---------|------|
| Drive Group | CUr  | Output current | -       |       |         |      |

- Inverter output current can be monitored in CUr code.

#### ● Motor RPM

| Group       | Code | Parameter Name             | Setting | Range    | Initial | Unit |
|-------------|------|----------------------------|---------|----------|---------|------|
| Drive Group | rPM  | Motor RPM                  | -       |          |         |      |
| PG Group    | P41  | No. of motor poles         | -       | 2 ~ 12   | 4       |      |
|             | P46  | Control mode select        | -       | 0 ~ 2    | 0       |      |
|             | P54  | Gain for motor rpm display | -       | 1 ~ 1000 | 100     | %    |

- Motor rpm can be monitored in rpm code of Drive Group.
  - ▶ When P46 is set to 0(V/F control) or 1(PID control), the Inverter output frequency (f) is displayed in RPM using the formula below without Motor slip considered.

$$RPM = \left( \frac{120 \times f}{P41} \right) \times \frac{P54}{100}$$

- ▶ P41: Enter the number of rated motor poles on the nameplate.
- ▶ P54: Enter gear ratio to monitor mechanical rotation, instead of rotation of motor axis.

#### ● Inverter DC link voltage

| Group       | Code | Parameter Name           | Setting | Range | Initial | Unit |
|-------------|------|--------------------------|---------|-------|---------|------|
| Drive Group | dCL  | Inverter DC link voltage | -       |       |         |      |

- Inverter DC link of input voltage can be monitored in dCL.
  - ▶  $\sqrt{2}$  times (1.414) the value of input voltage is displayed while motor is at a stop. This is why it is converted to DC voltage, the maximum of AC voltage by a rectifier.
  - ▶ It is the voltage between P1 on the inverter's power terminal and N terminal.



● User display select

| Group       | Code | Parameter Name         | Setting | Range | Initial | Unit |
|-------------|------|------------------------|---------|-------|---------|------|
| Drive Group | vOL  | Output voltage display | -       |       |         |      |

- It displays the current inverter output voltage.

● Power on display

| Group    | Code      | Parameter Name   | Range | Default                        |   |
|----------|-----------|------------------|-------|--------------------------------|---|
| PG Group | P53       | Power on display | 0     | Frequency command(0.0)         | 0 |
|          |           |                  | 1     | Accel time(ACC)                |   |
|          |           |                  | 2     | Decel time(DEC)                |   |
|          |           |                  | 3     | Drive mode(drv)                |   |
|          |           |                  | 4     | Frequency mode(Frq)            |   |
|          |           |                  | 5     | Multi-step frequency 1         |   |
|          |           |                  | 6     | Multi-step frequency 2         |   |
|          |           |                  | 7     | Multi-step frequency 3         |   |
|          |           |                  | 8     | Output current (CUr)           |   |
|          |           |                  | 9     | Motor rpm(rPM)                 |   |
|          |           |                  | 10    | Inverter DC link voltage (dCL) |   |
|          |           |                  | 11    | Output voltage (vOL)           |   |
|          |           |                  | 12    | Fault display 1                |   |
|          |           |                  | 13    | Operating display select       |   |
|          |           |                  | 14    | Output current                 |   |
| 15       | Motor rpm |                  |       |                                |   |

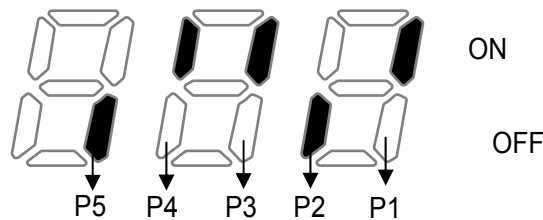
- Display the parameters set in P53 when power on.
  - ▶ The output current and motor rpm are displayed directly when P53 is set 14,15.

### 11.2 Monitoring I/O Terminal

● Input terminal status monitoring

| Group    | Code | Parameter Name                | Setting | Range | Initial | Unit |
|----------|------|-------------------------------|---------|-------|---------|------|
| PG Group | P71  | Input terminal status display | -       |       |         |      |

- Current input terminal status (ON/OFF) can be monitored in P71.
  - The following is displayed when P1, P3, P4 are ON and P5 is OFF.



### 11.3 Monitoring Fault Condition

● Monitoring Current Fault Status

| Group       | Code | Parameter Name        | Setting | Range | Initial | Unit |
|-------------|------|-----------------------|---------|-------|---------|------|
| Drive Group | nOn  | Current fault display | -       |       |         |      |

- Fault occurred during operation is displayed in nOn
- Up to 3 kinds of faults can be monitored.

▶ This parameter gives information on fault types and the operating status at the time of the fault in good order of fault type -> frequency -> current -> accel/decel. Refer to Page 5-10 for keypad setting.

|             |                         |                 |                           |
|-------------|-------------------------|-----------------|---------------------------|
| Fault types | Frequency               |                 |                           |
|             | Current                 |                 |                           |
|             | Accel/decel information |                 | Fault during accel        |
|             |                         |                 | Fault during decel        |
|             |                         |                 | Fault during constant run |
|             |                         | Fault at a stop |                           |

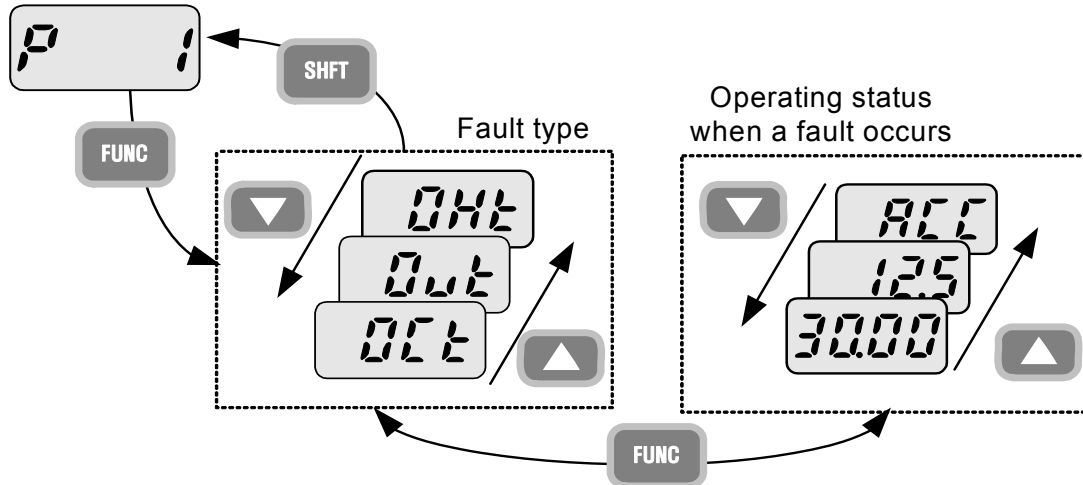
▶ Refer to Page 13-1 on fault types.

● Fault history monitoring

| Group    | Code | Parameter Name      | Setting | Range | Initial | Unit |
|----------|------|---------------------|---------|-------|---------|------|
| PG Group | P 1  | Fault history 1     | -       |       |         |      |
|          | P 2  | Fault history 2     |         |       |         |      |
|          | P 3  | Fault history 3     |         |       |         |      |
|          | P 4  | Reset fault history | -       | 0 ~ 1 | 0       |      |

- P 1 ~ P 3: Up to 3 faults information is stored.
- P 4: Previous fault information stored in the code P1 thru P3 is all cleared.

- ▶ When a fault occurs during operation, it can be monitored in the nOn.
- ▶ When the fault condition is reset via the STOP/RST key or multi-function terminal, information displayed in the nOn will be moved to P1. In addition, the previous fault info stored in P1 will be automatically moved to P2. Therefore, the latest update fault info will be stored in the lowest history number.
- ▶ When more than 1 fault occurred at the same time, up to 3 types of faults will be stored in one code.



**Note**

Among faults displayed, ESt(emergency stop) and Lvt(low voltage trip) are not stored in fault history.

11.4 Analogue output

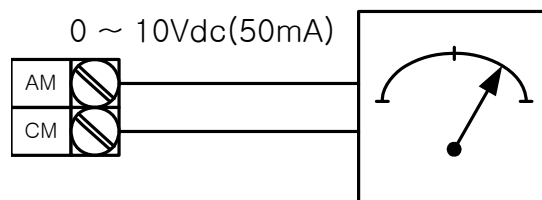
| Group    | Code | Parameter Name                   | Setting | Range    | Initial | Unit |
|----------|------|----------------------------------|---------|----------|---------|------|
| PG Group | P73  | Analogue output item select      | -       | 0 ~ 3    | 0       |      |
|          | P74  | Analogue output level adjustment | -       | 10 ~ 200 | 100     | %    |

- Output item and the level from the AM terminal are selectable and adjustable.

▶ P73: The selected item will be output to Analog output terminal (AM).

| P73 | Analogue output item select |                          | Item corresponding to 10V      |
|-----|-----------------------------|--------------------------|--------------------------------|
|     | 0                           | Output frequency         | Max. frequency(P16)            |
|     | 1                           | Output current           | 150% of inverter rated current |
|     | 2                           | Output voltage           | 282Vac                         |
|     | 3                           | Inverter DC link voltage | 400Vdc                         |

- ▶ P74: If you want to use analog output value as a gauge input, the value can be adjustable according to various gauge specifications.



11.5 Multi-function output terminal and Relay

| Group    | Code         | Parameter Name                        | Range |  |   | Default                          |    |
|----------|--------------|---------------------------------------|-------|--|---|----------------------------------|----|
| PG Group | P77          | Multi-function output terminal select | 0     | FDT-1  |   |                                  | 17 |
|          |              |                                       | 1     | FDT-2  |   |                                  |    |
|          |              |                                       | 2     | FDT-3  |   |                                  |    |
|          |              |                                       | 3     | FDT-4  |   |                                  |    |
|          |              |                                       | 4     | FDT-5  |   |                                  |    |
|          |              |                                       | 5     | -  |   |                                  |    |
|          |              |                                       | 6     | Inverter overload(IOL)                         |   |                                  |    |
|          |              |                                       | 7     | Motor stall(STALL)                             |   |                                  |    |
|          |              |                                       | 8     | Over voltage trip(Ovt)                         |   |                                  |    |
|          |              |                                       | 9     | Low voltage trip(Lvt)                          |   |                                  |    |
|          |              |                                       | 10    | Inverter overheat(OHt)                         |   |                                  |    |
|          |              |                                       | 11    | Command loss                                   |   |                                  |    |
|          |              |                                       | 12    | During run                                     |   |                                  |    |
|          |              |                                       | 13    | During stop                                    |   |                                  |    |
|          |              |                                       | 14    | During constant run                            |   |                                  |    |
|          |              |                                       | 15    | During speed searching                         |   |                                  |    |
|          |              |                                       | 16    | Wait time for run signal input                 |   |                                  |    |
| 17       | Fault output |                                       |       |  |   |                                  |    |
|          | P78          | Fault relay output                    | Type  | When setting H26(number of auto restart tries) | When the other than low voltage trip occurs | When the low voltage trip occurs | 2  |
|          |              |                                       | Set   | bit 2  | bit 1                                       | bit 0                            |    |
|          |              |                                       | 0     | -  | -   | -                                |    |
|          |              |                                       | 1     | -  | -   | ✓                                |    |
|          |              |                                       | 2     | -  | ✓   | -                                |    |
|          |              |                                       | 3     | -  | ✓   | ✓                                |    |
|          |              |                                       | 4     | ✓  | -   | -                                |    |
|          |              |                                       | 5     | ✓  | -   | ✓                                |    |
|          |              |                                       | 6     | ✓  | ✓   | -                                |    |
| 7        | ✓            | ✓                                     | ✓     |  |   |                                  |    |

- Select the desired item to be output.

- ▶ P78: When 17(Fault display) is selected in P77, Multi-function output relay will be activated with the value in P78.

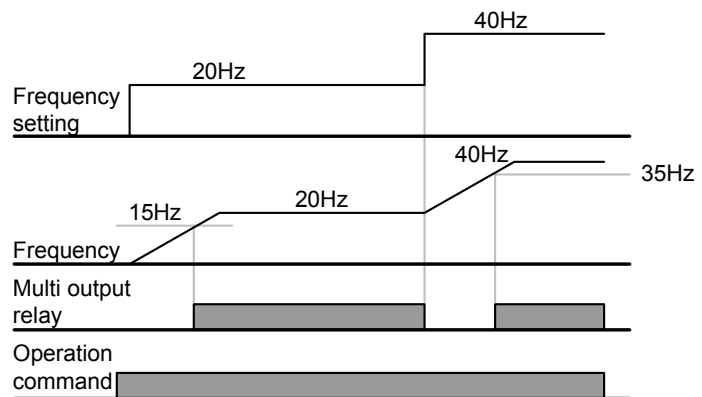
●0 : FDT-1

- ▶ Check whether the output frequency matches the user-setting frequency.
- ▶ Active condition: Absolute value (preset frequency-output frequency) <= Frequency Detection Bandwidth/ 2

| Group    | Code | Parameter Name               | Setting | Range   | Initial | Unit |
|----------|------|------------------------------|---------|---------|---------|------|
| PG Group | P76  | Detected frequency bandwidth | -       | 0 ~ 200 | 10.0    | Hz   |

- Can not be set above max. frequency(P16).

- ▶ When setting P76 to 10.0.



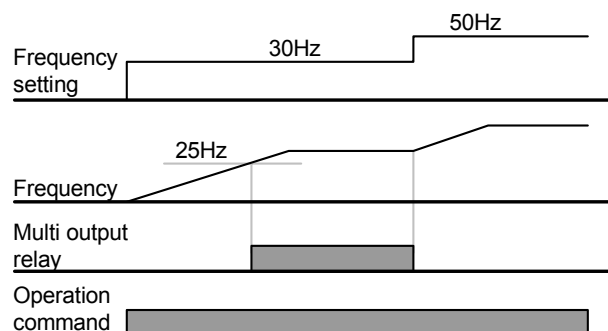
●1 : FDT-2

- ▶ Activated when the preset frequency matches frequency detection level (P75) and FDT-1 condition is met.
- ▶ Active condition: (Preset frequency = FDT level) & FDT-1

| Group    | Code | Parameter Name               | Setting | Range   | Initial | Unit |
|----------|------|------------------------------|---------|---------|---------|------|
| PG Group | P75  | Detected frequency           | -       | 0 ~ 200 | 30.0    | Hz   |
|          | P76  | Detected frequency bandwidth | -       |         | 10.0    |      |

- Cannot be set above Max frequency (P16).

- ▶ When setting P75 and P76 to 30.0 Hz and 10.0 Hz, respectively



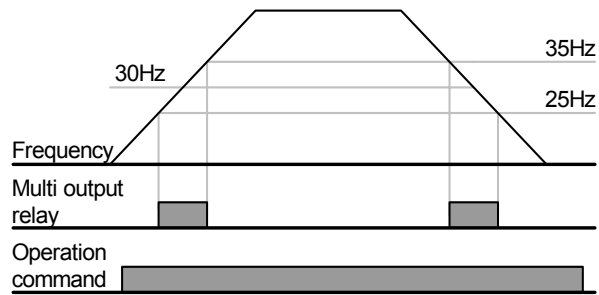
●2 : FDT-3

- ▶ Activated when run frequency meets the following condition.
- ▶ Active condition: Absolute value (detected frequency - run frequency)  $\leq$  detected frequency Bandwidth/2

| Group    | Code | Parameter Name               | Setting | Range   | Initial | Unit |
|----------|------|------------------------------|---------|---------|---------|------|
| PG Group | P75  | Detected frequency           | -       | 0 ~ 200 | 30.0    | Hz   |
|          | P76  | Detected frequency bandwidth | -       |         | 10.0    |      |

- Can not be set above max. frequency(P16).

- ▶ When setting P75 and P76 to 30.0Hz and 10.0 Hz, respectively



●3 : FDT-4

- ▶ Activated when run frequency meets the following condition.
- ▶ Active condition

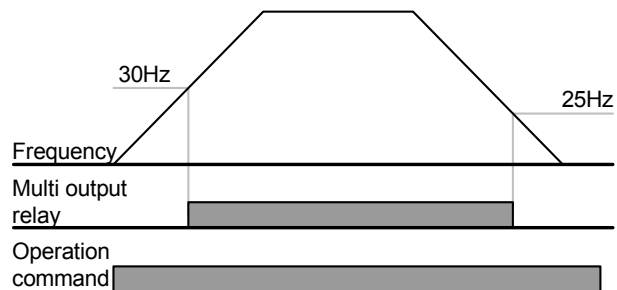
Accel time: Run Frequency  $\geq$  FDT Level

Decel time: Run Frequency  $>$  (FDT Level – FDT Bandwidth/2)

| Group    | Code | Parameter Name               | Setting | Range   | Initial | Unit |
|----------|------|------------------------------|---------|---------|---------|------|
| PG Group | P75  | Detected frequency           | -       | 0 ~ 200 | 30.0    | Hz   |
|          | P76  | Detected frequency bandwidth | -       |         | 10.0    |      |

- Can not be set above max. frequency(P16).

- ▶ When setting P75 and P76 to 30.0Hz and 10.0 Hz, respectively



●4 : FDT-5

- ▶ Activated as B contact contrast to FDT-4.
- ▶ Active condition

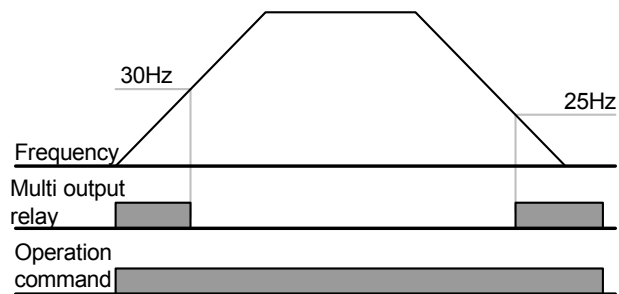
Accel time: Run Frequency >= FDT Level

Decel time: Run Frequency > (FDT Level – FDT Bandwidth/2)

| Group    | Code | Parameter Name               | Setting | Range   | Initial | Unit |
|----------|------|------------------------------|---------|---------|---------|------|
| PG Group | P75  | Detected frequency           | -       | 0 ~ 200 | 30.0    | Hz   |
|          | P76  | Detected frequency bandwidth | -       |         | 10.0    |      |

- Can not be set above max. frequency(P16).

- ▶ When setting P75 and P76 to 30.0Hz and 10.0 Hz, respectively



●5 : Overload (OL)

- ▶ Refer to page 12-1.

●6 : Inverter overload (IOL)

- ▶ Refer to page 12-5

●7 : Motor stall (Stall)

- ▶ Refer to page 12-1

●8 : Over voltage trip (Ovt)

- ▶ Activated when over voltage trip occurs due to DC link voltage exceeded 400VDC.

●9 : Low voltage trip (Lvt)

- ▶ Activated when low voltage trip occurs due to DC link voltage under 200V.

●10 : Inverter heatsink overheat (OHt)

- ▶ Activated when the heatsink is overheated

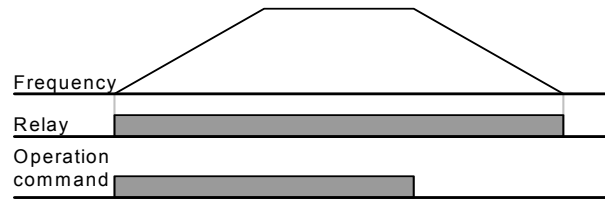
●11 : Command loss

- ▶ Activated when analogue or RS-485 communication command are lost. Refer to page 12-4 frequency input loss.



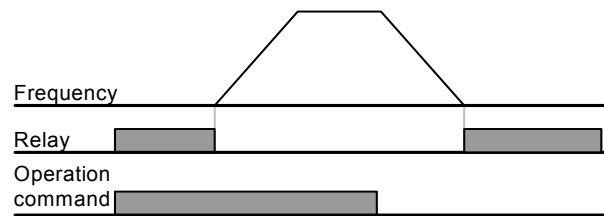
●12 : During operation

- ▶ Activated when run command is input and inverter outputs its voltage.



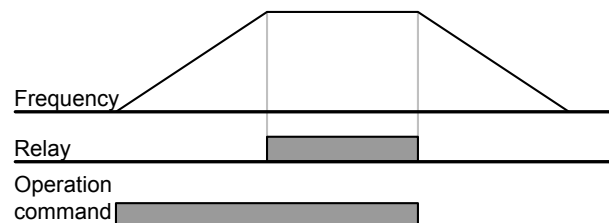
●13 : During stop

- ▶ Activated during stop without active command



●14 : During constant run

- ▶ Activated during constant speed operation



●15 : During speed searching

- ▶ Refer to page 10-10

●16 : Wait time for run signal input

- ▶ This function becomes active during normal operation and that the inverter waits for active run command from external sequence.

●17 : Fault output

- ▶ The parameter set in P78 is activated.
- ▶ For example, if setting P77, P78 to 17 and 2, respectively, Multi-function output relay will become active when trip other than “Low voltage trip” occurred.

## 12. Protective Function

### 12.1 Overload Trip

| Group    | Code | Parameter Name       | Setting | Range    | Initial | Unit |
|----------|------|----------------------|---------|----------|---------|------|
| PG Group | P24  | Overload trip select | 1       | 0 ~ 1    | 0       |      |
|          | P25  | Overload trip level  | -       | 30 ~ 200 | 180     | %    |
|          | P26  | Overload trip time   | -       | 0 ~ 60   | 60      | sec  |

- Set P24 of PG Group to 1.
- Cut the inverter's output in case of motor overload
- Cut the output if current is allowed to motor during overload trip time higher than the preset level.

### 12.2 Stall prevention

| Group    | Code | Parameter Name              | Setting | Range    | Initial | Unit |
|----------|------|-----------------------------|---------|----------|---------|------|
| PG Group | P27  | Stall prevention select     | -       | 0 ~ 7    | 3       |      |
|          | P28  | Stall prevention level      | -       | 30 ~ 150 | 150     | %    |
|          | P77  | Multi-function relay select | 7       | 0 ~ 18   | 17      |      |

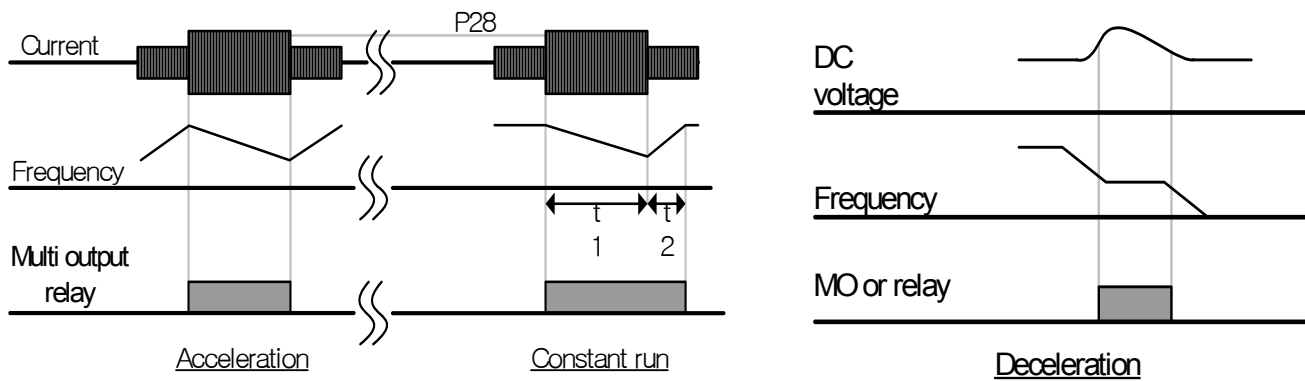
- During acceleration: Motor starts deceleration when current exceeding the value set in P28 flows
- During constant run: Motor decelerates when current exceeding the value set in P28 flows.
- During deceleration: Motor deceleration stops when inverter DC link voltage rises above a certain voltage level.
- P28: The value is set as the percent of motor rated current (P43).
- P77: Inverter outputs signals of stall prevention operation to externally connected device through multi-function relay output (30AC).

▶ P27 : Stall prevention can be set as the table below

| Set |  | Decel | Constant | Accel | Set |  | Decel | Constant | Accel |
|-----|--|-------|----------|-------|-----|--|-------|----------|-------|
| 0   |  | -     | -        | -     | 4   |  | ✓     | -        | -     |
| 1   |  | -     | -        | ✓     | 5   |  | ✓     | -        | ✓     |
| 2   |  | -     | ✓        | -     | 6   |  | ✓     | ✓        | -     |
| 3   |  | -     | ✓        | ✓     | 7   |  | ✓     | ✓        | ✓     |

- ▶ For example, set P27 to 3 to make stall prevention active during Acceleration and constant run.
- ▶ When stall prevention is executed during acceleration or deceleration, Accel/Decel time may take longer than the user-setting time.
- ▶ When stall prevention is activated during constant run, t1, t2 executed in accordance with the value set in ACC - [Accel time] and dEC - [Decel time].

i.e.) Stall prevention during operation



### 12.3 User's fault detection

| Group    | Code | Parameter Name         | Setting | Range | Initial | Unit |
|----------|------|------------------------|---------|-------|---------|------|
| PG Group | P33  | User's fault detection | 3       | 0 ~ 7 | 0       |      |

- Can set the following fault detection.
- Ground fault detection during operation: it stops output if excessive current of one or more outputs flows due to ground fault and etc.
- Input phase loss: Inverter output is blocked at the event of more than one phase loss among R, S and T.
- Output phase loss: Inverter output is shut off at the event of more than one phase loss among U, V and W.

### Caution

Set P43(Motor rated current) correctly. If the actual motor rated current and the value of P43 are different, output phase loss protection function could not be activated.

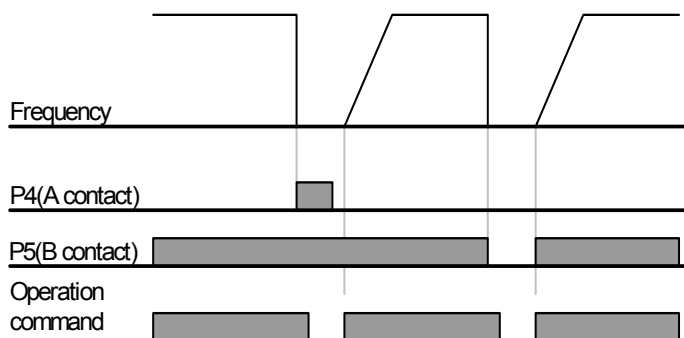
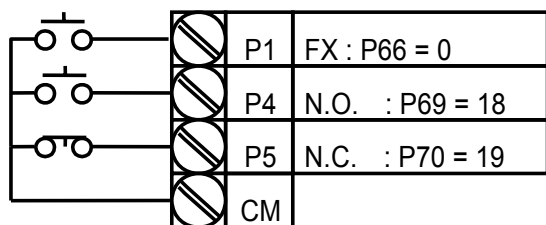
| Display | Ground fault during operation [GCt] | Input phase loss [COL] | Output phase loss [Pot] | Display | Ground fault during operation [GCt] | Input phase loss [COL] | Output phase loss [Pot] |
|---------|-------------------------------------|------------------------|-------------------------|---------|-------------------------------------|------------------------|-------------------------|
| 0       | -                                   | -                      | -                       | 4       | ✓                                   | -                      | -                       |
| 1       | -                                   | -                      | ✓                       | 5       | ✓                                   | -                      | ✓                       |
| 2       | -                                   | ✓                      | -                       | 6       | ✓                                   | ✓                      | -                       |
| 3       | -                                   | ✓                      | ✓                       | 7       | ✓                                   | ✓                      | ✓                       |

12.4 External trip signal

| Group    | Code | Parameter Name                          | Setting | Range  | Initial | Unit |
|----------|------|---|---------|--------|---------|------|
| PG Group | P66  | Multi-function input terminal P1 define |         | 0 ~ 24 | 0       |      |
|          | ~    | ~                                       |         |        |         |      |
|          | P69  | Multi-function input terminal P4 define | 18      |        | 3       |      |
|          | P70  | Multi-function input terminal P5 define | 19      |        | 4       |      |

- Select a terminal among P1 ~ P5 to output external trip signal.
- Set P69 and P70 to 18 and 19 to define P4 and P5 as External A contact and B contact.

- ▶ External trip signal input A contact (N.O.): At normal status, P4 and CM terminals are open while at fault, inverter output is shut off.
- ▶ External trip signal input B contact (N.C.): At normal status, P5 and CM terminals are open while at open, inverter output is shut off.



12.5 Frequency command loss

| Group    | Code | Parameter Name                                    | Setting | Range   | Initial | Unit |
|----------|------|---|---------|---------|---------|------|
| PG Group | P65  | Criteria for analogue input signal                | 0       | 0 ~ 2   | 0       |      |
|          | P81  | Drive mode select after loss of frequency command | -       | 0 ~ 2   | 0       |      |
|          | P82  | Wait time after loss of frequency command         | -       | 0.1~120 | 1.0     | sec  |
|          | P77  | Multi-function relay select                       | 11      | 0 ~ 18  | 17      |      |

- Select the Drive mode when frequency reference set via analog signal or communication option is lost.

▶ P65: Set the criteria for analog input signal loss.

|     |   |   |  |
|-----|---|---|--|
| P65 | Criteria for analogue input signal loss | 0 | Disabled   |
|     |   | 1 | When half the value set in P56 and P61 is entered      |
|     |   | 2 | When less than the value set in P56 and P61 is entered |

- ▶ If frequency command is set to 3(V1 of terminal) in Frq code of Drive Group and P65 is set to 1 and when AI is less than half the value set in P56, it determines frequency command loss. At the moment, if entering current based on the value converting 0~10V to 0~100%, it operates with the value converting 0~20mA to 0~100%.

i.e.) Voltage input: If P56 and P65 are set to 50% and 2 respectively, it operates at 5V.

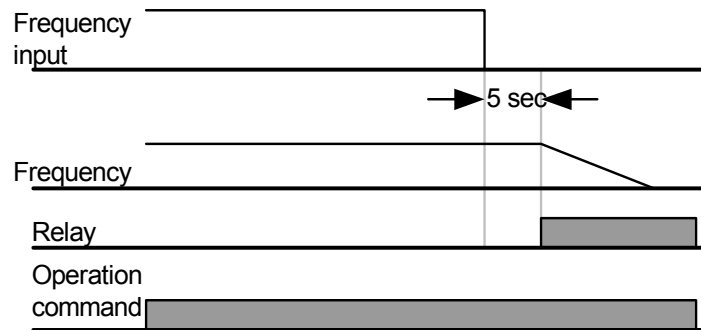
Current input: If P56 and P65 are set to 50% and 1 respectively, it operates at 5mA.

▶ P81: When the conditions set in P65 are met for the time set in P82, the inverter operates as follows.

|     |   |   |  |
|-----|---|---|--|
| P81 | Drive mode select after loss of frequency command | 0 | Continuous operation with the frequency before command loss occurs |
|     |   | 1 | Free run stop (output cut off)                                     |
|     |   | 2 | Decel to stop  |

- ▶ P77: Multi-function relay output (30AC) is used to output information on loss of frequency command to external sequence.

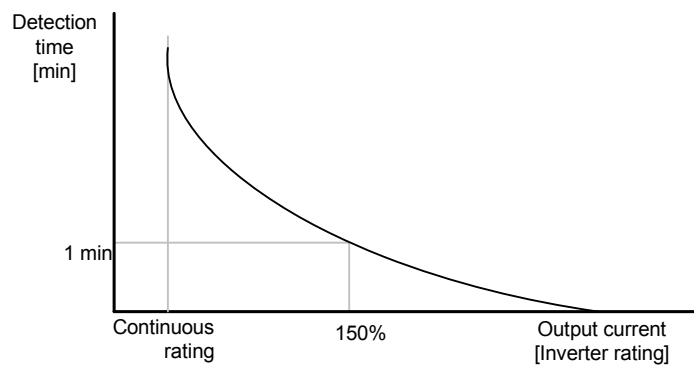
i.e.) when P65 is set to 2, P81 to 2, P82 to 5.0 sec and P77 to 11, respectively,



12.6 Inverter overload

| Group    | Code | Parameter Name                        | Setting | Range  | Initial | Unit |
|----------|------|---------------------------------------|---------|--------|---------|------|
| PG Group | P77  | Multi-function output terminal select | 6       | 0 ~ 17 | 17      |      |

- ▶ Inverter overload prevention function is activated when the current above inverter rated current flows. At the moment, the operation time becomes shorter as larger output current is.
- ▶ Multi-function relay (30BC) is used to output it to external device during inverter overload trip.
- ▶ Inverter overload trip operates as follows. However, level and time may vary automatically in accordance with motor type, depending on settings including carrier frequency.





## 13. Troubleshooting and Maintenance

### 13.1 Protective Functions



## Caution

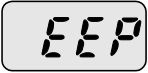
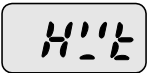
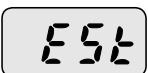
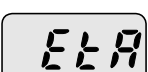
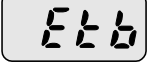

When a fault occurs, the cause must be corrected before the fault can be cleared. If protective function keeps active, the inverter should restart after clearing the cause(s). Or, it may lead to reduction in product life and damage to the equipment.

● Protection of Inverter output current and input voltage

| Fault display | Protective function  | Description  |
|---------------|----------------------|--|
|               | Overcurrent          | The inverter turns off its output when the output current of the inverter flows more than 200% of the inverter rated current   |
|               | Ground fault current | The inverter turns off its output when a ground fault occurs on the output as long as the function is active.  |
|               | Ground fault current | The inverter turns off its output when unbalanced output current occurs due to abnormal situation such as ground fault during run and one of U,V,W gets overcurrent.   |
|               | 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).   |
|               | Overload trip        | The inverter turns off its output if the output current of the inverter more than the motor rated current(P25) flows.  |
|               | Inverter overheat    | The inverter turns off its output if the heat sink overheats due to a damaged cooling fan.   |
|               | Condenser overload   | Inverter output is blocked when one of 3 phases gets opened or main condenser is outworn, resulting in excessive DC voltage variation. Detection time varies depending on inverter output current.                     |
|               | Output Phase loss    | 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 loss of the output.   |
|               | Over voltage         | The inverter turns off its output if the DC voltage of the main circuit increases higher than 400 V when the motor decelerates. This fault can also occur due to a surge voltage generated at the power supply system. |
|               | Low voltage          | The inverter turns off its output if the DC voltage is below 180V because of insufficient voltage input torque.  |





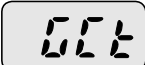


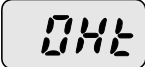
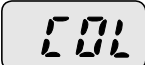
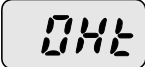
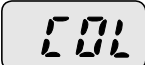
●Protection of abnormal internal circuit and external signal

| Fault display   | Protective function                | Description  |
|---|------------------------------------|--|
|    | Parameter save error               | Displayed when user-setting parameters fail to be entered into memory.   |
|    | Inverter hardware fault            | Displayed when an error occurs in CPU operation and internal OS program. The fault may not be relieved simply by STOP/RST key of the loader or reset terminal. Retry after completely turning off the inverter and the display of the loader is fully disappeared. |
|    | Instant cut off                    | Used for the emergency stop of the inverter. The inverter instantly turns off the output when the EST terminal is turned on.<br><b>Note</b><br>The inverter starts to regular operation when turning off the EST terminal while FX or RX terminal is ON.           |
|  | External fault A contact input     | When multi-function input terminal (P66~P70) is set to 18, external fault signal input: A (Normal Open Contact), the inverter turns off the output.  |
|  | External fault B contact input     | When multi-function input terminal (P66 ~ P70) is set to 19, external fault signal input: B (Normal Close Contact), the inverter turns off the output.   |
|  | When the frequency command is lost | When inverter operation is set via Analog input (0-10V or 0-20mA input) or option (RS-485) and no signal is applied, operation is done according to the method set in P81.   |




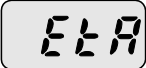
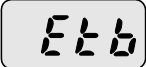

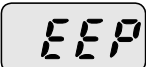
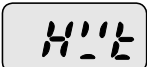
13.2 Fault Remedy

 **Caution**

If any trouble occurs due to overcurrent, make sure to restart after eliminating the causes because power semiconductor element inside the inverter may be broken.

| Protective function  | Cause   | Remedy   |  |   |  |   |
|--|---|--|--|---|--|---|
| <br>Overcurrent   | <ul style="list-style-type: none"> <li>● Accel/Decel time is too short compared to the inertia of the load(<math>GD^2</math>).</li> <li>● Load is greater than the inverter rating.</li> <li>● Inverter output is issued when the motor is free running.</li> <li>● Output short circuit or ground fault has occurred.</li> <li>● Mechanical brake of the motor is operating too fast.</li> </ul> | <ul style="list-style-type: none"> <li>☞ Increase the Accel/Decel time.</li> <li>☞ Replace the inverter with appropriate capacity.</li> <li>☞ Resume operation after stopping the motor or use P36 (Speed search).</li> <li>☞ Check output wiring.</li> <li>☞ Check the mechanical brake.</li> </ul> |  |   |  |   |
| <br><br>Ground fault current | <ul style="list-style-type: none"> <li>● Ground fault has occurred at the output wiring of the inverter.</li> <li>● The insulation of the motor is damaged due to heat.</li> </ul>  | <ul style="list-style-type: none"> <li>☞ Check the wiring of the output terminal.</li> <li>☞ Replace the motor.</li> </ul>   |  |   |  |   |
| <br>Inverter overload   | <ul style="list-style-type: none"> <li>● Load is greater than the inverter rating.</li> <li>● Torque boost scale is set too large.</li> </ul>   | <ul style="list-style-type: none"> <li>☞ Upgrade the capacity of motor and inverter or reduce the load weight.</li> <li>☞ Reduce torque boost scale.</li> </ul>  |  |   |  |   |
| <br>Overload trip   |   |  | <br>Inverter overheat | <ul style="list-style-type: none"> <li>● Cooling system has faults.</li> <li>●</li> <li>● Ambient temperature is too high.</li> </ul> | <ul style="list-style-type: none"> <li>☞ Check for alien substances clogged in the heat sink.</li> <li>☞ Keep ambient temperature under 40°C.</li> </ul> | <br>Condenser overload |
| <br>Inverter overheat   | <ul style="list-style-type: none"> <li>● Cooling system has faults.</li> <li>●</li> <li>● Ambient temperature is too high.</li> </ul>   | <ul style="list-style-type: none"> <li>☞ Check for alien substances clogged in the heat sink.</li> <li>☞ Keep ambient temperature under 40°C.</li> </ul>   |  |   |  |   |
| <br>Condenser overload  | <ul style="list-style-type: none"> <li>● 3-Phase product may have one phase lost.</li> <li>● Internal condenser was outworn.</li> </ul>   | <ul style="list-style-type: none"> <li>☞ Check whether wiring of input power or inter-phase voltage is abnormal.</li> <li>☞ It's almost time to replace or it may happen when it is used in hot temperature for a long while. Contact after-sales service.</li> </ul>                                |  |   |  |   |

● Fault Remedy

| Protective function  | Cause  | Remedy   |
|--|--|--|
| <br>Output Phase loss   | <ul style="list-style-type: none"> <li>● Faulty contact of magnetic switch at output</li> <li>● Faulty output wiring</li> </ul>  | <ul style="list-style-type: none"> <li>☞ Make connection of magnetic switch at output of the inverter securely.</li> <li>☞ Check output wiring.</li> </ul>   |
| <br>Over voltage  | <ul style="list-style-type: none"> <li>● Decel time is too short compared to the inertia of the load(<math>GD^2</math>).</li> <li>● Regenerative load is at the inverter output.</li> <li>● Line voltage is too high.</li> </ul>                         | <ul style="list-style-type: none"> <li>☞ Increase the Decel time.</li> <li>☞ Check whether line voltage exceeds its rating.</li> </ul>   |
| <br>Low voltage  | <ul style="list-style-type: none"> <li>● Line voltage is low.</li> <li>● Load larger than line capacity is connected to line (ex: welding machine, motor's direct input)</li> <li>● Faulty magnetic switch at the input side of the inverter.</li> </ul> | <ul style="list-style-type: none"> <li>☞ Check whether line voltage is below its rating.</li> <li>☞ Check the incoming AC line. Adjust the line capacity corresponding to the load.</li> <li>☞ Change a magnetic switch.</li> </ul>          |
| <br>External fault A contact input  | <ul style="list-style-type: none"> <li>● The multi function terminals(P66 ~ P70) set to "18 (External fault-A)" or "19 (External trip signal input : fault-B)" in P66~P70 in PG Group is ON.</li> </ul>  | <ul style="list-style-type: none"> <li>☞ Eliminate the cause of fault at circuit connected to external fault terminal or cause of external fault input.</li> </ul>   |
| <br>External fault B contact input  |  |  |
|   | <ul style="list-style-type: none"> <li>● No frequency command is applied to AI terminal.</li> <li>● Communication command is cuts off</li> </ul>   | <ul style="list-style-type: none"> <li>☞ Check the wiring of AI and frequency reference level.</li> <li>☞ In case of a program set to periodically update frequency, check the communication line or operation of master device.</li> </ul>  |
|  <br>Parameter save error Hardware fault |  | <ul style="list-style-type: none"> <li>☞ Contact your local LSIS sales representative.</li> <li>☞ EEP message occurs when first allowing power after upgrading software due to A/S service. At the moment, turn it off and retry.</li> </ul> |

13.3 Precautions for maintenance

 **Warning**

- Make sure to remove the input power while performing maintenance.
- Make sure to perform maintenance after checking the DC link capacitor has discharged. The bus capacitors in the inverter main circuit can still be charged even after the power is turned off. Check the voltage between terminal P or P1 and N using a tester before proceeding.
- SV-iE5 series inverter has ESD (Electrostatic Discharge) sensitive components. Take protective measures against ESD before touching them for inspection or installation.
- Do not change any inner parts and connectors. Never modify the inverter.

13.4 Checklist

- Daily inspections
  - ▶ Proper installation environment
  - ▶ Cooling system fault
  - ▶ Unusual vibration and noise
  - ▶ Unusual overheating and discoloration
- Periodic inspection
  - ▶ Do screws and bolts become loose or rust due to the environment?
- ☞ Tighten or replace them.
  - ▶ Alien substances are clogged in the cooling system?
- ☞ Eliminate them by using compressed air.
  - ▶ Check the rotating condition of the cooling fan, the condition of capacitors and the connections with the magnetic contactor
- ☞ Replace them if there are any abnormalities.

13.5 Parts Replacement

The inverter consists of many electronic parts such as semiconductor devices. The following parts may deteriorate with age because of their structures or physical characteristics, leading to reduced performance or failure of the inverter. For preventive maintenance, the parts must be changed periodically.

| Part name                   | Change period(year) | Description                 |
|-----------------------------|---------------------|-----------------------------|
| DC link condenser           | 4                   | Exchange                    |
| Control smoothing condenser | 4                   | Exchange                    |
| Relay                       | -                   | Determined after inspection |



## 14. COM Option (RS-485)

### 14.1 Introduction

SV-iE5 inverter can be controlled and monitored by the sequence program of the PLC or other master module. Drives or other slave devices may be connected in a multi-drop fashion on the RS-485 network and may be monitored or controlled by a single PLC or PC.

### 14.2 Specifications

● Performance Specifications

| Item                  | Specification                         |
|-----------------------|---------------------------------------|
| COM method            | RS-485                                |
| Transmission form     | Bus method, Multi drop Link System    |
| Inverter              | SV-iE5 series                         |
| Converter             | RS232 converter                       |
| Connectable drives    | Max. 16                               |
| Transmission distance | Max. 1,200m (within 700m recommended) |

● Hardware specification

| Item         | Specification                                      |
|--------------|--|
| Installation | Use S+, S- terminals on control terminal block     |
| Power supply | Use Insulated power from the inverter power supply |

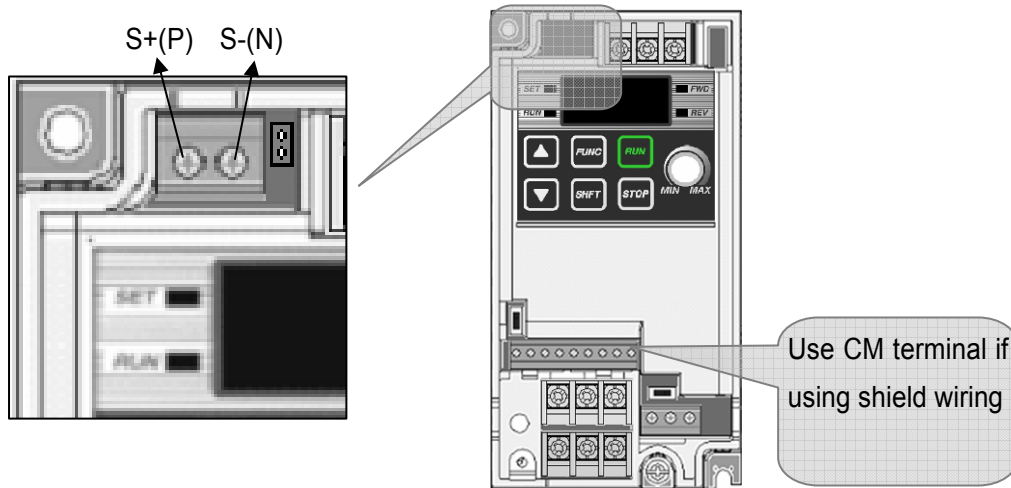
● Communication specification

| Item                | Specification                     |
|---------------------|-----------------------------------|
| Communication speed | 9,600/4,800/2,400 bps selectable  |
| Control procedure   | Asynchronous communication system |
| COM system          | Half duplex system                |
| Character system    | Binary                            |
| Stop bit length     | 1 bit / 2bit                      |
| CRC check           | 2 bytes                           |
| Parity check        | None                              |

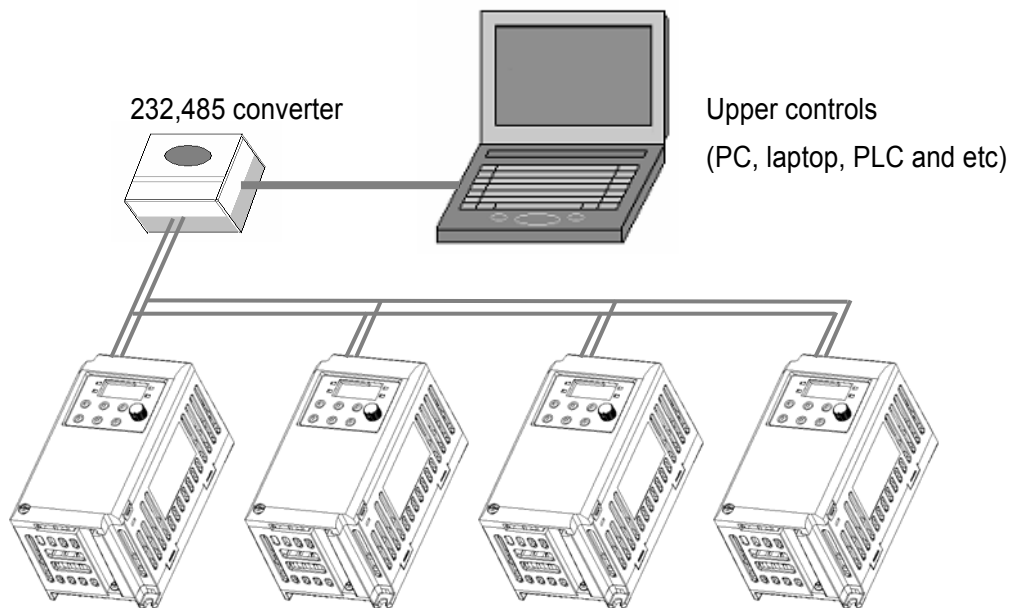
### 14.3 Installation

●Connecting the communication line

Connect(wire) to the inverter's (S+), (S-) terminals of the control terminals as shown in the below figure. Use CM terminal on the lower control terminal for COM signal shield ground. COM dedicated terminal is delivered with iE5 COM optional product.



●PC-Inverter connection



**Note**

The number of drives to be connected is up to 16 drives.  
 The specification of length of communication line is max. 1200m. To ensure stable communication, limit the length below 700m.  
 Short both(S+, S-) of JP1 pin located on the upper PBC of control terminal COM terminal.

● Cable Specification

If communicating by using RS-422 or RS-485 channel, the twisted pair cable for RS-422 should be used considering the communication distance and speed. The specifications of the recommended cable are as follows.

- Product : Low Capacitance Lan Interface Cable
- Spec. : 2P X 22AWG(D/0.254 TA)
- Manufacturer : LS cable
- Type : LIREV-AMESB

Even if using other cables but the above recommended cable, make sure to use cables conforming to the following table.

● Characteristics

| Electrical characteristics | Item                     | Unit      | Characteristics                | Test condition |  |
|----------------------------|--------------------------|-----------|--------------------------------|----------------|--|
| Electrical characteristics | Conductor resistance     | Ω/km      | 59 and lower                   | Ambient temp.  |  |
|                            | Withstand voltage(DC)    | V/1min    | Endurable at 500V for 1 minute | In the air     |  |
|                            | Insulation resistance    | MΩ-km     | 1,000 and higher               | Ambient temp.  |  |
|                            | Electrostatic cap        | Pf/M      | 45 and lower                   | 1kHz           |  |
|                            | Characteristic impedance | Ω         | 120 ± 12                       | 10MHz          |  |
| Appearance characteristics | Conductor                | Core      | Pair                           | 2              |  |
|                            |                          | Spec.     | AWG                            | 22             |  |
|                            |                          | Structure | NO./mm                         | 1/0.643        |  |
|                            |                          | Dia.      | Mm                             | 0.643          |  |
|                            | insulator                | Thickness | mm                             | 0.59           |  |
|                            |                          | Dia.      | Mm                             | 1.94           |  |

**14.4 Inverter functional code setting**

Once correctly connected, set COM parameters as follows. However, COM speed number should be set according to the system.

● Function

| Code | Function                            | Setting  |
|------|-------------------------------------|--|
| drv  | Run mode                            | 3 (COM)  |
| Frq  | Frequency mode                      | 4 (COM)  |
| P 79 | Inverter number                     | 1 ~ 250 (set avoiding duplication)                               |
| P 80 | COM speed                           | 2 (9,600 bps, factory default)                                   |
| P 81 | Run mode when speed command is lost | 0 (keep operating with the frequency set before command is lost) |



| Code | Function                                      | Setting   |
|------|---|---|
| P 82 | Determination time when speed command is lost | 1.0 second  |
| P 83 | COM waiting time                              | Set the waiting time until the next TX signal output after receiving RX signal. |
| P 84 | Parity/STOP setting                           | Set COM parity/stop bit   |

### 14.5 Operation

Check whether a computer and an inverter are correctly connected.

Turn on the inverter. Do not connect any load to the inverter until it is confirmed that it would be communicated with a computer. Run the inverter in accordance with the inverter run program.

### 14.6 COM Protocol(ModBus-RTU)

Use ModBus-RTU protocol, which is open protocol. It is structured that computer or other host serves as a master while the inverter servers as a slave. The inverter, as a slave, responds to the read/write request of the master

● Supportable function codes

| Function | Description              | Remarks |
|----------|--------------------------|---------|
| h03      | Read Hold Register       |         |
| h04      | Read Input Register      |         |
| h06      | Preset Single Register   |         |
| h10      | Preset Multiple Register |         |

● Exception codes

| Exception | Description          | Remarks   |
|-----------|----------------------|---|
| h01       | ILLEGAL FUNCTION     | When using other function codes but these supported by the inverter (h03,h04,h06,h10)   |
| h02       | ILLEGAL DATA ADDRESS | When parameter address is invalid (not exists)  |
| h03       | ILLEGAL DATA VALUE   | If function code is h06 or h10(parameter writing command) or when parameter value is not valid (reading only or beyond the range) |
| h06       | SLAVE DEVICE BUSY    | Delay   |
| h14       | User define          | 1. Write Disable(Address h0004 value is 0)<br>2. Read Only or Not Program during Running  |

**Note**

Common S/W version is displayed in hexadecimal number while the S/W version of parameter is displayed in decimal number.

14.7 Parameter code list

●Common area: Area accessible regardless of inverter models.

| Address              | Parameter              | Scale           | Unit | R/W | Data value                       |                     |
|----------------------|------------------------|-----------------|------|-----|----------------------------------|---------------------|
| h0000                | Inverter model         | -               | -    | R   | 0 : SV-iS3                       | 7 : SV-iG5          |
|                      |                        |                 |      |     | 1 : SV-iG                        | 8 : SV-iC5          |
|                      |                        |                 |      |     | 2 : SV-iV                        | 9 : SV-iP5          |
|                      |                        |                 |      |     | 3 : SV-iH                        | A : SV-iG5A         |
|                      |                        |                 |      |     | 4 : SV-iS5                       | D : SV-iE5          |
|                      |                        |                 |      |     | 5 :SV-iV5                        |                     |
| h0001                | Inverter capacity      | -               | -    | R   | FFFF:100W 0000:200W 0001:200W    |                     |
| h0002                | Inverter Input Voltage | -               | -    | R   | 0 : 220V class                   |                     |
| h0003                | Version                | -               | -    | R   | i.e.) Version 1.0 : h0010        |                     |
| h0004                | Parameter Lock         | -               | -    | R/W | 0: Lock (default)<br>1: Unlock   |                     |
| h0005                | Frequency Command      | 0.01            | Hz   | R/W | Starting freq. ~ Max. freq.      |                     |
| h0006                | Drive mode             | -               | -    | R/W | BIT 0: Stop                      |                     |
|                      |                        |                 |      |     | BIT 1: Forward Run               |                     |
|                      |                        |                 |      |     | BIT 2: Reverse Run               |                     |
|                      |                        |                 |      | W   | BIT 3: Fault Reset (RESET)       |                     |
|                      |                        |                 |      |     | BIT 4: Emergency Stop (EST)      |                     |
|                      |                        |                 |      | -   | BIT 5, 13~15: Not Used           |                     |
|                      |                        |                 |      | R   | BIT 6~7:                         |                     |
|                      |                        |                 |      |     | 00: terminal                     | 01: loader          |
|                      |                        |                 |      |     | 10: Reserved                     | 11: Com operation   |
|                      |                        |                 |      |     | BIT 8~12: frequency arrival info |                     |
|                      |                        |                 |      |     | 00000: DRV-00                    | 00001: multi-step 1 |
|                      |                        |                 |      |     | 00010: multi-step 2              | 00011: multi-step 3 |
| 00100: UP            | 00101: Down            |                 |      |     |                                  |                     |
| 00110: Up/down zero  | 00111: AI input        |                 |      |     |                                  |                     |
| 01000: JOG /         | 01001~                 |                 |      |     |                                  |                     |
| Loader volume        | 10010: reserved        |                 |      |     |                                  |                     |
| 10011: Com operation | 10100~                 |                 |      |     |                                  |                     |
|                      |                        | 11111: reserved |      |     |                                  |                     |
| h0007                | Acc Time               | 0.1             | sec  | R/W | See Function List                |                     |
| h0008                | Dec Time               | 0.1             | sec  | R/W | See Function List                |                     |
|                      |                        |                 |      |     | h0008                            |                     |

| Address    | Parameter          | Scale | Unit | R/W | Data value                        |
|------------|--------------------|-------|------|-----|-----------------------------------|
| h0009      | Output Current     | 0.1   | A    | R   | See Function List.                |
| H000A      | Output Frequency   | 0.01  | Hz   | R   | See Function List.                |
| H000B      | Output Voltage     | 0.1   | V    | R   | See Function List.                |
| H000C      | DC Link voltage    | 0.1   | V    | R   | See Function List.                |
| H000D      | -                  | -     | -    | -   | Reserved                          |
| h000E      | Status of Inverter |       |      | R   | BIT 0 : Stop                      |
|            |                    |       |      |     | BIT 1 : Forward running           |
|            |                    |       |      |     | BIT 2 : Reverse running           |
|            |                    |       |      |     | BIT 3 : Fault (Trip)              |
|            |                    |       |      |     | BIT 4 : Accelerating              |
|            |                    |       |      |     | BIT 5 : Decelerating              |
|            |                    |       |      |     | BIT 6 : speed arrival             |
|            |                    |       |      |     | BIT 7 : DC Braking                |
|            |                    |       |      |     | BIT 8 : Stopping                  |
|            |                    |       |      |     | BIT10 : Brake Open                |
|            |                    |       |      |     | BIT11 : Forward run command(1)    |
|            |                    |       |      |     | BIT12 : Reverse run command(1)    |
|            |                    |       |      |     | BIT13 : REM. R/S                  |
|            |                    |       |      |     | BIT14 : REM. Freq.                |
| h000F      | Trip information   |       |      | R   | BIT 0 : OCT                       |
|            |                    |       |      |     | BIT 1 : OVT                       |
|            |                    |       |      |     | BIT 2 : EXT-A                     |
|            |                    |       |      |     | BIT 3 : EST(Emergency Stop)       |
|            |                    |       |      |     | BIT 4 : COL                       |
|            |                    |       |      |     | BIT 5 : GFT(Ground Fault)         |
|            |                    |       |      |     | BIT 6 : OHT(Over Heat)            |
|            |                    |       |      |     | BIT 7 : GCT(Ground Current Trip)  |
|            |                    |       |      |     | BIT 8 : OLT(Overload trip)        |
|            |                    |       |      |     | BIT 9 : HW-Diag                   |
|            |                    |       |      |     | BIT10: EXT-B                      |
|            |                    |       |      |     | BIT11: EEP(Parameter Write Error) |
|            |                    |       |      |     | BIT12: -                          |
|            |                    |       |      |     | BIT13: PO(Phase Open)             |
|            |                    |       |      |     | BIT14 : IOLT                      |
| BIT15: LVT |                    |       |      |     |                                   |

| Address | Parameter              | Scale | Unit | R/W | Data value         |
|---------|------------------------|-------|------|-----|--------------------|
| h0010   | Input terminal status  |       |      | R   | BIT 0 : P1         |
|         |                        |       |      |     | BIT 1 : P2         |
|         |                        |       |      |     | BIT 2 : P3         |
|         |                        |       |      |     | BIT 3 : P4         |
|         |                        |       |      |     | BIT 4 : P5         |
| h0011   | Output terminal status |       |      | R   | BIT 0 ~6: Not Used |
|         |                        |       |      |     | BIT 7 : 30AC       |
| h0012   | -                      | -     | -    | -   | Reserved           |
| h0013   | -                      | -     | -    | -   | Reserved           |
| h0014   | -                      | -     | -    | -   | Reserved           |
| h0015   | RPM                    |       |      | R   | See Function List. |

**Note**

The changed value in Common area affects the current setting but returns to the previous setting when power is cycled or Inverter is reset. However, changing value is immediately reflected in other parameter groups even in the case of Reset or Power On/Off.

● DRV group

| Address |       | Code | Parameter | Initial | Max.       | Min. |
|---------|-------|------|-----------|---------|------------|------|
| 16bit   | 10bit |      |           |         |            |      |
| D100    | 53504 | D00  | Cmd. Freq | 0       | Max. Freq. | 0    |
| D101    | 53505 | D01  | ACC       | 50      | 60000      | 0    |
| D102    | 53506 | D02  | DEC       | 100     | 60000      | 0    |
| D103    | 53507 | D03  | DRV       | 1       | 3          | 0    |
| D104    | 53508 | D04  | FRQ       | 0       | 4          | 0    |
| D105    | 53509 | D05  | ST 1      | 1000    | Max. Freq. | 0    |
| D106    | 53510 | D06  | ST 2      | 2000    | Max. Freq. | 0    |
| D107    | 53511 | D07  | ST 3      | 3000    | Max. Freq. | 0    |
| D108    | 53512 | D08  | CUR       | -       | 255        | -    |
| D109    | 53513 | D09  | RPM       | 0       | 1800       | 0    |
| D10A    | 53514 | D10  | DCL       | 0       | 65535      | 0    |
| D10B    | 53515 | D11  | USR       | 0       | 1          | 0    |
| D10C    | 53516 | D12  | FLT       | 0       | 1          | 0    |
| D10D    | 53517 | D13  | DRC       | 0       | 1          | 0    |

●PROGRAM group

| Address |       | Code | Parameter           | Initial | Max.       | Min.      |
|---------|-------|------|---------------------|---------|------------|-----------|
| 16bit   | 10bit |      |                     |         |            |           |
| D201    | 53761 | P 1  | Last Fault1         | 0       | 1          | 0         |
| D202    | 53762 | P 2  | Last Fault2         | 0       | 1          | 0         |
| D203    | 53763 | P 3  | Last Fault3         | 0       | 1          | 0         |
| D204    | 53764 | P 4  | Fault Clear         | 0       | 1          | 0         |
| D205    | 53765 | P 5  | Run Prohibit        | 0       | 2          | 0         |
| D206    | 53766 | P 6  | ACC Pattern         | 0       | 1          | 0         |
| D207    | 53767 | P 7  | DEC Pattern         | 0       | 1          | 0         |
| D208    | 53768 | P 8  | Stop Method         | 0       | 2          | 0         |
| D209    | 53769 | P 9  | DcBr freq           | 500     | 6000       | startFreq |
| D20A    | 53770 | P 10 | DcBlk time          | 10      | 6000       | 0         |
| D20B    | 53771 | P 11 | DcBr value          | 50      | 200        | 0         |
| D20C    | 53772 | P 12 | DcBr time           | 10      | 600        | 0         |
| D20D    | 53773 | P 13 | DcSt value          | 50      | 200        | 0         |
| D20E    | 53774 | P 14 | DcSt time           | 0       | 600        | 0         |
| D20F    | 53775 | P 15 | Jog Freq            | 1000    | Max. Freq. | 0         |
| D210    | 53776 | P 16 | Max Freq            | 6000    | 12000      | 4000      |
| D211    | 53777 | P 17 | Base Freq           | 6000    | 12000      | 3000      |
| D212    | 53778 | P 18 | Start Freq          | 50      | 1000       | 10        |
| D213    | 53779 | P 19 | Trq Boost           | 0       | 1          | 0         |
| D214    | 53780 | P 20 | Fwd Boost           | 50      | 150        | 0         |
| D215    | 53781 | P 21 | Rev Boost           | 50      | 150        | 0         |
| D216    | 53782 | P 22 | VF Pattern          | 0       | 1          | 0         |
| D217    | 53783 | P 23 | OV adj              | 100     | 110        | 40        |
| D218    | 53784 | P 24 | OLT select          | 0       | 1          | 0         |
| D219    | 53785 | P 25 | OLT level           | 180     | 200        | 50        |
| D21A    | 53786 | P 26 | OLT time            | 600     | 600        | 0         |
| D21B    | 53787 | P 27 | Stall prev.         | 0       | 7          | 0         |
| D21C    | 53788 | P 28 | Stall level         | 150     | 150        | 30        |
| D21D    | 53789 | P 29 | Up/Down Save select | 0       | 1          | 0         |
| D21E    | 53790 | P 30 | Up/Down Save Freq.  | 0       | Max. Freq. | 0         |
| D21F    | 53791 | P 31 | Dwell freq          | 500     | Max. Freq. | startFreq |
| D220    | 53792 | P 32 | Dwell time          | 0       | 100        | 0         |

| Address |       | Code | Parameter                        | Initial | Max.                    | Min.                   |
|---------|-------|------|----------------------------------|---------|-------------------------|------------------------|
| 16bit   | 10bit |      |                                  |         |                         |                        |
| D221    | 53793 | P 33 | Trip select                      | 0       | 3                       | 0                      |
| D222    | 53794 | P 34 | Power-on run                     | 0       | 1                       | 0                      |
| D223    | 53795 | P 35 | RST restart                      | 0       | 1                       | 0                      |
| D224    | 53796 | P 36 | Speed Search                     | 0       | 50                      | 0                      |
| D225    | 53797 | P 37 | SS Sup-Curr                      | 100     | 200                     | 80                     |
| D226    | 53798 | P 38 | Retry number                     | 0       | 10                      | 0                      |
| D227    | 53799 | P 39 | Retry delay                      | 10      | 600                     | 0                      |
| D228    | 53800 | P 40 | Motor select                     | 0       | 2                       | 0                      |
| D229    | 53801 | P 41 | Pole number                      | 4       | 12                      | 2                      |
| D22A    | 53802 | P 42 | Rated-Slip freq.                 | 200     | 1000                    | 0                      |
| D22B    | 53803 | P 43 | Rated-Curr                       | 10      | 255                     | 0                      |
| D22C    | 53804 | P 44 | Noload-Curr                      | 5       | 255                     | 0                      |
| D22D    | 53805 | P 45 | Carrier freq                     | 30      | 100                     | 10                     |
| D22E    | 53806 | P 46 | Control Mode                     | 0       | 2                       | 0                      |
| D22F    | 53807 | P 47 | PI P-gain                        | 3000    | 9999                    | 0                      |
| D230    | 53808 | P 48 | PI I-gain                        | 100     | 3200                    | 10                     |
| D232    | 53810 | P 50 | PI F-gain                        | 0       | 9999                    | 0                      |
| D233    | 53811 | P 51 | PI output freq. H limit          | 6000    | Max. Freq.              | PI output freq.L limit |
| D234    | 53812 | P 52 | PI output freq. L limit          | 50      | PI output freq. H limit | startFreq.             |
| D235    | 53813 | P 53 | PowerOn disp                     | 0       | 15                      | 0                      |
| D236    | 53814 | P 54 | Rpm disp Gain                    | 100     | 1000                    | 1                      |
| D237    | 53815 | P 55 | AI input filter cont             | 10      | 9999                    | 0                      |
| D238    | 53816 | P 56 | AI min. Input(v/i)               | 0       | AI max. inupt           | 0                      |
| D239    | 53817 | P 57 | AI min. input freq.              | 0       | Max. Freq.              | 0                      |
| D23A    | 53818 | P 58 | AI max. Input(v/i)               | 1000    | 1000                    | AI min. input          |
| D23B    | 53819 | P 59 | AI max. input freq.              | 6000    | Max. Freq.              | 0                      |
| D23C    | 53820 | P 60 | Volume input filter cont         | 10      | 9999                    | 0                      |
| D23D    | 53821 | P 61 | Volume min. input                | 0       | Vol. max. input         | 0                      |
| D23E    | 53822 | P 62 | Volume input min. freq.          | 0       | Max. Freq.              | 0                      |
| D23F    | 53823 | P 63 | Volume max. input                | 1000    | 1000                    | Vol. min. input        |
| D240    | 53824 | P 64 | Volume input max. freq.          | 6000    | Max. Freq.              | 0                      |
| D241    | 53825 | P 65 | Anal speed command lost criteria | 0       | 2                       | 0                      |
| D242    | 53826 | P 66 | P1 define                        | 0       | 24                      | 0                      |

| Address |       | Code | Parameter                              | Initial | Max.       | Min. |
|---------|-------|------|--|---------|------------|------|
| 16bit   | 10bit |      |  |         |            |      |
| D243    | 53827 | P 67 | P2 define                              | 1       | 24         | 0    |
| D244    | 53828 | P 68 | P3 define                              | 2       | 24         | 0    |
| D245    | 53829 | P 69 | P4 define                              | 3       | 24         | 0    |
| D246    | 53830 | P 70 | P5 define                              | 4       | 24         | 0    |
| D247    | 53831 | P 71 | Input T/M status disp                  | 0       | 31         | 0    |
| D248    | 53832 | P 72 | MF input T/M filter cont.              | 3       | 20         | 1    |
| D249    | 53833 | P 73 | Anal. Output item select               | 0       | 3          | 0    |
| D24A    | 53834 | P 74 | Anal. Output level adj.                | 100     | 200        | 10   |
| D24B    | 53835 | P 75 | Det. Freq.                             | 3000    | Max. Freq. | 0    |
| D24C    | 53836 | P 76 | Det. Freq. bandwidth                   | 1000    | Max. Freq. | 0    |
| D24D    | 53837 | P 77 | Relay func. select                     | 17      | 17         | 0    |
| D24E    | 53838 | P 78 | Fault output select.                   | 2       | 7          | 0    |
| D24F    | 53839 | P 79 | Inv No.                                | 1       | 250        | 1    |
| D250    | 53840 | P 80 | Baud rate                              | 2       | 2          | 0    |
| D251    | 53841 | P 81 | Lost command                           | 0       | 2          | 0    |
| D252    | 53842 | P 82 | Determination time of freq. input lost | 10      | 1200       | 1    |
| D253    | 53843 | P 83 | COM speed set                          | 5       | 100        | 2    |
| D254    | 53844 | P 84 | Parity/Stop Bit set                    | 0       | 3          | 0    |
| D255    | 53845 | P 85 | Para Init                              | 0       | 2          | 0    |
| D256    | 53846 | P 86 | Password set                           | 0       | FFFF       | 0    |
| D257    | 53847 | P 87 | Para. Lock                             | 0       | 65535      | 0    |
| D258    | 53848 | P 88 | S/W Version                            | 1       | 65535      | 0    |

### 14.8 Troubleshooting

Refer to Troubleshooting when RS -485 communication error occurs

- If communication is not connected

| Check points  | Corrective measures  |
|---|--|
| Is the power provided to the converter?                           | Provide electric power to the converter.                               |
| Are the connections between converter and computer correct?       | Refer to converter manual.   |
| Does master start to communicate?                                 | Start communication  |
| Is baud rate of computer and inverter correctly set?              | Set the correct value in accordance with“14.3 Installation”.           |
| <sup>1)</sup> Is the data format of user program right?           | Revise User Program.   |
| Is the connection between converter and communication card right? | Check for GF the correct wiring in accordance with“14.3 Installation”. |

<sup>1)</sup> User program refers to the embedded program for MCU or S/W programmed by a user.



**MEMO**

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## 15. Specifications

### 15.1 Technical data

#### ● Input & output ratings

| Type : SV xxx iE5 – x |                  | 001-1                       | 002-1 | 004-1 | 001-2                     | 002-2 | 004-2 |
|-----------------------|------------------|-----------------------------|-------|-------|---------------------------|-------|-------|
| 1)Motor               | [HP]             | 1/8                         | 1/4   | 1/2   | 1/8                       | 1/4   | 1/2   |
|                       | [kW]             | 0.1                         | 0.2   | 0.4   | 0.1                       | 0.2   | 0.4   |
| Output ratings        | 2)Capacity[kVA]  | 0.3                         | 0.6   | 0.95  | 0.3                       | 0.6   | 1.14  |
|                       | Current [A]      | 0.8                         | 1.4   | 2.5   | 0.8                       | 1.6   | 3.0   |
|                       | Output frequency | 0 ~ 200 [Hz]                |       |       |                           |       |       |
|                       | Voltage [V]      | 3) 3phase 200 ~ 230V        |       |       |                           |       |       |
| Input ratings         | Voltage [V]      | 1phase 200 ~ 230 VAC (±10%) |       |       | 3phase 200~230 VAC (±10%) |       |       |
|                       | Frequency        | 50 ~ 60 [Hz] (±5%)          |       |       |                           |       |       |
|                       | Current[A]       | 2.0                         | 3.5   | 5.5   | 1.2                       | 2.0   | 3.5   |

#### ● Control

|                              |  |
|------------------------------|--|
| Control method               | v/f  |
| Frequency setting resolution | Digital command : 0.01Hz<br>Analog command : 0.1Hz (max. fre : 60Hz)                           |
| Frequency accuracy           | Digital command: 0.01% of Max output frequency<br>Analog command: 0.1% of Max output frequency |
| v/f pattern                  | Linear, Squared, v/f   |
| Overload capacity            | 150% per min.  |
| Torque boost                 | Manual/Auto torque boost   |

<sup>1)</sup> Motor shows the max. capacity assuming that 4 poles standard motor is used.

<sup>2)</sup> Ratings are based on 220V.

<sup>3)</sup> Max. output voltage may not be over the power voltage. Output voltage may be set temporarily lower than the power voltage.

● Operation

|                    |   |   |   |
|--------------------|---|---|---|
| Operation mode     |   | Select one of loader/terminal/COM operation(optional)   |   |
| Frequency setting  |   | Analogue: 0 ~ 10[V], 0 ~ 20[mA], loader volume<br>Digital: loader   |   |
| Operation features |   | PID, up-down, 3-wire  |   |
| Input              | Multi-function terminal<br>P1, P2, P3, P4, P5 | NPN / PNP selectable(see page 3-5)  |   |
|                    |   | Functions: FWD/REV RUN, Emergency stop, Fault reset, Jog operation, Multi-step Frequency-High & Low, Frequency UP/Down, 3-wire operation, External trip A & B, PID-Inverter (v/f) operation bypass, Analog Hold, Accel/Decel stop, Up/Down Save Freq. |   |
|                    | Multi-function relay                          | Fault output and inverter status output   | Less than (N.O., N.C.) AC250V 0.3A<br>Less than DC 30V 1A |
| Analog output      |   | 0 ~ 10 Vdc (less than 10mA) : frequency, current, voltage, DC voltage selectable  |   |

● Protective function

|                      |   |
|----------------------|---|
| Trip                 | Over Voltage, low voltage, over current, ground fault detection, inverter overload, overload trip, inverter overheat, condenser overload, output phase loss, overload protection, frequency command loss, hardware fault. |
| Alarm                | Stall prevention  |
| Momentary power loss | Below 15 msec: Continuous operation (should be within rated input voltage, rated output power.)<br>Above 15 msec: Auto restart enable   |

● Structure & Environment

|                          |   |
|--------------------------|---|
| Cooling                  | Natural cooling   |
| Protection type          | Open(IP 20)   |
| Ambient temperature      | -10°C ~ 40°C  |
| Storage temperature      | -20°C ~ 65°C  |
| Ambient humidity         | Less than 90% RH(no condensation)                               |
| Altitude, vibration      | Below 1,000m, below 5.9m/sec <sup>2</sup> (0.6G)                |
| Environmental conditions | Protected from corrosive gas, combustible gas, oil mist or dust |

## WARRANTY

|                      |                               |                                    |  |
|----------------------|-------------------------------|------------------------------------|--|
| <b>Maker</b>         | LS Industrial Systems Co.,Ltd | <b>Installation(start-up) date</b> |  |
| <b>Model No.</b>     | SV-iE5                        | <b>Warranty period</b>             |  |
| <b>Customer info</b> | <b>Name</b>                   |                                    |  |
|                      | <b>Address</b>                |                                    |  |
|                      | <b>Tel.</b>                   |                                    |  |
| <b>Sales office</b>  | <b>Name</b>                   |                                    |  |
|                      | <b>Address</b>                |                                    |  |
|                      | <b>Tel.</b>                   |                                    |  |

### Note

This product has been manufactured through the strict QC control and inspection of LS Industrial Systems. Warranty period is 12 months after installation or 18 months after manufactured when the installation date is unidentified. However, the guarantee term may vary on the sales term.

● In-warranty service information

- ▶ If the defective part has been identified under normal and proper use within the guarantee term, contact your local authorized LS distributor or LS Service center.

● Out-of-warranty service information

- ▶ The guarantee will not apply in the following cases.
- ▶ Troubles are attributable to a user's intentional negligence or carelessness
- ▶ Damage was caused by abnormal voltage and peripheral devices' malfunction (failure)
- ▶ Damage was caused by natural disasters(earthquake, fire, flooding, lightning and etc)
- ▶ When LS nameplate is not attached

## Manual Revision History

| No. | Revision  | Changes       | Version. No | Remarks |
|-----|-----------|---------------|-------------|---------|
| 1   | Jan. 2007 | First edition | 1.10        |         |
|     |           |               |             |         |
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|     |           |               |             |         |



● Sustainable Management

LS Industrial System Co.,Ltd take the highest priority on sustainable management and do our best to preserve the environment of the earth.



● Disposal Recommendation

LS Inverter is intended and designed to preserve the environment. To dispose of it, iron, aluminum, copper, and synthetic resin(product cover) may be separated and reused.



LS values every single customer.  
 Quality and service come first at LSIS.  
 Always at your service, standing for our customers.

[www.lsis.biz](http://www.lsis.biz)

**LS** Industrial Systems

10310000756

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※ LS Industrial Systems constantly endeavors to improve its product so that  
 Information in this manual is subject to change without notice.

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