

Thank you for purchasing LS Variable Frequency Drives!

SAFETY INSTRUCTIONS

To prevent injury and property damage, follow these instructions during the installation and operation of the inverter.

Incorrect operation due to ignoring these instructions may cause harm or damage. The following symbols are used throughout the manual to highlight important information.



DANGER

This symbol indicates death or serious injury can occur if you do not follow instructions.



WARNING

This symbol indicates the possibility of death or serious injury.



CAUTION

This symbol indicates the possibility of damage to the inverter or other components.

- The meaning of each symbol in this manual and on your equipment is as follows.



This is the safety alert symbol.

Read and follow instructions carefully to avoid a dangerous situation.



This symbol alerts the user to the presence of “dangerous voltage” inside the product that might cause bodily harm or electric shock.

- This manual should be placed in a location where it can be accessed by users.
- This manual should be given to the person who actually uses the inverter and is responsible for its maintenance.



WARNING

- **Do not remove the cover while power is applied or the unit is in operation.**
Otherwise, electric shock could occur.
- **Do not operate the inverter with the front cover removed.**
Otherwise, electric shock can occur due to the exposed terminals and bus bars.
- **Do not remove the cover except for periodic inspections or wiring, even if the input power is not applied.**
Otherwise, electric shock can occur due to accessing capacitor banks.
- **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 30VDC).**
Otherwise, electric shock could occur.
- **Operate the switches with dry hands.**
Otherwise, electric shock could occur.
- **Do not use the cable when its insulating tube is damaged.**
Otherwise, electric shock could occur.
- **Do not subject the cables to scratches, excessive stress, heavy loads or pinching.**
Otherwise, electric shock could occur.



CAUTION

- **Install the inverter on a non-flammable surface. Do not place flammable materials nearby.**
Otherwise, fire could occur.
- **Disconnect the input power if the inverter has been damaged.**
Otherwise, it could result in a secondary accident and fire.
- **Do not touch the inverter after shutting down or disconnecting it. It will remain hot for a couple of minutes.**
Otherwise, bodily injuries such as skin-burn or damage could occur.
- **Do not apply power to a damaged inverter or to an inverter with parts missing even if the installation is complete.**
Otherwise, electric shock could occur.
- **Do not allow lint, paper, wood chips, dust, metallic chips or other foreign material into the drive.**
Otherwise, fire or accident could occur.

- Equipment is intended for installation in closed electrical operating areas only
- On User's Manual it shall be made clear that maintenance adjustments should be made by qualified personnel.

OPERATING PRECAUTIONS

(1) Handling and installation

- The iP5A series inverter can be heavy. Lift according to the weight of the product. Use a hoist or crane to move and install the iP5A series inverter if necessary. Failure to do so may result in personal injury or damage to the inverter.
- Do not stack the inverter boxes higher than the number recommended.
- Install the inverter according to instructions specified in this manual.
- Do not open the cover during delivery.
- Do not place heavy items on the inverter.
- Check that the inverter mounting orientation is correct.
- Do not drop the inverter, or subject it to hard impact.
- Verify the ground impedance 100ohm or less for 230 V Class inverters and 10ohm or less for 460V class inverters.
- Take protective measures against ESD (Electrostatic Discharge) before touching the pcb boards during inspection, installation or repair.
- The inverter is designed for use under the following environmental conditions :

| | | |
|-------------|----------------------|--|
| Environment | Ambient temp. | - 10 ~ 50 °C (14°F ~ 122°F) Decrease 2% of rated current for every 1 °C increase in above 40°C. |
| | Relative humidity | 90% Relative Humidity or less (non-condensing) |
| | Storage temp. | - 20 ~ 65 °C (-4°F ~ 149°F) |
| | Location | Protected from corrosive gas, combustible gas, oil mist or dust (Pollution degree 2 environment) |
| | Altitude, Vibration | Max. 1,000m (3,300ft) above sea level, Max. 5.9m/sec ² (0.6G) or less |
| | Atmospheric pressure | 70 ~ 106 kPa (20.67 in Hg ~ 31.3 in Hg) |

(2) Wiring

- Do not connect power factor correction capacitors, surge suppressors, or RFI filter to the output of the inverter.
- The connection orientation of the motor output cables U, V, W will affect the direction of rotation of the motor. Verify correct wiring before starting inverter.
- Incorrect terminal wiring could result in inverter and/or equipment damage.
- Reversing the polarity (+/-) of the terminals could damage the inverter.
- Only authorized personnel familiar with LS inverter should perform wiring and

inspections.

- Always install the inverter before wiring. Otherwise, electric shock or bodily injury can occur.
- Wire insulation recommended for main power circuits.(Refer to Appendix A)

(3) Trial run

- Check all parameters during operation. Parameter values might require adjustment depending on the application.
- Always apply voltage within the permissible range of each terminal as indicated in this manual. Otherwise, inverter damage may result.
- Current hunting can be occurred in the low speed territory during testing. It occurs where the capacity is above 110kW with no-load and the axis is not connected. The current hunting have a gap according to the motor characteristic. It will be disappeared when the load is connected and it is not the indication of abnormal condition. If the hunting is occurred seriously, please stop the testing and operates with the load.

(4) Operation precautions

- When the Auto restart function is selected, the inverter will restart after a fault has occurred.
- The Stop key on the keypad can only be used to stop the inverter when keypad control is enabled. Install a separate emergency stop switch if necessary.
- If a fault reset is made with the run command and /or reference signal present, a sudden start will occur. Check that the run command and /or reference signal is turned off in advance of resetting any faults. Otherwise an accident could occur.
- Do not modify the inverter.
- Depending on the motor specifications and user ETH overload settings, the motor may not be protected by electronic thermal function of inverter.
- The operation of the inverter is intended to be controlled by either keypad command or control input signals. Do not use a magnetic contactor or any other device that routinely disconnects the inverter and reconnects the inverter to the input supply power for the purpose of starting and stopping the motor.
- A noise filter may be installed to reduce the effect of electromagnetic interference. Otherwise nearby electronic equipment may be affected.
- In cases with input voltage unbalances, install an AC input reactor.
- Power Factor capacitors and generators may become overheated and damaged due to harmonics created by the inverter.
- Use an insulation-rectified motor or take measures to suppress the micro surge voltage when driving 460V class motor with inverter. A micro surge voltage attributable to wiring constant is generated at motor terminals, and may deteriorate insulation and damage motor.
- Before operating unit and prior to user programming, reset user parameters to default settings.

- The Inverter can be set to operate a motor at high-speeds. Verify the speed capability of motor and machinery prior to operating inverter.
- Holding torque is not produced when using the DC-Brake function. Install separate equipment when holding torque is required.

(5) Fault prevention precautions

- If required, provide a safety backup such as an emergency mechanical brake to prevent any hazardous conditions if the inverter fails during operation.

(6) Maintenance, inspection and parts replacement

- Do not megger (hi-pot or insulation resistance) test the power or control circuit of the inverter.
- Refer to 'Chapter 6 Troubleshooting and Maintenance' and parts replacement details.

(7) Disposal

- Handle the inverter as an industrial waste when disposing of it.

(8) General instructions

Many of the diagrams and drawings in this instruction manual show the inverter without a cover. Prior to operating the unit, be sure to restore covers and circuit protection according to specifications.

(9) Protective requirements

The accessible connections and parts listed below are of protective class 0, it means that the protection of these circuits relies only upon basic insulation and becomes hazardous in the event of a failure of the basic insulation. Therefore, devices connected to these circuits must provide electrical-shock protection as if the device was connected to supply mains voltage. In addition, during installation these parts must be considered, in relation with electrical-shock, as supply mains voltage circuits.

This applies to the following circuits :

STARTING CONTACT FUNCTION SELECT

→ M1, M2, M3, FX [M7], RX [M8], JOG [M6], BX [M5], RST [M4], CM, 24

ANALOG FREQUENCY SETTING

→ V+, V-, I, A0, B0, 5G (~30kW), CM(37kW~)

EXTERNAL MOTOR THERMAL DETECTION

→ NT (~30kW), ET (37kW ~), 5G

BUILT-IN RS485 TERMINAL

→ C+, C-, CM

ANALOG OUTPUT

→ S0, S1, 5G

CONTACT


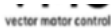
→ 3A, 3C, 3B, "A1~4, C1~4"

CONSOLE PORT

FAN CIRCUITS

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Read and understand this manual before installing, operating or servicing this inverter. The inverter must be installed according to this manual.

The following conventions are used to indicate safety messages in this manual. Failure to heed these messages could result in serious or possibly even fatal injury or damage to the products or to related equipment and systems.

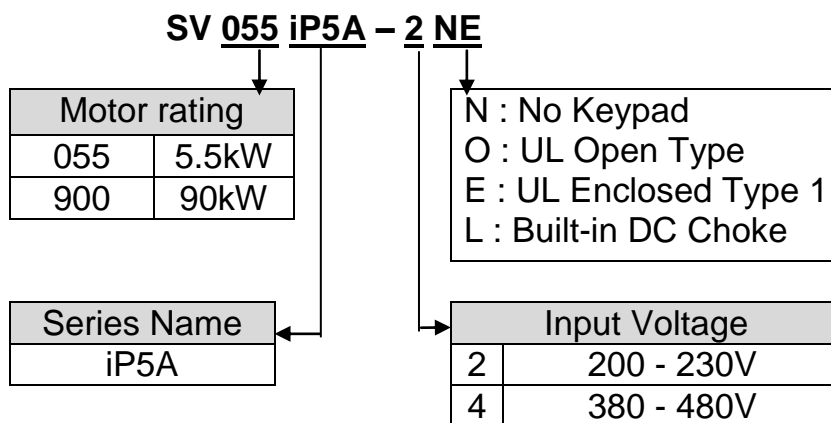
CHAPTER 1 - BASIC INFORMATION

1.1 Inspection

- Remove the inverter from its packing and inspect its exterior for shipping damage. If damage is apparent notify the shipping agent and your LSIS sales representative.
- Remove the cover and inspect the inverter for any apparent damage or foreign objects. Ensure that all mounting hardware and terminal connection hardware is properly seated, securely fastened, and undamaged.
- Check the nameplate on the iP5A inverter. Verify that the inverter unit is the correct horsepower and input voltage for the application.
- Inverter control is applied for AC asynchronous (Induction Motor) Synchronous motor is excluded.

1.1.1 Inverter model number

The numbering system of the inverter is as shown below.



- * UL Open type : UL Open type product must be mounted on the panel in a house.
- * UL Enclosed type 1 : UL Enclosed type1 product can be mounted without the panel in a house.

1.1.2 Installation


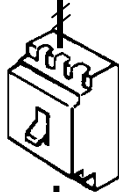
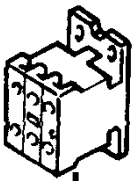
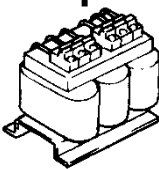

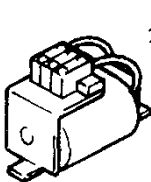
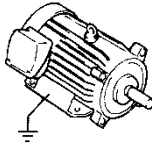
To operate the inverter reliably, install the inverter in a proper place with the correct direction and with the proper clearances.

1.1.3 Wiring

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.

1.2 Basic configuration

The following devices are required to operate the inverter. Proper peripheral devices must be selected and correct connections made to ensure proper operation. An incorrectly applied or installed inverter can 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 Source Supply | Use a power source with a voltage within the permissible range of inverter input power rating. |
|  | MCCB or Earth leakage circuit breaker (ELB) | Select circuit breakers or fuses in accordance with applicable national and local codes. |
|  | Inline Magnetic Contactor | Install if necessary. When installed, do not use it for the purpose of starting or stopping the drive. It can reduce the life of inverter. |
|  | AC Reactor | An AC reactor can be used when the harmonics are to be reduced and power factor is to be improved. One must be used when the inverter is installed on a power source with greater than 10 times the KVA rating of the drive. |
|  | AC Drive (SV-iP5A) Installation and wiring | To reliably operate the drive, install the inverter in the proper orientation and with proper clearances. Please pay attention, if the inverter is installed in the panel. Incorrect terminal wiring could result in the equipment damage. Control wire of control circuit must be wired separately with main circuit wire to reduce the electric noise. |
|  | DC Reactor | A DC reactor may be used together with or in place of an AC reactor if necessary to reduce harmonics or improve power factor. |
|  | Motor | Do not connect power factor capacitors, surge arrestors or radio noise filters to the output side of the inverter. |

CHAPTER 2 - SPECIFICATION

2.1 200~230V Class (0.75~30kW / 1~40HP)

| Model Number (SVxxxiP5A-2) | | | | 008 | 015 | 022 | 037 | 055 | 075 | 110 | 150 | 185 | 220 | 300 |
|-------------------------------|------------------|--------------------------------|----|-------------------------------|--------------|--------------|---------------|---------------|-------------|-------------|-------------------------------|----------------|--------------|--------------|
| Capacity [kVA] ⁽¹⁾ | | | | 1.9 | 3.0 | 4.6 | 6.1 | 9.1 | 12.2 | 17.5 | 22.9 | 28.2 | 33.5 | 43.8 |
| Output ratings | Fan or pump load | Motor rating ⁽²⁾ | HP | 1 | 2 | 3 | 5 | 7.5 | 10 | 15 | 20 | 25 | 30 | 40 |
| | | | kW | 0.75 | 1.5 | 2.2 | 3.7 | 5.5 | 7.5 | 11 | 15 | 18.5 | 22 | 30 |
| | | Current [A] (110% overload) | | 5 | 8 | 12 | 16 | 24 | 32 | 46 | 60 | 74 | 88 | 115 |
| | | 110% 1Minute (Normal Duty) | | | | | | | | | | | | |
| | General load | Motor rating ⁽²⁾ | HP | 0.5 | 1 | 2 | 3 | 5 | 7.5 | 10 | 15 | 20 | 25 | 30 |
| | | | kW | 0.4 | 0.75 | 1.5 | 2.2 | 3.7 | 5.5 | 7.5 | 11 | 15 | 18.5 | 22 |
| | | Current [A] (150% overload) | | 2.5 | 5 | 8 | 12 | 17 | 23 | 33 | 44 | 54 | 68 | 84 |
| | | 150% 1 Minute (Heavy Duty) | | | | | | | | | | | | |
| | Frequency | | | 0.01 ~ 120 Hz | | | | | | | | | | |
| | Voltage | | | 200 ~ 230 V ⁽³⁾ | | | | | | | | | | |
| Input ratings | Voltage | | | 3φ 200 ~ 230 V (-15% ~ +10 %) | | | | | | | | | | |
| | Frequency | | | 50/60 Hz (± 5 %) | | | | | | | | | | |
| Protection degree | | | | IP20 / UL Type1 | | | | | | | IP00 / UL Open ⁽³⁾ | | | |
| Weight [kg (lbs.)] | | | | 4.1 (9.0) | 4.2 (9.3) | 4.2 (9.3) | 4.9 (10.8) | 4.9 (10.8) | 6 (13.2) | 6 (13.2) | 13 (28.7) | 13.5 (29.8) | 20 (44.1) | 20 (44.1) |

2.2 380~480V Class (0.75~30kW / 1~40HP)

| Model Number (SVxxxIP5A-4) | | | | 008 | 015 | 022 | 037 | 055 | 075 | 110 | 150 | 185 | 220 | 300 |
|-------------------------------|-------------------|--|----|-------------------------------|---------------|---------------|---------------|---------------|-------------|-------------|-------------------------------|----------------|----------------|----------------|
| Capacity [kVA] ⁽¹⁾ | | | | 2.0 | 3.2 | 4.8 | 6.4 | 9.6 | 12.7 | 19.1 | 23.9 | 31.1 | 35.9 | 48.6 |
| Output ratings | Fan or pump load | Motor rating ⁽²⁾ | HP | 1 | 2 | 3 | 5 | 7.5 | 10 | 15 | 20 | 25 | 30 | 40 |
| | | | kW | 0.75 | 1.5 | 2.2 | 3.7 | 5.5 | 7.5 | 11 | 15 | 18.5 | 22 | 30 |
| | | Current [A] (110% overload) | | 2.5 | 4 | 6 | 8 | 12 | 16 | 24 | 30 | 39 | 45 | 61 |
| | | 110% 1Minute (Normal Duty) | | | | | | | | | | | | |
| | General load | Motor rating ⁽²⁾ | HP | 0.5 | 1 | 2 | 3 | 5.5 | 7.5 | 10 | 15 | 20 | 25 | 30 |
| | | | kW | 0.4 | 0.75 | 1.5 | 2.2 | 3.7 | 5.5 | 7.5 | 11 | 15 | 18.5 | 22 |
| | | Current [A]/ Built-in DCL Type (150% overload) | | 1.25 | 2.5 | 4 | 6 | 8.8 | 12 | 16 | 22/24 | 28/30 | 34/39 | 44/45 |
| | | 150% 1 Minute (Heavy Duty) | | | | | | | | | | | | |
| | Frequency | | | 0.01 ~ 120 Hz | | | | | | | | | | |
| | Voltage | | | 380 ~ 480 V ⁽³⁾ | | | | | | | | | | |
| Input ratings | Voltage | | | 3φ 380 ~ 480 V (-15% ~ +10 %) | | | | | | | | | | |
| | Frequency | | | 50/60 Hz (± 5 %) | | | | | | | | | | |
| Protection degree | | | | IP20 / UL Type1 | | | | | | | IP00 / UL Open ⁽³⁾ | | | |
| Weight [kg (lbs.)] | Standard Type | | | 4.1 (9.04) | 4.2 (9.26) | 4.2 (9.26) | 4.9 (10.8) | 4.9 (10.8) | 6 (13.2) | 6 (13.2) | 12.5 (27.6) | 13 (28.7) | 20 (44.1) | 20 (44.1) |
| | Built-in DCL Type | | | - | - | - | - | - | - | - | 19.5 (42.9) | 19.5 (42.9) | 26.5 (58.3) | 26.5 (58.3) |

2.3 380 ~ 480V Class (37~90kW / 50~125HP)

| Model Number(SVxxxiP5A-4) | | | | 370 | 450 | 550 | 750 | 900 |
|-------------------------------|------------------|--------------------------------|----------------------------|-------------------------------|----------|----------|-----------|-----------|
| Capacity [kVA] ⁽¹⁾ | | | | 59.8 | 72.5 | 87.6 | 121.1 | 145.8 |
| Output ratings | Fan or pump load | motor rating ⁽²⁾ | HP | 50 | 60 | 75 | 100 | 125 |
| | | | kW | 37 | 45 | 55 | 75 | 90 |
| | | Current [A] (110% overload) | | 75 | 91 | 110 | 152 | 183 |
| | | 110% 1 Minute (Normal Duty) | | | | | | |
| | General load | motor rating ⁽²⁾ | HP | 40 | 50 | 60 | 75 | 100 |
| | | | kW | 30 | 37 | 45 | 55 | 75 |
| | | Current [A] (150% overload) | | 61 | 75 | 91 | 110 | 152 |
| | | 150% 1 Minute (Heavy Duty) | | | | | | |
| | Frequency | | | 0.01 ~ 120 Hz | | | | |
| Voltage | | | 380 ~ 480 V ⁽³⁾ | | | | | |
| Input ratings | Voltage | | | 3φ 380 ~ 480 V (-15% ~ +10 %) | | | | |
| | Frequency | | | 50/60 Hz (± 5 %) | | | | |
| Protection degree | | | | IP00 / UL Open(3) | | | | |
| Weight [kg (lbs.)] | | Standard Type | | 27(59.5) | 27(59.5) | 29(64) | 42(92.6) | 43(94.8) |
| | | Built-in DCL Type | | 39(86) | 40(88.2) | 42(92.6) | 67(147.4) | 68(149.9) |

2.4 380 ~ 480V Class (110~450kW / 150~600HP)

| Model Number(SVxxxiP5A-4) | | | | 1100 | 1320 | 1600 | 2200 | 2800 | 3150 | 3750 | 4500 | |
|-------------------------------|------------------|--------------------------------|----|-------------------------------|------|------|------|------|-----------------|------|------|--|
| Capacity [kVA] ⁽¹⁾ | | | | 178 | 210 | 259 | 344 | 436 | 488 | 582 | 699 | |
| Output ratings | Fan or pump load | Motor rating ⁽²⁾ | HP | 150 | 200 | 250 | 300 | 350 | 400 | 500 | 600 | |
| | | | kW | 110 | 132 | 160 | 220 | 280 | 315 | 375 | 450 | |
| | | Current [A] (110% overload) | | 223 | 264 | 325 | 432 | 547 | 613 | 731 | 877 | |
| | | 110% 1 Minute (Normal Duty) | | | | | | | | | | |
| | General load | Motor rating ⁽²⁾ | HP | 125 | 150 | 200 | 250 | 300 | 350 | 400 | 500 | |
| | | | kW | 90 | 110 | 132 | 160 | 220 | 280 | 315 | 375 | |
| | | Current [A] (150% overload) | | 183 | 223 | 264 | 325 | 432 | 547 | 613 | 731 | |
| | | 150% 1 Minute (Heavy Duty) | | | | | | | | | | |
| | Frequency | | | 0.01 ~ 120 Hz | | | | | | | | |
| | Voltage | | | 380 ~ 480 V ⁽³⁾ | | | | | | | | |
| Input ratings | Voltage | | | 3φ 380 ~ 480 V (15% ~ +10 %) | | | | | | | | |
| | Frequency | | | 50/60 Hz (± 5 %) | | | | | | | | |
| Protection degree | | | | IP00 / UL Open ⁽⁴⁾ | | | | | | | | |
| DCL (DC Choke) | | | | Built-in | | | | | External Option | | | |

| | | | | | | | | |
|--------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| Weight [kg (lbs.)] | 101 (222.7) | 101 (222.7) | 114 (251.3) | 200 (441.9) | 200 (441.9) | 243 (535.7) | 380 (837.7) | 380 (837.7) |
|--------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|

Common Specifications

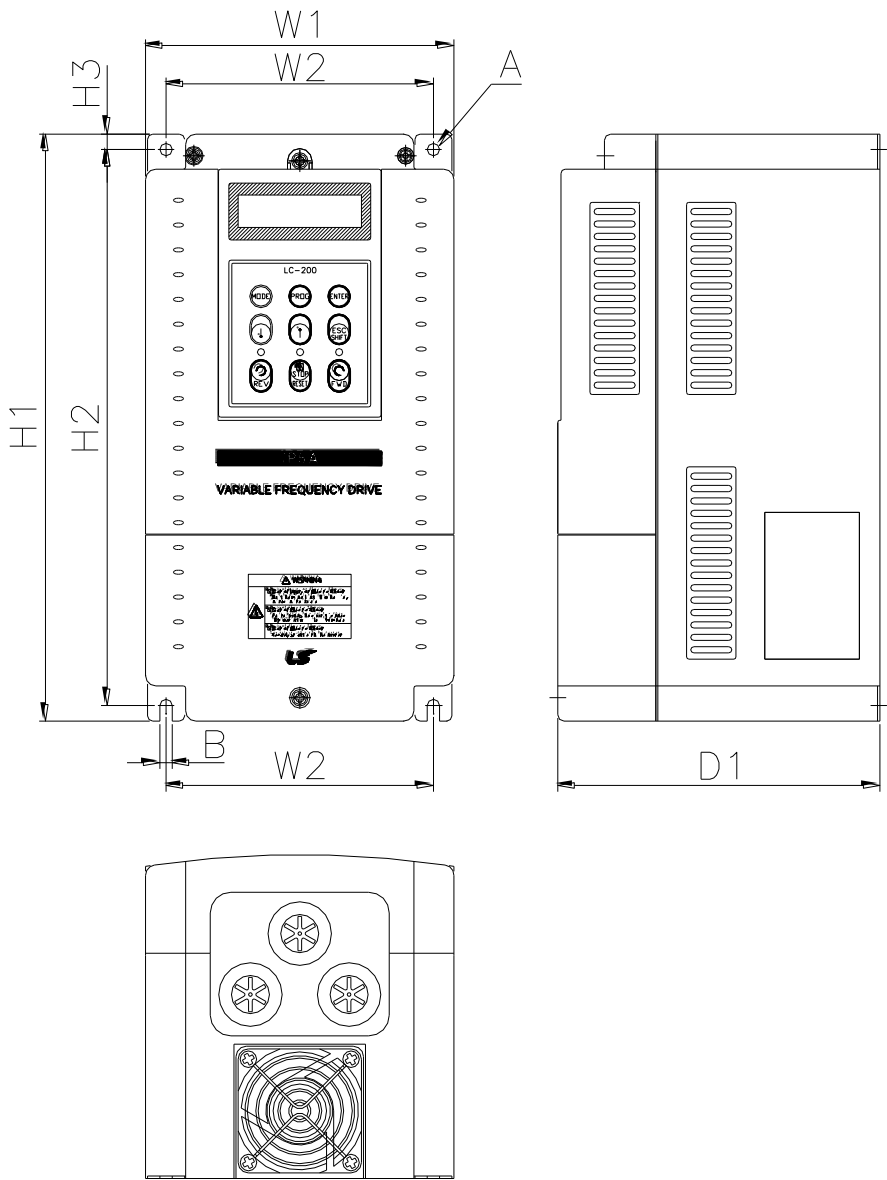
| | | | |
|----------------------|------------------------------|--|---|
| Cooling method | | Forced air cooling (Self-cooling for below 1.5kW-2, 1.5kW-4) | |
| Short Circuit Rating | | 65kA, suitable for use on a circuit capable of delivering not more than 100,000 RMS Symmetrical amperes, 240 (or 480V) volts maximum | |
| Agency Approvals | | UL and cUL listed, CE marked | |
| CONTROL | Control Method | V/F, Sensorless Vector, Slip Compensation, Easy Start Selectable | |
| | Frequency Setting Resolution | Digital Reference: 0.01 Hz (Below 100 Hz), 0.1 Hz (Over 100 Hz) Analog Reference: 0.01 Hz / 60 Hz | |
| | Frequency Accuracy | Digital: 0.01 % of Max. Output Frequency Analog: 0.1 % of Max. Output Frequency | |
| | V/F Ratio | Linear, Squared Pattern, User V/F | |
| | Overload Capacity | 110 % per 1 min, 120% per 1 min ⁽⁵⁾ | |
| | Torque Boost | Manual Torque Boost (0 ~ 15 % settable), Auto Torque Boost | |
| OPERATION | Operation Method | Keypad / Terminal / Communication Operation | |
| | Frequency Setting | Analog: 0 ~ 12V / -12V ~ 12V / 4 ~ 20mA or 0~20mA/ Pulse / Ext-PID Digital: Keypad | |
| | Input Signal | Start Signal | Forward, Reverse |
| | | Multi-Step | Up to 18 Speeds can be set including Jog (Use Programmable Digital Input Terminal,Including Jog/Dwell) |
| | | Multi Step Accel/Decel Time | 0.1~ 6,000 sec, Max 4 types can be set via Multi- Function Terminal. Accel/Decel Pattern: Linear, U-Curve, S-Curve Selectable |
| | | Emergency Stop | Interrupts the Output of Inverter |
| | | Jog | Jog Operation |
| | | Fault Reset | Trip Status is Reset when Protection Function is Active. |
| | Output signal | Operating Status | Frequency Detection Level, Overload Alarm, Stalling, Over Voltage, Low Voltage, Inverter Overheating/ Running/ Stopping/ Constant running, Inverter By-Pass, Speed Searching |
| | | Fault Output | Contact Output (3A, 3C, 3B) – AC 250V 1A, DC 30V 1A |
| | | Indicator | Choose 2 from Output Frequency, Output Current, Output Voltage, DC Link Voltage (Output Voltage: 0 ~ 10V) |
| | Operation Function | | DC Braking, Frequency Limit, Frequency Jump, 2 nd Function, Slip Compensation, Reverse Rotation Prevention, Auto Restart, Inverter By-Pass, Auto-Tuning, PID Control, Flying Start, Safety Stop, Flux Braking, Low leakage, Pre-PID, Dual-PID, MMC, Easy Start, Pre-heater |

| | | | |
|-------------|----------------------|-----------------------|---|
| PROTECTION | Inverter Trip | | Over Voltage, Low Voltage, Over Current, Ground Fault, Inverter Overheat, Motor Overheat, Output Phase Open, Overload Protection, External Fault 1, 2, Communication Error, Loss of Speed Command, Hardware Fault, Option Fault, etc. |
| | Inverter Alarm | | Stall Prevention, Overload Alarm, Thermal Sensor Fault |
| DISPLAY | Keypad | Operation Information | Output Frequency, Output Current, Output Voltage, Frequency Set Value, Operating Speed, DC Voltage, Integrating Wattmeter, Fan ON time, Run-time, Last Trip Time |
| | | Trip Information | Trips Indication when the Protection Function activates. Max. 5 Faults are saved. Last Trip Time. |
| ENVIRONMENT | Ambient Temperature | | -10℃ ~ 50℃ (14°F ~ 104°F) (Use loads less than 80% at 50℃) |
| | Storage Temperature | | -20℃ ~ 65℃ (14°F ~ 149°F) |
| | Ambient Humidity | | Less Than 90 % RH Max. (Non-Condensing) |
| | Altitude – Vibration | | Below 1,000m (3,300ft), Below 5.9m/sec ² (0.6g) |
| | Application Site | | Pollution degree 2, No Corrosive Gas, Combustible Gas, Oil Mist, or Dust |

- (1) Rated capacity ($\sqrt{3} \times V \times I$) is based on 220V for 200V class and 460V for 400V class.
- (2) Indicates the maximum applicable capacity when using a 4-Pole standard motor.
- (3) IP20 or UL Enclosed Type1 can be provided by the option.
- (4) IP20 or UL Enclosed Type1 is not provided.
- (5) Overload rating 120%, 1 min is based on ambient 25℃.

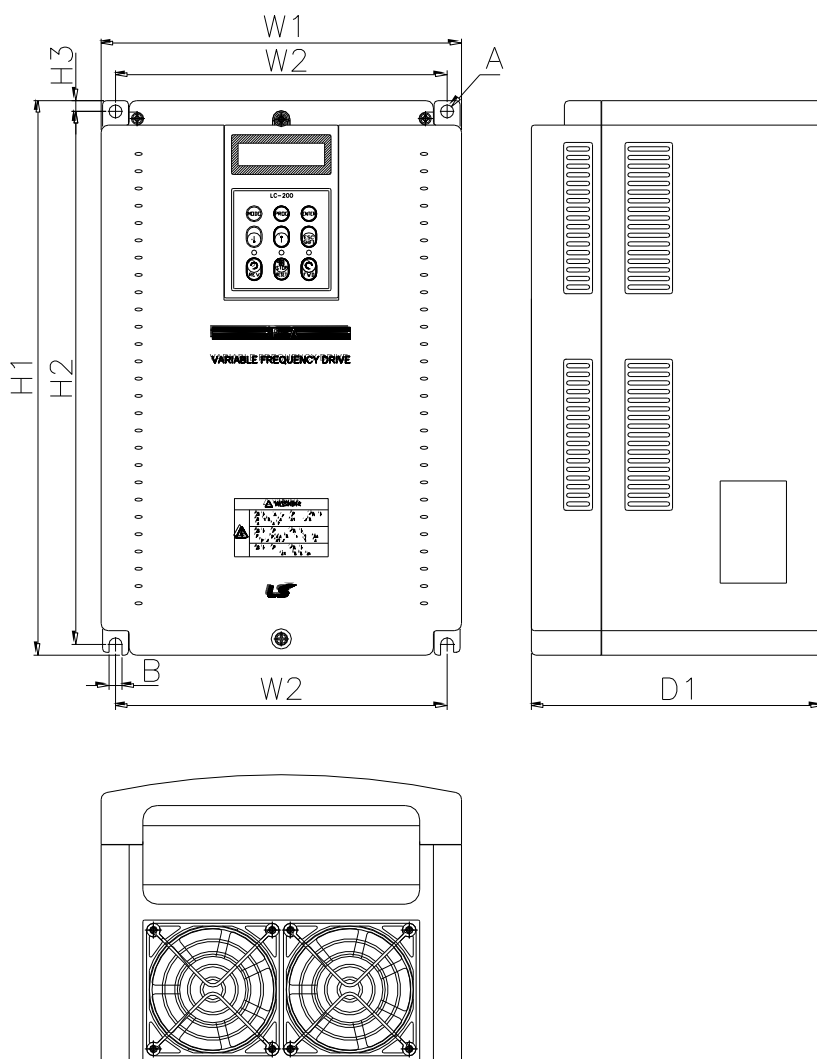
2.5 Dimensions

1) SV008~055iP5A (200/400V Class)



| mm (inches) | | | | | | | | | Enclosure Type |
|-----------------------|---------------|---------------|----------------|----------------|---------------|-------------|-------------|-----------------|-------------------|
| Model | W1 | W2 | H1 | H2 | H3 | A | B | D1 | |
| SV008 ~055iP5A-2/4 | 150 (5.91) | 130 (5.12) | 284 (11.18) | 269 (10.69) | 7.5 (0.29) | 6 (0.23) | 6 (0.23) | 156.5 (6.16) | IP20 UL Type 1 |

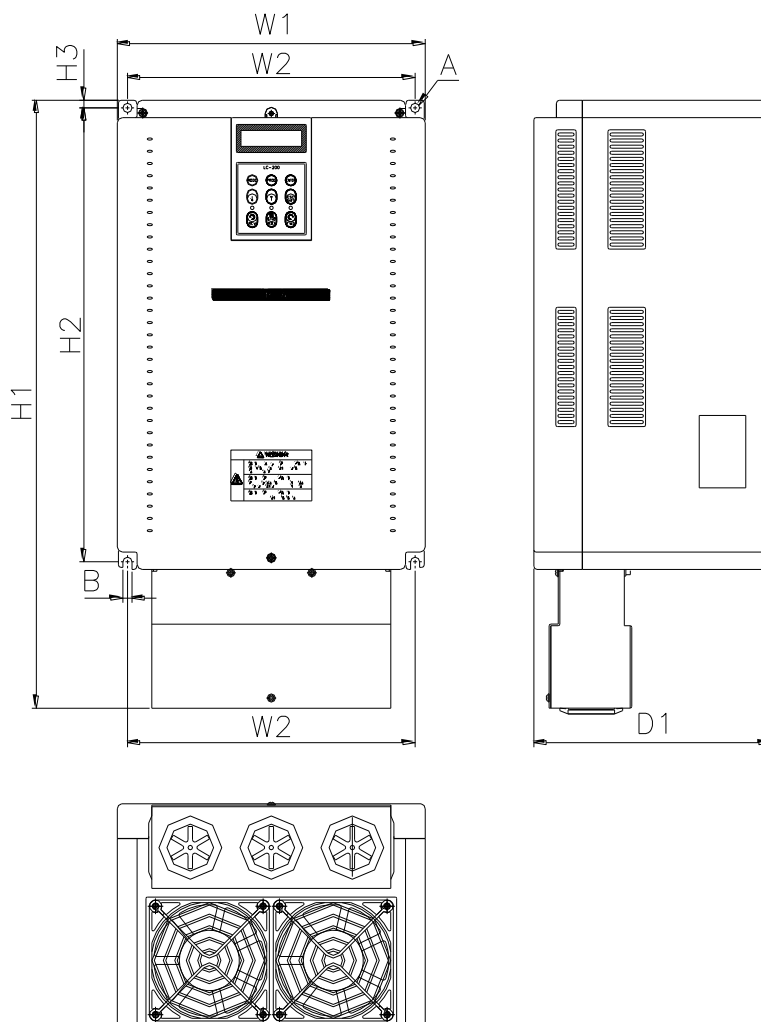
2) SV075~300iP5A (200/400V Class)



mm (inches)

| Model | W1 | W2 | H1 | H2 | H3 | D1 | A | B | Enclosure Type |
|---------------|----------------|----------------|----------------|----------------|---------------|---------------|-------------|-------------|-------------------|
| SV075iP5A-2/4 | 200 (7.87) | 180 (7.09) | 284 (11.18) | 269 (10.69) | 7.5 (0.29) | 182 (7.16) | 6 (0.23) | 6 (0.23) | IP20 UL Type 1 |
| SV110iP5A-2/4 | 200 (7.87) | 180 (7.09) | 284 (11.18) | 269 (10.69) | 7.5 (0.29) | 182 (7.16) | 6 (0.23) | 6 (0.23) | IP20 UL Type 1 |
| SV150iP5A-2/4 | 250 (9.84) | 230 (9.06) | 385 (15.16) | 370 (14.57) | 7.5 (0.29) | 201 (7.91) | 9 (0.35) | 9 (0.35) | IP00 UL Open |
| SV185iP5A-2/4 | 250 (9.84) | 230 (9.06) | 385 (15.16) | 370 (14.57) | 7.5 (0.29) | 201 (7.91) | 9 (0.35) | 9 (0.35) | IP00 UL Open |
| SV220iP5A-2/4 | 304 (11.97) | 284 (11.18) | 460 (18.11) | 445 (17.52) | 7.5 (0.29) | 234 (9.21) | 9 (0.35) | 9 (0.35) | IP00 UL Open |
| SV300iP5A-2/4 | 304 (11.97) | 284 (11.18) | 460 (18.11) | 445 (17.52) | 7.5 (0.29) | 234 (9.21) | 9 (0.35) | 9 (0.35) | IP00 UL Open |

3) SV150~300iP5A (UL Type 1 or UL Open Type with Conduit Option used, 200V/400V Class)

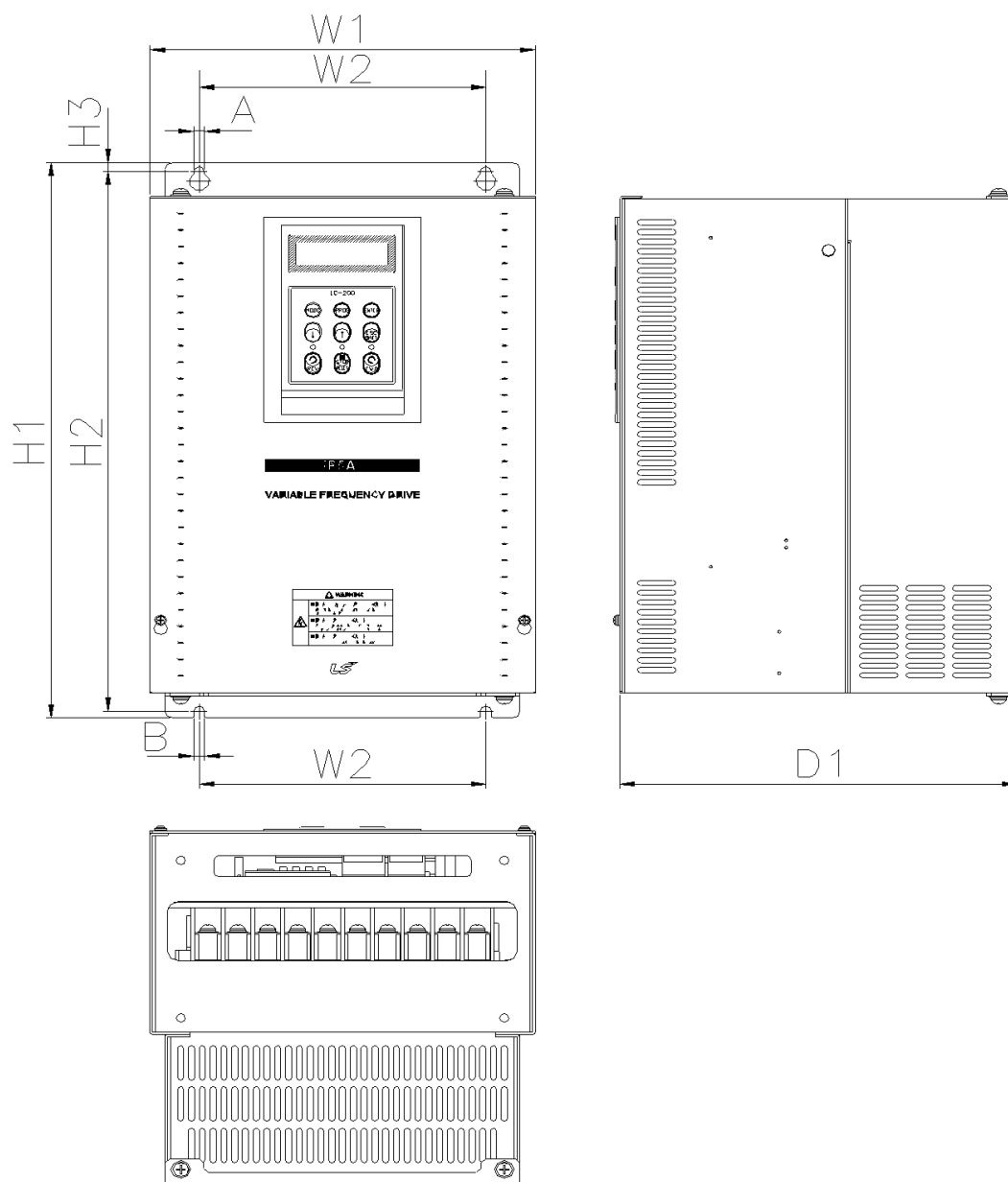


mm (inches)

| Model | W1 | W2 | H1 | H2 | H3 | D1 | A | B | Enclosure Type |
|---------------|----------------|----------------|------------------|----------------|---------------|---------------|-------------|-------------|-------------------|
| SV150iP5A-2/4 | 250 (9.84) | 230 (9.06) | 451.1 (17.75) | 370 (14.57) | 7.5 (0.29) | 201 (7.91) | 9 (0.35) | 9 (0.35) | IP20 UL Type 1 |
| SV185iP5A-2/4 | 250 (9.84) | 230 (9.06) | 451.1 (15.16) | 370 (14.57) | 7.5 (0.29) | 201 (7.91) | 9 (0.35) | 9 (0.35) | IP20 UL Type 1 |
| SV220iP5A-2/4 | 304 (11.97) | 284 (11.18) | 596.1 (23.46) | 445 (17.52) | 7.5 (0.29) | 234 (9.21) | 9 (0.35) | 9 (0.35) | IP20 UL Type 1 |
| SV300iP5A-2/4 | 304 (11.97) | 284 (11.18) | 596.1 (18.11) | 445 (17.52) | 7.5 (0.29) | 234 (9.21) | 9 (0.35) | 9 (0.35) | IP20 UL Type 1 |

Note) Mounting NEMA 1 conduit option to the 15~90Kw(20~125HP) Open Type meets NEMA 1 but does not comply with UL Enclosed Type 1. To that end, please purchase UL Type 1 product.

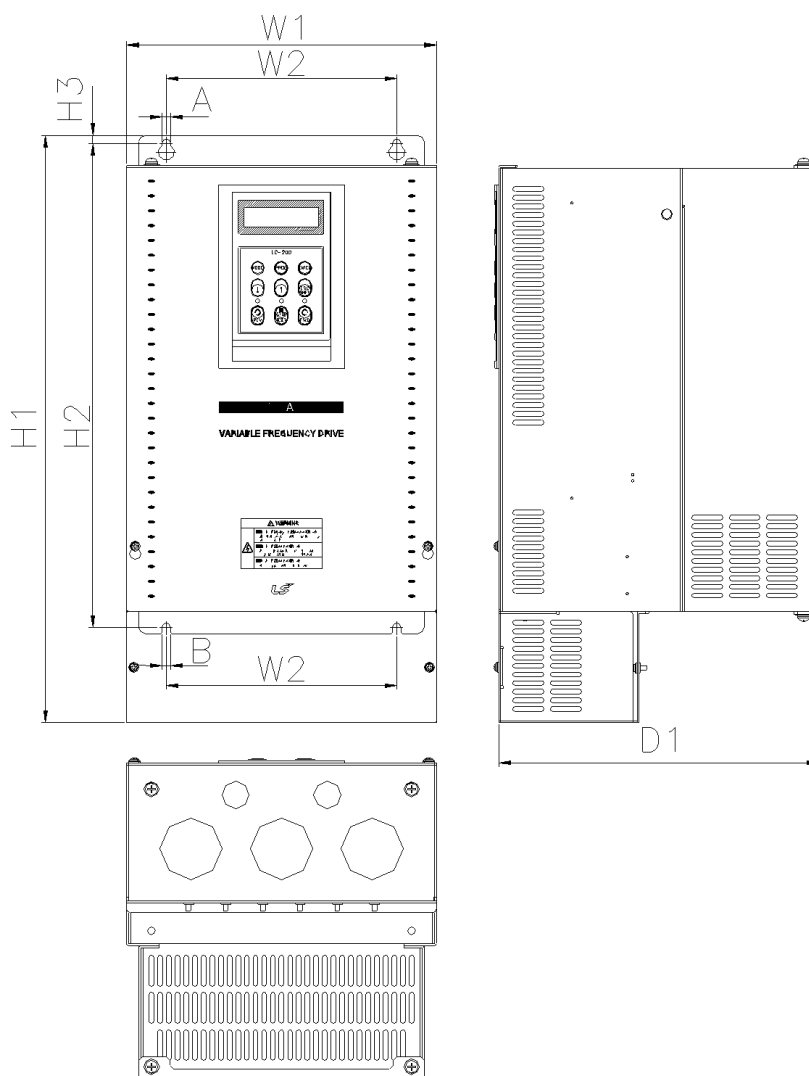
4) SV150 ~ SV300 iP5A (400V Class) – Built-in DCL Type



mm (inches)

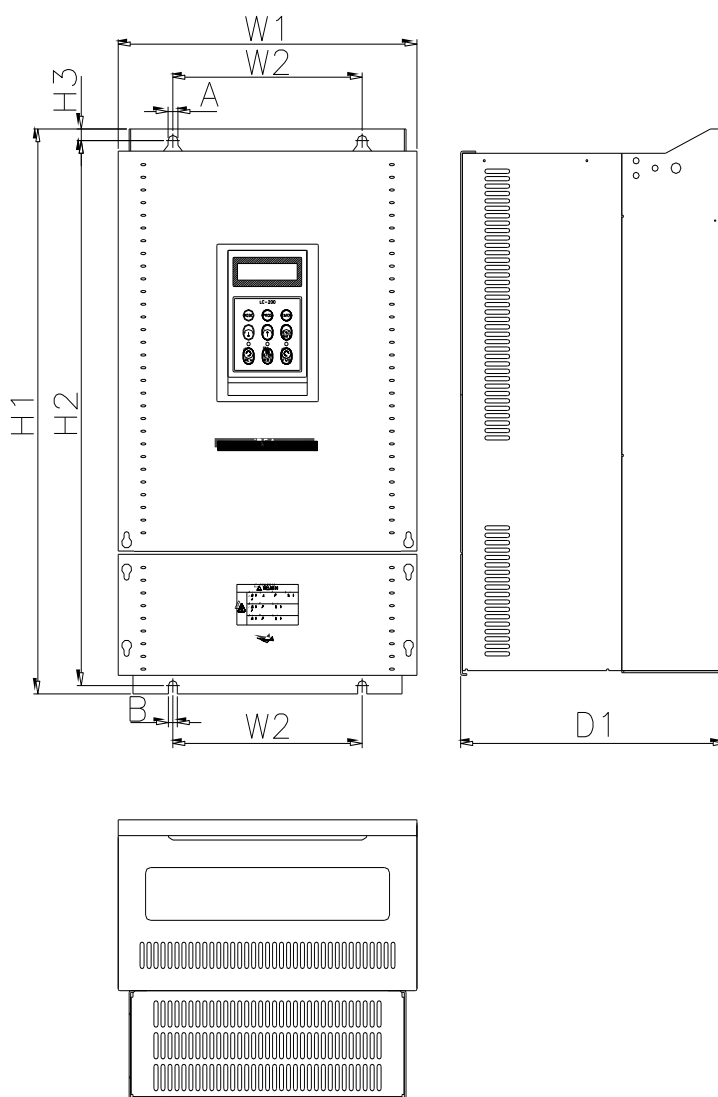
| Model | W1 | W2 | H1 | H2 | H3 | D1 | A | B | Enclosure Type |
|---|----------------|---------------|------------------|------------------|---------------|------------------|-------------|-------------|-------------------|
| SV150, 185 iP5A-4L (Built-in DCL) | 250 (9.84) | 186 (7.32) | 403.5 (15.88) | 392 (15.43) | 6.5 (0.25) | 261.2 (10.28) | 7 (0.27) | 7 (0.27) | IP00 UL Type 1 |
| SV220, 300 iP5A-4L (Built-in DCL) | 260 (10.23) | 220 (8.66) | 480 (18.89) | 468.5 (18.44) | 6.5 (0.25) | 268.6 (10.57) | 7 (0.27) | 7 (0.27) | IP20 UL Type 1 |

5) SV150 ~ SV300 iP5A (Built-in DCL Type, UL Type 1 or UL Open Type with Conduit Option used, 400V Class)



| Model | W1 | W2 | H1 | H2 | H3 | D1 | A | B | mm (inches) |
|--|----------------|---------------|------------------|------------------|---------------|------------------|-------------|-------------|-------------------|
| | | | | | | | | | Enclosure Type |
| SV150, 185iP5A-4L (Built-in DCL Type) | 250 (9.84) | 186 (7.32) | 475.5 (18.72) | 392 (15.43) | 6.5 (0.25) | 261.2 (10.28) | 7 (0.27) | 7 (0.27) | IP20 UL Type 1 |
| SV220, 300iP5A-4L (Built-in DCL Type) | 260 (10.23) | 220 (8.66) | 552 (21.73) | 468.5 (18.44) | 6.5 (0.25) | 268.6 (10.57) | 7 (0.27) | 7 (0.27) | IP20 UL Type 1 |

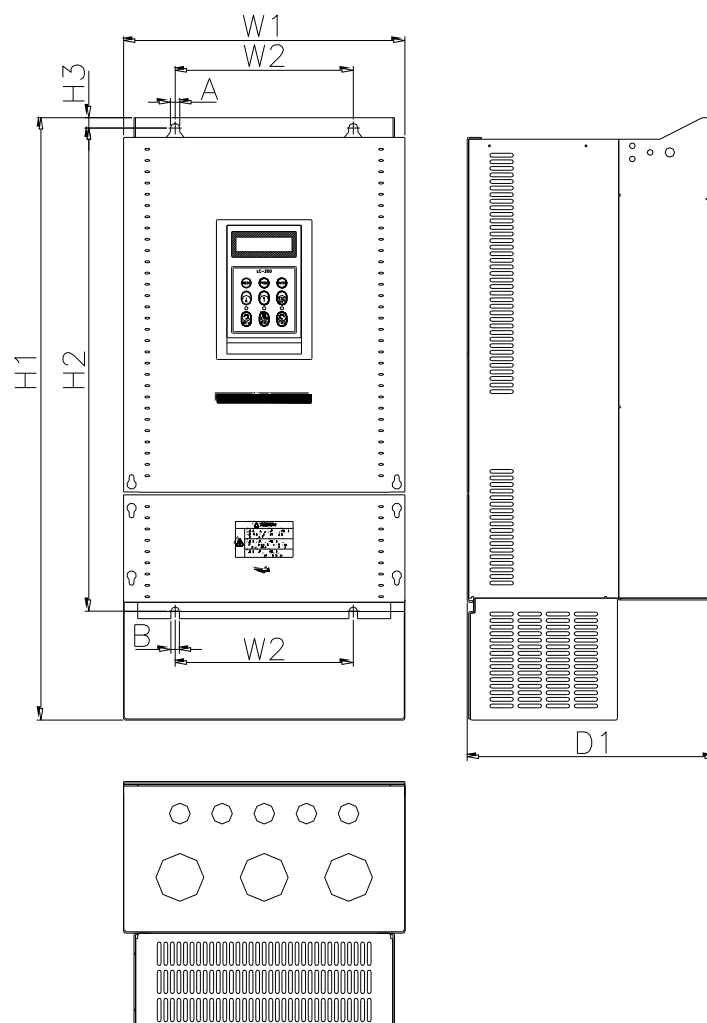
6) SV370 ~ SV550iP5A (400V Class)



mm (inches)

| Model | W1 | W2 | H1 | H2 | H3 | D1 | A | B | Enclosure Type |
|---|----------------|---------------|----------------|----------------|--------------|------------------|--------------|-------------|-----------------|
| SV370, 450 iP5A-4 | 300 (11.81) | 190 (7.48) | 534 (21.02) | 515 (20.28) | 11 (0.43) | 265.6 (10.46) | 10 (0.39) | 9 (0.35) | IP00 UL Open |
| SV550iP5A-4 | 300 (11.81) | 190 (7.48) | 534 (21.02) | 515 (20.28) | 11 (0.43) | 292.6 (11.52) | 10 (0.39) | 9 (0.35) | IP00 UL Open |
| SV370, 450 iP5A-4L (Built-in DCL) | 300 (11.81) | 190 (7.48) | 684 (26.92) | 665 (26.18) | 11 (0.43) | 265.6 (10.46) | 10 (0.39) | 9 (0.35) | IP00 UL Open |
| SV550 iP5A-4L (Built-in DCL) | 300 (11.81) | 190 (7.48) | 684 (26.92) | 665 (26.18) | 11 (0.43) | 292.6 (11.52) | 10 (0.39) | 9 (0.35) | IP00 UL Open |

7) SV370~550iP5A (UL Type 1 or UL Open Type with Conduit Option Used, 400V Class)

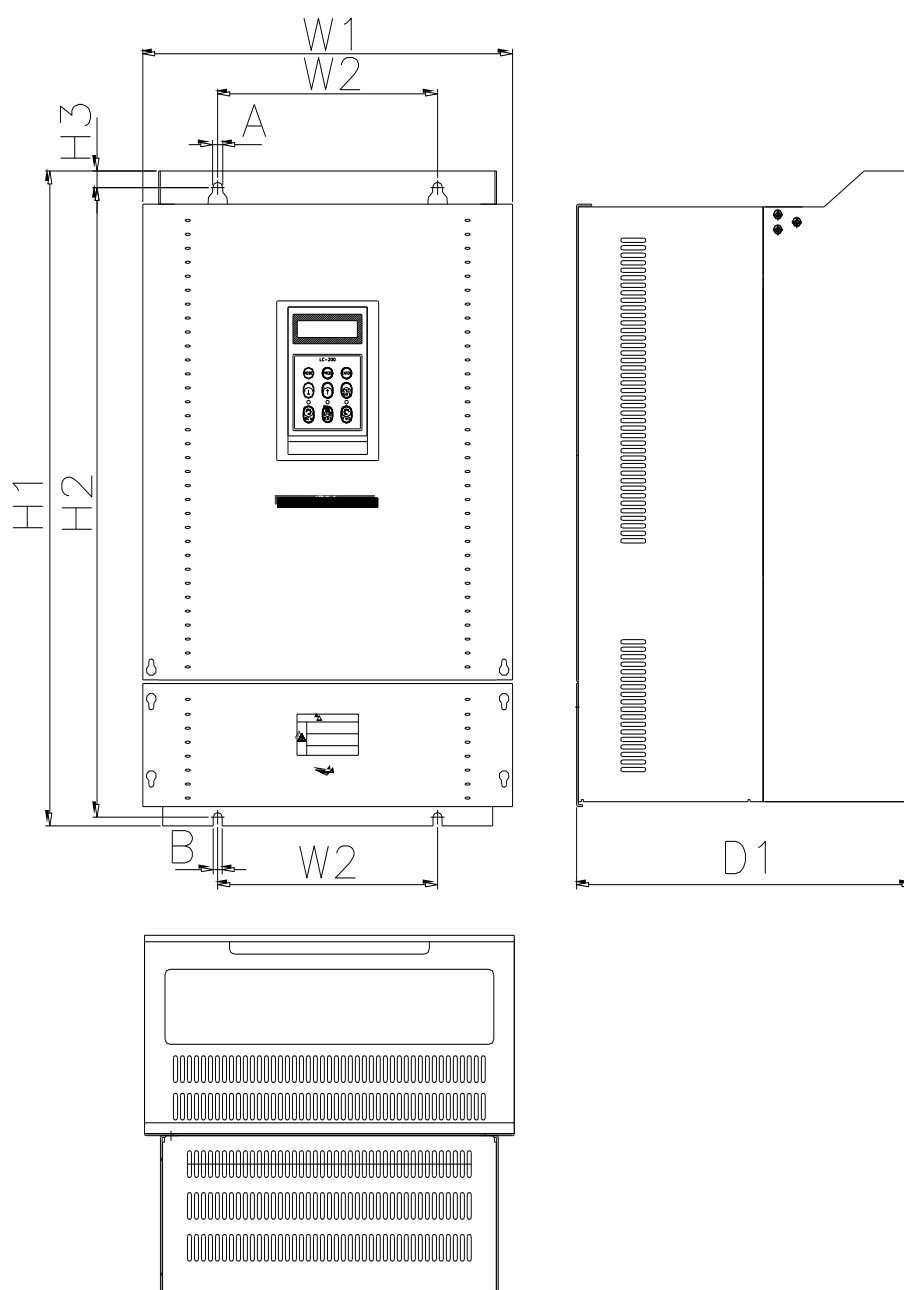


mm (inches)

| Model | W1 | W2 | H1 | H2 | H3 | D1 | A | B | Enclosure Type |
|---|----------------|---------------|----------------|----------------|--------------|------------------|--------------|-------------|-------------------|
| SV370, 450 iP5A-4 | 300 (11.81) | 190 (7.48) | 642 (25.28) | 515 (20.28) | 11 (0.43) | 265.6 (10.46) | 10 (0.39) | 9 (0.35) | IP20 UL Type 1 |
| SV550iP5A-4 | 300 (11.81) | 190 (7.48) | 642 (25.28) | 515 (20.28) | 11 (0.43) | 292.6 (11.52) | 10 (0.39) | 9 (0.35) | IP20 UL Type 1 |
| SV370, 450 iP5A-4L (Built-in DCL) | 300 (11.81) | 190 (7.48) | 792 (31.18) | 665 (26.18) | 11 (0.43) | 265.6 (10.46) | 10 (0.39) | 9 (0.35) | IP20 UL Type 1 |
| SV550iP5A-4L (Built-in DCL) | 300 (11.81) | 190 (7.48) | 792 (31.18) | 665 (26.18) | 11 (0.43) | 292.6 (11.52) | 10 (0.39) | 9 (0.35) | IP20 UL Type 1 |

Note) Mounting NEMA 1 conduit option to the 15~90Kw(20~125HP) Open Type meets NEMA 1 but does not comply with UL Enclosed Type 1. To that end, please purchase UL Type 1 product.

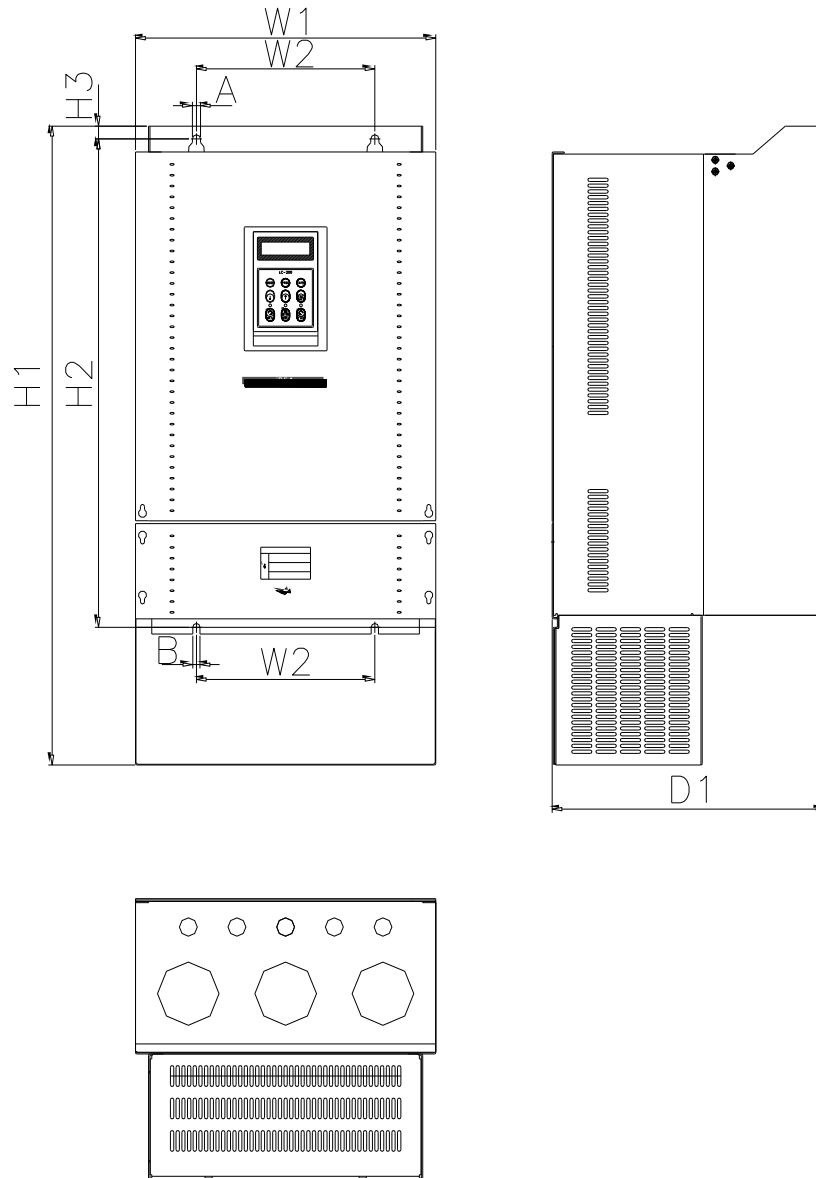
8) SV750, 900iP5A (400V Class)



mm (inches)

| Model | W1 | W2 | H1 | H2 | H3 | D1 | A | B | Enclosure Type |
|-------------------------------------|----------------|---------------|----------------|------------------|----------------|------------------|--------------|-------------|-----------------|
| SV750, 900iP5A-4 | 370 (14.57) | 220 (8.66) | 610 (24.02) | 586.5 (23.09) | 15.5 (0.61) | 337.6 (13.29) | 10 (0.39) | 9 (0.35) | IP00 UL Open |
| SV750, 900iP5A-4L (Built-in DCL) | 370 (14.57) | 220 (8.66) | 760 (29.92) | 736.6 (28.99) | 15.5 (0.61) | 337.6 (13.29) | 10 (0.39) | 9 (0.35) | IP00 UL Open |

9) SV750, 900iP5A (UL Type 1 or UL Open Type with Conduit Option used, 400V Class)

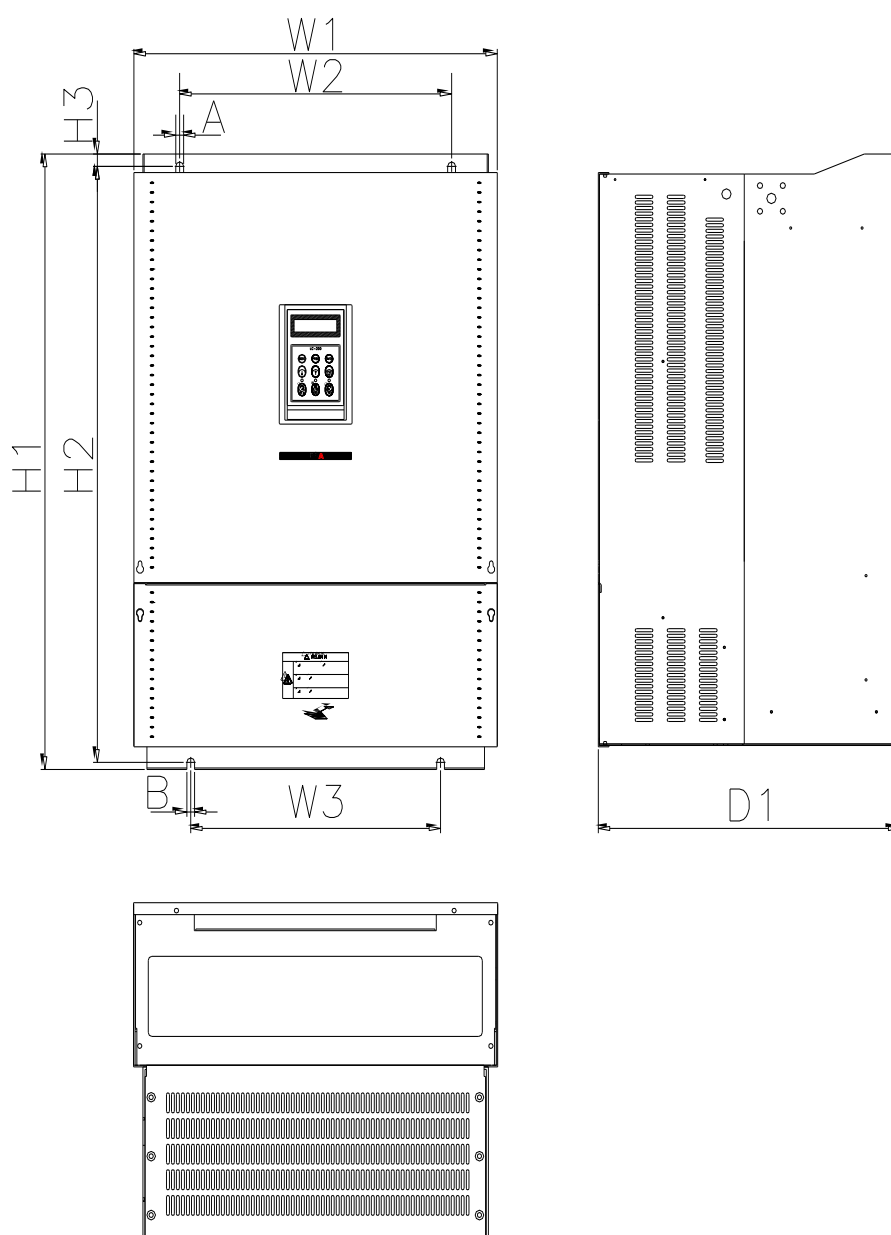


mm (inches)

| Model | W1 | W2 | H1 | H2 | H3 | D1 | A | B | Enclosure Type |
|-------------------------------------|----------------|---------------|------------------|------------------|----------------|------------------|--------------|-------------|-------------------|
| SV750,900iP5A-4 | 370 (14.57) | 220 (8.66) | 767.5 (30.22) | 586.5 (23.09) | 15.5 (0.61) | 337.6 (13.29) | 10 (0.39) | 9 (0.35) | IP20 UL Type 1 |
| SV750, 900iP5A-4L (Built-in DCL) | 370 (14.57) | 220 (8.66) | 917.5 (36.12) | 736.5 (28.99) | 15.5 (0.61) | 337.6 (13.29) | 10 (0.39) | 9 (0.35) | IP20 UL Type 1 |

Note) Mounting NEMA 1 conduit option to the 15~90Kw(20~125HP) Open Type meets NEMA 1 but does not comply with UL Enclosed Type 1. To that end, please purchase UL Type 1 product.

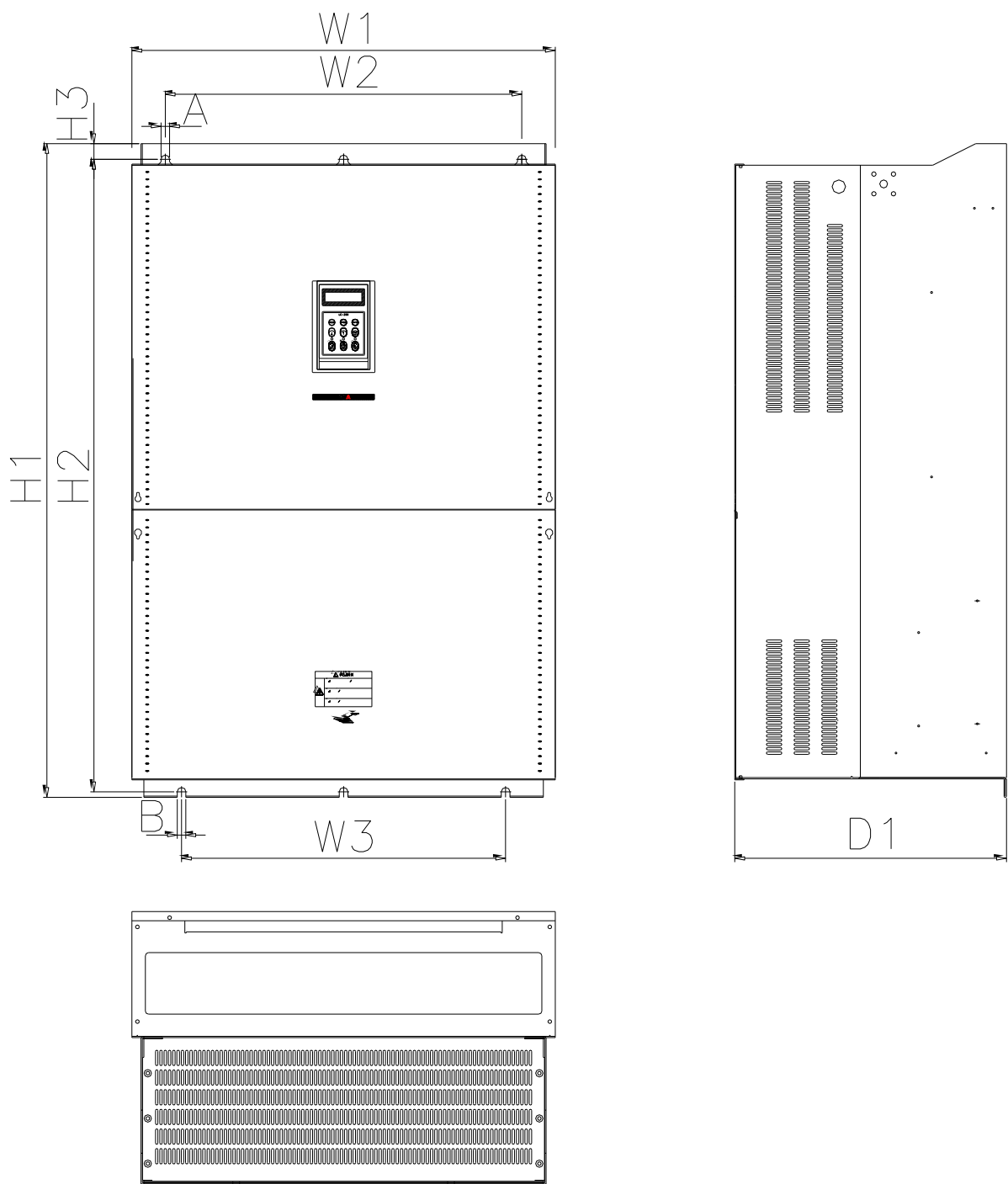
10) SV1100, 1600iP5A (400V Class)



mm(inches)

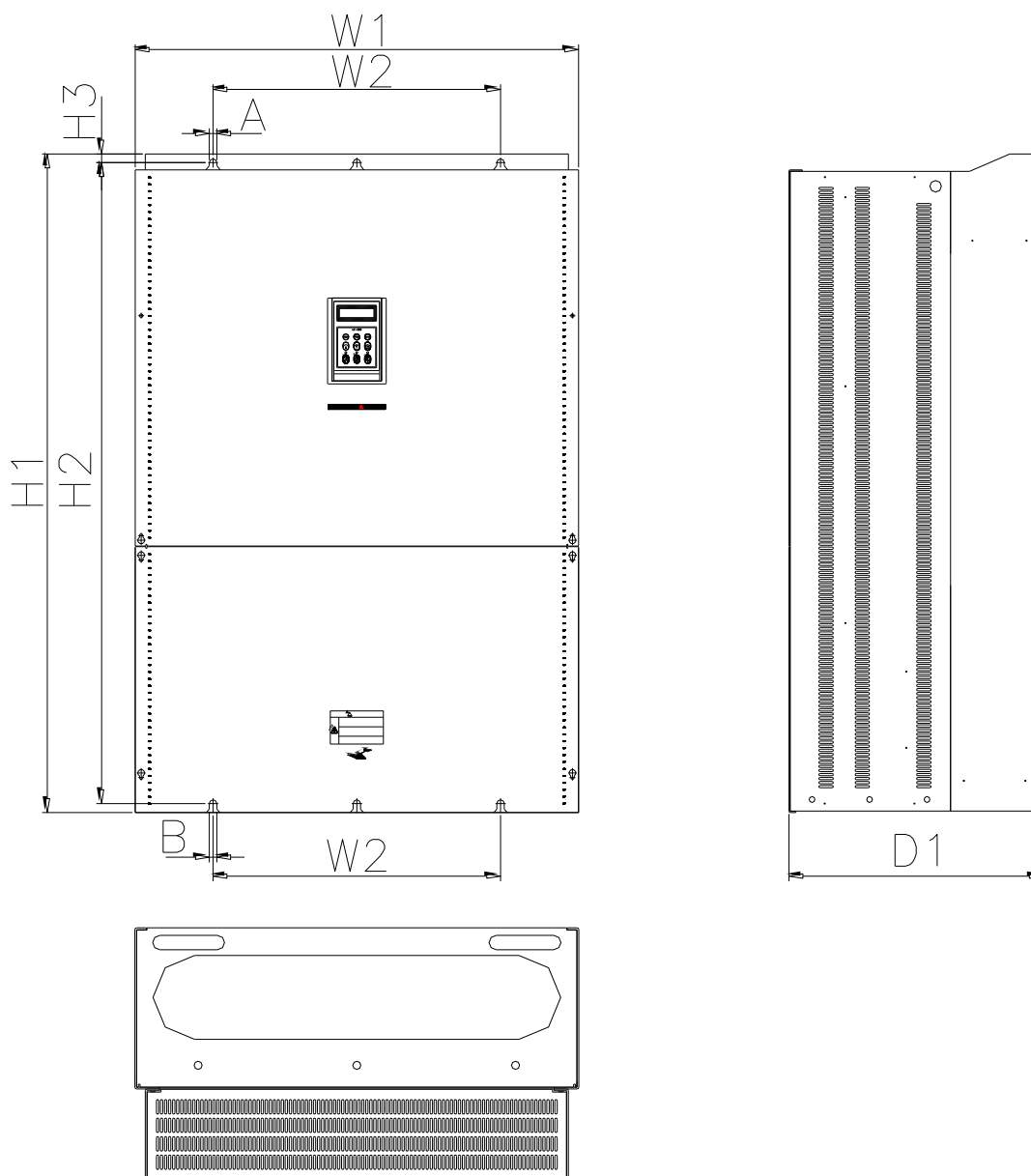
| Model | W1 | W2 | W3 | H1 | H2 | H3 | D1 | A | B | Enclosure Type |
|------------------------|----------------|----------------|--------------|------------------|------------------|----------------|------------------|--------------|--------------|-----------------|
| SV1100, 1320iP5A-4L | 510 (20.08) | 381 (15.00) | 11 (0.43) | 783.5 (30.85) | 759 (29.88) | 15.5 (0.61) | 422.6 (16.64) | 11 (0.43) | 11 (0.43) | IP00 UL Open |
| SV1600iP5A-4L | 510 (20.08) | 381 (15.00) | 11 (0.43) | 861 (33.90) | 836.5 (32.93) | 15.5 (0.61) | 422.6 (16.64) | 11 (0.43) | 11 (0.43) | IP00 UL Open |

11) SV2200, 2800iP5A (400V Class)



| mm (inches) | | | | | | | | | | |
|-------------------------|----------------|----------------|--------------|-----------------|-------------------|----------------|------------------|--------------|--------------|-----------------|
| Model | W1 | W2 | W3 | H1 | H2 | H3 | D1 | A | B | Enclosure Type |
| SV2200, 2800 iP5A-4L | 690 (27.17) | 581 (22.87) | 14 (0.55) | 1063 (41.85) | 1043.5 (41.08) | 25.5 (1.00) | 449.6 (17.70) | 14 (0.55) | 14 (0.55) | IP00 UL Open |

12) SV3150, 4500iP5A (400V Class)



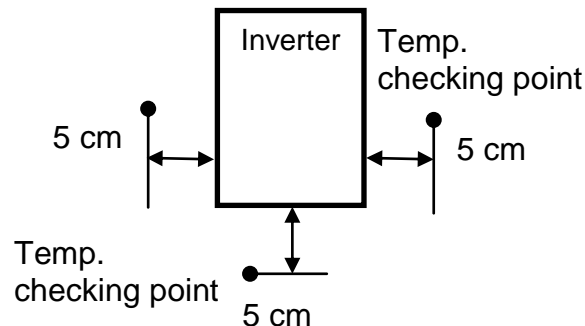
mm (inches)

| Model | W1 | W2 | H1 | H2 | H3 | A | B | D1 | Enclosure Type |
|-----------------------|----------------|----------------|-------------------|-------------------|----------------|--------------|--------------|----------------|-----------------|
| SV3150iP5A-4 | 772 (30.39) | 500 (19.69) | 1140.5 (44.90) | 1110 (43.70) | 15 (0.59) | 13 (0.51) | 13 (0.51) | 442 (17.40) | IP00 UL Open |
| SV3750, 4500iP5A-4 | 922 (36.30) | 580 (22.83) | 1302.5 (51.28) | 1271.5 (50.06) | 15.5 (0.61) | 14 (0.55) | 14 (0.55) | 495 (19.49) | IP00 UL Open |

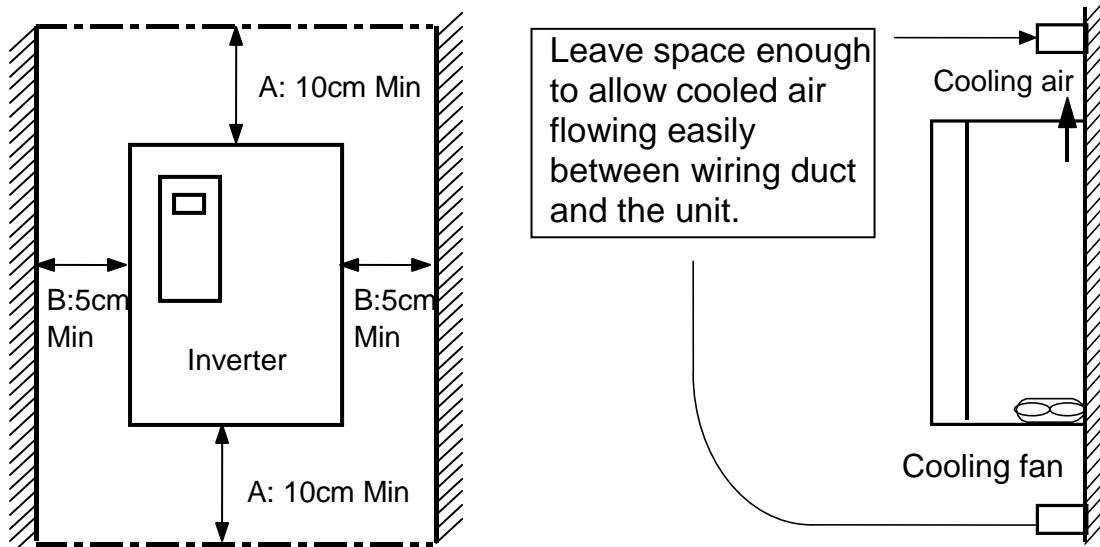
CHAPTER 3 - INSTALLATION

3.1 Installation precautions

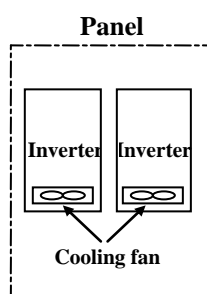
- 1) Handle the inverter with care to prevent damage to the plastic components. Do not hold the inverter by the front cover.
- 2) Do not mount the inverter in a location where excessive vibration (5.9 m/sec^2 or less) is present such as installing the inverter on a press or other moving equipment.
- 3) Install in a location where temperature is within the permissible range ($-10\sim 40^\circ\text{C}$).



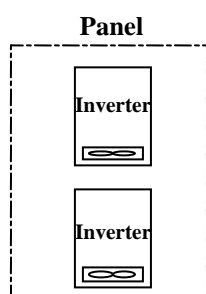
- 4) The inverter will be very hot during operation. Install it on a non-combustible surface.
- 5) Mount the inverter on a flat, vertical and level surface. Inverter orientation must be vertical (top up) for proper heat dissipation. Also leave sufficient clearances around the inverter. However, A = Over 500mm and B = 200mm should be obtained for inverters rated 30kW and above.



- 6) Do not mount the inverter in direct sunlight or near other heat sources.
- 7) The inverter shall be mounted in a Pollution Degree 2 environment. If the inverter is going to be installed in an environment with a high probability of dust, metallic particles, mists, corrosive gases, or other contaminants, the inverter must be located inside the appropriate electrical enclosure of the proper NEMA or IP rating.
- 8) When two or more inverters are installed or a ventilation fan is mounted in inverter panel, the inverters and ventilation fan must be installed in proper positions with extreme care taken to keep the ambient temperature of the inverters below the permissible value. If they are installed in improper positions, the ambient temperature of the inverters will rise.

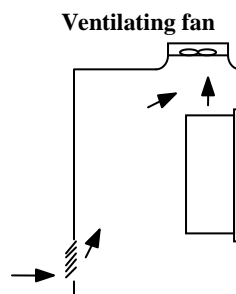


GOOD (O)

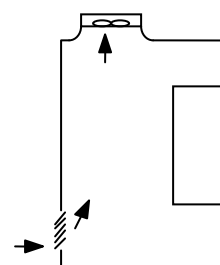


BAD (X)

[When installing several inverters in a panel]



GOOD (O)



BAD (X)

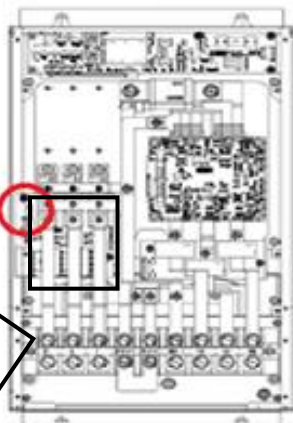
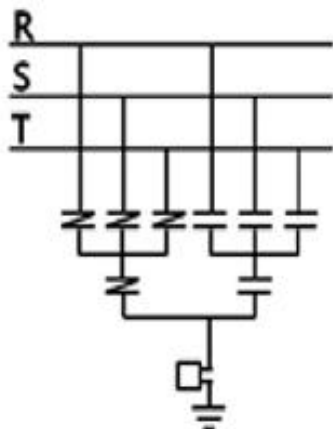
[When installing a ventilating fan in a panel]

- 9) Install the inverter using screws or bolts to insure the inverter is firmly fastened.
- 10) IP5A Series Drives contain protective MOVs and common mode capacitors that are referenced to ground. To guard against drive damage or operation problems, these devices must be properly configured according to below table

| Power Source Type | MOV Input Filter Caps | Benefits |
|---|--------------------------|--|
| 3-Phase AC grounded system | Connected | Reduced electrical noise, Most stable operation, Reduced voltage stress on components and motor bearings |
| 3-Phase AC ungrounded system Impedance grounded | Disconnected | Helps avoid severe equipment damage when ground fault occurs |

Note: 5.5~30kW and 575V Series are not supported.

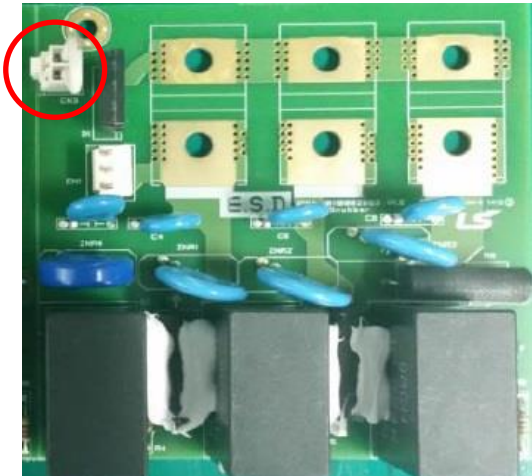
- ⚠ To avoid drive's damage or electric shock, disconnect switch, When Drive's capacitors are discharged completely
- ⚠ In case of surge and lighting don't flow in the grounded system , you can disconnect the switch.



<MOV and AC EMI Capacitor Phase to Ground >

< Example of 37~90kW-4 >

< Example of 110~450kW-4 >



⚠ CAUTION



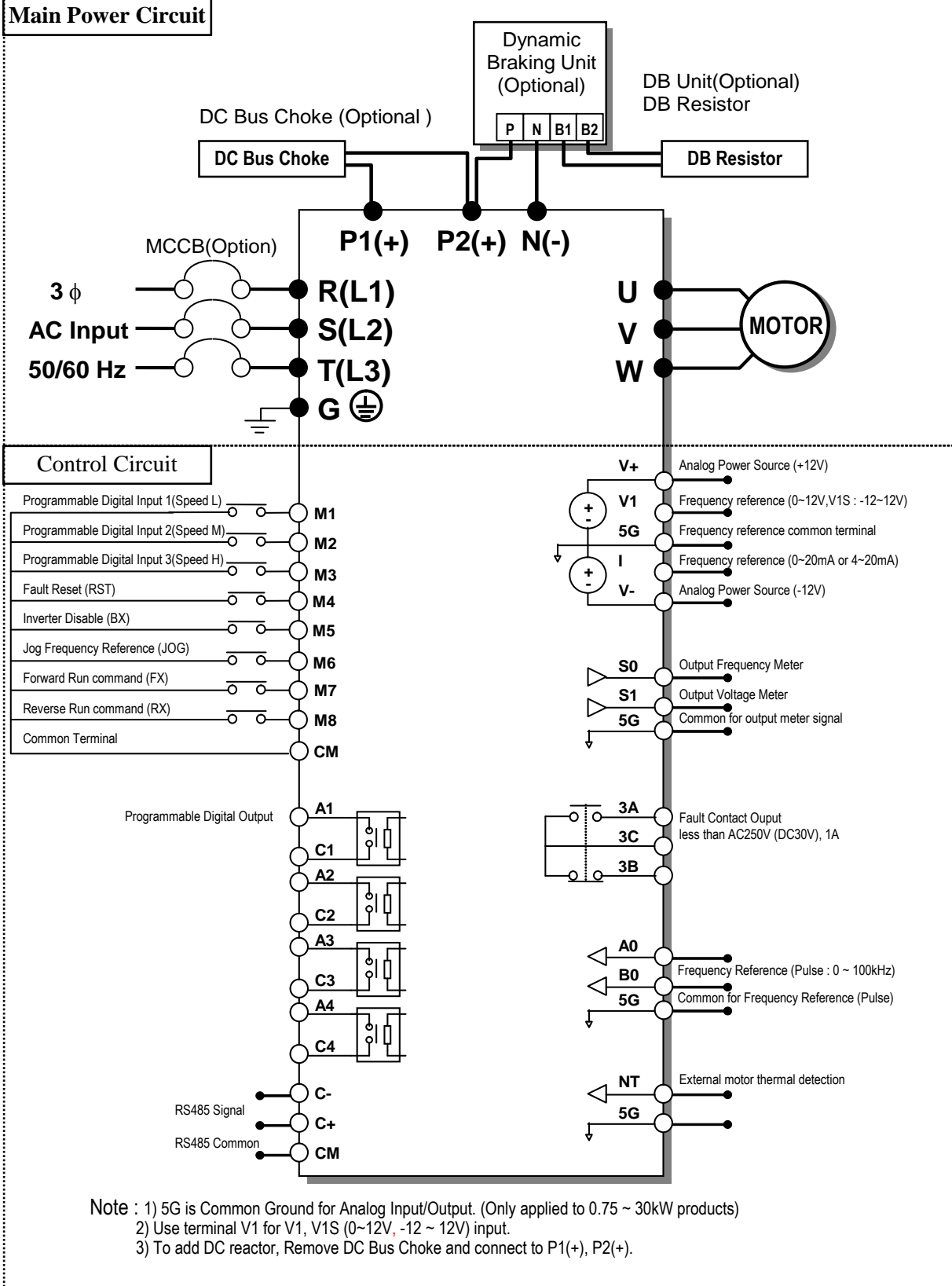
■ Risk of Electric Shock

More than one disconnect switch may be required to de-energize the equipment before servicing.

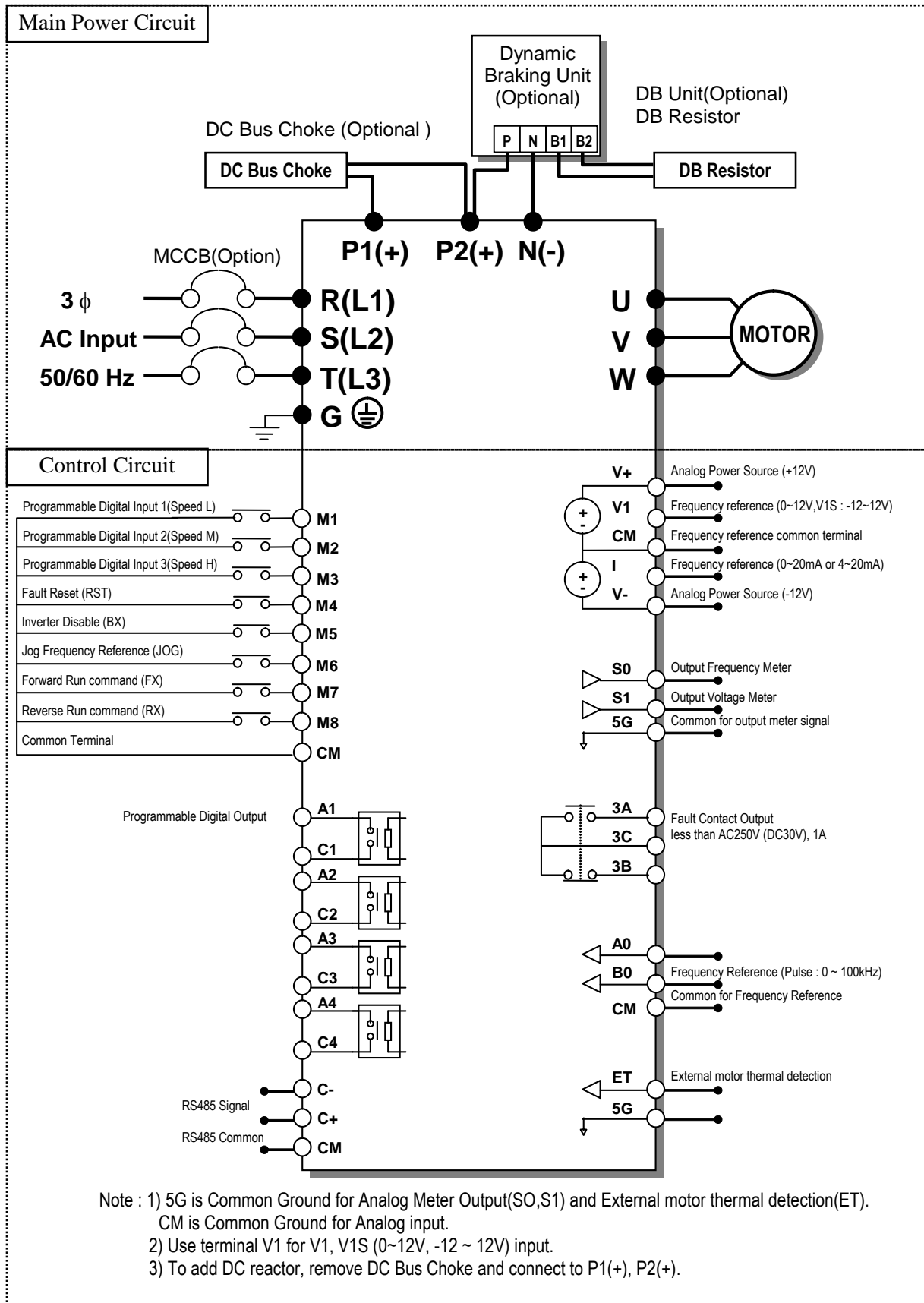
3.2 Wiring

3.2.1 Basic wiring

1) For 0.75~30kW (1~40HP)

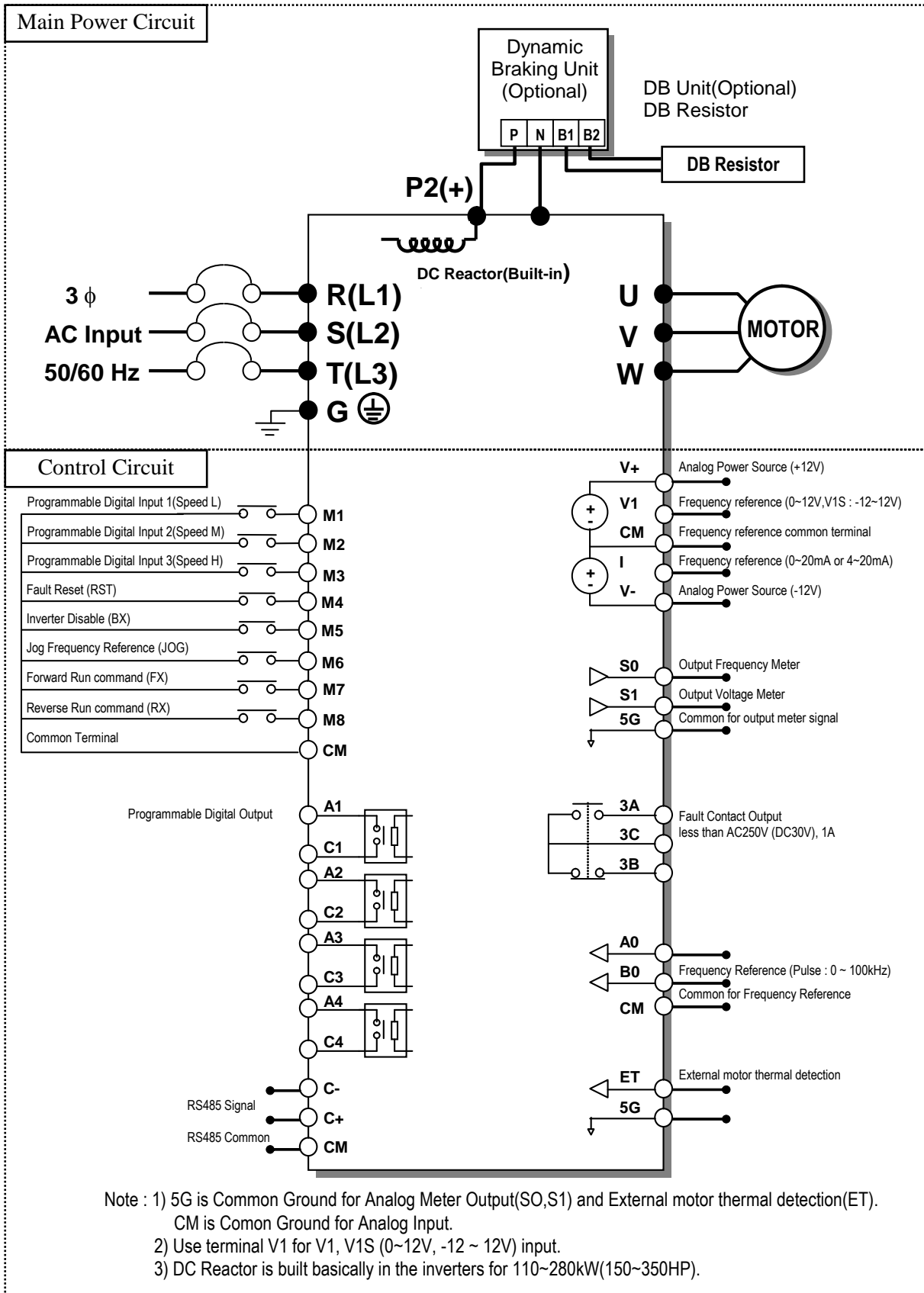


2) For 37~90kW (50~125HP) / 315~450(400~600HP)

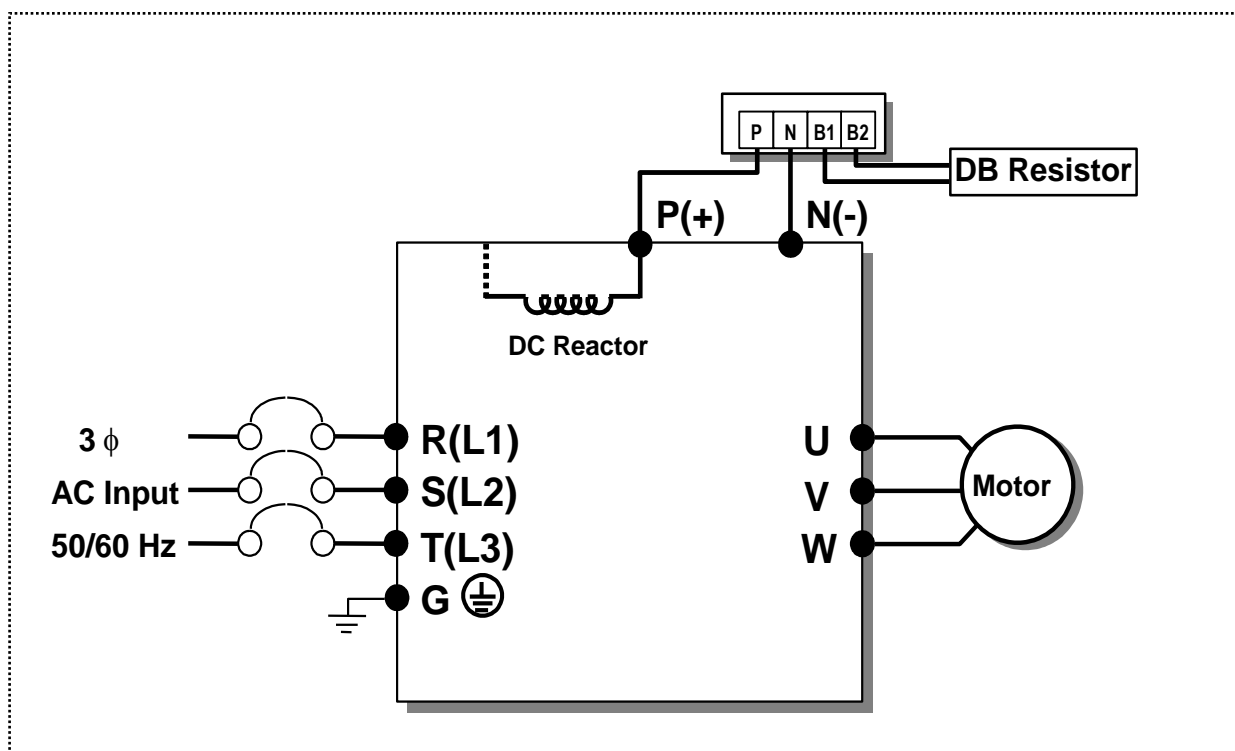


Chapter 3 - Installation

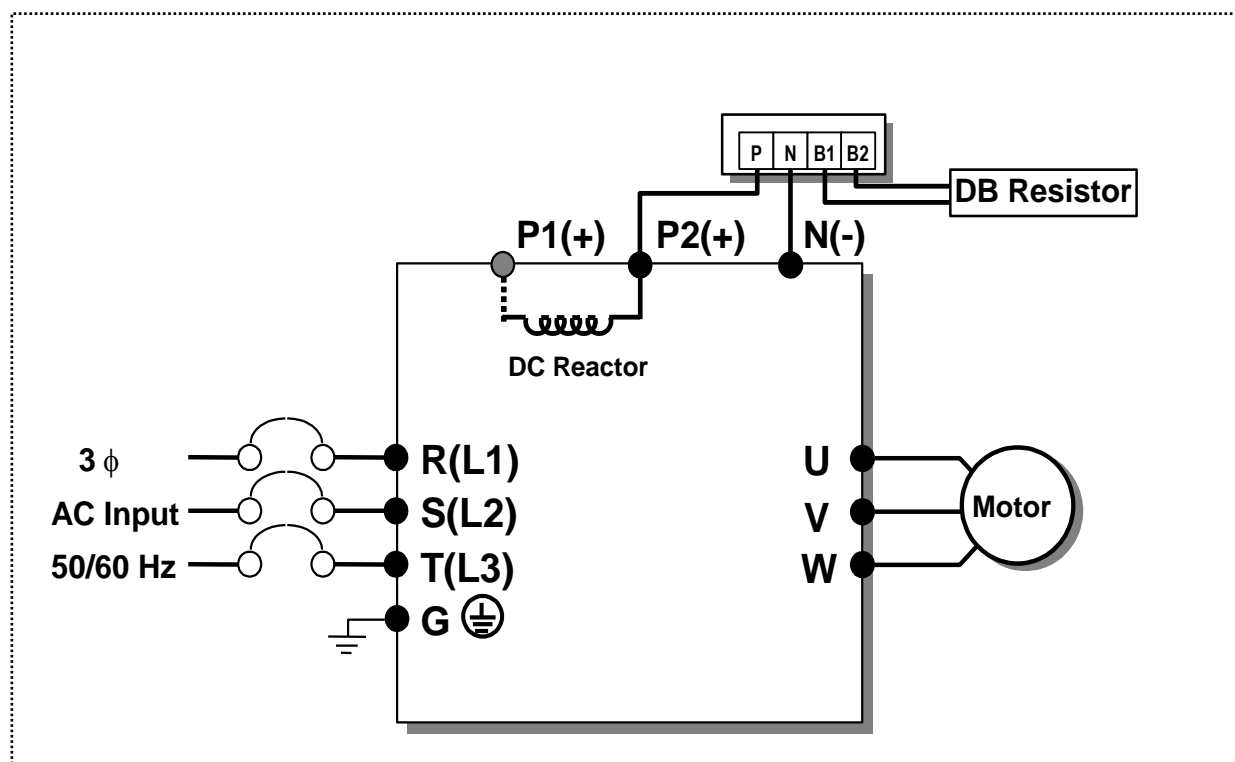
3) For 110~280kW (150~350HP)



4) For 15~30kW (20~40HP) Built-in DCL Type



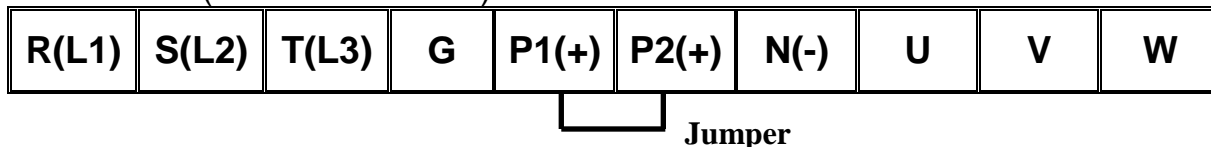
5) For 37~90kW (50~125HP) Built-in DCL Type



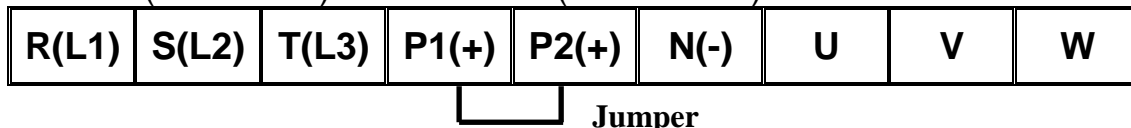
Note : P1(+) is not provided for wiring.

6) Power Terminals:

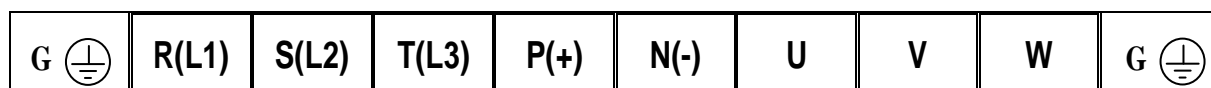
(1) 0.75 ~ 30 kW (200V/400V Class)



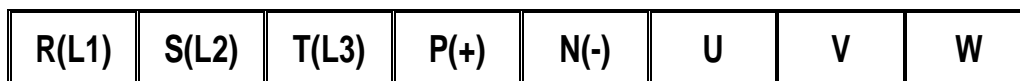
(2) 37~90kW (50~125HP) / 315~450kW (400~600HP) <400V Class>



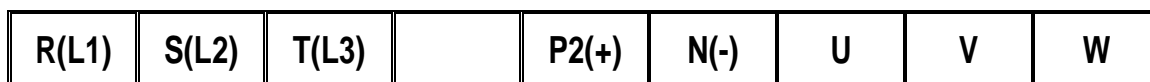
(3) 15~18.5kW (20~25HP) <Built-in DC Reactor Type, 400V Class>



(4) 22~30kW (30~40HP) <Built-in DC Reactor Type, 400V Class>



(5) 37~90kW (50~125HP) / 110 ~280kW (150~350HP) <Built-in DC Reactor Type, 400V Class>

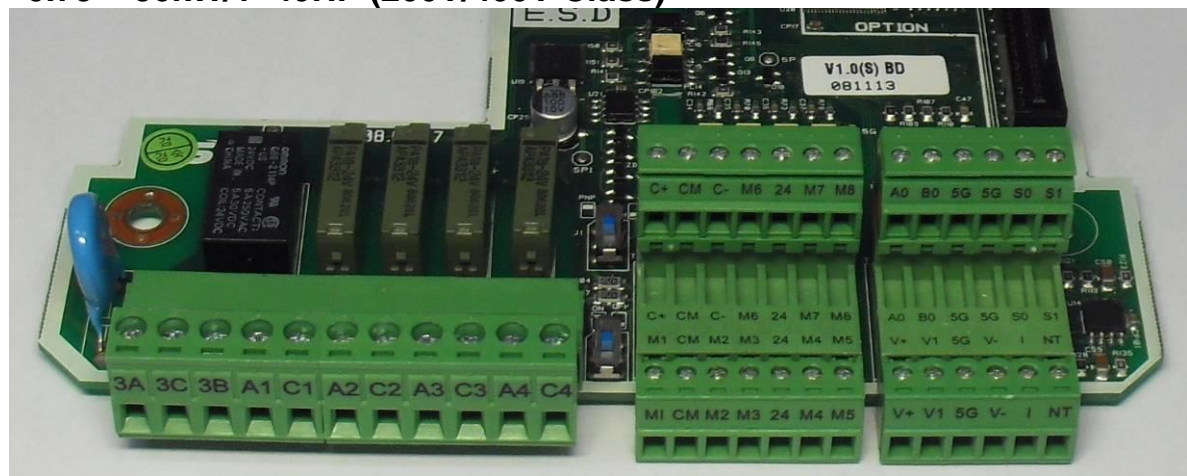


Note : P1(+) is not provided for wiring.

| Symbol | Description |
|---------------------------|--|
| R(L1), S(L2), T(L3) | AC Line Voltage Input |
| G | Earth Ground |
| P1(+), P2(+) | External DC Reactor (P1(+)-P2(+)) Connection Terminals (Jumper must be removed). |
| P2(+), N(-) or P(+), N(-) | DB Unit (P2(+)-N(-)) Connection Terminals |
| U, V, W | 3 Phase Power Output Terminals to Motor |

7) Control circuit terminal

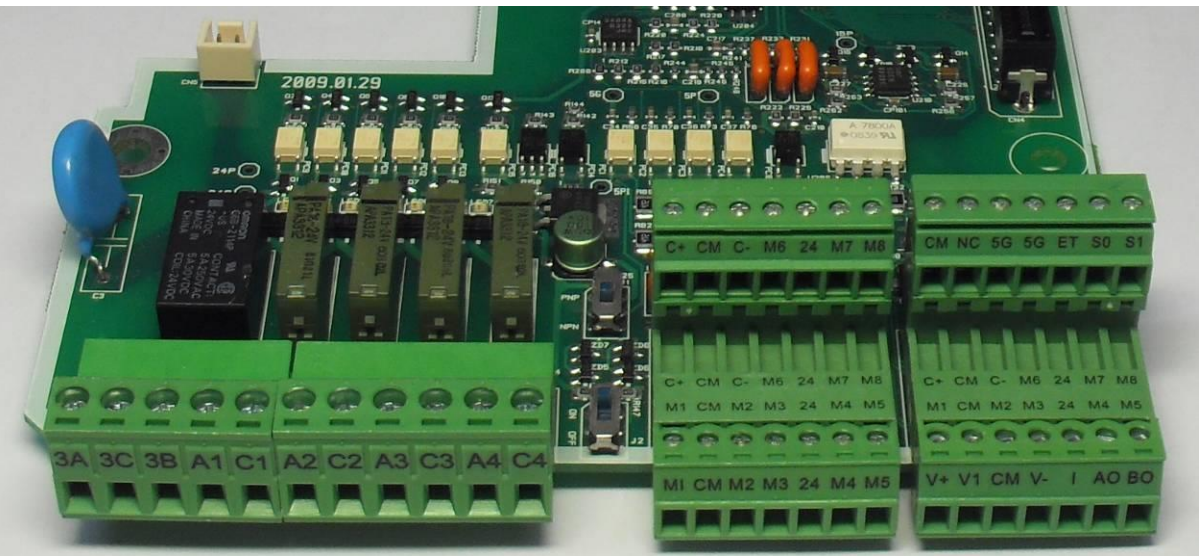
0.75 ~ 30kW/1~40HP (200V/400V Class)



| | | | |
|----------------|-------------------|----------------------|-------------------|
| 3A 3C 3B A1 C1 | A2 C2 A3 C3 A4 C4 | C+ CM C- M6 24 M7 M8 | A0 B0 5G 5G S0 S1 |
| | | | |
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| | | | |

| | |
|----------------------|------------------|
| M1 CM M2 M3 24 M4 M5 | V+ V1 5G V- I NT |
| | |
| | |
| | |
| | |
| | |

37 ~ 450 kW/ 50~600HP (400V Class)



| | | | |
|----------------|-------------------|----------------------|--------------------|
| 3A 3C 3B A1 C1 | A2 C2 A3 C3 A4 C4 | C+ CM C- M6 24 M7 M8 | CMNC5G 5G ET S0 S1 |
| | | | |
| | | | |
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| | | | |

| | |
|----------------------|---------------------|
| M1 CM M2 M3 24 M4 M5 | V+ V1 CM V- I A0 B0 |
| | |
| | |
| | |
| | |
| | |

Note) The terminal specification is subject to change according to decision of manufacturer.

| Type | Symbol | Name | Description |
|---------------|----------------------------------|---------------------------|--|
| Input signal | Starting Contact Function Select | M1, M2, M3 | Programmable Digital Input 1, 2, 3 Defines Programmable Digital Inputs. (Factory setting : Multi-Step Frequency 1, 2, 3) |
| | | FX [M7] | Forward Run Command Forward Run When Closed and Stopped When Open. |
| | | RX [M8] | Reverse Run Command Reverse Run When Closed and Stopped When Open. |
| | | JOG [M6] | Jog Frequency Reference Runs at Jog Frequency when the Jog Signal is ON. The Direction is set by the FX (or RX) Signal. |
| | | BX [M5] | Emergency Stop When the BX Signal is ON the Output of the Inverter is Turned Off. When Motor uses an Electrical Brake to Stop, BX is used to Turn Off the Output Signal. Take caution when BX Signal is OFF (Not Turned Off by Latching) and FX Signal (or RX Signal) is ON. If so, motor continues to Run. |
| | | RST [M4] | Fault Reset Used for Fault Reset. |
| | | CM | Sequence Common (NPN) Common terminal for NPN contact. |
| | | 24 | Sequence Common (PNP) Common 24V terminal for PNP contact input. (maximum output : +24V, 100mA) |
| | Analog frequency setting | V+, V- | Analog Power Source (+12V, -12V) Power supply for Analog Frequency Setting. Maximum Output: +12V, 100mA, -12V, 100mA. |
| | | V1 | Frequency Reference (Voltage) Used by a DC 0-12V or -12~ 12 V input to set the frequency reference. (Input impedance is 20 kΩ) |
| | | I | Frequency Reference (Current) Used by a 0-20mA input to set the frequency reference. (Input impedance is 249Ω) |
| | | A0, B0 | Frequency Reference (Pulse) Used by a pulse input to set the frequency reference. |
| | | 5G (~30kW) CM(37kW~) | Frequency Reference Common Terminal Common Terminal for Analog Frequency Reference Signal. |
| | External motor thermal detection | NT (~30kW) ET (37kW ~) | External motor thermal detection Motor thermal sensor input. Used to prevent motor from overheating by using a NTC or PTC thermal sensor. |
| | | 5G | Common for NT (or ET) Common Terminal for External motor thermal detection. |
| | Built-in RS485 terminal | C+, C- | RS485 signal High, Low RS485 signal |
| | | CM | RS485 common Common Ground. Terminal for RS485 interface. |
| Output signal | Analog Output | S0, S1 | Programmable Voltage Output Voltage output for one of the following: Output Frequency, Output Current, Output Voltage, DC Link Voltage. Default is set to Output Frequency. (Maximum Output Voltage and Output Current are 0-12V and 1mA). |
| | | 5G | Analog Common Terminal Common Terminal for Analog Output (S0, S1). |
| | Contact | 3A, 3C, 3B | Fault Contact Output Energizes when a fault is present. (AC250V, 1A; DC30V, 1A) Fault : 3A-3C Closed (3B-3C Open) Normal : 3B-3C Closed (3A-3C Open) |
| | | A1~4, C1~4 | Programmable Digital Output Defined by Programmable Digital Output terminal settings. (AC250V, 1A or less; DC30V, 1A or less) |

Note) M1~M8 terminals are User Programmable. NC terminal is unavailable.

3.2.2 Wiring power terminals

◆ Wiring Precautions

- 1) The internal circuits of the inverter will be damaged if the incoming power is connected and applied to output terminals (U, V, W).
- 2) Use ring terminals with insulated caps when wiring the input power and motor wiring.
- 3) Do not leave wire fragments inside the inverter. Wire fragments can cause faults, breakdowns, and malfunctions.
- 4) For input and output, use wires with sufficient size to ensure voltage drop of less than 2%.
- 5) Motor torque may drop of operating at low frequencies and a long wire run between inverter and motor.
- 6) The cable length between inverter and motor should be less than 150m (492ft). Due to increased leakage capacitance between cables, overcurrent protective feature may operate or equipment connected to the output side may malfunction. The total cable length should be less than 150 m (492ft) in case the many motors are connected. Do not use the 3-core cable in the wiring for long distance. In the wiring for long distance, lower the carrier frequency and use the output circuit filter.

| | | | |
|-------------------------------------|-------|------|------------|
| Distance between Motor and inverter | 50m | 100m | Above 100m |
| Max. permissible carrier freq. | 15kHz | 5kHz | Below 2kHz |

(But for products of less than 11kW, the cable length should be less than 100m.)

- 7) The main circuit of the inverter contains high frequency noise, and can hinder communication equipment near the inverter. To reduce noise, install line noise filters on the input side of the inverter.
- 8) Do not use power factor capacitor, surge killers, or RFI filters on the output side of the inverter. Doing so may damage these components.
- 9) Always check whether the LCD and the charge lamp for the power terminal are OFF before wiring terminals. The charge capacitor may hold high-voltage even after the power is disconnected. Use caution to prevent the possibility of personal injury.
- 10) Do not connect with MC at output part of inverter and make MC On/Off during operation. It can cause the Trip or damage of inverter.

◆ Grounding

- 1) The inverter is a high switching device, and leakage current may flow. Ground the inverter to avoid electrical shock. Use caution to prevent the possibility of personal injury. The ground impedance for 200V class is 100 ohm with 400V class 10ohm. (Protective Class : I)
- 2) Connect only to the dedicated ground terminal of the inverter. Do not use the case or the chassis screw for grounding.
- 3) The protective earth conductor must be the first one in being connected and the last one in being disconnected.
- 4) As a minimum, grounding wire should meet the specifications listed below. Grounding wire should be as short as possible and should be connected to the

ground point as near as possible to the inverter.

| Inverter Capacity | | Grounding Wire Sizes, AWG or kcmil (mm ²) | |
|-------------------|-----------|---|------------|
| kW | HP | 200V Class | 400V Class |
| 5.5 ~ 7.5 | 7.5 ~ 10 | 10 | 4 |
| 11 ~ 15 | 15 ~ 20 | 16 | 10 |
| 18.5 ~ 30 | 25 ~ 40 | 35 | 16 |
| 37 ~ 55 | 50 ~ 75 | - | 25 |
| 75 ~ 90 | 100 ~ 125 | - | 35 |
| 110 ~ 132 | 150 ~ 200 | - | 70 |
| 160 ~ 280 | 250 ~ 350 | - | 150 |
| 315 ~ 375 | 400 ~ 600 | - | 240 |
| 450 | 700 | - | 240 |

3.2.3 Wires and terminal lugs

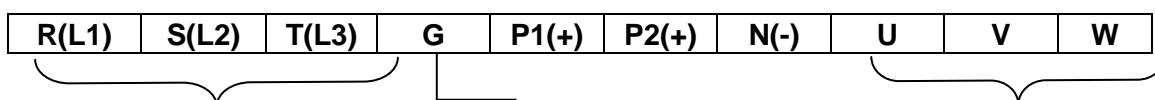
Refer to below for wires, terminal lugs, and screws used to connect the inverter power input and output.

| Inverter Capacity | | Terminal Screw Size | Screw Torque | | Wire Size | | | |
|-------------------|-----------------------|---------------------|--------------|------------|---------------------|--------------|-----------------|--------------|
| | | | kgf · cm | lb · in | R(L1), S(L2), T(L3) | | | U, V, W |
| | | | | | mm ² | AWG or kcmil | mm ² | AWG or kcmil |
| 200V | 0.75kW (1HP) | M4 | 7.1 ~ 12.2 | 6.2 ~ 10.6 | 2.5 | 14 | 2.5 | 14 |
| | 1.5kW (2HP) | | | | | | | |
| | 2.2kW (3HP) | | | | | | | |
| | 3.7kW (5HP) | | | | | | | |
| | 5.5kW (7.5HP) | | | | | | | |
| | 7.5kW (10HP) | M5 | 24.5 ~ 31.8 | 21.2~27.6 | 10 | 8 | 10 | 8 |
| | 11kW (15HP) | | | | 16 | 6 | 16 | 6 |
| | 15kW (20HP) | M6 | 30.6 ~ 38.2 | 26.6~33.2 | 25 | 4 | 25 | 4 |
| | 18.5kW (25HP) | | | | 35 | 2 | 35 | 2 |
| | 22kW (30HP) | M8 | 61.2 ~ 91.8 | 53.1~79.7 | 50 | 2 | 50 | 2 |
| | 30kW (40HP) | | | | 70 | 1/0 | 70 | 1/0 |
| 400V | 0.75kW (1HP) | M4 | 7.1 ~ 12.2 | 6.2 ~ 10.6 | 2.5 | 14 | 2.5 | 14 |
| | 1.5kW (2HP) | | | | | | | |
| | 2.2kW (3HP) | | | | | | | |
| | 3.7kW (5HP) | | | | | | | |
| | 5.5kW (7.5HP) | | | | | | | |
| | 7.5Kw (10HP) | M6 | 30.6~38.2 | 26.6~33.2 | 4 | 12 | 4 | 12 |
| | 11 kW (15HP) | | | | 6 | 10 | 6 | 10 |
| | 15 kW (20HP) | | | | 10 | 8 | 10 | 8 |
| | 18.5kW (25HP) | M8 | 61.2~91.8 | 53.1~79.7 | 16 | 6 | 16 | 6 |
| | 22~30kW (30~40HP) | | | | 25 | 4 | 25 | 4 |
| | 37~55kW (50~75HP) | M10 | 89.7~91.8 | 53.1~79.7 | 35 | 2 | 35 | 2 |
| | 75~90kW(100~125HP) | M12 | 182.4~215.0 | 77.9~105.9 | 70 | 1/0 | 70 | 1/0 |
| | 110~132kW (150~200HP) | | | | 120 | 4/0 | 120 | 4/0 |
| | 160kW (250HP) | M12 | 182.4~215.0 | ~186.6 | 150 | 300 | 150 | 300 |

| Inverter Capacity | Terminal Screw Size | Screw Torque | | Wire Size | | | |
|-------------------|---------------------|--------------|---------|---------------------|--------------|-----------------|--------------|
| | | | | R(L1), S(L2), T(L3) | | | U, V, W |
| | | kgf · cm | lb · in | mm ² | AWG or kcmil | mm ² | AWG or kcmil |
| 220kW (300HP) | | | | 240 | 400 | 240 | 400 |
| 280kW (350HP) | | | | 240 | 500 | 240 | 500 |
| 315kW (400HP) | | | | 300 | 700 | 300 | 700 |
| 375kW(500HP) | | | | 2×240 | 2×400 | 2×240 | 2×400 |
| 450kW (600HP) | | | | 2×240 | 2×500 | 2×240 | 2×500 |

- * Apply the rated torque to terminal screws.
- * Loose screws can cause of short circuit or malfunction. Tightening the screw too much can damage the terminals and cause a short circuit or malfunction.
- * Use copper wires only with 600V, 75°C ratings. For 7.5~11kW 240V type inverters, R(L1), S(L2), T(L3) and U, V, W terminals are only for use with insulated ring type connector.

Power and Motor Connection Example (5.5~30kW inverters)



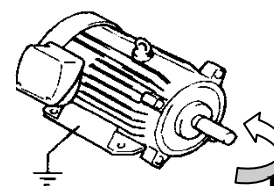
Power supply must be connected to the R(L1), S(L2), and T(L3) terminals. Connecting it to the U, V, and W terminals causes internal damages to the inverter. Arranging the phase sequence is not necessary

Les câblages de l'alimentation électrique doivent être connectés aux bornes R, S et T. Leur connexion aux bornes U, V et W provoque des dommages internes à l'onduleur. Le moteur doit être raccordé aux bornes U, V et W. L'arrangement de l'ordre de phase n'est pas nécessaire.



Ground

Ground



Forward

Motor should be connected to the U, V, and W terminals.

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

Si la commande avant (Fx) est activée, le moteur doit tourner dans le sens anti-horaire si on le regarde côté charge du moteur. Si le moteur tourne dans le sens inverse, inverser les câbles aux bornes U et V.

3.2.4 Control circuit wiring

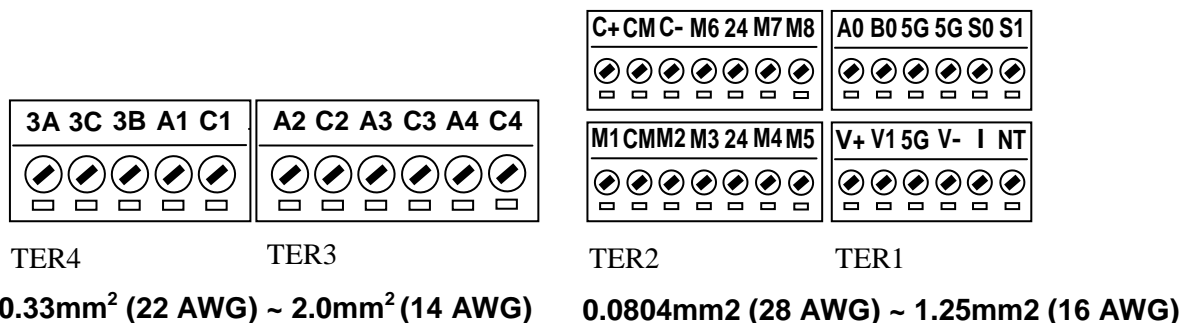
1) Wiring Precautions

CM and 5G terminals are insulated each other. Do not connect these terminals together or to the power ground.

Use shielded wires or twisted wires for control circuit wiring, and separate these wires from the main power circuits and other high voltage circuits (200V relay sequence circuit).

It is recommended to use the cables of 0.0804mm^2 (28 AWG) ~ 1.25mm^2 (16 AWG) for TER1, TER2 control terminals and the cables of 0.33mm^2 (22 AWG) ~ 2.0mm^2 (14 AWG) for TER3, TER4 control terminals.

2) Control terminal layout



3) Sink mode (NPN mode) / Source mode (PNP mode)

SV-iP5A provides Sink / Source (NPN/PNP) modes for sequence input terminal on the control circuit.

The logic of the input terminal is settable to Sink mode (NPN mode) / Source mode (NPN mode) by using the J1 switch. Connection method is as shown below.

(1) Sink mode (NPN mode)

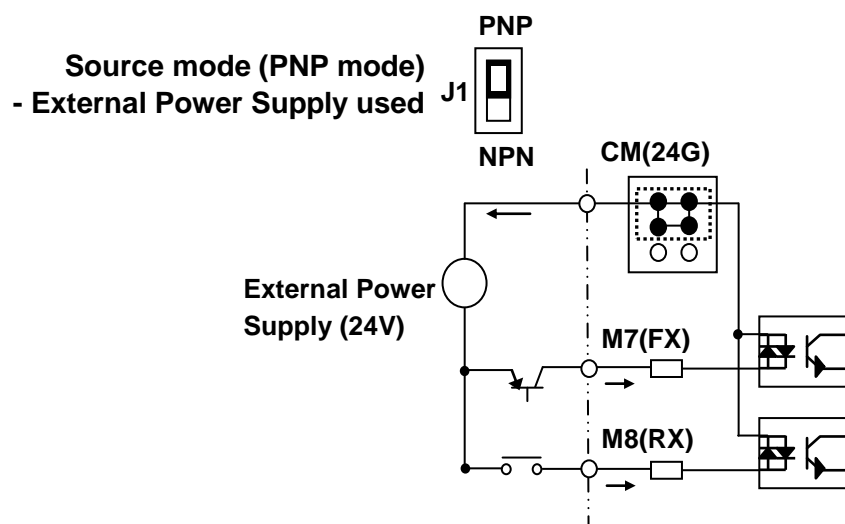
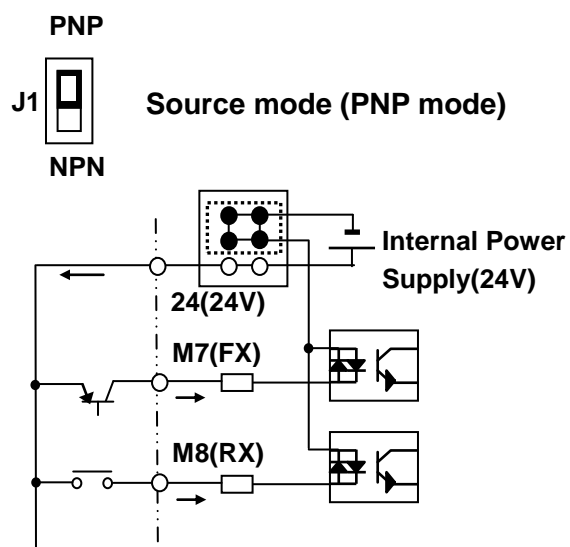
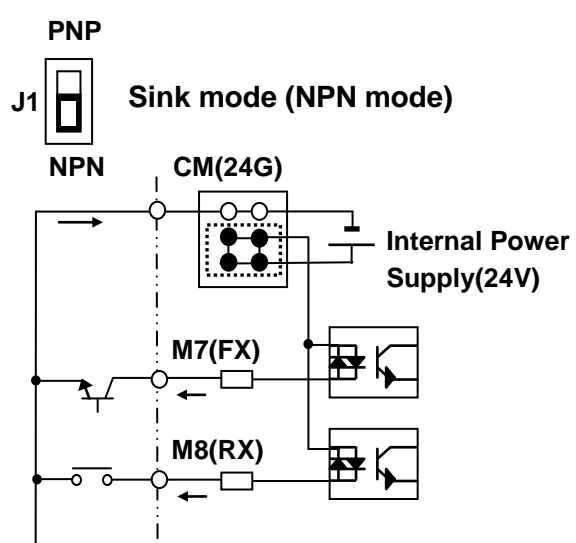
- Put J1 switch down to set to Sink mode (NPN mode). CM terminal (24V GND) is common terminal for contact signal input.
- The factory default is Sink mode (NPN mode).

(2) Source mode (PNP mode) - Internal Power Supply used

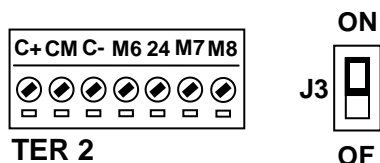
- Put J1 switch up to set to Source mode (PNP mode). Terminal 24 (24V Power Supply) is common terminal for contact input signal.

(3) Source mode (PNP mode) - External Power Supply used

- Put J1 switch up to set to Source mode (PNP mode).
- To use external 24V Power Supply, make a sequence between external Power Supply (-) terminal and CM (24V GND) terminal.



3.2.5 RS485 circuit wiring



Use C+ (RS485 signal High), C- (RS485 signal LOW) in TER 2. Turn the J3 switch ON (Upward) to connect the termination resistor (120 ohm). J3 switch is On the left side of the TER2.

| Item | Specification |
|-----------------------|--|
| Transmission type | Bus method, Multi drop Link System |
| Applicable inverter | SV-iP5A series |
| Number of inverters | Max.31 |
| Transmission distance | Within 1200m Max. (700m desired) |
| Recommendable cable | 0.75mm ² (18AWG), Shield Type Twisted-pair Wire |
| Installation | C+, C-, CM terminals on the control terminal block |
| Power supply | Insulated from the inverter power supply |

3.2.6 Check points on wiring

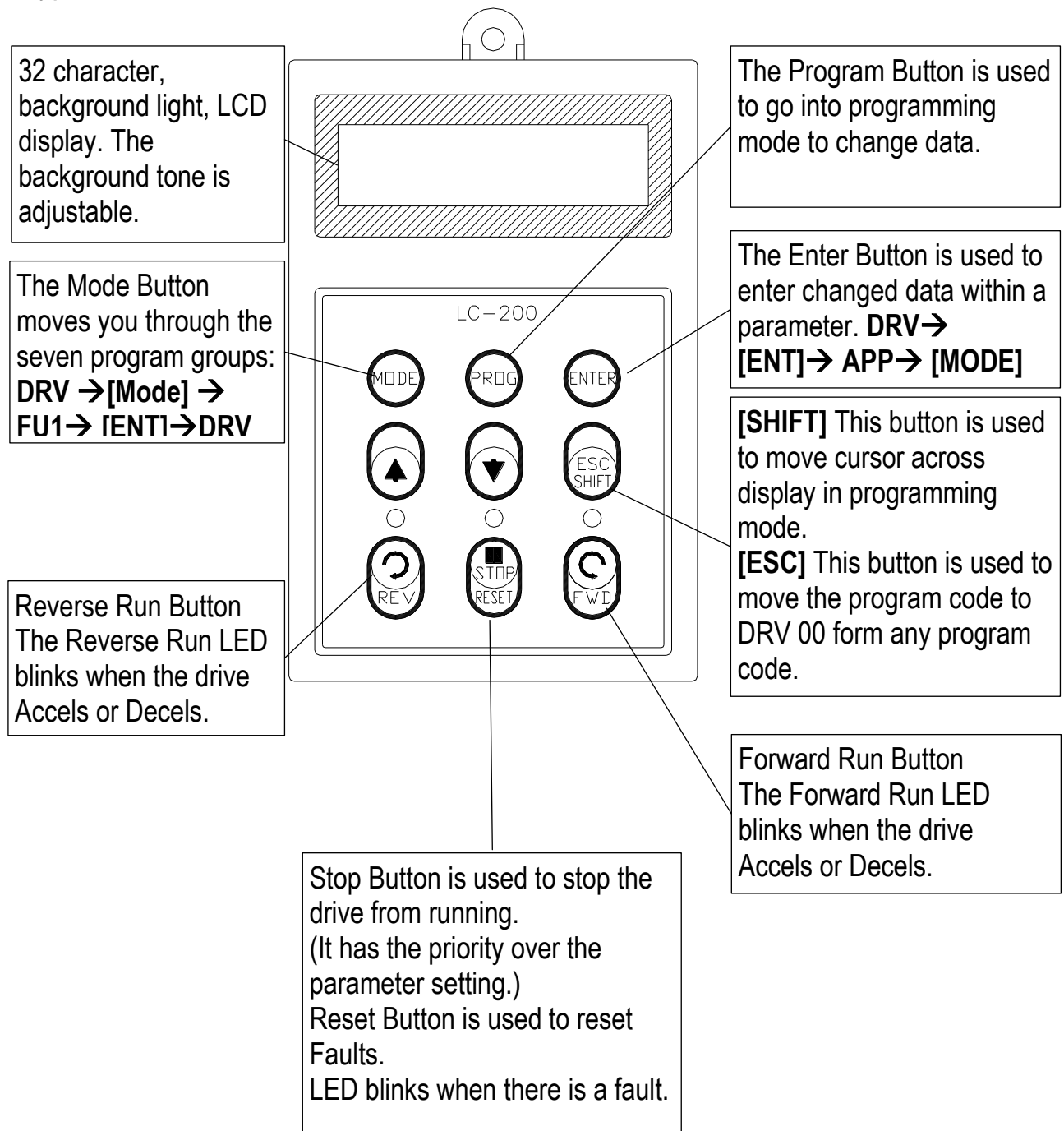
- 1) Electrical or mechanical interlock of MC1 and MC2 is required for Inverter Bypass Operation. Otherwise, chattering may occur or input power may flow to inverter output, damaging the inverter.
- 2) Make the sequence to disable the Auto restart after power failure if required. Otherwise, inverter will be automatically restarted.
- 3) Do not apply the voltage directly to control circuit input terminals such as FX, RX.

CHAPTER 4 - OPERATION

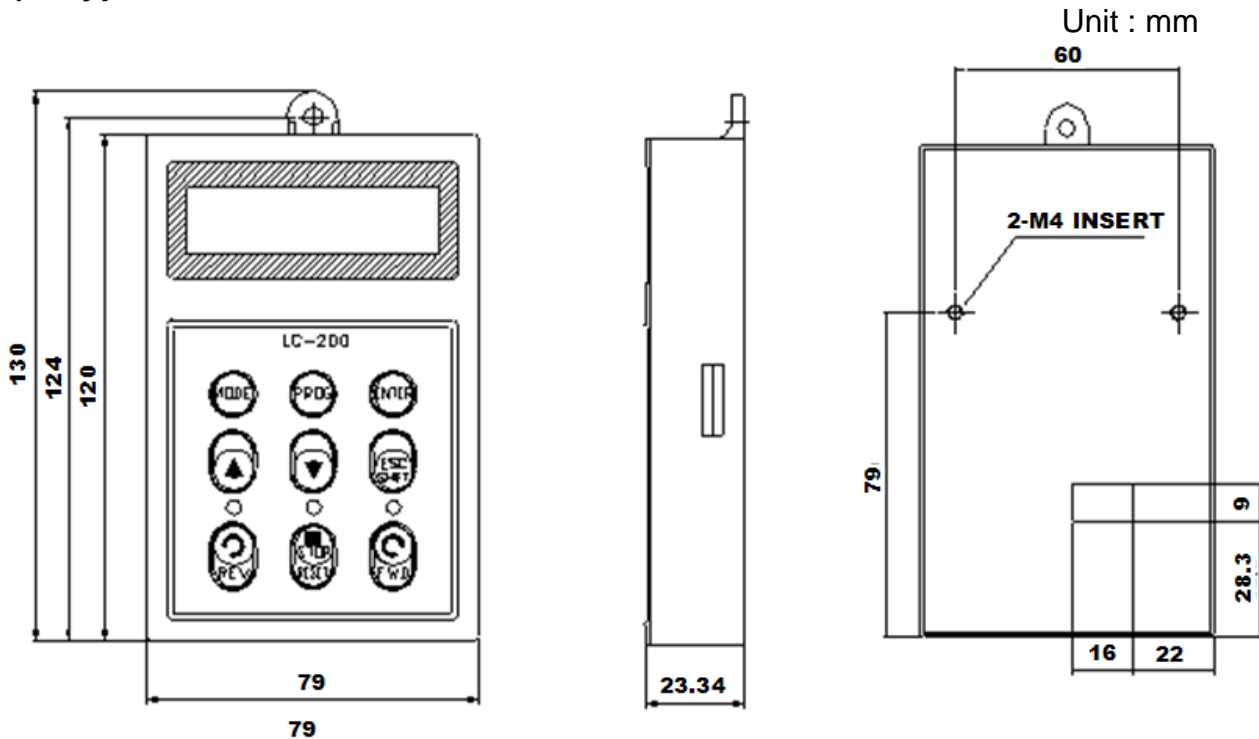
4.1 Programming Keypads

4.1.1 LCD Keypad

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

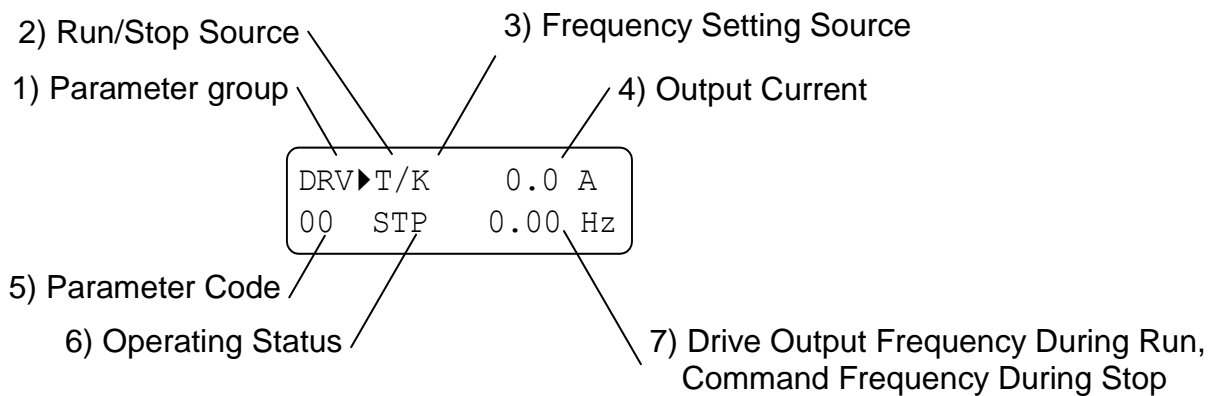


1) Keypad dimension



4.1.2 2) Detail description

(1) LCD Keypad Display



| Displays | Description |
|-----------------------------|--|
| 1) Parameter Group | Displays the parameter group. There are DRV, FU1, FU2, I/O, EXT, COM, APP groups. |
| 2) Run/Stop Source | Displays the source of motor Run and Stop. K : Run/Stop using FWD, REV buttons on keypad T : Run/Stop using control terminal input FX, RX R : Run/Stop using RS485 O : Run/Stop via option board |
| 3) Frequency Setting Source | Displays the source of command frequency setting. K : Frequency setting using keypad V : Frequency setting using V1 (0 ~12V) or V1 + I terminal |

| Displays | Description |
|--|--|
| | W : Analog frequency reference (V1S: -12 ~ 12V) I : Frequency setting using I (4 ~ 20mA) terminal P : Frequency setting using Pulse input R : Frequency setting using RS485 U : Up terminal input when Up/Down operation is selected D : Down terminal input when Up/Down operation is selected S : Stop status when Up/Down operation is selected O : Frequency setting via Option board X : Frequency setting via Sub board J : Jog terminal input 1 ~ 15 : Step frequency operation (except Jog) |
| 4) Output Current | Displays the Output Current during operation. |
| 5) Parameter Code | Displays the code of a group. Use the ▲(Up), ▼(Down) key to move through 0~99 codes. |
| 6) Operating Status | Displays the operation information. STP : Stop Status FWD : During Forward operation REV : During Reverse operation DCB : During DC Braking LOP : Loss of Reference from Option Board (DPRAM fault) LOR : Loss of Reference from Option Board (Communication network fault) LOV : Loss of Analog Frequency Reference (V1: 0~12V, -10~12V) LOI : Loss of Analog Frequency Reference (I: 4~20mA) LOS : Loss of Reference from Sub-Board |
| 7) Inverter Output Frequency / Command Frequency | Displays the Output Frequency during run. Displays the Command Frequency during stop. |

4.1.3 Parameter setting and changing

- 1) Press **[MODE]** key until the desired parameter group is displayed.
- 2) Press **[▲]** or **[▼]** keys to move to the desired parameter code. If you know the desired parameter code, you can set the code number of each parameter group in "Jump code", except DRV group.
- 3) Press **[PROG]** key to go into the programming mode, the cursor starts blinking.
- 4) Press **[SHIFT/ESC]** key to move the cursor to the desired digit.
- 5) Press **[▲]** or **[▼]** keys to change the data.

6) Press **[ENT]** key to enter the data. The cursor stops blinking.

Note: Data cannot be changed when 1) the parameter is not adjustable during the inverter is running (see the function list), or 2) Parameter Lock function FU2-94 [Parameter Lock] is activated.

EX) Changing Accel time from 10 sec to 15 sec

1) LCD keypad

DRV ► Acc. time
01 10.0 sec

Move to the desired code to change.

DRV ► Acc. time
01 1[■].0 sec

Press the **[PROG]** key.
A Cursor (■) will appear.

DRV ► Acc. time
01 10.0 sec

Use the **[SHIFT]** key to move the cursor.

DRV ► Acc. time
01 15.0 sec

Change the data using **[▲]**, **[▼]** keys.

DRV ► Acc. time
01 15.0 sec

Press the **[ENT]** key to save the value into memory.
The Cursor will disappear.

4.1.4 Parameter groups

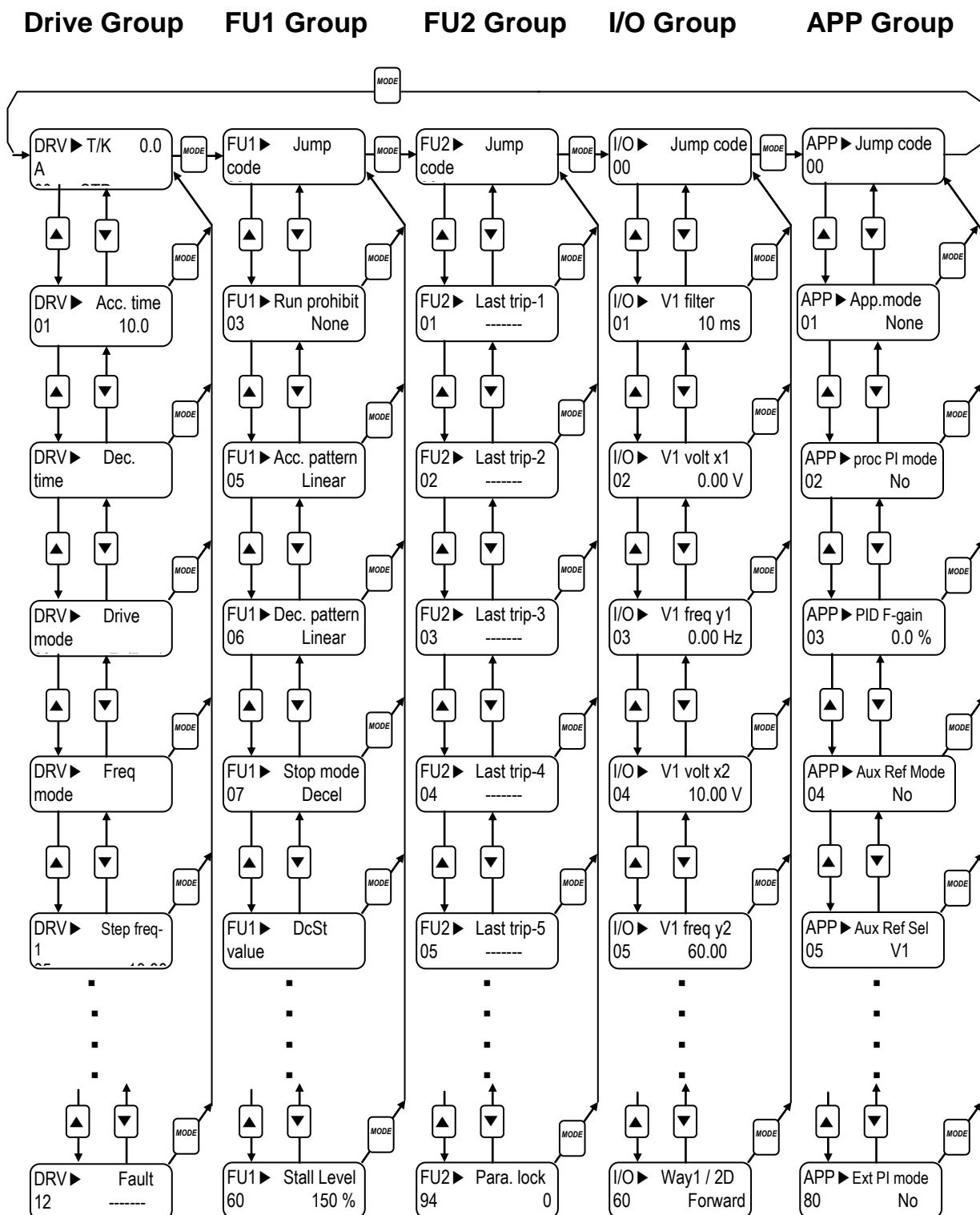
The iP5A series inverter has 5 parameter groups separated according to their applications as indicated in the following table.

The iP5A series inverter provides two kinds of keypad. One is 32-character alphanumeric LCD keypad and the other is 7-Segment LED keypad.

| Parameter Group | LCD Keypad | Description |
|----------------------|------------|--|
| Drive Group | DRV | Command Frequency, Accel/Decel Time etc. Basic function Parameters |
| Function 1 Group | FU1 | Max. Frequency, Amount of Torque Boost etc. Parameters related to basic functions |
| Function 2 Group | FU2 | Frequency Jumps, Max./Min. Frequency Limit etc. Basic Application Parameters |
| Input / Output Group | I/O | Programmable Digital Input/Output Terminal Setting, Auto Operation etc. Parameters needed for Sequence Operation |
| Application Group | APP | PID, MMC (Multi-Motor Control), 2 nd motor operation etc. Parameters related to Application function |

1) Parameter Navigation (LCD Keypad)

The parameter group moves directly to DRV group by pressing [**SHIFT**] key in any parameter code.



Note: This figure shows the group and code navigation through LCD display keypad. It can be different from the actual display due to the group addition or code change.

4.2 Operating Example

4.2.1 Easy Start Operation

Easy Start Operation is activated by pressing STOP key on the Keypad for 2~3 seconds and inverter begins operation via Keypad (FWD/REV RUN/STOP).

Drive mode is preset to V/F and reference frequency to JOG.

4.2.2 Operation via Control terminal + Keypad

Setting: DRV-03 [Drive Mode (Run/Stop method)] = Fx/Rx-1

DRV-04 [Frequency Mode (Freq. setting method)] = Keypad

With above setting, Freq setting via terminal & Run/Stop via Keypad disabled

- 1) Check the LCD display when Power ON. Otherwise, change the setting correctly as shown above.

| | |
|-----------|--------|
| DRV ▶ T/K | 0.0 A |
| 00 STP | 0.00Hz |

- 2) Turn the FX (or RX) terminal ON. Then FWD (or REV) LED will be lit.

| | |
|-----------|--------|
| DRV ▶ T/K | 0.0 A |
| 00 FWD | 0.00Hz |

- 3) When setting the Ref. Freq to 60 Hz using **PROG/ENT/SHIFT**, **▲** keys, the motor will rotate at 60Hz. FWD (or REV) LED will be flickering during Acceleration / Deceleration.

| | | | | | | |
|-----------------|--|---|-----------------|---|-----------|---------|
| DRV ▶ Cmd. freq | | → | DRV ▶ Cmd. freq | → | DRV ▶ T/K | 5.0 A |
| 00 ■ 0.00Hz | | | 00 60.00Hz | | 00 FWD | 60.00Hz |

- 4) Turn the FX (or RX) terminal Off. Then Stop LED will be lit.

| | |
|-----------|---------|
| DRV ▶ T/K | 0.0 A |
| 00 STP | 60.00Hz |

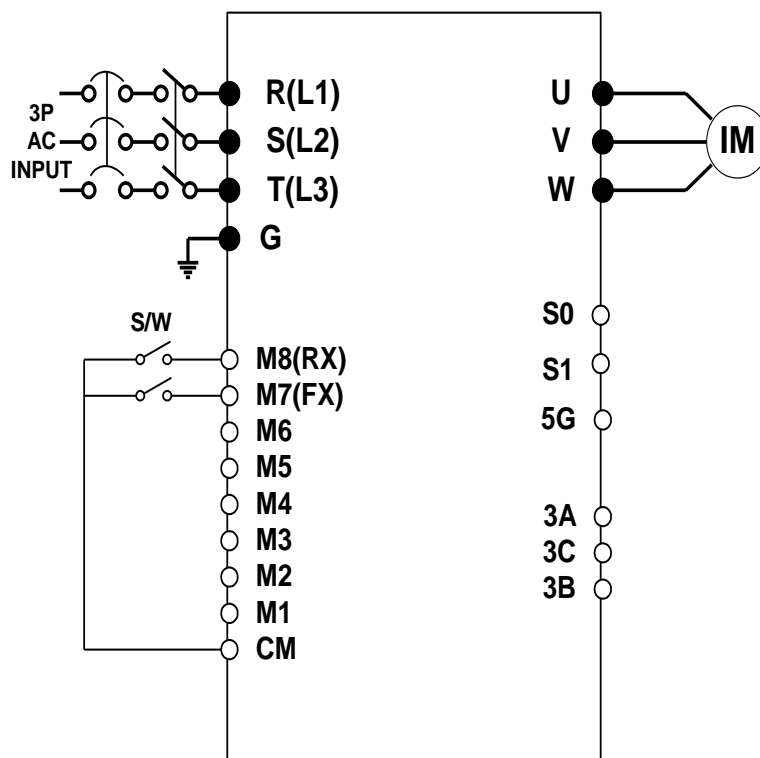
Note) To enable Run/Stop via keypad and Freq setting via control terminal,
 Setting : DRV-03 [Drive Mode (Run/Stop method)] = Keypad
 DRV-04 [Frequency Mode (Freq. setting method)] = V1, V1S or I

Operation Example (1) Freq Setting via Keypad + Run/Stop via Terminal (FX/RX)

[Operation condition]

- Control mode : V/F control
- Ref. Frequency : 50[Hz] setting via keypad
- Accel/Decel time : Accel – 10 [sec], Decel – 20 [sec]
- Drive mode : Run/Stop via FX/RX terminal, Control terminal : NPN mode

[Wiring]



| Step | Parameter setting | Code | Description |
|------|-----------------------------|----------------|--|
| 1 | Drive Mode | DRV-3 | Set it to 1 FX/RX-1. |
| 2 | Frequency Mode | DRV-4 | Set it to 0 Keypad-1. |
| 3 | 50[Hz] freq command setting | DRV-0 | Set freq command 50[Hz] via Keypad. |
| 4 | Accel/Decel time | DRV-1 DRV-2 | Set Accel time to 10 [sec] in DRV-1. Set Decel time to 20 [sec] in DRV-2. |
| 5 | Terminal FX (M7) | I/O-26 | Motor starts to rotate in Forward direction at 50Hz with Accel time 10 [sec] when FX terminal is turned ON. Motor decelerates to stop with Decel time 20[sec] when FX terminal is turned OFF. |
| 6 | Terminal RX (M8) | I/O-27 | When RX terminal is turned ON motor starts to rotate in Reverse direction at 50[Hz] with Accel time 10 [sec]. When it is OFF, motor decelerates to stop with Decel time 20 [sec]. |

4.2.3 Operation via Control Terminal

Setting: **DRV-03** [Drive Mode (Run/Stop method)] = **1 (Fx/Rx-1)**
DRV-04 [Frequency Mode (Freq. setting method)] = **2 (V1)**

- 1) Check the LCD display when Power ON. Otherwise, change the setting correctly as shown above.

| | |
|-----------|--------|
| DRV ▶ T/V | 0.0 A |
| 00 STP | 0.00Hz |

- 2) Turn the FX (or RX) terminal ON. Then FWD (or REV) LED will be lit.

| | |
|-----------|--------|
| DRV ▶ T/V | 0.0 A |
| 00 FWD | 0.00Hz |

- 3) Set the frequency using V1 (Potentiometer), Output freq (60Hz). Rotating direction (FWD or REV) and output current (5A) will be displayed on the LCD.

| | |
|-----------|---------|
| DRV ▶ T/V | 5.0 A |
| 00 FWD | 60.00Hz |

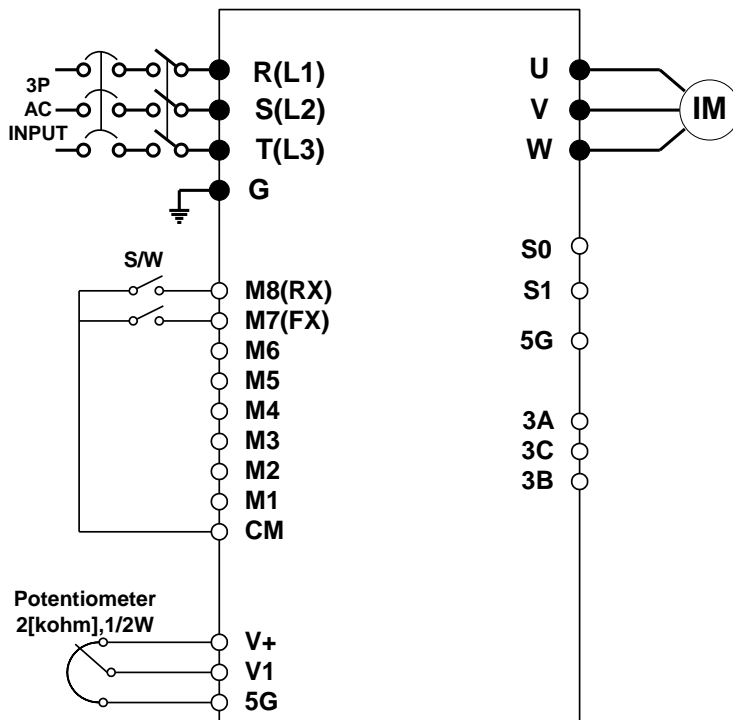
- 4) Output freq value is decreasing when turning the potentiometer counterclockwise. Inverter output stops at 0.00Hz and motor is stopped.

| | |
|-----------|--------|
| DRV ▶ T/V | 0.0 A |
| 00 FWD | 0.00Hz |

- 5) Turn FX (or RX) terminal OFF.

| | |
|-----------|--------|
| DRV ▶ T/V | 0.0 A |
| 00 STP | 0.00Hz |

Chapter 4 - Operation

| Operation Example (2) | | Analog Voltage Input (V1) + Operation via Terminal (FX/RX) | |
|--|-----------------------------|--|--|
| [Operation condition] <ul style="list-style-type: none">- Control mode : V/F control- Reference Frequency : 50[Hz] analog input via V1 (Potentiometer)- Accel/Decel time : Accel – 10 [sec], Decel – 20 [sec]- Drive mode : Run/Stop via FX/RX terminal, Control terminal : NPN mode | | | |
| [Wiring] <div></div> | | | |
| Step | Parameter setting | Code | Description |
| 1 | Drive Mode | DRV-3 | Set it to 1 Fx/Rx-1. |
| 2 | Frequency Mode | DRV-4 | Set it to 2 V1 Analog input. |
| 3 | 50[Hz] freq command setting | DRV-0 | Set freq command 50[Hz] via V1 (potentiometer). |
| 4 | Accel/Decel time | DRV-1 DRV-2 | Set Accel time to 10 [sec] in DRV-1. Set Decel time to 20 [sec] in DRV-2. |
| 5 | Terminal FX (M7) | I/O-26 | Motor starts to rotate in Forward direction at 50Hz with Accel time 10 [sec] when FX terminal is turned ON. Motor decelerates to stop with Decel time 20[sec] when FX terminal is turned OFF. |
| 6 | Terminal RX (M8) | I/O-27 | When RX terminal is turned ON motor starts to rotate in Reverse direction at 50[Hz] with Accel time 10 [sec]. When it is OFF, motor decelerates to stop with Decel time 20 [sec]. |

☞ 0.75 ~ 30 kW products: Common terminal of frequency setting is 5G terminal.

☞ 37 ~ 450 kW products: Common terminal of frequency setting is CM terminal.

4.2.4 Operation via Keypad

Setting : DRV-03 [Drive Mode (Run/Stop method)] = **0 (Keypad)**

DRV-04 [Frequency Mode (Freq. setting method)] = **0 (Keypad-1)**

- 1) Check the LCD display when Power ON. Otherwise, change the setting as shown above.

| | | |
|-------|-----|--------|
| DRV ▶ | K/K | 0.0 A |
| 00 | STP | 0.00Hz |

- 2) Set the Ref. Freq to 60 Hz using **PROG/ENT/SHIFT**, **▲** keys. Set freq is displayed during stop.

| | | |
|-------|-----|---------|
| DRV ▶ | K/K | 0.0 A |
| 00 | STP | 60.00Hz |

- 3) When pressing **FWD/REV** key, motor starts running and output freq and output current are displayed.

| | | |
|-------|-----|---------|
| DRV ▶ | K/K | 5.0 A |
| 00 | FWD | 60.00Hz |

- 4) Press **STOP/RESET** key. Then motor decelerates to stop. Set freq 60Hz is displayed.

| | | |
|-------|-----|---------|
| DRV ▶ | K/K | 0.0 A |
| 00 | STP | 60.00Hz |

4.3 Various function setting and Description

4.3.1 Basic function parameter setting

It is the basic function setting. All settings are factory defaults unless users make change. It is recommended to use factory setting value unless the parameter change is necessary.

1) Common parameter setting

The following table shows common parameter setting that should be checked before use regardless of control mode.

| Parameter Name | Code | Description |
|--------------------------|----------------|---|
| Line Freq. | FU1-29 | Sets a freq of the inverter input power source. |
| Base Frequency | FU1-31 | Sets the Motor Base Frequency ¹⁾ . |
| Motor Rated Voltage | FU1-50 | Sets the Motor Rated Voltage ¹⁾ . |
| Motor Selection | FU2-40 | Selects motor and voltage rating suitable to the desired inverter. |
| Motor Parameters | FU2-41 ~ 46 | Basic parameter value setting when selecting the motor rating. Note : If there is any discrepancy between parameter preset value and the actual motor parameter value, change the parameter value according to the actual motor. |
| Drive Mode | DRV-3 | Operation via Keypad, Fx/Rx-1, Fx/Rx-2 and Int 485 setting. |
| Frequency Mode | DRV-4 | Frequency reference source setting parameter |
| Accel/Decel Time Setting | DRV-1 DRV-2 | Accel/Decel time setting |

1) If FU1-31 and FU1-50 are set higher than motor nameplate value, it may cause motor overheat and if it is set smaller than that, it may cause Over voltage trip during deceleration. Make sure to enter the actual motor value.

2) V/F control

FU2-60 [Control mode] is set to 0 "V/F" as factory setting. Operation via V/F control is activated after the above common parameter setting is done and the followings are set.

| Parameter Name | Code | Description |
|--------------------|------------------|---|
| Starting freq. | FU1-32 | Set frequency to start the motor. |
| Torque boost | FU2-67 | Manual or Auto torque boost settable in this parameter. |
| Torque boost value | FU2-68 FU2-69 | If FU1-67 [torque boost] is set to "manual", user sets the desired value and the direction in code FU1-68 and 69. |

3) Slip compensation

Operation is done via Slip compensation if FU2-60 is set to 1 {Slip compen}. This control keeps motor speed constant regardless of load change.

4) Sensorless vector control

Set FU2-60 to "Sensorless" to enable Sensorless vector control. It is strongly recommended to perform **Auto-tuning** before starting Sensorless control in order to maximize performance.

| Parameter Name | Code | Description |
|----------------------------------|----------------|----------------------------|
| Control method selection | FU2-60 | Select Sensorless. |
| P, I gain for sensorless control | FU2-65, FU2-66 | Set gain for Sensorless. |
| Starting freq | FU1-32 | Starting freq of the motor |

Note) No-load current for Sensorless control is not entered by auto-tuning. Therefore enter the no-load current value in V/F operation. When other than LS standard motor is used, set this value according to the motor in use for better performance.

5) Auto-tuning of motor constant

This parameter enables auto-tuning of the motor constants. If FU2-61 is set to Yes and press the enter key, **Rs**, **Lsigma** values begin tuning with the motor stopped. Refer to motor nameplate for the rest of other parameters.

| Parameter Name | Code | Description |
|----------------|--------|-------------|
| Auto-tuning | FU2-61 | No, Yes |

Note) Motor no-load current and slip freq should be set correctly for safe and better performance. Be sure to check these values and set them properly. Refer to Chapter 5, FU2-40~66 for more.

4.3.2 Advanced function setting

SV-iP5A inverter features advanced function parameters to maximize efficiency and performance of the motor. It is recommended to use the factory setting unless parameter value change is inevitable.

1) V/F control

| Parameter Name | Code | Description |
|--------------------------------|----------------------|---|
| V/F Pattern | FU1-40 | Use it according to load characteristics. If User V/F is selected, user can select the optimum output V/F characteristic for the application and load characteristics in [FU1-41]~[FU1-48]. |
| Dwell operation | FU2-07 FU2-08 | Used to output torque in an intended direction. Inverter stops acceleration for the preset [FU2-08] Dwell time while running at Dwell frequency [FU2-07] and starts acceleration at commanded frequency. Setting [FU2-08] Dwell time to 0 disable the Dwell operation. |
| Jump Frequency | FU2-10 FU2-1~16 | When it is desired to avoid resonance attributable to the natural frequency of a mechanical system, these parameters allow resonant frequencies to be jumped. Up to three areas can be set, with the jump frequencies set to either the top or bottom point of each area. To enable the function, set [FU2-10] to 'Yes' and set the value in [FU2-11]~[FU2-16]. |
| Accel/Decel pattern S-curve | FU1-2, 3 FU1-4, 5 | This pattern has an effect on the prevention of cargo collapse on conveyor etc. and reduction in an acceleration/ deceleration shock. |

2) Sensorless vector control

Related parameters for starting in **Sensorless vector control** when FU2-60 [Control Mode Selection] is set to Sensorless.

| Parameter Name | Code | Description |
|----------------|-----------|---|
| When starting | FU2-64 | Pre-excitation time setting |
| | I/O-20~27 | Programmable Digital Input terminals define |

3) Parameters to monitor motor and inverter status

| Parameter Name | Code | Description |
|---|------------------|---|
| Output current/ motor speed | DRV-8~9 | Displays output current and motor rpm. |
| DC link voltage | DRV-10 | Displays DC link voltage. |
| User display selection (Voltage and watt) | DRV-11 FU2-81 | Either output voltage or power selected in FU2-81 is displayed in DRV-11. |
| Fault display | DRV-12 | Displays the current inverter fault. |
| TAR / OUT Freq. display | DRV-14 | Displays Target freq. for Accel/Decel and Output freq during Accel/Decel. |
| REF/FBK display | DRV-15 | Displays PID Reference/ Feedback frequency display. |
| Speed (Hz / Rpm) selection | DRV-16 | Selects inverter output speed unit [Hz or Rpm]. |
| PID parameter | DRV-18 | Displays related parameters of PID controller. |
| AD parameter | DRV-19 | Displays inverter analog input value to AD value. |
| EXT - PID parameter | DRV-20 | Displays related parameters of EXT-PID controller. |

Note) DRV-15, DRV-18 only displayed when APP-02 [proc PI mode] is set to "Yes." DRV-20 only displayed when APP-80 [Ext PI mode] is set to "Yes."

4) Parameter initialize

| Parameter Name | Code | Description |
|---|--|---|
| Software version | FU2-82 | Displays the inverter software version. |
| Parameter Read/Write/ Initialize/Lock | FU2-91 FU2-92 FU2-93 FU2-94 FU2-95 | [FU2-91], [FU2-92] : Copying parameters from other inverter [FU2-93] : Initializing parameters to factory setting values [FU2-94] : Parameter write disabled [FU2-95] : Parameter save |

Note: Motor parameters (FU2-40~46, FU2-62~63) returned to factory setting once Parameter Read/Write is executed.

5) Protection and Trip level setting

| Parameter Name | Code | Description |
|-------------------------|--|--|
| Electronic thermal | FU1-60 FU1-61 FU1-62 FU1-63 | Protection of the motor from overheating without the use of external thermal relay. Refer to parameter descriptions for more detail. |
| Overload alarm and trip | FU1-64 FU1-65 FU1-66 FU1-67 FU1-68 | Warning alarm outputs and displays the trip message when overcurrent above the threshold value keeps on. |
| Stall prevention | FU1-70 FU1-71 | Set the output current level at which the output freq will be adjusted to prevent the motor from stopping due to over-current etc. It activates during accel/ constant speed/decel to prevent the motor stall. |

6) Starting / Accel / Decel / Stopping pattern setting

| Parameter Name | Code | Description |
|---------------------------|----------------------------|---|
| Accel/Decel pattern | FU1-02 FU1-03 | 2 types of Accel/Decel pattern: 'S-curve', 'U-curve' settable according to application and load characteristic. If 'S-curve' is selected, the desired value of [FU1-4], [FU1-5] is settable. |
| Starting/Stopping method | FU1-20 FU1-23 | 4 types of stopping method 'Decel', 'DC-brake', 'Free-run', 'Flux Brake' selectable. If 'DC-brake' is selected, the desired value of [FU1-21, 22], [FU1-24]~ [FU1-27] is settable. See function description of chapter 5 for more details. |
| Frequency Limit selection | FU1-33 FU1-34 FU1-35 | Limits the active frequency. Inverter operates at the freq range between upper freq limit [FU1-35] and bottom freq limit [FU1-34] and higher/ lower freq value is entered, it is automatically replaced by limit value. Setting range: [FU1-30] Maximum freq to [FU1-32] starting freq. |

7) Operation-starting method

| Parameter Name | Code | Description |
|------------------------|--------------------------------------|---|
| Starting Method | FU2-20 FU2-21 FU2-25 FU2-26 | Motor starting method: [FU2-20] Power-on run [FU2-21] Restart after Fault Reset [FU2-25] Number of Auto Restart Attempt [FU2-26] Delay Time Before Auto Restart |
| Speed Search Selection | FU2-22 FU2-23 FU2-24 | Speed search function is available during Accel, trip, instant power failure, restart after fault reset and Speed search at auto restart. |

4.3.3 Application function setting

1) PID operation

Inverter can be used to exercise process control, e.g. flow rate, air volume or pressure via PID feedback control.

| Parameter Name | Code | Description |
|---------------------|-----------------|------------------------------------|
| PID control setting | APP-02 ~ APP-17 | Parameters for PID control setting |

2) Ext PID operation

It is used for External PID feedback control.

| Parameter Name | Code | Description |
|----------------|-----------------|------------------------|
| ExtPID setting | APP-80 ~ APP-97 | Parameters for Ext PID |

3) Pre PID operation

It helps to begin smooth start of the PID control.

| Parameter Name | Code | Description |
|----------------|-----------------|----------------------------------|
| PrePID setting | APP-74 ~ APP-76 | Parameters for Pre PID operation |

4) MMC operation

Inverter controls a whole system by controlling Main motor connected directly to the inverter and Aux motors connected to the inverter relays and operated via relay On/Off.

| Parameter Name | Code | Description |
|----------------|------------------------------------|------------------------------|
| MMC setting | APP-40 ~ APP-71 I/O-20 ~ I/O-27 | Parameters for MMC operation |

5) Jog and Multi-speed operation

| Parameter Name | Code | Description |
|---|-------------------------------|---|
| Multi function input terminal setting | I/O-20 ~27 | If I/O-20 ~27 are set to Speed-H, Speed-M, Speed-L, multi- speed operation up to speed 17 is available. |
| Filter time constant for input terminal | I/O-29 | Effective for eliminating noise in the freq. Setting circuit |
| Speed reference value | DRV-05 ~07 I/O-31 ~ I/O-42 | Speed reference value for each step setting |

| Parameter Name | Code | Description |
|--|-------------|--|
| Accel/Decel time setting for each step | I/O-50 ~ 63 | Accel/Decel time for each step setting |
| Jog freq. | I/O-30 | jog freq for jog operation setting |

| Speed-X | Speed-H | Speed-M | Speed-L | JOG | Speed Command | Parameter value |
|---------|---------|---------|---------|-----|---------------|-----------------|
| 0 | 0 | 0 | 0 | 0 | Speed 0 | DRV-00 |
| 0 | X | X | X | 1 | Jog freq. | I/O-20 |
| 0 | 0 | 0 | 1 | 0 | Speed -1 | DRV-05 |
| 0 | 0 | 1 | 0 | 0 | Speed -2 | DRV-06 |
| .. | .. | .. | .. | .. | .. | .. |
| .. | .. | .. | .. | .. | .. | .. |
| 1 | 1 | 0 | 1 | 0 | Speed -13 | I/O-40 |
| 1 | 1 | 1 | 0 | 0 | Speed -14 | I/O-41 |
| 1 | 1 | 1 | 1 | 0 | Speed -15 | I/O-42 |

6) 2nd motor operation

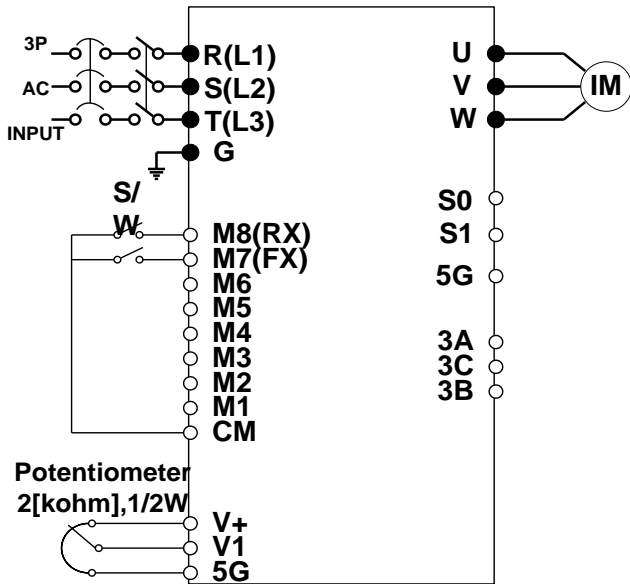
2nd function setting is required to run the two motors by one inverter by exchange. If the terminal defined for 2nd function signal input is turned ON, 2nd motor operation is valid.

| Parameter Name | Code | Description |
|---|-----------------|---|
| Programmable Digital Input terminals setting | I/O-20 ~27 | 2 nd motor operation is available with Programmable Digital Input terminals M1 ~ M8 set to 7 {2 nd Func}. |
| Parameter setting for 2 nd motor operation | APP-20 ~ APP-29 | Setting parameters necessary to operate 2 nd motor such as base freq., Accel/Decl time, Stall. |

7) Energy-saving operation

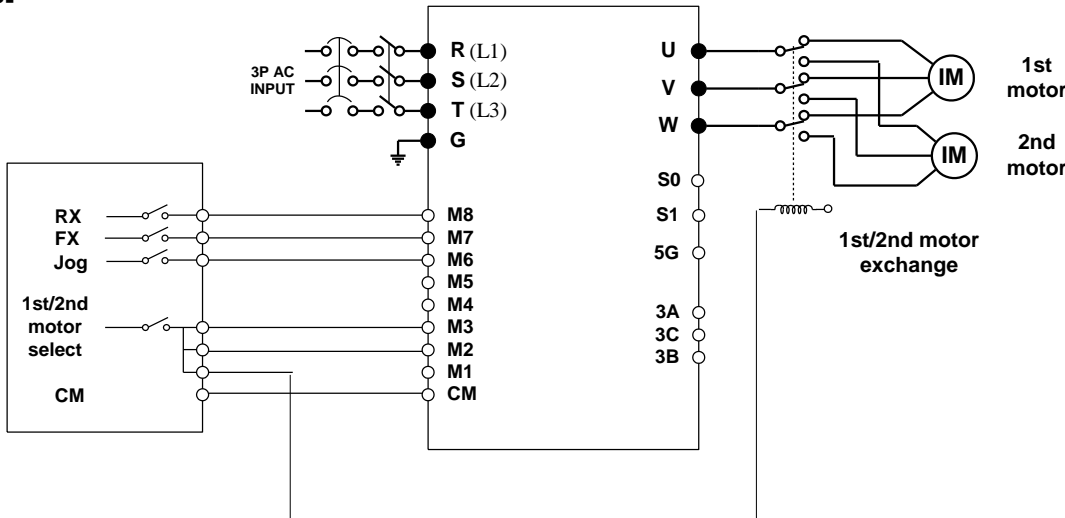
FU1-51 [Energy Save Level] tunes the inverter output voltage to minimize the inverter output voltage during constant speed operation. Appropriate for energy-saving applications such as fan, pump and HVAC.

4.4 Operation Example

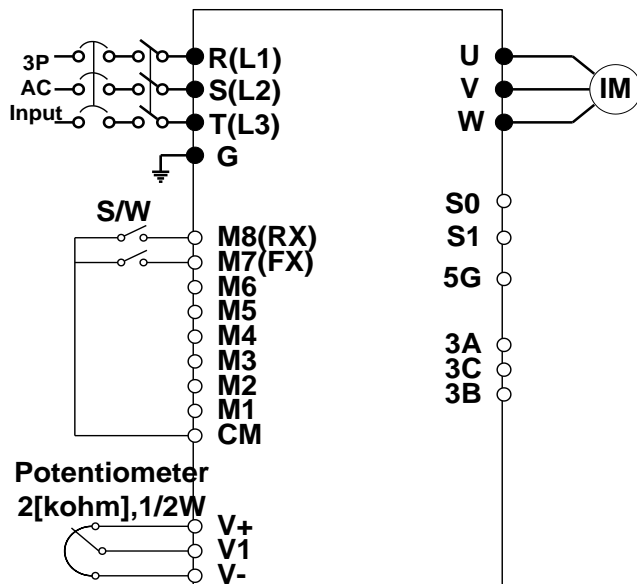
| Operation Example (1) | V/F Control + Analog Voltage Input (V1) + Operation via Terminal (FX/RX) | | |
|---|--|----------------|--|
| [Operation condition] <ul style="list-style-type: none">- Control mode : V/F control- Frequency command : 50[Hz] analog input via V1 terminal- Accel/Decel time : Accel – 15 [sec], Decel – 25 [sec]- Drive mode : Run/Stop via FX/RX terminal, Control terminal : NPN mode | | | |
| [Wiring]  | | | |
| Step | Parameter setting | Code | Description |
| 1 | Control Mode Selection | FU2-60 | Set it to 0 {V/F}. |
| 2 | Drive Mode | DRV-3 | Set it to Fx/Rx-1. |
| 3 | Frequency Mode | DRV-4 | Set V1 Analog input value in frequency mode. |
| 4 | 50[Hz] freq command setting | DRV-0 | Set freq command 50[Hz] via V1 (potentiometer). |
| 5 | Accel/Decel time | DRV-1 DRV-2 | Set Accel time to 15 [sec] in DRV-2. Set Decel time to 25 [sec] in DRV-3. |
| 6 | Terminal FX | I/O-26 | Motor starts to rotate in Forward direction at 50Hz with Accel time 15 [sec] when FX terminal is turned ON. Motor decelerates to stop with Decel time 25[sec] when FX terminal is turned OFF. |
| 7 | Terminal RX | I/O-27 | When RX terminal is turned ON motor starts to rotate in Reverse direction at 50[Hz] with Accel time 15 [sec]. When it is OFF, motor decelerates to stop with Decel time 25 [sec]. |

☞ 0.75 ~ 30 kW products: Common terminal of frequency setting is 5G terminal.

☞ 37 ~ 450 kW products: Common terminal of frequency setting is CM terminal.

| Operation Example (2) | 2 nd motor operation | | |
|---|--|------------------|---|
| [Operation condition] <ul style="list-style-type: none">- Control mode : V/F control- 1st motor + 2nd motor Operation by exchange using [2nd Func] (Set Value different)- Frequency command : Using Multi-step operation 1st motor --- 50[Hz] as main speed 2nd motor --- 20[Hz] with M1 terminal set as multi- step operation)- Accel/Decel time : 1st motor --- Accel time : 15[sec], Decel time : 25 [sec] 2nd motor --- Accel time : 30[sec], Decel time : 40 [sec]- Drive mode : Run/Stop via FX/RX, Control terminal : NPN mode | | | |
| [Wiring]  | | | |
| Step | Parameter setting | Code | Description |
| 1 | Control Mode Selection | FU2-60 | Set it to 0 {V/F}. |
| 2 | Drive mode | DRV-3 | Set it to Fx/Rx-1. |
| 3 | Frequency Mode setting | DRV-4 | Set it to 0 {keypad-1}. 1 st motor freq setting |
| 4 | Programmable digital input terminal M1 | I/O-20 | Set M1 to 2nd Func. |
| 5 | Programmable digital input terminal M2 | I/O-21 | Set M2 to Speed-L. 2 nd motor freq setting. |
| 6 | Freq setting for 1 st motor | DRV-0 | Set it to 50[Hz]. |
| 7 | Accel/Decel time setting for 1 st motor | DRV-1 DRV-2 | Set Accel/Decel time to 15[sec]/25[sec]. |
| 8 | Freq setting for 2 nd motor | DRV-5 | Set it to 10[Hz]. |
| 9 | Accel/Decel time setting for 2 nd motor | APP-20 APP-21 | Set Accel/Decel time to 30[sec]/50[sec]. |
| 10 | 1 st motor operation | - | Set it as main motor by turning M1, M2, Output relay OFF. Run the motor in FWD/REV direction using FX/RX terminal. |
| 11 | 2 nd motor operation | - | Set 2 nd motor parameters by turning terminal M1 ON. Change the freq setting to 20[Hz] by turning terminal M2 ON. Change to 2 nd motor terminal by turning output relay ON. Run the motor in FWD/REV direction by terminal FX/RX. |

Chapter 4 - Operation

| Operation Example (3) | | V/F control + Analog input (V1S) + Operation via terminal FX/RX | |
|---|--|---|--|
| [Operation condition] <ul style="list-style-type: none">- Control mode : V/F control- Frequency command : Setting 50[Hz] via Analog input (V1S)- Accel/Decel time : Accel time 15 [sec], Decel time 25 [sec]- Drive mode : Run/Stop via FX/RX, Control terminal: NPN mode | | | |
| [Wiring] <div></div> | | | |
| Step | Parameter setting | Code | Description |
| 1 | Control mode selection | FU2-60 | Set it to 0 {V/F}. |
| 2 | Drive mode | DRV-3 | Set it to 1 {Fx/Rx-1}. |
| 3 | Frequency mode | DRV-4 | Set it to 3 {V1S}. |
| 4 | Operating frequency command 50[Hz] setting | DRV-0 | Set 50[Hz] via potentiometer (V1S). |
| 5 | Accel/Decel time setting | DRV-1 DRV-2 | Set Accel. time to 15[sec] in DRV-1 with Decal. time to 25[sec] in DRV-2. |
| 6 | FX terminal (M7) | IO-26 | When FX terminal is turned ON, motor rotating in forward direction starts running at 50[Hz] for 15 [sec]. When FX terminal is turned OFF, motor decelerates to stop for 25[sec]. |
| 7 | RX terminal (M8) | IO-27 | When RX terminal is turned ON, motor rotating in reverse direction starts running at 50[Hz] for 15[sec]. When RX terminal is turned OFF, motor decelerates to stop for 25 [sec]. |

🔧 **Note:** V1S mode enables Forward/Reverse rotation using $\pm 12V$ power via Analog input command.

🔧 **Note:** Use V1 instead of V1S mode when FWD/REV Run Prevention is active. V1S mode enables the motor to run both FWD/REV directions.

- ☞ **Note:** If the inverter is operated without wiring a motor, trip occurs as below because the protection function is active automatically. In this case, refer to the related parameters(FU1 57 ~ 59). Trip is reset if the inverter is powered down and up once again.





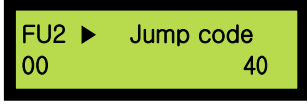


In case that a simple trial run is needed such as a check on basic operation state without a wiring a motor, FU1-57(No Motor Sel) should be set to [No].



CHAPTER 5 - PARAMETER LIST

5.1 Parameter groups

The parameters of SV-IP5A Series are divided into 5 function groups in accordance with the application. Their names, principal contents and LCD keypad displays are shown below.

| Name of Group | LCD Keypad Display | Description |
|-----------------------------|---|---|
| Drive Group [DRV] |  | Target frequency and Accel/ Decel Time, etc. Basic parameters |
| Function1 Group [FU1] |  | Maximum Frequency and Protection, etc. Parameters regarding basic functions |
| Function2 Group [FU2] |  | Frequency Jump and Frequency Limit, etc Parameters regarding application functions |
| Input/Output Group [I/O] |  | Programmable Digital terminal Define and Analog Command, etc Parameters necessary for sequence configuration |
| Application Group [APP] |  | PID, MMC, and 2 nd motor, etc. Parameters regarding application functions |


5.2 Parameter list

* The number of page is for User's manual uploaded at LSIS website. You can download the User's manual which is described detailed function of parameter from website. (<http://www.lsis.com>)

[DRV Group]

| CODE | Comm. Addr | Description | LCD Keypad Display | Setting Range | Factory Default | Adj. During Run | Page |
|---------------|------------|---|--------------------|---|-----------------------------------|-----------------|------|
| DRV-00 (1) | 9100 | Command Frequency (Output Frequency during motor run, Reference Frequency during motor stop), Output Current (LCD) | Cmd. freq | 0 to FU1-30[Hz] | 0 [Hz] | O | 6-1 |
| DRV-01 | 9101 | Acceleration Time | Acc. Time | 0 to 6000 [sec] | 0.75~90kW (1~125HP) 20 [sec] | O | 6-2 |
| | | | | | 110~450kW (150~600HP) 60 [sec] | | |
| DRV-02 | 9102 | Deceleration Time | Dec. time | 0 to 6000 [sec] | 0.75~90kW (1~125HP) 30 [sec] | O | 6-2 |
| | | | | | 110~450kW (150~600HP) 90 [sec] | | |
| DRV-03 | 9103 | Drive Mode (Run/Stop Method) | Drive mode | 0 (Keypad) 1 (Fx/Rx-1) 2 (Fx/Rx-2) 3 (Int. 485) | 1 (Fx/Rx-1) | X | 6-3 |
| DRV-04 | 9104 | Frequency Mode (Frequency setting method) | Freq mode | 0 (Keypad-1) 1 (Keypad-2) 2 (V1) 3 (V1S) 4 (I) 5 (V1+I) 6 (Pulse) 7 (Int. 485) 8 (Ext. PID) | 0 (Keypad-1) | X | 6-3 |
| DRV-05 | 9105 | Step Frequency 1 | Step freq-1 | 0 to FU1-30[Hz] | 10 [Hz] | O | 6-3 |
| DRV-06 | 9106 | Step Frequency 2 | Step freq-2 | | 20 [Hz] | O | |
| DRV-07 | 9107 | Step Frequency 3 | Step freq-3 | | 30 [Hz] | O | |
| DRV-08 | 9108 | Output Current | Current | * [A] | * [A] | * | 6-4 |
| DRV-09 | 9109 | Motor Speed | Speed | * [rpm] | * [rpm] | * | 6-4 |
| DRV-10 | 910A | DC link Voltage | DC link Vtg | * [V] | * [V] | * | 6-4 |
| DRV-11 | 910B | User Display Selection | User disp | - | Output voltage [V] | * | 6-4 |
| DRV-12 | 910C | Current Trip Display | Fault | * | * | * | 6-4 |
| DRV-14(2) | 910E | Target/Output Frequency Display | Tar. Out. Freq. | * [Hz] | * [Hz] | * | 6-5 |
| DRV-15(2) | 910F | Reference/Feedback Frequency Display | Ref. Fbk. Freq. | * [Hz] | * [Hz] | * | 6-5 |

| CODE | Comm. Addr | Description | LCD Keypad Display | Setting Range | Factory Default | Adj. During Run | Page |
|------------|------------|----------------------|--------------------|---|---------------------|-----------------|------|
| DRV-16 | 9110 | Speed Unit Selection | Hz/Rpm Disp | Hz or Rpm | Hz | O | 6-6 |
| DRV-18 (2) | 9112 | PID Parameter | R T F O | * [Hz] | * [Hz] | X | 6-6 |
| DRV-19 | 9113 | AD Parameter | V1 V2 V1S I | * | * | X | 6-6 |
| DRV-20 (3) | 9114 | EXT-PID Parameter | R T F O | % | % | X | 6-6 |
| DRV-22 | 9116 | Local/Remote Key | LocalRemKey | 0. (2 nd Source) 1 (Cntl&RefStop) 2 (Control Stop) 3 (Ref Only) 4 (Cntl&Ref Run) 5 (Control Run) 6 (Disable) | 1 (Cntl&RefStop) | O | 6-6 |
| DRV-23 | 9117 | Keypad Mode | Key Ref Mode | 0 (Minimum Spd) 1 (Last Spd) 2 (Preset Spd 1) 3 (Stop) 4 (Fault) 5 (Disable) | 5 (Disable) | O | 6-7 |
| DRV-91 (4) | 915B | Drive mode 2 | Drive mode2 | 0 (Keypad) 1 (Fx/Rx-1) 2 (Fx//Rx-2) | 1 (Fx/Rx-1) | X | - |
| DRV-92 | 915C | Frequency mode 2 | Freq mode2 | 0 (Keypad-1) 1 (Keypad-2) 2 (V1) 3 (V1S) 4 (I) 5 (V1+I) 6 (Pulse) | 0 (Keypad-1) | X | - |

*  The gray-highlighted codes are hidden parameters and will appear when the related functions are to be set.

- (1) The speed unit is changed from [Hz] to [%] when DRV-16 is set to [Rpm]. Only User Unit will be displayed when APP-02 is set to [Yes] and when APP-06 is set to either I, V1 or Pulse and when one of I/O-86~ I/O-88 is set to either [Speed] (Hz or Rpm), [Percent], [Bar], [mBar], [kPa] or [Pa].
Output Frequency (Hz or Rpm; Unit of output speed) is displayed in DRV-00 during the Inverter is running. User Unit reference (Unit of PID controller selected) is displayed in DRV-00 during the Inverter is not running.
- (2) DRV-15, DRV-18 will appear when APP-02 [Process PI Mode] is set to "Yes". Also User Unit is displayed when one of I/O-86~ I/O-88 is set to either [Speed](Hz or Rpm), [Percent], [Bar], [mBar], [kPa] or [Pa].
- (3) DRV-20 will appear when APP-80 [ExtProcess PI Mode] is set to "Yes".
- (4) DRV-91/92 will appear only when DRV-22 is set to [2nd Source].

[FU1 GROUP]

| CODE | Comm. Addr | Description | LCD Keypad Display | Setting Range | Factory Default | Adj. During Run | Page |
|---------------|------------|---|--------------------|----------------------------------|-----------------|-----------------|------|
| FU1-00 | 9200 | Jump to Desired Code # | Jump code | 1 to 74 (Use Only LCD Keypad) | 1 | O | 6-8 |
| FU1-01 | 9201 | Run Prevention | Run prevent | 0 (None) | 0 (None) | X | 6-8 |
| | | | | 1 (Fwd prev) | | | |
| | | | | 2 (Rev prev) | | | |
| FU1-02 | 9202 | Acceleration Pattern | Acc. Pattern | 0 (Linear) | 0 (Linear) | X | 6-8 |
| | | | | 1 (S-curve) | | | |
| | | | | 2 (U-curve) | | | |
| FU1-03 | 9203 | Deceleration Pattern | Dec. Pattern | 0 (Linear) | 0 (Linear) | X | 6-8 |
| | | | | 1 (S-curve) | | | |
| | | | | 2 (U-curve) | | | |
| FU1-04 (5) | 9204 | Start Curve for S-Curve Accel/Decel Pattern | Start SCurve | 0 to 100 [%] | 50 [%] | X | 6-8 |
| FU1-05 | 9205 | End Curve for S-Curve Accel/Decel Pattern | End SCurve | 0 to 100 [%] | 50 [%] | X | |
| FU1-10 | 920A | Pre-Heat | Pre-Heat mode | 0 (No) | 0 (No) | X | 6-9 |
| | | | | 1 (Yes) | | | |
| FU1-11 | 920B | Pre-Heat Value | Pre Heat level | 1 to 50 [%] | 30 (%) | X | |
| FU1-12 | 920C | Pre-Heat Duty | Pre Heat Perc | 1 to 100 [%] | 50 (%) | X | |
| FU1-20 | 9214 | Start Mode | Start mode | 0 (Accel) | 0 (Accel) | X | 6-10 |
| | | | | 1 (Dc-start) | | | |
| | | | | 2 (Flying-start) | | | |
| FU1-21 (6) | 9215 | Starting DC Injection Braking Time | DcSt time | 0 to 60 [sec] | 0.1 [sec] | X | 6-10 |
| FU1-22 | 9216 | Starting DC Injection Braking Value | DcSt value | 0 to 150 [%] | 50 [%] | X | |
| FU1-23 | 9217 | Stop Mode | Stop mode | 0 (Decel) | 0 (Decel) | X | 6-10 |
| | | | | 1 (Dc-brake) | | | |
| | | | | 2 (Free-run) | | | |
| | | | | 3 (Flux-brake) | | | |
| FU1-24 (7) | 9218 | DC Injection Braking On-delay Time | DcBlk Time | 0.1 to 60 [sec] | 0.1 [sec] | X | 6-11 |
| FU1-25 | 9219 | DC Injection Braking Frequency | DcBrk freq | 0.1 to 60 [Hz] | 5 [Hz] | X | |
| FU1-26 | 921A | DC Injection Braking Time | DcBr time | 0 to 60 [sec] | 1 [sec] | X | |
| FU1-27 | 921B | DC Injection Braking Value | DcBr value | 0 to 200 [%] | 50 [%] | X | |

| CODE | Comm. Addr | Description | LCD Keypad Display | Setting Range | | Factory Default | Adj. During Run | Page |
|----------------|------------|---------------------------|--------------------|-------------------|------------|-----------------|-----------------|------|
| FU1-28 | 921C | Safety Stop | Safety Stop | 0 | (No) | 0 (No) | X | 6-12 |
| | | | | 1 | (Yes) | | | |
| FU1-29 | 921D | Power Source Freq | Line Freq | 40 to 120 [Hz] | | 60.00 [Hz] | X | 6-12 |
| FU1-30 | 921F | Max Frequency | Max Freq | 30 - 120 [Hz] | | 60.00 [Hz] | X | 6-12 |
| FU1-31 | 9220 | Base Frequency | Base Freq | 30 - 120 [Hz] | | 60.00 [Hz] | X | 6-12 |
| FU1-32 | 9220 | Starting Frequency | Start Freq | 0.01 to 10 [Hz] | | 0.50 [Hz] | X | 6-12 |
| FU1-33 | 9221 | Frequency Limit selection | Freq limit | 0 | (No) | 0 (No) | X | 6-13 |
| | | | | 1 | (Yes) | | | |
| FU1-34 (8) | 9222 | Freq Lower Limit | Lim Lo Freq | 0 – FU1-35 | | 0.50 [Hz] | ○ | 6-13 |
| FU1-35 | 9223 | Freq Upper Limit | Lim Hi Freq | FU1-34 – FU1-30 | | 60.00 [Hz] | X | 6-13 |
| FU1-40 | 9228 | Volts/Hz Pattern | V/F Pattern | 0 | (Linear) | 0 (Linear) | X | 6-14 |
| | | | | 1 | (Square) | | | |
| | | | | 2 | (User V/F) | | | |
| FU1-41 (9) | 9229 | User V/F – Frequency 1 | User freq 1 | 0 to FU1-30 | | 15.00 [Hz] | X | 6-14 |
| FU1-42 | 922A | User V/F – Voltage 1 | User volt 1 | 0 to 100 [%] | | 25 [%] | X | |
| FU1-43 | 922B | User V/F – Frequency 2 | User freq 2 | 0 to FU1-30 | | 30.00 [Hz] | X | |
| FU1-44 | 922C | User V/F – Voltage 2 | User volt 2 | 0 to 100 [%] | | 50 [%] | X | |
| FU1-45 | 922D | User V/F – Frequency 3 | User freq 3 | 0 to FU1-30 | | 45.00 [Hz] | X | |
| FU1-46 | 922E | User V/F – Voltage 3 | User volt 3 | 0 to 100 [%] | | 75 [%] | X | |
| FU1-47 | 922F | User V/F – Frequency 4 | User freq 4 | 0 to FU1-30 | | 60.00 [Hz] | X | |
| FU1-48 | 9230 | User V/F – Voltage 4 | User volt 4 | 0 to 100 [%] | | 100[%] | X | |
| FU1-49 | 9231 | Input voltage adjustment | VAC voltage | 73 to 115.0 [%] | | 86.4 [%] | X | 6-15 |
| FU1-50 | 9232 | Motor Rated Voltage | Motor Volt | 0 to 600 [V] | | 380 [V] | X | 6-15 |
| FU1-51 | 9233 | Energy Save | Energy save | 0 | (None) | 0 (None) | X | 6-15 |
| | | | | 1 | (Manual) | | | |
| | | | | 2 | (Auto) | | | |
| FU1-52 (10) | 9234 | Energy Save % | Manual save% | 0 to 30 [%] | | 0 [%] | O | |
| FU1-54 (13) | 9236 | Integrating Wattmeter | KiloWattHour | M kWh | | * | X | 6-16 |
| FU1-55 | 9237 | Inverter Temperature | Inv. Temp. | 0 to 160 [degree] | | * | X | 6-16 |
| FU1-56 | 9238 | Motor Temperature | Motor Temp. | | | * | X | 6-16 |
| FU1-57 | 9239 | No Motor Selection | No Motor Sel | 0 | (No) | 0 (No) | X | 6-16 |
| | | | | 1 | (Yes) | | | |
| FU1-58 | 923A | Trip Current Level | No Motor Level | 5 to 100 [%] | | 5 [%] | X | 6-16 |
| FU1-59 | 923B | Trip Time Setting | No Motor Time | 0.5 to 10.0 [sec] | | 3.0 [sec] | X | 6-16 |
| FU1-60 | 923C | Electronic Thermal | ETH select | 0 | (No) | 1 (Yes) | O | 6-17 |

Chapter 5 – Parameter List

| CODE | Comm. Addr | Description | LCD Keypad Display | Setting Range | Factory Default | Adj. During Run | Page |
|----------------|------------|---|--------------------|--|-----------------|-----------------|------|
| | | Selection | | 1 (Yes) | | | |
| FU1-61 (11) | 923D | Electronic Thermal Level for 1 Minute | ETH 1min | FU1-62 to 200 [%] | 150 [%] | O | 6-17 |
| FU1-62 | 923E | Electronic Thermal Level for Continuous | ETH Cont | 50 to FU1-61 (Maximum 150%) | 120 [%] | O | 6-17 |
| FU1-63 | 923F | Characteristic Selection (Motor Type) | Motor type | 0 (Self-cool) 1 (Forced-cool) | 0 (Self-cool) | O | 6-17 |
| FU1-64 | 9240 | Overload Warning Level | OL level | 30 to 110 [%] | 110 [%] | O | 6-18 |
| FU1-65 | 9241 | Overload Warning Time | OL time | 0 to 30 [sec] | 10 [sec] | O | 6-18 |
| FU1-66 | 9242 | Overload Trip Selection | OLT select | 0 (No) 1 (Yes) | 0 (No) | O | 6-18 |
| FU1-67 (12) | 9243 | Overload Trip Level | OLT level | 30 to 150 [%] | 120[%] | O | 6-18 |
| FU1-68 | 9244 | Overload Trip Delay Time | OLT time | 0 to 60 [sec] | 60 [sec] | O | 6-18 |
| FU1-69 | 9245 | Input/Output Phase Loss Protection | Trip select | 000 to 111 (Bit Set) | 100 | O | 6-19 |
| FU1-70 | 9246 | Stall Prevention Selection | Stall Mode. | No Yes | No | X | 6-19 |
| FU1-71 | 9247 | Stall Prevention Level | Stall level | 30 to 200 [%] | 120[%] | X | 6-19 |
| FU1-72 | 9248 | Accel/Decel Change Frequency | Acc/Dec ch F | 0 to FU1-30 | 0 [Hz] | X | 6-19 |
| FU1-73 | 9249 | Reference Frequency for Accel and Decel | Acc/Dec freq | 0 (Max freq) 1 (Delta freq) | 0 (Max freq) | X | 6-20 |
| FU1-74 | 924A | Accel/Decel Time Scale | Time scale | 0 (0.01 sec) 1 (0.1 sec) 2 (1 sec) | 1 (0.1 sec) | O | 6-20 |
| FU1-75 | 924B | Up Down Save Mode | UpDnSaveMode | 0 (No) 1 (Yes) | 0 (No) | X | 6-20 |
| FU1-76 (31) | 924C | Up Down Save Freq | UpDnSaveFreq | startFreq to 120[Hz] | 0.00Hz | O | 6-20 |
| FU1-80 (32) | 924D | Voltage Suppression | Suppression | Yes / No | Yes | O | 6-20 |

*  The gray-highlighted codes are hidden parameters and will appear when the related functions are to be set.

(5) Only displayed when FU1-02, FU1-03 is set to [S-Curve].

(6) Only displayed when FU1-20 is set to [DC-start]. (7) Only displayed when FU1-23 is set to [DC-brake].

(8) Only displayed when FU1-33 is set to [Yes]. (9) FU1-41~48 Only displayed when FU1-40 is set to [User V/F].

(10) Only displayed when FU1-51 is set to [Manual]. (11) Only displayed when FU1-60 is set to [Yes].

(12) Only displayed when FU1-66 is set to [Yes].

(13) It isn't proper measuring Input power because some error can be occurred by Kinds of Motor, Load, Output Freq etc.

(31) Only displayed when FU1-75 is set to [Yes].

(32) If you do not want to suppress output voltage, Set this parameter to NO

[FU2 GROUP]

| CODE | Comm. Addr | Description | LCD Keypad Display | Setting Range | | Factory Default | Adj. During Run | Page |
|----------------|------------|---|--------------------------|---|-------|-----------------|-----------------|------|
| FU2-00 | 9300 | Jump to desired code # | Jump code | 1 to 95 (Use Only LCD Keypad) | | 40 | O | 6-21 |
| FU2-01 | 9301 | Last trip 1 | Last trip-1 | By pressing [ENTER] and [SEL] key, the frequency, current, and operational status at the time of fault can be seen. | | 0 (None) | * | 6-21 |
| FU2-02 | 9302 | Last trip 2 | Last trip-2 | | | | * | 6-21 |
| FU2-03 | 9303 | Last trip 3 | Last trip-3 | | | | * | 6-21 |
| FU2-04 | 9304 | Last trip 4 | Last trip-4 | | | | * | 6-21 |
| FU2-05 | 9305 | Last trip 5 | Last trip-5 | | | | * | 6-21 |
| FU2-06 | 9306 | Erase trips | Erase trips | 0 | (No) | 0 (No) | O | 6-21 |
| | | | | 1 | (Yes) | | | |
| FU2-07 | 9307 | Dwell Frequency | Dwell time | 0 to 10 [sec] | | 0 [sec] | X | 6-21 |
| FU2-08 (12) | 9308 | Dwell Frequency | Dwell freq | FU1-32 to FU1-30 | | 5 [Hz] | X | 6-21 |
| FU2-10 | 930A | Frequency Jump Selection | Jump Freq | 0 | (No) | 0 (No) | X | 6-21 |
| | | | | 1 | (Yes) | | | |
| FU2-11 (13) | 930B | Jump Frequency 1 Low | jump lo 1 | 0 to FU2-12 | | 10 [Hz] | O | 6-21 |
| FU2-12 | 930C | Jump Frequency 1 High | jump Hi 1 | FU2-11 to FU1-30 | | 15 [Hz] | O | |
| FU2-13 | 930D | Jump Frequency 2 Low | jump lo 2 | 0 to FU2-14 | | 20 [Hz] | O | |
| FU2-14 | 930E | Jump Frequency 2 High | jump Hi 2 | FU2-13 to FU1-30 | | 25 [Hz] | O | |
| FU2-15 | 930F | Jump Frequency 3 Low | jump lo 3 | 0 to FU2-16 | | 30 [Hz] | O | |
| FU2-16 | 9310 | Jump Frequency 3 High | jump Hi 3 | FU2-15 to FU1-30 | | 35 [Hz] | O | |
| FU2-20 | 9314 | Power ON Start Selection | Power-on run RST restart | 0 | (No) | 0 (No) | O | 6-22 |
| | | | | 1 | (Yes) | | | |
| FU2-21 | 9315 | Restart after Fault Reset | RST restart | 0 | (No) | 0 (No) | O | |
| | | | | 1 | (Yes) | | | |
| FU2-22 | 9316 | Start After Interrupt Power Fault Selection | IPF Mode | 0 | (No) | 0(No) | X | 6-23 |
| | | | | 1 | (Yes) | | | |
| FU2-23 | 9317 | Speed Search Type Selection | Search Type | estimated SS | | estimated SS | O | 6-23 |
| FU2-24 | 9318 | Retry mode | Retry mode | NO/YES | | 0 (No) | O | 6-24 |
| FU2-25 | 9319 | Number of Auto Retry | Retry number | 0 to 10 | | 0 | O | 6-24 |
| FU2-26 (15) | 931A | Delay Time Before Auto Retry | Retry delay | 0 to 60 [sec] | | 1 [sec] | O | 6-24 |
| FU2-27 | 931B | Speed Search Limit | Flying Perc | 30 to 160 | | 70% | X | 6-23 |

Chapter 5 – Parameter List

| CODE | Comm. Addr | Description | LCD Keypad Display | Setting Range | | Factory Default | Adj. During Run | Page | |
|---|------------|---|--------------------|-------------------|---------------|------------------------------------|-----------------|------|-----------|
| FU2-40 | 9328 | Motor Capacity selection Inverter (5.5 ~ 450 kW) | Motor select | 0 (0.75kW) | | Depending on the inverter capacity | X | 6-25 | |
| | | | | 1 (1.5kW) | | | | | |
| | | | | 2 (2.2kW) | | | | | |
| | | | | 3 (3.7kW) | | | | | |
| | | | | 4 (5.5kW) | | | | | |
| | | | | 5 (7.5kW) | | | | | |
| | | | | 6 (11.0kW) | | | | | |
| | | | | 7 (15.0kW) | | | | | |
| | | | | 8 (18.5kW) | | | | | |
| | | | | 9 (22.0kW) | | | | | |
| | | | | 10 (30.0kW) | | | | | |
| | | | | 11 (37.0kW) | | | | | |
| | | | | 12 (45.0kW) | | | | | |
| | | | | 13 (55.0kW) | | | | | |
| | | | | 14 (75.0kW) | | | | | |
| | | | | 15 (90.0kW) | | | | | |
| | | | | 16 (110.0kW) | | | | | |
| | | | | 17 (132.0 kW) | | | | | |
| | | | | 18 (160.0 kW) | | | | | |
| | | | | 18 (220.0 kW) | | | | | |
| | | | | 20 (280.0 kW) | | | | | |
| | | | | 21 (315.0 kW) | | | | | |
| | | | | 22 (375.0 kW) | | | | | |
| 23 (450.0 kW) | | | | | | | | | |
| * A motor rating same as inverter capacity is automatically set. If different, set the correct value. | | | | | | | | | |
| FU2-41 | 9329 | Number of Motor Poles | Pole number | 2 to 12 | | 4 | X | 6-25 | |
| FU2-42 | 932A | Motor Slip | Rate-Slip | 0.00 to 10.00 | | Depending on the motor capacity | X | 6-25 | |
| FU2-43 | 932B | Rated Current of Motor (rms) | Rated-Curr | 1.0 to 999.9[A] | | | X | | |
| FU2-44 | 932C | No Load Motor Current (rms) | Noload-Curr | 0.1 to 999.9 | | | X | | |
| FU2-46 | 932E | Load Inertia | Inertia rate | 0 to 40 | | | X | | |
| FU2-47 | 932F | Gain for Motor Speed Display | RPM DisplayGn | 1 to 1000 [%] | | | 100 [%] | | O |
| FU2-48 | 9330 | Carrier Frequency | Carrier freq | 5.5~22kW | 0.7~15 [kHz] | 5.0 [kHz] | O | 6-26 | |
| | | | | 30kW | 0.7~10 [kHz] | | | | |
| | | | | 37~75kW | 0.7~4 [kHz] | | | | 4.0 [kHz] |
| | | | | 90~280kW | 0.7~3 [kHz] | | | | 3.0 [kHz] |
| | | | | 315~450kW | 0.7~2[kHz] | | | | 2.0 [kHz] |
| FU2-49 | 9331 | PWM Type Selection | PWM Technique | 0 | (Normal) | 0 (Normal) | X | 6-26 | |
| | | | | 1 | (Low leakage) | | | | |
| FU2-52 | 9334 | Safety Stop Dec. Rate | Dec Rate | 1.0 - 100.0 [sec] | | 100.0 [sec] | - | 6-26 | |
| FU2-53 | 9335 | Safety Stop Output Dec. Rate | safety_perc | 2 - 500 | | 21 | - | 6-26 | |
| FU2-60 | 933C | Control Mode Selection | Control Mode | 0 | (V/F) | 0 (V/F) | X | 6-27 | |
| | | | | 1 | (Slip compen) | | | | |
| | | | | 2 | (Sensorless) | | | | |
| FU2-61 | 933D | Auto Tuning Selection | AutoTuneEnbl | 0 | (No) | 0 (No) | X | 6-28 | |
| | | | | 1 | (Static) | | | | |

| CODE | Comm. Addr | Description | LCD Keypad Display | Setting Range | Factory Default | Adj. During Run | Page |
|-------------|------------|------------------------------------|--------------------|--|-----------------------------------|-----------------|------|
| FU2-62 | 933E | Stator Resistance of Motor | %Rs | 0.01-20 [%] | 4 [%] | X | 6-28 |
| FU2-63 | 933F | Leakage Inductance of Motor | %Lsigma | 0.01-100[%] | 12 [%] | X | 6-28 |
| FU2-64 (16) | 9340 | Pre-excitation Time | PreEx time | 0 to 60 [sec] | 1 [sec] | X | 6-28 |
| FU2-67 | 9343 | Manual/Auto Torque Boost Selection | Torque boost | 0 (Manual) 1 (Auto) | 0 (Manual) | X | 6-29 |
| FU2-68 | 9344 | Torque Boost in Forward Direction | Fwd boost | 0.75~90kW 110~450kW | 0 to 15 [%] 2.0 [%] 1.0 [%] | X | |
| FU2-69 | 9345 | Torque Boost in Reverse Direction | Rev boost | 0.75~90kW 110~450kW | 0 to 15 [%] 2.0 [%] 1.0 [%] | X | |
| FU2-80 | 9350 | Power On display | PowerOn Disp | 0 to 12 | 0 | O | 6-30 |
| FU2-81 | 9351 | User Select | User Disp | Voltage Watt | Voltage | O | 6-30 |
| FU2-82 | 9352 | Software Version | iP5A S/W Ver | Ver X.X | Ver X.X | * | 6-30 |
| FU2-83 | 9353 | Last Trip Time | LastTripTime | X:XX:XX:XX:XX:X | * | X | 6-30 |
| FU2-84 | 9354 | Power On Time | On-time | | * | X | |
| FU2-85 | 9355 | Run-time | Run-time | | * | X | |
| FU2-87 | 9357 | Power Set | Power Set | 0.1~400 % | 100 | O | 6-31 |
| FU2-90 | 935A | Parameter Display | Para. disp | 0 Default 1 (All Para) 2 (Diff Para) | 0 (Default) | O | 6-31 |
| FU2-91 | 935B | Read Parameter | Para. Read | 0 (No) 1 (Yes) | 0 (No) | X | 6-31 |
| FU2-92 | 935C | Write Parameter | Para. Write | 0 (No) 1 (Yes) | 0 (No) | X | 6-31 |
| FU2-93 | 935D | Initialize Parameters | Para. Init | 0 (No) 1 (All Groups) 2 (BAS) 3 (DRV) 4 (FU1) 5 FU2) 6 (I/O) 7 (EXT) 8 (COM) 9 (APP) | 0 (No) | X | 6-31 |
| FU2-94 | 935E | Parameter Write Protection | Param. Lock | 0 to 9999 | 0 | O | 6-32 |
| FU2-95 | 935F | Parameter Save | Param. save | 0 (No) 1 (Yes) | 0 (No) | X | 6-32 |

* The gray-highlighted codes are hidden parameters and will appear when the related functions are to be set.

(12) FU2-8 is displayed when FU2-07 is set to [1~10 sec].

(13) FU2-11 is displayed when FU2-10 is set to [Yes].

(15) FU2-26 is displayed when FU2-25 [Retry number] is set to [1~10].

(16) FU2-64 is displayed when FU2-60 is set to [Sensorless].

Table 1) Switching frequency and factory default value for each inverter capacity

| Inverter Capacity | Setting Range | Factory Default |
|---------------------|----------------|-----------------|
| 0.75 ~ 22 kW | 0.7 ~ 15 [kHz] | 5.0 [kHz] |
| 30 kW | 0.7 ~ 10 [kHz] | |
| 37 ~ 75 kW | 0.7 ~ 4 [kHz] | 4.0 [kHz] |
| 110~280 kW | 0.7 ~ 3 [kHz] | 3.0 [kHz] |
| 90kW / 315 ~ 450 kW | 0.7 ~ 2 [kHz] | 2.0 [kHz] |

[I/O GROUP]

| CODE | Comm. Addr | Description | LCD Keypad Display | Setting Range | Factory Default | Adj. During Run | Page |
|-------------|------------|---|--------------------|---|-----------------|-----------------|------|
| I/O-00 | 9400 | Jump to desired code | Jump code | 1 to 98 | 1 | O | 6-33 |
| I/O-01 (17) | 9401 | Filtering Time Constant for V1 Signal Input | V1 Filter | 0 to 9999 [msec] | 10 [msec] | O | 6-33 |
| I/O-02 | 9402 | V1 Input Minimum Voltage | V1 volt x1 | 0 to 12[V] | 0.00 [V] | O | |
| I/O-03 | 9403 | Frequency Corresponding to V1 Input Minimum Voltage | V1 Freq y1 | 0 to FU1-30 [Hz] 0 to 100.00 [**](18) | 0.00 [Hz] | O | |
| I/O-04 | 9404 | V1 Input Minimum Voltage | V1 volt x2 | 0 to 12[V] | 10 [V] | O | |
| I/O-05 | 9405 | V1 Input Maximum Voltage | V1 Freq y2 | 0 to FU1-30 [Hz] 0 to 100.00 [**](18) | 60.00 [Hz] | O | |
| I/O-06 | 9406 | Filtering Time Constant for I Signal Input | I Filter | 0 to 9999 [msec] | 10 [msec] | O | 6-33 |
| I/O-07 | 9407 | I Input Minimum Current | I curr x1 | 0 to 20 [mA] | 4 [mA] | O | |
| I/O-08 | 9408 | Frequency Corresponding to I Input Minimum Current | I Freq y1 | 0 to FU1-30 [Hz] 0 to 100.00 [**](18) | 0.00 [Hz] | O | |
| I/O-09 | 9409 | Filtering Time Constant for I Signal Input | I curr x2 | 0 to 20 [mA] | 20 [mA] | O | |
| I/O-10 | 940A | Frequency Corresponding to I Input Maximum Current | I Freq y2 | 0 to FU1-30 [Hz] 0 to 100.00 [**](18) | 60.00 [Hz] | O | |
| I/O-11 | 940B | Pulse input method | P Pulse set | 0 (A+B) 1 (A) | 1 (A) | O | 6-34 |
| I/O-12 | 940C | Pulse input filter | P filter | 0 to 9999 [msec] | 10 [msec] | O | |
| I/O-13 | 940D | Pulse input Minimum frequency | P pulse x1 | 0 to 10 [kHz] | 0 [kHz] | O | |
| I/O-14 | 940E | Frequency corresponding to I/O-13 Pulse input Minimum frequency | P freq y1 | 0 to FU1-30 [Hz] 0 to 100.00 [**](18) | 0 [Hz] | O | |
| I/O-15 | 940F | Pulse input Minimum frequency | P pulse x2 | 0 to 100 [kHz] | 10 [kHz] | O | |
| I/O-16 | 9410 | Frequency corresponding to I/O-15 Pulse input Maximum frequency | P freq y2 | 0 to FU1-30 [Hz] 0 to 100.00 [**](18) | 60.00 [Hz] | O | |
| I/O-17 | 9411 | Criteria for Analog Input Signal Loss | Wire broken | 0 (None) 1 (half of x1) 2 (below x1) | 0 (None) | O | 6-35 |
| I/O-18 | 9412 | Operating selection at Loss of Freq. Reference | Lost command | 0 (None) 1 (FreeRun) 2 (Stop) 3 (Protection) | 0 (None) | O | |
| I/O-19 | 9413 | Waiting Time after Loss of Freq. Reference | Time out | 0.1 to 120 [sec] | 1.0 [sec] | O | |
| I/O-20 | 9414 | Programmable Digital Input Terminal 'M1' Define | M1 Define | 0 (Speed-L) 1 (Speed-M) | 0 (Speed-L) | O | 6-36 |

| CODE | Comm. Addr | Description | LCD Keypad Display | Setting Range | Factory Default | Adj. During Run | Page |
|--------|------------|---|--------------------|--|-------------------|-----------------|------|
| | | | | 2 (Speed-H) 3 (XCEL-L) 4 (XCEL-M) 5 (XCEL-H) 6 (Dc-brake) 7 (2nd Func) 8 (Exchange) 9 (- Reserved -) 10 (Up) 11 (Down) 13 (Ext Trip) 14 (Pre-Heat) 15 (iTerm Clear) 16 (Open-loop) 17 (LOC/REM) 18 (Analog hold) 19 (XCEL stop) 20 (P Gain2) 21 -Reserved- 22 (Interlock1) 23 (Interlock2) 24 (Interlock3) 25 (Interlock4) 26 (Speed_X) 27 (RST) 28 (BX) 29 (JOG) 30 (FX) 31 (RX) 32 (ANA_CHG) 33 (Ext PID Run) 34 (Up/Dn Clr) | | | |
| I/O-21 | 9415 | Programmable Digital Input Terminal 'M2' Define | M2 define | Same as I/O-20 | 1 (Speed-M) | O | 6-36 |
| I/O-22 | 9416 | Programmable Digital Input Terminal 'M3' Define | M3 define | | 2 (Speed-H) | O | |
| I/O-23 | 9417 | Programmable Digital Input Terminal 'M4' Define | M4 define | | 27 (RST) | O | |
| I/O-24 | 9418 | Programmable Digital Input Terminal 'M5' Define | M5 define | | 12 (Stop/3-wire) | X | |
| I/O-25 | 9419 | Programmable Digital Input Terminal 'M6' Define | M6 define | | 29 (JOG) | O | |
| I/O-26 | 941A | Programmable Digital Input Terminal 'M7' Define | M7 define | | 30 (FX) | O | |
| I/O-27 | 941B | Programmable Digital Input Terminal | M8 define | Same as I/O-20 | 31 (RX) | O | |


Chapter 5 – Parameter List

| CODE | Comm. Addr | Description | LCD Keypad Display | Setting Range | Factory Default | Adj. During Run | Page |
|-------------|------------|--|--------------------|-------------------------------|-----------------|-----------------|------|
| | | 'M8' Define | | | | | |
| I/O-28 | 941C | Terminal Input Status | In status | 000000000000/ 111111111111 | 0000000 0000 | * | |
| I/O-29 | 941D | Filtering Time Constant for Programmable Digital Input Terminals | Ti Filt Num | 2 to 1000 [msec] | 15 | 0 | |
| I/O-30 (19) | 941E | Jog Freq-uency Setting | Jog Speed | 0 to FU1-30 | 10 [Hz] | 0 | 6-39 |
| I/O-31 | 941F | Step Frequency 4 | PresetSpd-4 | | 40 [Hz] | 0 | |
| I/O-32 | 9420 | Step Frequency 5 | PresetSpd-5 | | 50 [Hz] | 0 | |
| I/O-33 | 9421 | Step Frequency 6 | PresetSpd-6 | | 40 [Hz] | 0 | |
| I/O-34 | 9422 | Step Frequency 7 | PresetSpd-7 | | 30 [Hz] | 0 | |
| I/O-35 | 9423 | Step Frequency 8 | PresetSpd-8 | | 20 [Hz] | 0 | |
| I/O-36 | 9424 | Step Frequency 9 | PresetSpd-9 | | 10 [Hz] | 0 | |
| I/O-37 | 9425 | Step Frequency 10 | PresetSpd-10 | | 20 [Hz] | 0 | |
| I/O-38 | 9426 | Step Frequency 11 | PresetSpd-11 | | 30 [Hz] | 0 | |
| I/O-39 | 9427 | Step Frequency 12 | PresetSpd-12 | | 40 [Hz] | 0 | |
| I/O-40 | 9428 | Step Frequency 13 | PresetSpd-13 | | 50 [Hz] | 0 | |
| I/O-41 | 9429 | Step Frequency 14 | PresetSpd-14 | | 40 [Hz] | 0 | |
| I/O-42 | 942A | Step Frequency 15 | PresetSpd-15 | | 30 [Hz] | 0 | |
| I/O-50 | 9432 | Acceleration Time 1 (for Step speed) | Acc time-1 | 0 to 6000 [sec] | 20 [sec] | 0 | 6-40 |
| I/O-51 | 9433 | Deceleration Time 1 (for Step speed) | Dec time-1 | | | 0 | |
| I/O-52 (20) | 9434 | Acceleration Time 1 (for Step speed) | Acc time-2 | 0 to 6000 [sec] | 30 [sec] | 0 | |
| I/O-53 | 9435 | Deceleration Time 2 | Dec time-2 | | | 0 | |
| I/O-54 | 9436 | Acceleration Time 3 | Acc time-3 | | 40 [sec] | 0 | |
| I/O-55 | 9437 | Deceleration Time 3 | Dec time-3 | | | 0 | |
| I/O-56 | 9438 | Acceleration Time 4 | Acc time-4 | | 50 [sec] | 0 | |
| I/O-57 | 9439 | Deceleration Time 4 | Dec time-4 | | | 0 | |
| I/O-58 | 943A | Acceleration Time 5 | Acc time-5 | | 40 [sec] | 0 | |
| I/O-59 | 943B | Deceleration Time 5 | Dec time-5 | | | 0 | |
| I/O-60 | 943C | Acceleration Time 6 | Acc time-6 | | 30 [sec] | 0 | |
| I/O-61 | 943D | Deceleration Time 6 | Dec time-6 | | | 0 | |
| I/O-62 | 943E | Acceleration Time 7 | Acc time-7 | | 20 [sec] | 0 | |
| I/O-63 | 943F | Deceleration Time 7 | Dec time-7 | | | 0 | |
| I/O-70 | 9446 | S0 output selection | S0 mode | 0 (Frequency) | 0 (Frequency) | 0 | 6-41 |
| | | | | 1 (Current) | | | |
| | | | | 2 (Voltage) | | | |
| | | | | 3 (DC link Vtg) | | | |
| | | | | 4 (Ext PID Out) | | | |
| I/O-71 | 9447 | S0 output adjustment | S0 adjust | 10 to 200 [%] | 100 [%] | 0 | 6-41 |
| I/O-72 | 9448 | S1 output selection | S1 mode | Same as I/O-70 | 2 (Voltage) | 0 | |
| I/O-73 | 9449 | S1 output adjustment | S1 adjust | 10 to 200 [%] | 100 [%] | 0 | |

| CODE | Comm. Addr | Description | LCD Keypad Display | Setting Range | Factory Default | Adj. During Run | Page |
|--------|------------|--|--------------------|--|------------------|-----------------|------|
| I/O-74 | 944A | Frequency Detection Level | FDT freq | 0 to FU1-30 [Hz] | 30.00 [Hz] | O | 6-42 |
| I/O-75 | 944B | Frequency Detection Bandwidth | FDT band | | 10.00 [Hz] | O | 6-42 |
| I/O-76 | 944C | Programmable Digital Output Terminal Define (Aux terminal) | RlyOut 1 Def | 0 (NONE) 1 (FDT-1) 2 (FDT-2) 3 (FDT-3) 4 (FDT-4) 5 (FDT-5) 6 (OL) 7 (IOL) 8 (Stall) 9 (OV) 10 (LV) 11 (OH) 12 (Lost Command) 13 (Run) 14 (Stop) 15 (Steady) 16 (INV line) 17 (COMM line) 18 (SpeedSearch) 19 (Ready) 20 (MMC) 21 (CriticalTrip) | 0 (NONE) | O | 6-42 |
| I/O-77 | 944D | Programmable Digital Output Terminal Define | Aux mode2 | Same as I/O-76 | 0 (NONE) | O | |
| I/O-78 | 944E | Programmable Digital Output Terminal Define | Aux mode3 | | | O | |
| I/O-79 | 944F | Programmable Digital Output Terminal Define | Aux mode4 | | | O | |
| I/O-80 | 9450 | Fault Output Relay Setting (3A, 3B, 3C) | Relay mode | 000 to 111 [bit] | 010 [bit] | O | 6-46 |
| I/O-81 | 9451 | Terminal Output Status | Out status | 00000000/ 11111111 | 00000000 | * | 6-46 |
| I/O-82 | 9452 | Waiting time after Fault Output Relay On | Relay On | 0 to 9999 | 0 | X | 6-47 |
| I/O-83 | 9453 | Waiting time after Fault Output Relay Off | Relay Off | | | X | |
| I/O-84 | 9454 | Fan Con Sel (37 ~ 90kW) | Fan Con. Sel | 0 (Power On Fan) 1 (Run Fan) 2 (Temper-Fan) | 0 (Power On Fan) | X | 6-47 |
| I/O-85 | 9455 | Fan Temp (37 ~ 90kW) | Fan Temp | 0 to 70 [°C] | 70 [°C] | O | 6-47 |
| I/O-86 | 9456 | Input User Unit Selection | Unit Sel | 0 (Percent) 1 (Bar) 2 (mBar) 3 (kPa) | 0 (Percent) | X | 6-47 |

Chapter 5 – Parameter List

| CODE | Comm. Addr | Description | LCD Keypad Display | Setting Range | Factory Default | Adj. During Run | Page |
|----------------|------------|---|--------------------|-------------------------------|------------------|-----------------|------|
| | | | | 4 (PSI) 5 (Pa) | | | |
| I/O-87 | 9457 | Unit Maximum Selection | Unit Max Val | 1.0 to 999.9[%] | 100[%] | X | |
| I/O-90 | 945A | Inverter Number | Inv No. | 1 to 250 | 1 | O | 6-48 |
| I/O-91 (22) | 945B | Baud Rate Selection | Baud rate | 0 (1200 bps) | 3 (9600 bps) | O | 6-37 |
| | | | | 1 (2400 bps) | | | |
| | | | | 2 (4800 bps) | | | |
| | | | | 3 (9600 bps) | | | |
| | | | | 4 (19200 bps) | | | |
| | | | | 5 (38400 bps) | | | |
| I/O-92 | 945C | Operating method at loss of freq. reference | COM Lost Cmd | 0 (None) | 0 (None) | O | 6-48 |
| | | | | 1 (FreeRun) | | | |
| | | | | 2 (Stop) | | | |
| | | | | 3 (Lost Preset) | | | |
| I/O-93 | 945D | Waiting time after loss of freq. reference | COM Time Out | 0.1 to 120 [sec] | 1.0 [sec] | O | |
| I/O-94 | 945E | Communication Response Delay time | Delay Time | 2 to 1000 [msec] | 5 [msec] | O | 6-48 |
| I/O-95 | 945F | A or B contact | In No/Nc Set | 000000000000 /111111111111 | 00000000 0000 | X | 6-49 |
| I/O-96 | 9460 | Input time | In CheckTime | 1 to 1000 | 1 [msec] | X | 6-49 |
| I/O-97 | 9461 | Overheat trip selection | OH Trip Sel | 000 to 111 [bit] | 010 [bit] | X | 6-49 |
| I/O-98 | 9462 | Motor overheat trip temperature | MotTripTemp | 0 to 255 [°C] | 110 [°C] | X | |
| I/O-98 (23) | 9463 | Lost Cmd Pre freq Setting | Lost Preset | 0 to 60 [Hz] | 0 | O | 6-50 |

*  The gray-highlighted codes are hidden parameters and will appear when the related functions are to be set.

(17) When DRV-04 is set to either V1, V1S, I or V1+I or Pulse, only selected item codes are displayed in I/O-1~I/O-19.

(18) I/O-3,5,8,10,14,16 is displayed 0~100.00 [**] when App-02 is set to [proc PI mode] or APP-80 is set to [Ext PI mode] and APP-06 PID Feedback Signal Selection is set to one of I, VI, Pulse, after then, one of I/O-86 ~I/O-88 is set to percentage, Bar, mBar, kPa, Pa except for Speed. Unit will be changed to selected unit.

Only user unit displayed when APP-02 or APP-80 is set to [Yes], after APP-06 is set to one of I, V, Pulse, after then one of I/O-86 ~I/O-88 is set to either speed, percentage, Bar, mBar, kPa, Pa.

(19) I/O-30 ~ I/O-34 displayed only when one of I/O-20 ~ I/O-27 is set to either JOG, Speed_L, Speed_M, Speed_H.

I/O-35 ~ I/O-42 displayed only when one of I/O-20 ~ I/O-27 is set to Speed_X.

(20) I/O-52 ~ I/O-63 displayed only when one of I/O-20 ~ I/O-27 is set to either XCEL_L, XCEL_M, XCEL_H.

(22) 38400 bps can be set only when the external communication option card is installed.

(23) I/O-99 displayed only when one of DRV-04 is set to [V1, V1S, I, V1+I, Pulse].

[APP GROUP]

| CODE | Comm. Addr | Description | LCD Keypad Display | Setting Range | Factory Default | Adj. During Run | Page |
|----------------|------------|--|--------------------|---|-----------------|-----------------|------|
| APP-00 | 9700 | Jump to Desired Code # | Jump code | 1 to 80 | 1 | O | 6-51 |
| APP-01 | 9701 | Application Mode Selection | App mode | 0 (None) 1 (MMC) | 0 (None) | X | 6-51 |
| APP-02 | 9702 | PID Operation Selection | Proc PI mode | 0 (No) 1 (Yes) | 0 (No) | X | 6-51 |
| APP-03 (25) | 9703 | PID F Gain Selection | PID FFwd-Gn | 0 to 999.9[%] | 0.0 [%] | O | 6-57 |
| APP-04 (26) | 9704 | PID Auxiliary Reference Mode Selection | Aux Ref Enbl | 0 (No) 1 (Yes) | 0 (No) | X | 6-57 |
| APP-05 (27) | 9705 | PID Auxiliary Reference Signal Selection | Aux Ref Sel | 0 (Keypad-1) 1 (Keypad-2) 2 (V1) 3 (V1S) 4 (I) 5 (V1+I) 6 (Pulse) 7 (Int. 485) 8 (Ext. PID) | 2 (V1) | X | 6-57 |
| APP-06 | 9706 | PID Feedback Signal Selection | PID Fbk Src | 0 (I) 1 (V1) 2 (Pulse) | 0 (I) | X | 6-57 |
| APP-07 | 9707 | Meter I Maximum Value | Meter I Max | 0 to 20.00 mA | 20.00 mA | O | 6-57 |
| APP-08 | 9708 | Meter V Maximum Value | Meter V Max | 0 to 12.00 V | 10.00V | O | 6-57 |
| APP-09 | 9709 | Meter P Maximum Value | Meter P Max | 0 to 100.0kHz | 100.0kHz | O | 6-57 |
| APP-11 | 970B | P Gain for PID Control | PID P Gain | 0 to 999.9 [%] | 1.0 [%] | O | 6-58 |
| APP-12 | 970C | I Time for PID Control | PID I Time | 0 to 32.0 [sec] | 10.0 [sec] | O | 6-58 |
| APP-13 | 970D | D Time for PID Control | PID D Time | 0 to 100 [msec] | 0.0 [msec] | O | 6-58 |
| APP-14 | 970E | High Limit Frequency for PID Control | PID Hi Limit | 0.00 to FN1-30 | 60 .00[Hz] | O | 6-58 |
| APP-15 | 970F | Low Limit Frequency for PID Control | PID LowLimit | FN1-32 to APP-10 | 0.5 [Hz] | O | |
| APP-16 | 9710 | PID Output Gain | PID OutScale | 0.0 to 999.9 [%] | 100.0 [%] | X | |
| APP-17 | 9711 | PID P2 Gain | PID P2 Gain | | | X | |
| APP-18 | 9712 | P Gain Scale | P Gain Scale | 0.0 to 100.0 [%] | | X | 6-58 |
| APP-19 | 9713 | PID Output Inverse | PID OutInvt | 0 (No) 1 (Yes) | 0 (No) | X | 6-58 |
| APP-20 | 9714 | PID U curve feedback select | PID U Fbk | 0 (No) 1 (Yes) | 0 (No) | X | 6-58 |
| APP-23 | 9717 | PrePID Reference Frequency | PrePID Freq | 0 to FU1-30 | 0 | O | 6-59 |
| APP-24 | 9718 | PrePID Exit Level | PrePID Exit | 0 to 100.0% | 0 | O | |
| APP-25 | 9719 | PrePID Stop delay | PrePID Dly | 0 to 9999 | 600 | O | |


Chapter 5 – Parameter List

| CODE | Comm. Addr | Description | LCD Keypad Display | Setting Range | Factory Default | Adj. During Run | Page |
|----------------|------------|---|--------------------|--|-----------------|-----------------|------|
| APP-26 | 971A | Pipe Broken | Pipe Broken | 0 (No) 1 (Yes) | 0 (No) | X | |
| APP-27 | 971B | Sleep Delay Time | Sleep Delay | 0.0 to 9999 [sec] | 60.0 [sec] | O | 6-59 |
| APP-28 | 971C | Sleep Frequency | Sleep Freq | 0 to FU1-30 [Hz] | 0.00 [Hz] | O | |
| APP-29 | 971D | Wake-Up Level | WakeUp level | 0.0 to 100.0 [%] | 2.0 [%] | O | |
| APP-30 (28) | 971E | 2nd Acceleration Time | 2nd Acc Time | 0 to 6000 [sec] | 5 [sec] | O | 6-60 |
| APP-31 | 971F | 2nd Deceleration Time | 2nd Dec Time | | 10 [sec] | O | 6-60 |
| APP-32 | 9720 | 2nd Base Frequency | 2nd BaseFreq | 30 to FN1-30 [Hz] | 60 [Hz] | X | 6-60 |
| APP-33 | 9721 | 2nd V/F Pattern | 2nd V/F | 0 (Linear) 1 (Square) 2 (User V/F) | 0(Linear) | X | 6-60 |
| APP-34 | 9722 | 2nd Forward Torque Boost | 2nd F-Boost | 0.0 to 15.0 [%] | 2.0 [%] | X | 6-60 |
| APP-35 | 9723 | 2nd Reverse Torque Boost | 2nd R-Boost | 0.0 to 15.0 [%] | 2.0 [%] | X | 6-60 |
| APP-36 | 9724 | 2nd Stall Prevention Level | 2nd Stall | 30 to 150 [%] | 100 [%] | X | 6-60 |
| APP-37 | 9725 | 2nd Electronic Thermal Level for 1 minute | 2nd ETH 1min | FU2-28 to 200 [%] | 130 [%] | O | 6-60 |
| APP-38 | 9726 | 2nd Electronic Thermal Level for continuous | 2nd ETH Cont | 50 to FU2-27 (Max 150%) | 120 [%] | O | 6-60 |
| APP-39 | 9727 | 2nd Rated Motor Current | 2nd R-Curr | 1 to 200 [A] | 3.6 [A] | X | 6-60 |
| APP-40 (29) | 9728 | Number of Auxiliary Motor Run Display | Aux Mot Run | * | * | * | 6-60 |
| APP-41 | 9729 | Aux. Motor Start Selection | Starting Aux | 1 to 4 | 1 | O | 6-62 |
| APP-42 | 972A | Operation Time Display on Auto Change | Auto Op Time | * | * | * | 6-63 |
| APP-43 | 972B | The Number of Aux Motor | Nbr Aux's | 0 to 7 | 4 | O | 6-63 |
| APP-44 | 972C | Aux.Motor Stop sequence | F-in L-Out | 0 (No) 1 (Yes) | 1 (Yes) | X | 6-63 |
| APP-45 | 972D | How to stop Aux. Motor | ALL Stop | 0 (No) 1 (Yes) | 1 (Yes) | X | 6-60 |
| APP-47 | 972F | Start Frequency of Aux. Motor 1 | Start freq 1 | 0 to FU1-30 | 49.99 [Hz] | O | 6-63 |
| APP-48 | 9730 | Start Frequency of Aux. Motor 2 | Start freq 2 | | | O | |
| APP-49 | 9731 | Start Frequency of Aux. Motor 3 | Start freq 3 | | | O | |
| APP-50 | 9732 | Start Frequency of Aux. Motor 4 | Start freq 4 | | | O | |
| APP-51 | 9733 | Stop Frequency of Aux. Motor 1 | Stop freq 1 | | 20.00 [Hz] | O | 6-63 |
| APP-52 | 9734 | Stop Frequency of Aux. Motor 2 | Stop freq 2 | | | O | |
| APP-53 | 9735 | Stop Frequency of Aux. Motor 3 | Stop freq 3 | | | O | |
| APP-54 | 9736 | Stop Frequency of Aux. Motor 4 | Stop freq 4 | | | O | |
| APP-58 | 973A | Delay Time before Operating Aux Motor | Aux start DT | 0.0 to 999.9 [sec] | 5.0 [sec] | O | 6-63 |

| CODE | Comm. Addr | Description | LCD Keypad Display | Setting Range | Factory Default | Adj. During Run | Page |
|----------------|------------|--|--------------------|---|-----------------|-----------------|------|
| APP-59 | 973B | Delay Time before Stopping Aux Motor | Aux stop DT | 0.0 to 999.9 [sec] | 5.0 [sec] | O | 6-63 |
| APP-60 | 973C | Accel time when the number of pump decreases | Pid AccTime | 0 to 600.0 [sec] | 2.0 [sec] | O | 6-63 |
| APP-61 | 973D | Decel time when the number of pump increases | Pid DecTime | | | O | 6-64 |
| APP-62 | 973E | PID Bypass Selection | Regul Bypass | 0 (No) 1 (Yes) | 0 (No) | X | 6-64 |
| APP-66 | 9742 | Auto Change Mode Selection | AutoCh_Mode | 0(EXCH_NONE), 1 (AUX_EXCH), 2 (MAIN_EXCH) | 0(EXCH_NONE) | O | 6-65 |
| APP-67 | 9743 | Auto Change Time | AutoEx-intv | 00:00 to 99:00 | 72:00 | O | 6-65 |
| APP-68 | 9744 | Auto Change Freq | AutoEx-Freq | FN1-32 to FN1-30 [Hz] | 20.0 [Hz] | O | 6-65 |
| APP-69 | 9745 | Inter-Lock Selection | Inter-lock | 0 (No) | 0 (No) | O | 6-66 |
| APP-71 | 9747 | Pressure difference for Aux motor Start | Aux Stt Diff | 0 to 100% | 2[%] | O | 6-68 |
| APP-72 | 9748 | Pressure difference for Aux motor Stop | Aux Stp Diff | | | O | 6-68 |
| APP-80 | 9750 | Ext PID Operation Selection | Ext PI Mode | 0 (No) 1 (Yes) | 0 (No) | X | 6-68 |
| APP-81 (30) | 9751 | Ext PID Reference Signal Selection | ExtPI RefSel | 0(I) 1 (V1) 2 (Pulse) 3(Keypad) | 3(Keypad) | X | 6-68 |
| APP-82 | 9752 | Ext PID Reference Level | Ext PI Ref % | 0 to 100.00 [%] | 50.00 [%] | X | 6-68 |
| APP-83 | 9753 | Ext PID Feedback Signal Selection | ExtPI FbkSel | 0 (I) 1 (V1) 2 (Pulse) | 0 (I) | X | 6-68 |
| APP-85 | 9755 | P Gain for ExtPID | ExtPID Pgain | 0 to 999.9 [%] | 1.0 [%] | X | 6-68 |
| APP-86 | 9756 | I Time for ExtPID | ExtPID ltime | 0 to 32.0 [sec] | 10.0 [sec] | X | 6-68 |
| APP-87 | 9757 | D Time for ExtPID | ExtPID Dtime | 0 to 2000 [msec] | 0 [msec] | X | 6-68 |
| APP-88 | 9758 | High Limit Frequency for ExtPID Control | ExtPID Lmt-H | 0 to 100.00 [%] | 100.00 [%] | X | 6-68 |
| APP-89 | 9759 | Low Limit Frequency for ExtPID Control | ExtPID Lmt-L | 0 to 30.00 [%] | 0 [%] | X | 6-68 |
| APP-90 | 975A | ExtPID Output Scale | ExtPID Scale | 0 to 999.9 | 100.0 [%] | X | 6-68 |
| APP-91 | 975B | ExtPID P2 Gain | ExtPI P2Gain | | | X | 6-68 |
| APP-92 | 975C | ExtPID P Gain Scale | ExtPI PScale | | | X | 6-68 |
| APP-93 | 975D | ExtPID F Gain | ExtPID F-gain | 0 to 999.9 [%] | 0.0 [%] | O | 6-68 |
| APP-95 | 975F | ExtPID Output Inverse | ExtPI OutInv | 0 (No) 1 (Yes) | 0 (No) | X | 6-68 |

Chapter 5 – Parameter List

| CODE | Comm. Addr | Description | LCD Keypad Display | Setting Range | Factory Default | Adj. During Run | Page |
|--------|------------|------------------|--------------------|------------------|-----------------|-----------------|------|
| APP-97 | 9761 | ExtPID Loop Time | ExtPI LoopTm | 50 to 200 [msec] | 100 [msec] | X | 6-68 |

*  The gray highlighted codes are hidden parameters and will appear when the related functions are to be set.

(25) Only APP-03 ~ APP-17 displayed when APP-02 is set to [Yes].

Only APP-03 ~ APP-17 and APP-63 ~ APP-65 displayed when APP-2 is set to [Yes].

(26) If APP-04 Aux Ref Mode is no set, DRV-04 setting will be reference of process PID and APP -05 setting will be ignored.

(27) If APP-04 is set, APP-04 will appear and APP -05 setting value will be reference of process PID, DRV-04 setting will be ignored.

(28) Only APP-30 ~ APP-39 displayed only when one of I/O-20 ~ I/O-27 is set to either "2nd Func".

(29) Only APP-40 ~ APP-71 displayed when APP-01 is set to [MMC].

(30) Only APP-81 ~ APP-97 displayed when APP-80 Ext PI mode is set to [Yes].

[EXT GROUP]

| CODE | Comm. Addr | Description | LCD Keypad Display | Setting Range | Factory Default | Adj. During Run | Page |
|--------|------------|---|--------------------|---|-----------------|-----------------|--|
| EXT-00 | 9500 | Jump Code | Jump code | 1 to 45 | 1 | O | Refer to the corresponding option manual |
| EXT-01 | 9501 | Type of SUB Board | Sub B/D | Sub-E | * | * | |
| EXT-40 | 9528 | Current Output Terminal 1(CO1) Selection | AM1 mode | Frequency Current Voltage DC link Vtg Ext PID Out | Frequency | O | |
| EXT-41 | 9529 | Adjust Gain of Current Output Terminal 1(CO1) | AM1 adjust | 10 – 200 [%] | 100 [%] | O | |
| EXT-42 | 952A | Adjust Offset of Current Output Terminal 1(CO1) | AM1 Offset | 0 – 100 [%] | 0 [%] | O | |
| EXT-43 | 952B | Current Output Terminal 2(CO2) Selection | AM2 mode | Frequency Current Voltage DC link Vtg Ext PID Out | DC link Vtg | O | |
| EXT-44 | 952C | Adjust Gain of Current Output Terminal 2(CO2) | AM2 adjust | 10 – 200 [%] | 100 [%] | O | |
| EXT-45 | 952D | Adjust Offset of Current Output Terminal 2(CO2) | AM2 Offset | 0 – 100 [%] | 0 [%] | O | |

* Only the above EXT group displayed when the corresponding option board is installed.

* Refer to the SUB board option manual for details.

[COM GROUP]

| CODE | Comm. Addr | Description | LCD Keypad Display | Setting Range | Factory Default | Adj. During Run | Page |
|--------|------------|---------------------------|--------------------|---|-----------------|-----------------|--|
| COM-00 | 9600 | Jump Code | Jump code | 1 to 60 | 1 | 0 | Refer to the corresponding option manual |
| COM-01 | 9601 | Type of SUB Board | Opt B/D | RS485 DeviceNet Profibus BACnet LonWork | * | * | |
| COM-02 | 9602 | Option Mode | Opt mode | None Command Freq Cmd + Freq | None | X | |
| COM-03 | 9603 | Option Version | Opt Version | Ver X.X | Ver X.X | * | |
| COM-13 | 960D | Device Net Input Instance | In Instance | 70 71 110 111 | 70 | X | |
| COM-17 | 9611 | PLC Station ID | Station ID | 0 to 63 | 1 | 0 | |
| COM-20 | 9614 | Profi MAC ID | Profi MAC ID | 1 to 127 | 1 | 0 | |
| COM-30 | 961E | Output Num | Output Num | 0 to 8 | 3 | 0 | |
| COM-31 | 961F | Output 1 | Output 1 | 0000 – FFFF (HEX) | 000A(HEX) | 0 | |
| COM-32 | 9620 | Output 2 | Output 2 | | | 0 | |
| COM-33 | 9621 | Output 3 | Output 3 | | | 0 | |
| COM-34 | 9622 | Output 4 | Output 4 | | | 0 | |
| COM-35 | 9623 | Output 5 | Output 5 | | | 0 | |
| COM-36 | 9624 | Output 6 | Output 6 | | | 0 | |
| COM-37 | 9625 | Output 7 | Output 7 | | | 0 | |
| COM-38 | 9626 | Output 8 | Output 8 | | | 0 | |
| COM-40 | 9628 | Input Num | Input Num | 0 to 8 | 2 | 0 | |
| COM-41 | 9629 | Input 1 | Input 1 | 0000 – FFFF (HEX) | 0005(HEX) | 0 | |
| COM-42 | 962A | Input 2 | Input 2 | | 0006(HEX) | 0 | |
| COM-43 | 962B | Input 3 | Input 3 | | 0000(HEX) | 0 | |
| COM-44 | 962C | Input 4 | Input 4 | | | 0 | |
| COM-45 | 962D | Input 5 | Input 5 | | | 0 | |
| COM-46 | 962E | Input 6 | Input 6 | | | 0 | |
| COM-47 | 962F | Input 7 | Input 7 | | | 0 | |
| COM-48 | 9630 | Input 8 | Input 8 | | | 0 | |
| COM-60 | 963C | Parity/Stop | Parity/Stop | 8None/1Stop 8None/2Stop 8Even/1Stop 8Odd/1Stop | 8None/1Stop | 0 | |

Chapter 5 – Parameter List

| CODE | Comm. Addr | Description | LCD Keypad Display | Setting Range | Factory Default | Adj. During Run | Page |
|--------|------------|-------------|--------------------|-------------------|-----------------|-----------------|------|
| COM-61 | 963D | Opt Para-1 | Opt Para-1 | 0 to FFFF | 0 | 0 | |
| COM-62 | 963E | Opt Para-2 | Opt Para-2 | | | 0 | |
| COM-63 | 963F | Opt Para-3 | Opt Para-3 | | | 0 | |
| COM-64 | 9640 | Opt Para-4 | Opt Para-4 | | | 0 | |
| COM-65 | 9641 | Opt Para-5 | Opt Para-5 | | | 0 | |
| COM-66 | 9742 | Opt Para-6 | Opt Para-6 | | | 0 | |
| COM-67 | 9743 | Comm UpDate | Comm UpDate | 0 (No) 1 (Yes) | 0 (No) | X | |

* Only the above COM group displayed when the corresponding option board is installed.

* COM-61~66 parameter is used to LonWorks and BACnet communication.

CHAPTER 6 - TROUBLESHOOTING AND MAINTENANCE

6.1 Fault Display

When a fault occurs, the inverter turns off its output and displays the fault status in DRV-12. The last 5 faults are saved in FU2-01 through FU2-05 with the operation status at the instance of fault. Reset the inverter when a fault occurs.

| Keypad Display | Protective Function | Description |
|--------------------------------|--|--|
| Over Current Over Current 1 | Over Current Protection | The inverter turns off its output when the output current of the inverter flows more than 200% of the inverter rated current. This may cause danger or damage the drive so it requires double protection. |
| Ground Fault | Ground Fault Protection | The inverter turns off its output when a ground fault occurs and the ground fault current is more than the internal setting value of the inverter. Over current trip function may protect the inverter when a ground fault occurs due to a low ground fault resistance. |
| Over Voltage | Over voltage protection | The inverter turns off its output if the DC voltage of the main circuit increases higher than the rated value when the motor decelerates or when regenerative energy flows back to the inverter due to a regenerative load. This fault can also occur due to a surge voltage generated at the power supply system. |
| Over Load | Current Limit Protection (Overload Protection) | The inverter turns off its output if the output current of the inverter flows at 120% of the inverter rated current. |
| Over Heat | Inverter Over Heat | The inverter turns off its output if the heat sink is over heated due to a damaged cooling fan or an foreign substance in the cooling fan. |
| E-Thermal | Electronic Thermal | The internal electronic thermal of the inverter determines the over heating of the motor. If the motor is overloaded the inverter turns off the output. The inverter cannot protect the motor when driving a multi-pole motor or when driving multiple motors, so consider thermal relays or other thermal protective devices for each motor. Overload capacity: 130% for 1 min |
| Ext. Trip | External Trip | Use this function if the user needs to turn off the output by an external trip signal. (Normal Open Contact) Inverter blocks the output to protect motor overload by detecting through this terminal. |
| Low Voltage | Low Voltage Protection | The inverter turns off its output if the DC voltage is below the detection level because insufficient torque or over heating of the motor can occurs when the input voltage of the inverter drops. |
| Over Current 2 | IGBT Short | The inverter turns off the output if an IGBT short through or an output short occurs. |

Chapter 6 – Troubleshooting and Maintenance

| Keypad Display | Protective Function | Description |
|---------------------------------|---|---|
| Output Phase Open | Output Phase open | The inverter turns off its output when the one or more of the output (U, V, W) phase is open. The inverter detects the output current to check the phase open of the output. |
| Input Phase Open | Input Phase Open | The inverter turns off its output if the one or more of the input (R, S, T) phase is open. The inverter detects the input current to check the phase open of the input. If smaller load is used, it can not be detected. |
| BX | BX Protection (Instant Cut Off) | Used for the emergency stop of the inverter. The inverter instantly turns off the output when the BX terminal is turned ON, and returns to regular operation when the BX terminal is turned OFF. Take caution when using this function. |
| HW-Diag | Inverter H/W Fault | A fault signal is output when an error occurs to the control circuitry of the inverter. There are the Wdog error, the EEP error, Input phase open, NTC open and the ADC Offset for this fault. |
| COM Error CPU Error | Comm. Error | This fault is displayed when the inverter cannot communicate with the keypad. |
| Inv. OLT | Inverter Overload | The inverter turns off its output when the output current of the inverter flows more than the rated level (110% for 1 minute, 130% for 4 seconds). |
| NTC open | NTC Open | This fault is displayed when inverter internal NTC is opened. |
| LOP LOR LOV LOI LOX | Operating Method when the Frequency Reference is Lost | According to the I/O-92 [Operating method at loss of freq. reference] setting, there are three modes: None (continuous operation), Stop (decelerate to stop), and Free Run (free run to stop), LOP: Displayed when option frequency reference is lost. (DPRAM time out) LOR: Displayed when option frequency reference is lost. (Communication network fault) LOV: Displayed when 'V1' analog frequency reference is lost. LOI: Displayed when 'I' analog frequency reference is lost. LOX: Displayed when sub-board (V2, ENC) analog frequency reference is lost. |
| Lost cmd | | This fault is displayed when I/O -18 sets to Protection. |
| Fuse Open | Fuse Open | This fault is displayed when inverter internal fuse is opened by over current. (applied above 37 kW products) |
| Output Fault Trip | No Motor Trip | Trip has occurred according to setting of FU1 - 57~59. |
| Keypad Open | Keypad FLT | Indicates wire is separated from keypad. It is displayed only DRV-23 set to Fault. |

To reset fault, Press **RESET** key, close RST-CM terminals or cycle the input power.
If a problem keeps occurring, please contact the factory or your local distributor.

6.1.1 Operation methods and fault display in case of frequency loss

- I/O-18 <Lost Command> is as below description.

| I/O-18 set data | Description |
|-----------------|---|
| None | Keep the operation because frequency command is lost. (Factory default) |
| FreeRun | Free Run to stop because frequency command is lost. |
| Stop | Deceleration to stop because frequency command is lost. |
| Protection | Lost Cmd Trip because frequency command is lost. |

- Load display when command is lost

| LCD display | Description |
|-------------|---|
| LOP | Displayed when option command is lost. (DPRAM Time out) |
| LOR | Displayed when option command is lost. (Abnormal communication network) |
| LOV | Displayed when V1 analog frequency command is lost. |
| LOI | Displayed when I analog frequency command is lost. |
| LOX | Displayed when sub board (V2, ENC) frequency is lost. |

6.1.2 If you want to check the previous state of inverter trip occurred and inverter trip description

- Current faulty description

| Code | Display | Description |
|-------|--------------|--|
| DRV-7 | Over Current | Displayed the current trip message. (Over current) |

Use the **PROG**, **▲** and **▼** key before pressing the **RESET** key to check the fault content(s) such as output frequency, output current, and whether the inverter was accelerating, decelerating, or in constant speed at the time of the fault occurred. Press the **ENT** key to escape.

Press the **RESET** key to save the trip history in FU2-01~05.

- Last fault history

- 1) This code displays up to five previous fault (trip) status of the inverter. The lowest numbered fault such as “Last trip 1” is the most recent. Previous state of inverter trip occurred and inverter trip description can be checked.
- 2) FU2-06 [Erase trips] initializes the FU2-01~05 [Last trip-x]. It becomes the value of factory default.

| Code | LCD display | Description |
|--------|-------------|----------------|
| FU2-01 | Last trip-1 | Trip history 1 |
| FU2-02 | Last trip-2 | Trip history 2 |
| FU2-03 | Last trip-3 | Trip history 3 |
| FU2-04 | Last trip-4 | Trip history 4 |
| FU2-05 | Last trip-5 | Trip history 5 |

6.1.3 Reset the trip (Abnormal inverter state)

There are 3 kinds of reset methods. Auto-restart number is initialized after reset the inverter.

1. Reset by [RESET] key in loader.
2. Cut off the RST-CM of terminal block of inverter control circuit.
3. Turn off the inverter power and turn on the inverter.

| Protection furnction | LCD display | Description |
|---------------------------------------|-------------------------------|--|
| Over Current 1 Protection | Over Current Over Current1 | Inverter output cuts off when the inverter output exceeds 200% of th rated current. It must be double protected because it can be damaged by Over Current. |
| Ground Fault Current Protection | Ground Fault | Inverter output cuts off when current above the prescribed amount flows due to earth in the inverter outputu part. Ground fault due to low ground resistor can be protective by over current trip. |
| Over Voltage Protection | Over Voltage | Inverter output cutss off when the DC current above the prescribed amount flows due to deceleration or regenerative energy. It can be occurred due to surge voltage from power system. |

Fault Remedy

| Protective Function | Cause | Remedy |
|--|--|--|
| Over Current Protection 1 | 1) Acceleration/Deceleration time is too short compared to the GD^2 of the load. 2) Load is larger than the inverter rating. 3) Inverter turns output on when the motor is free running. 4) Output short or ground fault has occurred. 5) Mechanical brake of the motor is operating too fast. 6) Components of the main circuit have overheated due to a faulty cooling fan. | 1) Increase Accel/Decel time. 2) Increase inverter capacity. 3) Operate after motor has stopped. 4) Check output wiring. 5) Check mechanical brake operation. 6) Check cooling fan. (Caution) Operating inverter prior to correcting fault may damage the IGBT. |
| Ground Fault Current Protection | 1) Ground fault has occurred at the output wiring of inverter. 2) The insulation of the motor is damaged due to heat. | 1) Investigate the output wiring of inverter. 2) Exchange motor. |
| Over Voltage Protection | 1) Acceleration time is too short compared to the GD^2 of load. 2) Regenerative load at the output 3) Line voltage is high. | 1) Increase deceleration time. 2) Use regenerative resistor option. 3) Check line voltage. |
| Current Limit Protection (Overload Protection) | 1) Load is larger than the inverter rating. 2) Incorrect inverter capacity selected. 3) Set incorrect V/F pattern. | 1) Increase capacity of motor and inverter. 2) Select correct inverter capacity. 3) Select correct V/F pattern. |
| Inverter Overheat | 1) Cooling fan damaged or a foreign substance inserted. 2) Cooling system has faults. 3) Ambient temperature high. | 1) Exchange cooling fans and/or eliminate foreign substance. 2) Check for foreign substances in the heat sink. 3) Keep ambient temperature under 40 °C. |
| Electronic Thermal | 1) Motor has overheated. 2) Load is larger than inverter rating. 3) ETH level too low. 4) Incorrect inverter capacity selected. 5) Set incorrect V/F pattern. 6) Operated too long at low speeds. | 1) Reduce load and/or running duty. 2) Increase inverter capacity. 3) Adjust ETH level to an appropriate level. 4) Select correct inverter capacity. 5) Select correct V/F pattern. 6) Install a cooling fan with a separate power supply. |

Chapter 6 – Troubleshooting and Maintenance

| Protective Function | Cause | Remedy |
|---|--|--|
| External Trip | External Trip has occurred. | Eliminate Trip at circuit connected to external trip terminal or remove external trip input. |
| Low Voltage Protection | 1) Line voltage low. 2) Load larger than line capacity is connected to line. (welding machine, motor with high starting current connected to the commercial line) 3) Faulty magnetic switch at the input side of the inverter. | 1) Check line voltage. 2) Increase line capacity. 3) Exchange magnetic switch. |
| Over Current 2 | 1) Short has occurred between the upper and lower IGBT. 2) Short has occurred at the output of the inverter. 3) Acceleration/Deceleration time is too short compared to the GD^2 of load. | 1) Check IGBT. 2) Check output wiring of inverter. 3) Increase acceleration time. |
| Output Phase Open | 1) Faulty contact of magnetic switch at output. 2) Faulty output wiring | 1) Check magnetic switch at output of inverter. 2) Check output wiring. |
| H/W Fault | 1) Wdog error (CPU fault) 2) EEP error (memory fault) 3) ADC Offset (current feedback circuit fault) | 1) Exchange inverter. 2) Check the input power wiring. |
| Communication Fault | 1) Faulty connection between inverter and keypad 2) Inverter CPU malfunction | 1) Check connector. 2) Exchange inverter. |
| Operating Method when the Speed Reference is Lost | LOP (Loss of reference from the Option), LOR (Remote) LOV (V1), LOI (I), LOX (Sub-V2, ENC) | Eliminate cause of fault. |
| Inverter Overload | 1) Load is larger than inverter rating. 2) Incorrect inverter capacity selected. | 1) Increase motor and/or inverter capacity. 2) Select correct inverter capacity. |

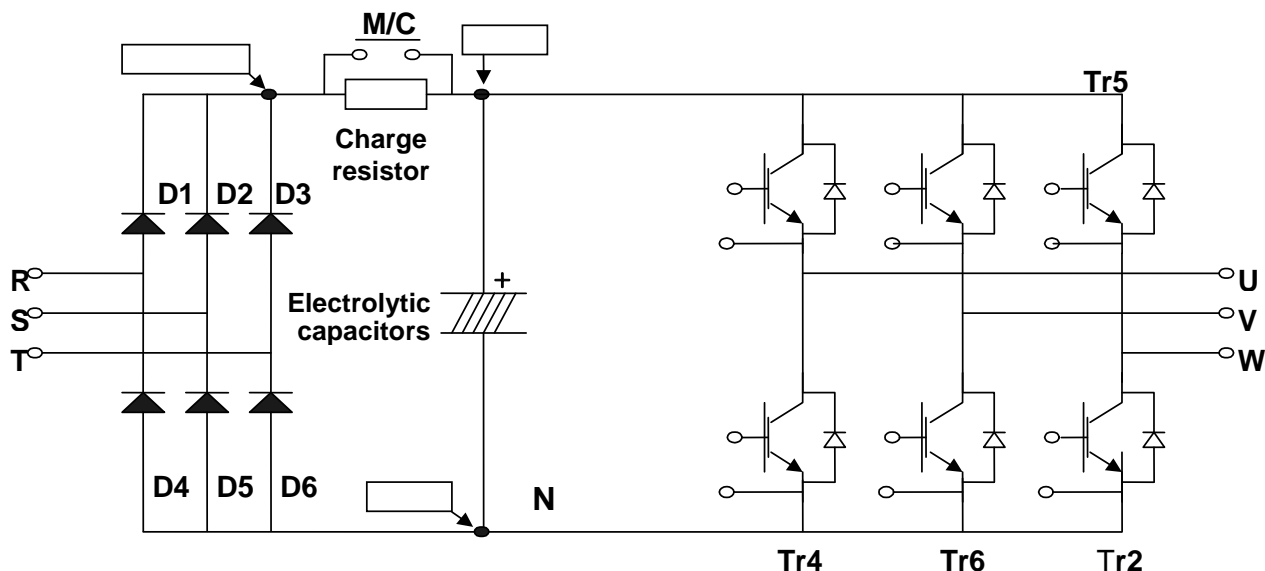
6.2 Troubleshooting

| Condition | Checking Point |
|---|--|
| The motor does not rotate. | <ol style="list-style-type: none"> 1) Main circuit inspection : <ul style="list-style-type: none"> - Is the input (line) voltage normal? (Is the LED in the inverter is lit?) - Is the motor connected correctly? 2) Input signal inspection : <ul style="list-style-type: none"> - Check the operating signal input to the inverter. - Check the forward and the reverse signal input simultaneously to the inverter? - Check the command frequency signal input to the inverter. 3) Parameter setting inspection : <ul style="list-style-type: none"> - Is the reverse prevention (FU1-01) function set? - Is the Drive mode (DRV-03) set correctly? - Is the command frequency set to 0? 4) Load inspection : <ul style="list-style-type: none"> - Is the load too large or is the motor jammed? (Mechanical brake) 5) Other : <ul style="list-style-type: none"> - Is the alarm displayed on the keypad or is the alarm LED lit? (STOP LED blinks) |
| The motor rotates in opposite directions. | <ul style="list-style-type: none"> - Is the phase sequence of the output terminal U, V, W correct? - Is the starting signal (forward/reverse) connected correctly? |
| The difference between the rotating speed and the reference is too large. | <ul style="list-style-type: none"> - Is the frequency reference signal correct? (Check the level of the input signal) - Is the following parameter setting is correct? - Lower Limit Frequency (FU1-34), Upper Limit Frequency (FU1-35), Analog Frequency Gain (I/O-1~10) - Is the input signal line influenced by external noise? (Use a shielded wire) |
| The Inverter does not accelerate or decelerate smoothly. | <ul style="list-style-type: none"> - Is the acceleration/deceleration time is set too short a period of time? - Is the load too large? - Is the Torque Boost (FU2-68, 69) value is too high that the current limit function and the stall prevention function do not operate? |
| The motor current is too high. | <ul style="list-style-type: none"> - Is the load too large? - Is the Torque Boost Value (manual) too high? |
| The rotating speed does not increase. | <ul style="list-style-type: none"> - Is the Upper Limit Frequency (FU1-35) value correct? - Is the load too large? - Is the Torque Boost (FU1-68, 69) value too high that the stall prevention function (FU1-71) does not operate? |
| The rotating speed oscillates when the inverter is operating. | <ol style="list-style-type: none"> 1) Load inspection : <ul style="list-style-type: none"> - Is the load oscillating? 2) Input signal inspection : <ul style="list-style-type: none"> - Is the frequency reference signal oscillating? 3) Other : <ul style="list-style-type: none"> - Is the wiring too long when the inverter is using V/F control? (over 500m) |

6.3 How to Check Power Components

1) Diode module and IGBT module check (5.5~ 30kW)

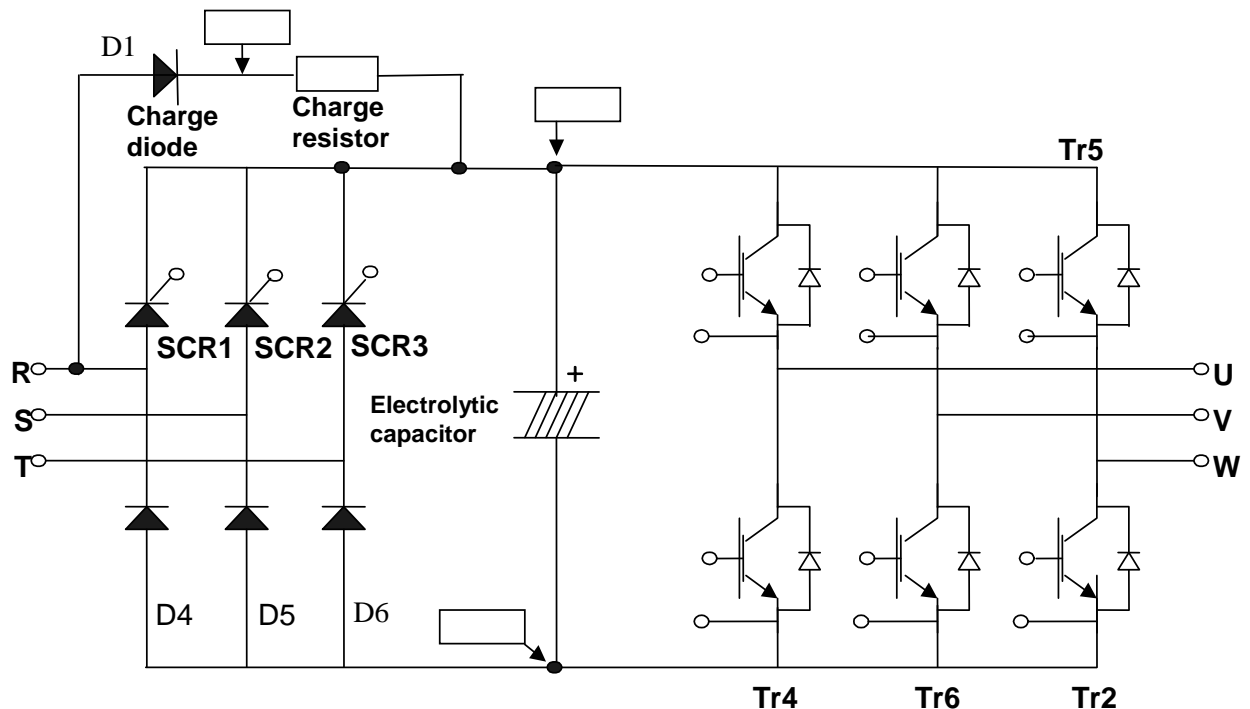
Before checking the power components, be sure to disconnect AC Input supply and wait until the Main Electrolytic Capacitors (DCP-DCN) is discharged.



- Turn the power off and disconnect RST/UVW wiring.
- Determine whether inverter terminals (R,S,T, U, V, W, P1(or P2),N) are energized or not using a tester.
- Wait until the Main Electrolytic Capacitors (DCP-DCN) is discharged to a safe level.
- Enormous amount of value such as Mega will be displayed when Open.
When closed, the resistance value ranges from a few ohms to tens of Ω .
Sometimes, it seems to be closed due to electrolytic capacitors but soon to be displayed mega value resistance.
- The displayed value is not always the same according to modules and tester types but should be similar.
- Modules number and checking point

| Module | | Test polarity | | Check value | Number | Test polarity | | Check value |
|--------|-----|---------------|------|-------------|--------|---------------|---|-------------|
| | | + | - | | | + | - | |
| Diode | D1 | R | DCP+ | Closed | D4 | R | N | Open |
| | | DCP+ | R | Open | | N | R | Closed |
| | D2 | S | DCP+ | Closed | D5 | S | N | Open |
| | | DCP+ | S | Open | | N | S | Closed |
| | D3 | T | DCP+ | Closed | D6 | T | N | Open |
| | | DCP+ | T | Open | | N | T | Closed |
| IGBT | Tr1 | U | DCP | Closed | Tr4 | U | N | Open |
| | | DCP | U | Open | | N | U | Closed |
| | Tr3 | V | DCP | Closed | Tr6 | V | N | Open |
| | | DCP | V | Open | | N | V | Closed |
| | Tr5 | W | DCP | Closed | Tr2 | W | N | Open |
| | | DCP | W | Open | | N | W | Closed |

2) Diode module and IGBT module check (37~ 90kW)



- Turn the power off and disconnect RST/UVW wiring.
- Determine whether inverter terminals (R,S,T, U, V, W, P1(or P2),N) are energized or not using a tester.
- Wait until the Main Electrolytic Capacitors (DCP-DCN) is discharged to a safe level.
- Enormous amount of value such as Mega will be displayed when Open.
When closed, the resistance value ranges from a few ohms to tens of Ω .
Sometimes, it seems to be closed due to electrolytic capacitors but soon to be displayed mega value resistance.
- The displayed value is not always the same according to modules and tester types but should be similar.
- Modules number and checking point

| Module | | Test polarity | | Check value | Number | Test polarity | | Check value |
|--------|-----|---------------|------|-------------|--------|---------------|---|-------------|
| | | + | - | | | + | - | |
| Diode | D1 | R | DCP+ | Closed | D4 | R | N | Open |
| | | DCP+ | R | Open | | N | R | Closed |
| | D5 | S | N | Open | D6 | T | N | Open |
| | | N | S | Closed | | N | T | Closed |
| IGBT | Tr1 | U | DCP | Closed | Tr4 | U | N | Open |
| | | DCP | U | Open | | N | U | Closed |
| | Tr3 | V | DCP | Closed | Tr6 | V | N | Open |
| | | DCP | V | Open | | N | V | Closed |
| | Tr5 | W | DCP | Closed | Tr2 | W | N | Open |
| | | DCP | W | Open | | N | W | Closed |

6.4 Maintenance

The iP5A series is an industrial electronic product with advanced semiconductor elements. However, temperature, humidity, vibration and aging parts may still affect it. To avoid this, it is recommended to perform routine inspections.

6.4.1 Precautions

- ✎ Be sure to remove the drive power input while performing maintenance.
- ✎ Be sure to perform maintenance only after checking that the bus has discharged (The voltage between terminal P1-N (or P2-N) should be less than DC 30V). The bus capacitors in the electronic circuit can still be charged even after the power is turned off.
- ✎ The correct output voltage can only be measured by using a rectifier voltage meter. Other voltage meters, including digital voltage meters, are likely to display incorrect values caused by the high frequency PWM output voltage of the drive.

6.4.2 Routine Inspection

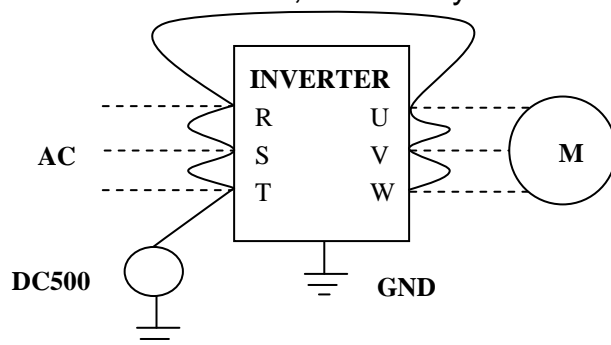
- ✎ Be sure to check the following before operation
- ✎ The conditions of the installation location
- ✎ The conditions of the drive cooling
- ✎ Abnormal vibration or loud noise
- ✎ Abnormal heating or discoloration

6.4.3 Periodic Inspection

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

6.4.4 Megger/Withstanding Voltage Test

Perform megger test after inverter wiring is disconnected. Test voltage should not be applied to the inverter. Megger test should be conducted only for the main circuit, not the control circuit. Use DC 500V megger. Dielectric test should not be conducted to the inverter. Otherwise, IGBT may be damaged.



6.4.5 Daily and Periodic Inspection Items

| Inspection Location | Inspection Item | Inspection | Period | | | Inspection Method | Criterion | Measuring Instrument |
|---------------------|---------------------------|--|--------|--------|--------|---|---|-----------------------------------|
| | | | Daily | 1 year | 2 year | | | |
| All | Ambient Environment | Is there any dust? Is the ambient temperature and humidity adequate? | O | | | Refer to the precautions. | Temperature: -10~+40 no freezing. Humidity: Under 50% no dew | Thermometer, Hygrometer, Recorder |
| | Equipment | Is there any abnormal oscillation or noise? | O | | | Use sight and hearing. | No abnormality | - |
| | Input Voltage | Is the input voltage of the main circuit normal? | O | | | Measure the voltage between the terminals R, S, T. | - | Digital Multi-Meter/Tester |
| Main Circuit | All | 1) Megger check (between the main circuit and the ground) 2) Are any fixed parts removed? 3) Are there any traces of overheating at each component's cleaning? | | O | O | 1) Undo the inverter connections short the terminals R, S, T, U, V, W and measure between these parts and the ground. 2) Tighten the screws. 3) Visual check. | 1) Over 5MΩ 2), 3) No fault | DC 500V class Megger |
| | Conductor/Wire | 1) Is the conductor rusty? 2) Is the wire coating damaged? | | O | | Visual check | No fault | - |
| | Terminal | Is there any damage? | | O | | Visual check | No fault | - |
| | IGBT Module /Diode Module | Check the resistance between each of the terminals. | | | O | Undo the inverter connection and measure the resistance between R, S, T ⇔ P, N and U, V, W ⇔ P, N with a tester. | (Refer 'How to Check Power Components') | Digital Multi-Meter/Analog Tester |

Chapter 6 – Troubleshooting and Maintenance

| Inspection Location | Inspection Item | Inspection | Period | | | Inspection Method | Criterion | Measuring Instrument |
|------------------------------------|---------------------|--|---------------------|------------|--------|--|---|---|
| | | | Daily | 1 year | 2 year | | | |
| | Smoothing Capacitor | 1) Is there any liquid coming out? 2) Is the safety pin out, and is there any swelling? 3) Measure the capacitance. | O O O | | | 1), 2) Visual check 3) Measure with a capacitance-measuring device. | 1), 2) No fault 3) Over 85% of the rated capacity | Capacitance Measuring device |
| | Relay | 1) Is there any chattering noise during operation? 2) Is there any damage to the contact? | | O O | | 1) Auditory check 2) Visual check | No fault | - |
| | Resistor | 1) Is there any damage to the resistor insulation? 2) Is the wiring in the resistor damaged (open)? | | O O | | 1) Visual check 2) Disconnect one of the connections and measure with a tester. | 1) No fault 2) Error must be within $\pm 10\%$ the displayed resistance. | Digital Multi-Meter/ Analog Tester |
| Control Circuit Protective Circuit | Operation Check | 1) Is there any unbalance between each phases of the output voltage? 2) Nothing must be wrong with display circuit after executing the sequence protective operation. | | O O | | 1) Measure the voltage between the output terminals U, V and W. 2) Short and open the inverter protective circuit output. | 1) The voltage balance between the phases for 200V (400V) class is under 4V (8V). 2) The fault circuit operates according to the sequence. | Digital Multi-Meter/ Rectifying Voltmeter |
| Cooling System | Cooling Fan | 1) Is there any abnormal oscillation or noise? 2) Is the connection area loose? | O O | | | 1) Turn OFF the power and turn the fan by hand. 2) Tighten the connections. | 1) Must rotate smoothly. 2) No fault | - |

| Inspection Location | Inspection Item | Inspection | Period | | | Inspection Method | Criterion | Measuring Instrument |
|---------------------|---------------------|---|--------|--------|--------|--|--|-------------------------|
| | | | Daily | 1 year | 2 year | | | |
| Display | Meter | Is the displayed value correct? | 0 | 0 | | Check the meter reading at the exterior of the panel. | Check the specified and management values. | Voltmeter/ Ammeter etc. |
| Motor | All | 1) Are there any abnormal vibrations or noise? 2) Is there any unusual odor? | 0 | | | 1) Auditory, sensory, visual check. 2) Check for overheat and damage. | No fault | - |
| | Insulation Resistor | Megger check (between the output terminals and the ground terminal) | | | 0 | Undo the U, V and W connections and tie the motor wiring. | Over 5MΩ | 500V class Megger |

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

Note: Life cycle of the Main components indicated above is based on continuous operation with rated load. It may vary with surrounded environment.

6.4.6 Parts replacement

| Part name | Period | Comments |
|------------------------|-----------|---|
| Cooling fan | 2-3 years | Exchange for a new part after consulting LS customer service center. |
| Electrolytic capacitor | 5 years | Check for the periodic inspection for 1 year. Exchange for a new part after consulting LS customer service center. The Recommended level to exchange a capacitor in main/control circuit is 85% or less of the initial value. |
| Relays | - | Exchange for a new part after consulting LS customer service center. |

The life expectancy of a part depends on the type of part, the environment, and operating condition.

CHAPTER 7 - OPTIONS

7.1 OPTION LIST

iP5A series is available to connect below option device.

| | | | | |
|----------|-------------------|-------------------------|--|--------------------------------|
| External | Keypad | LCD | 32 character display keypad Download and Upload available | All units |
| | Remote | Remote cable | 2m, 3m and 5m long keypad cable enables users to control the inverter from a distant area. | Optional |
| | Dynamic braking | DB resistor | To enhance the regenerative braking performance, it makes the inverter to accelerate/decelerate rapidly. | According to inverter capacity |
| | | DB unit | If it need a regenerative braking, it is used with DB resistor. | |
| | Conduit option | Conduit for NEMA TYPE 1 | Install it to fit for NEMA TYPE 1 Enclosure or IP20. | 15~90kW (20~125HP) |
| | Comm. option card | DEVICENET | DEVICENET optional communication card | All series (Above S/W V1.0) |
| | | PROFIBUS | PROFIBUS optional communication card. | |
| | | LS485 /MODBUS_RTU | LS485/MODBUS_RTU optional communication card | |
| | | Lonworks | Lonworks optional communication card | |
| | | BACNet | BACNet optional communication card | |
| | | MODBUS_TCP | MODBUS_TCP optional communication card | |
| | | Metasys_N2 | Metasys_N2 optional communication card. | |
| | | CCLink | CCLink optional communication card. | |

Note) Refer to Option manuals for details.

MEMO

CHAPTER 8 - RS485 COMMUNICATION

8.1 Introduction

Inverter can be controlled and monitored by the sequence program of the PLC or other master module.

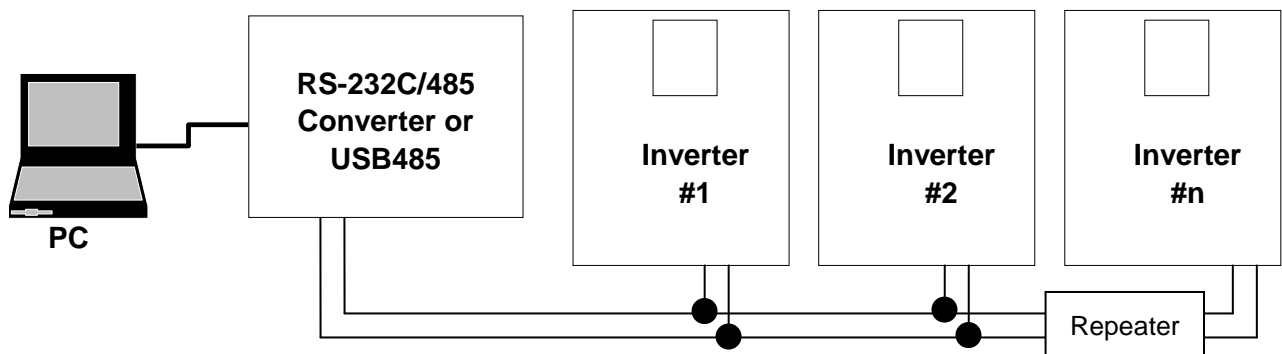
Drives or other slave devices may be connected in a multi-drop fashion on the RS-485 network and may be monitored or controlled by a single PLC or PC. Parameter setting and change are available through PC.

8.1.1 Features

Inverter can be easily applied for Factory automation because Operation and monitoring is available by User-program.

- * Parameter change and monitoring is available via computer.
(Ex: Accel/Decel time, Freq. Command etc.)
- * Interface type of RS485 reference:
 - 1) Allows the drive to communicate with any other computers.
 - 2) Allows connection of up to 31 drives with multi-drop link system.
 - 3) Noise-resistant interface.

8.1.2 Connection guide for RS485 communication with PC , PLC and RS232/485



* REPEATER is not a required item but helps communication in long-distance communication or high noise environment.

8.1.3 Before installation

Before installation and operation, this should be read thoroughly. If not, it can cause personal injury or damage to other equipment.

8.2 Specification

8.2.1 Performance specification

| Item | Specification |
|-----------------------|---|
| Transmission form | Bus method, Multi-drop Link System |
| Applicable inverter | SV-iP5A series |
| Connectable drives | Max. 31 |
| Transmission distance | Max. 1,200m (Within 700m Recommended) |
| Recommended wire | 0.75mm ² (12AWG), Shielded Twisted-Pair Wire |

8.2.2 Hardware specification

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

8.2.3 Communication specification

| Item | Specification |
|----------------------|--|
| Communication speed | 19,200/9,600/4,800/2,400/1,200 bps selectable |
| Communication system | Half duplex system |
| Character system | ASCII (8 bit) |
| Stop bit length | 1 bit |
| Sum check (CRC16) | 2 bytes |
| Parity bit | None |
| Protocol supported | Parameter Read/Write, Monitoring parameter register/execution Broadcasting |

8.2.4 Installation

■ Connecting the communication line

- 1) Connect the RS485 communication line to the inverter's (C+), (C-) and CM terminals of the control terminals.
- 2) Connect the CM terminal among inverters for stable communication.
- 3) Check the connection and turn ON the inverter.
- 4) If the communication line is connected correctly set the communication-related parameters as the following.
- 5) Install a repeater to upgrade the communication speed or longer than 1200mm communication line is used.
Repeater is required for upgrading communication quality in the noise-high environment.

■ Communication parameters

| Code | Display | Name | Set value | Unit | Default |
|-----------|-----------------|---|---|------|----------|
| DRV_03 | Drive mode | Drive mode | Int. 485 | - | Fx/Rx-1 |
| DRV_04 | Freq mode | Freq mode | Int. 485 | - | KeyPad-1 |
| DRV_91 | Drive mode2 | Drive mode 2 | KeyPad Fx/Rx-1 Fx/Rx-2 | - | Fx/Rx-1 |
| DRV_92 | Freq mode2 | Freq mode 2 | KeyPad-1 KeyPad-2 V1 V1S I V1+I Pulse | - | KeyPad-1 |
| I/O_20~27 | M1 ~ M8 | Programmable Digital Inputs | Main-drive | - | |
| I/O_90 | Inv No | Inverter number | 1~250 | - | 1 |
| I/O_91 | Baud rate | Communicatio- n speed | 1200 bps 2400 bps 4800 bps 9600 bps 19200 bps | - | 9600 bps |
| I/O_92 | COM Lost Cmd | Operating mode when communication signal is lost | None FreeRun Stop | - | None |
| I/O_93 | COM Time Out | Time to determine whether Communication signal is lost. | 0.1~120.0 | sec | 1.0 |
| I/O_94 | Delay Time | Delay time of communication response | 1 ~ 1200 | msec | 5 |

8.3 Operation

8.3.1 Operating steps

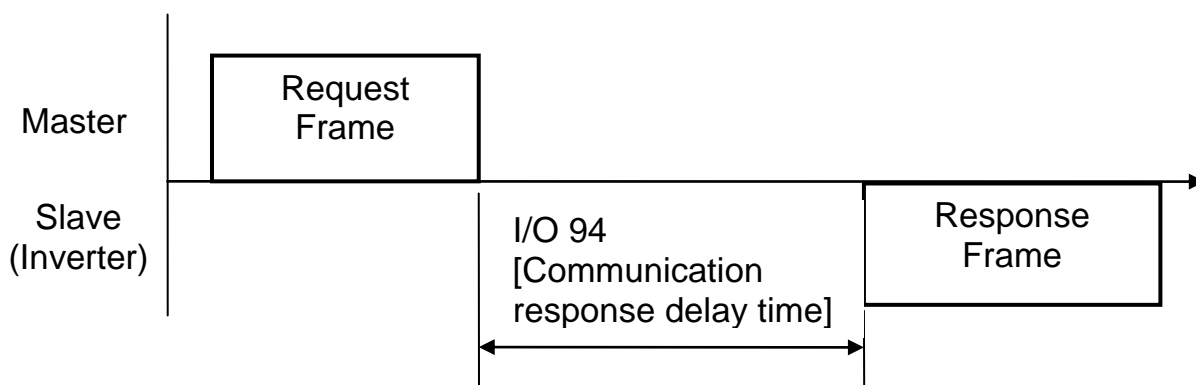
- 1) Check whether the computer and the inverter are connected correctly.
- 2) Turn ON the inverter. But, do not connect the load until stable communication between the computer and the inverter is verified. Start the operating program for the inverter from the computer.

- 3) If computer is a master, RS232-485 converter is needed to communicate because computer does not have RS485 port.
The communication is delayed at transmitting/receiving when the RS232-485 converter is used. If delay is happened, retry the communication by increasing the I/O-94 [Delay Time].
- 4) Operate the inverter using the operating program for the inverter.
- 5) Refer to 'Chapter 6. Troubleshooting and Maintenance' if the communication is not operating normally.
- 6) User program or the 'DriveView 7' program supplied from LS Industrial Systems can be used as the operating program for the inverter.
- 7) Turn the inverter J3 switch ON to connect the terminating resistor for the end of network.
 - * Connect to C+,C-,CM terminal on the control terminal. Be careful for the polarity(+, -).
 - * Maximum connectable inverter are 31.

8.4 Communication protocol (RS485)

The configuration of RS485 is that PC or PLC is the Master and Inverter Slave. Inverter responds the Master's Read/Write Requests.

When master sends Write Request to Inverter address # 255, all inverters perform Write action but do not return a Acknowledge response. This is used to drive multiple inverters at the same time via RS485.



8.4.1 Basic format

- 1) Command message (Request):

| ENQ | Inverter No. | CMD | Data | SUM | EOT |
|--------|--------------|--------|---------|---------|--------|
| 1 byte | 2 bytes | 1 byte | n bytes | 2 bytes | 1 byte |

- * Normal response (Acknowledge Response):

| ENQ | Inverter No. | CMD | Data | SUM | EOT |
|--------|--------------|--------|-------------|---------|--------|
| 1 byte | 2 bytes | 1 byte | n * 4 bytes | 2 bytes | 1 byte |

- * Negative response (Negative Acknowledge Response):

| ENQ | Inverter No. | CMD | Data | SUM | EOT |
|--------|--------------|--------|---------|---------|--------|
| 1 byte | 2 bytes | 1 byte | 2 bytes | 2 bytes | 1 byte |

2) Description :

- * Request starts with “ENQ” and ends with “EOT”.
- * Acknowledge Response starts with “ACK” and ends with “EOT”.
- * Negative Acknowledge Response starts with “NAK” and ends with “EOT”.
- * “Inverter Number” is the number of Inverters used and indicated in 2 bytes ASCII-HEX. (ASCII-HEX : Hexadecimal consists of ‘0’ ~ ‘9’, ‘A’ ~ ‘F’)

* CMD : Capital letter (“IF Error” when small letter is used.)

| Character | ASCII-HEX | Command |
|-----------|-----------|---------------------------------------|
| ‘R’ | 52h | Read |
| ‘W’ | 57h | Write |
| ‘X’ | 58h | Request for monitoring registration |
| ‘Y’ | 59h | Execution for monitoring registration |

- Data : ASCII-HEX

Ex) when data value is 3000 : 3000 (dec) → ‘0’ ‘B’ ‘B’ ‘8’h → 30h 42h 42h 38h

- Error code : ASCII (20h ~ 7Fh)

- Receive/Send buffer size : Receive= 39 bytes, Send=44 bytes

- Monitor register buffer : 8 Word

- SUM : to check the communication error

SUM= ASCII-HEX format of lower 8 bit of (Inverter No. + CMD + DATA)

Ex) Command Message (Request) for reading one address from address “9000”

| ENQ | Inverter No. | CMD | Address | Number of address to read | SUM | EOT |
|--------|--------------|--------|---------|---------------------------|---------|--------|
| 05h | “01” | “R” | “9000” | “1” | “AD” | 04h |
| 1 byte | 2 bytes | 1 byte | 4 bytes | 1 byte | 2 bytes | 1 byte |

SUM = ‘0’ + ‘1’ + ‘R’ + ‘9’ + ‘0’ + ‘0’ + ‘0’ + ‘1’

= 30h + 31h + 52h + 39h + 30h + 30h + 30h + 31h

= 1ADh (except for ENA/ACK/EOT value)

8.4.2 Detail communication protocol

1) Request for Read: Request for read successive ‘N’ numbers of WORD from address “XXXX”

| ENQ | Inv. No. | CMD | Address | Number of Address | SUM | EOT |
|--------|-------------|--------|---------|-------------------|---------|--------|
| 05h | “01” ~ “FA” | “R” | “XXXX” | “1” ~ “8” = n | “XX” | 04h |
| 1 byte | 2 bytes | 1 byte | 4 bytes | 1 byte | 2 bytes | 1 byte |

Total bytes = 12

The quotation marks (“ ”) mean character.

1.1) Acknowledge Response :

| ACK | Inv No | CMD | Data | SUM | EOT |
|--------|-------------|--------|-------------|---------|--------|
| 06h | "01" ~ "FA" | "R" | "XXXX" | "XX" | 04h |
| 1 byte | 2 bytes | 1 byte | N * 4 bytes | 2 bytes | 1 byte |

Total bytes = 7 * n * 4 = Max. 39

1.2) Negative Acknowledge Response :

| NAK | Inv No | CMD | Error code | SUM | EOT |
|--------|-------------|--------|------------|---------|--------|
| 15h | "01" ~ "FA" | "R" | "**" | "XX" | 04h |
| 1 byte | 2 bytes | 1 byte | 2 bytes | 2 bytes | 1 byte |

Total bytes = 9

2) Request for Write :

| ENQ | Inverter No | CMD | Address | Number of Address | SUM | EOT | EOT |
|--------|-------------|--------|---------|-------------------|-------------|---------|--------|
| 05h | "01" ~ "FA" | "W" | "XXXX" | "1" ~ "8" = n | "XXXX..." | "XX" | 04h |
| 1 byte | 2 bytes | 1 byte | 4 bytes | 1 byte | n * 4 bytes | 2 bytes | 1 byte |

Total bytes = 12 + n * 4 = Max. 44

2.1) Acknowledge response :

| ACK | Inverter No. | CMD | Data | SUM | EOT |
|--------|--------------|--------|-------------|---------|--------|
| 06h | "01" ~ "FA" | "W" | "XXXX..." | "XX" | 04h |
| 1 byte | 2 bytes | 1 byte | n * 4 bytes | 2 bytes | 1 byte |

Total bytes = 7 + n * 4 = Max. 39

Note) When Request for Write and Acknowledge Response is exchanged between PC and Inverter for the first time, previous data is returned. From the second time of transmission, the current data will be received.

2.2) Negative response :

| NAK | Inverter No. | CMD | Error code | SUM | EOT |
|--------|--------------|--------|------------|---------|--------|
| 15h | "01" ~ "FA" | "W" | "**" | "XX" | 04h |
| 1 byte | 2 bytes | 1 byte | 2 bytes | 2 bytes | 1 byte |

Total bytes = 9

3) Request for Monitor Register : This is useful when constant parameter monitoring and data updates are required.

Request for Register of 'n' numbers of Address. (non-successive)

| ENQ | Inverter No. | CMD | Number of Address | Address | SUM | EOT |
|--------|--------------|--------|-------------------|-------------|---------|--------|
| 05h | "01" ~ "FA" | "X" | "1" ~ "8" = n | "XXXX..." | "XX" | 04h |
| 1 byte | 2 bytes | 1 byte | 1 byte | n * 4 bytes | 2 bytes | 1 byte |

Total bytes = 8 + n * 4 = Max 40

3.1) Acknowledge Response :

| ACK | Inverter No. | CMD | SUM | EOT |
|--------|--------------|--------|---------|--------|
| 06h | "01" ~ "FA" | "X" | "XX" | 04h |
| 1 byte | 2 bytes | 1 byte | 2 bytes | 1 byte |

Total bytes = 7

3.2) Negative Acknowledge Response:

| NAK | Inverter No. | CMD | Error code | SUM | EOT |
|--------|--------------|--------|------------|---------|--------|
| 15h | "01" ~ "FA" | "X" | "**" | "XX" | 04h |
| 1 byte | 2 bytes | 1 byte | 2 bytes | 2 bytes | 1 byte |

Total bytes = 9

4) Execution Request for monitor register: Request for read of address registered by monitor register.

| ENQ | Inverter No. | CMD | SUM | EOT |
|--------|--------------|--------|---------|--------|
| 05h | "01" ~ "FA" | "Y" | "XX" | 04h |
| 1 byte | 2 bytes | 1 byte | 2 bytes | 1 byte |

Total bytes = 7

4.1) Acknowledge response:

| ACK | Inverter No. | CMD | Data | SUM | EOT |
|--------|--------------|--------|-------------|---------|--------|
| 06h | "01" ~ "FA" | "Y" | "XXXX..." | "XX" | 04h |
| 1 byte | 2 bytes | 1 byte | n * 4 bytes | 2 bytes | 1 byte |

Total bytes = 7 + n * 4 = Max 39

4.2) Negative response:

| NAK | Inverter No. | CMD | Error code | SUM | EOT |
|--------|--------------|--------|------------|---------|--------|
| 15h | "01" ~ "FA" | "Y" | "**" | "XX" | 04h |
| 1 byte | 2 bytes | 1 byte | 2 bytes | 2 bytes | 1 byte |

Total bytes = 9

* Request for Monitor Register should be made before Execution Request for monitor register. If inverter power is turned off, monitor register is cleared so redo the request for monitor register when Power ON.

5) Error code

| Error code | Description |
|------------|---|
| IF | ILLEGAL FUNCTION When master is sending codes other than Function code (R, W, X, Y). |
| IA | ILLEGAL ADDRESS - When parameter address does not exist. |
| ID | ILLEGAL VALUE - When Data contains an out of range value for an inverter parameter during 'W' (Write). |
| WM | WRITE MODE ERROR - When the requested data cannot be changed (written) during 'W' (Write) such as Read Only, Not adjustable during Run parameters. |

8.5 Parameter code list

<Common area> : Area accessible regardless of inverter models (Note 3)

| Address | Parameter | Scale | Unit | R/W | Data value |
|---------|----------------------------------|-------|------|-----|--|
| 0x0000 | Inverter model | - | - | R | 9 : SV-iP5A |
| 0x0001 | Inverter capacity | - | - | R | 0 : 0.75kW(1HP) 1 : 1.5kW(2HP) 2 : 2.2kW(3HP) 3 : 3.7kW(5HP) 4 : 5.5kW(7.5HP), 5 : 7.5kW(10HP), 6 : 11kW(15HP), 7 : 15kW(20HP), 8 : 18.5kW(25HP), 9 : 22kW(30HP), A : 30kW(40HP), B : 37kW(50HP), C : 45kW(60HP), D : 55kW(75HP), E : 75kW(100HP) F : 90kW(125HP) 10 : 110kW(150HP) 11 : 132kW(200HP) 12 : 160kW(250HP) 13 : 220kW(300HP) 14 : 280kW(350HP) 15 : 315kW(400HP) 16 : 375kW(500HP) 17 : 450kW(600HP) |
| 0x0002 | Inverter Input Voltage | - | - | R | 0 : 220V Class 1 : 400V Class |
| 0x0003 | S/W Version | - | - | R | (Ex) 0x0100 : Version 1.00 0x0101 : Version 1.10 |
| 0x0005 | Frequency Reference | 0.01 | Hz | R/W | - |
| 0x0006 | Run Command (Option) (Note 1) | - | - | R/W | BIT 0 : Stop (S) BIT 1 : Forward run (F) BIT 2 : Reverse run (R) BIT 3 : Fault reset (0->1) BIT 4 : Emergency stop BIT 5 : Not used |
| | | | | R | BIT 6, BIT 7 : Run/Stop command source 0(Terminal), 1(Keypad), 2(Option), 3(Int. 485) BIT 8 ~14 : Freq. reference BIT 0 ~ 16 : Multi-step speed freq. (0, 2~16) BIT 17 ~ 19 : UpDown (Up, Down, UD Zero) BIT 20 ~ 21 : Reserved BIT 22 ~ 25 : Analog (V1, V1S, I, V1I) BIT 26 : Pulse, BIT 27 : Sub, BIT 28: Int. 485 BIT 29 : Option, BIT 30 : Jog BIT, 31 : PID BIT 15 : Set when network error |
| | | | | R/W | - |
| 0x0007 | Acceleration Time | 0.1 | sec | R/W | - |
| 0x0008 | Deceleration Time | 0.1 | sec | R/W | - |

| Address | Parameter | Scale | Unit | R/W | Data value |
|---------|------------------------------|-------|------|-----|--|
| 0x0009 | Output Current | 0.1 | A | R | - |
| 0x000A | Output Frequency | 0.01 | Hz | R | - |
| 0x000B | Output Voltage | 1.0 | V | R | - |
| 0x000C | DC Link voltage | 1.0 | V | R | - |
| 0x000D | Output power | 0.1 | kW | R | - |
| 0x000E | Operating 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 |
| 0x000E | Operating status of Inverter | | | R | BIT 7 : DC Braking BIT 8 : Stopping BIT 9 : not Used BIT10 : Brake Open BIT11 : Forward run command BIT12 : Reverse run command BIT13 : REM. R/S (Int. 485, OPT) BIT14 : REM. Freq. (Int. 485, OPT) |
| 0x000F | Trip information | - | - | R | BIT 0 : OCT1 BIT 1 : OV BIT 2 : EXT-A BIT 3 : BX BIT 4 : LV BIT 5 : RESERVE BIT 6 : GF (Ground Fault) BIT 6 : OHT (Inverter overheat) BIT 7 : ETH (Motor overheat) BIT 8 : OLT (Overload trip) BIT10 : HW-Diag BIT11 : RESERVE BIT12 : OCT2 BIT13 : OPT (Option error) BIT14 : PO (Phase Open) BIT15 : IOLT |
| 0x0010 | Input terminal status | - | - | R | BIT 0 : M1 BIT 1 : M2 BIT 2 : M3 BIT 3 : M4 BIT 4 : M5 BIT 5 : M6 BIT 6 : M7 BIT 7 : M8 BIT 8 : - |

Chapter 8 – RS485 Communication

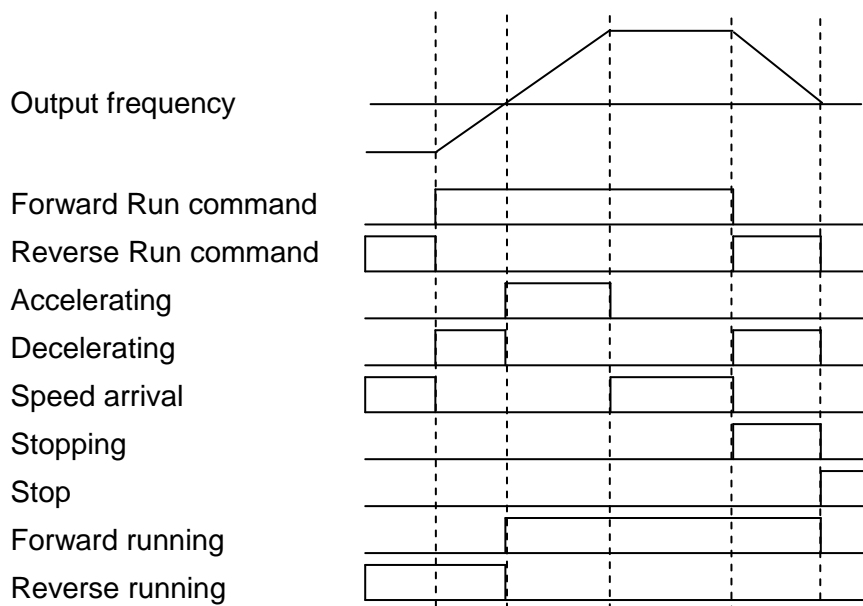
| Address | Parameter | Scale | Unit | R/W | Data value |
|---------|------------------------|--------|------|-----|---|
| | | | | | BIT 9 : - BIT 10 : - |
| 0x0011 | Output terminal status | - | - | R | BIT 0 : AUX1 BIT 1 : AUX2 BIT 2 : AUX3 BIT 3 : AUX4 BIT 4 : - BIT 5 : - BIT 6 : - BIT 7 : 30AC |
| 0x0012 | V1 | 0~10V | - | R | - |
| 0x0013 | V2 | 0~10V | - | R | - |
| 0x0014 | I | 0~20mA | - | R | - |
| 0x0015 | RPM | - | - | R | - |
| 0x001A | Unit display | - | - | R | 0 : Hz, 1 : Rpm |
| 0x001B | Pole number | - | - | R | - |
| 0x001C | Custom Version | - | - | R | - |

Note 1) Detail description on Common area address 0x0006

| Bit | Value | R/W | Name | Description |
|------|-------|-----|-------------------|--|
| 0 | 0x01 | R/W | Stop | Issue a Stop command via communication (0->1) |
| 1 | 0x02 | R/W | Forward run | Issue a Forward run command via communication (0->1) |
| 2 | 0x04 | R/W | Reverse run | Issue a Reverse run command via communication (0->1) |
| 3 | 0x08 | R/W | Fault reset | Issue a Fault reset command via communication (0->1) |
| 4 | 0x10 | R/W | Emergency stop | Issue a Emergency stop command via communication (0->1) |
| 5 | - | - | Not used | Not Used |
| 6~7 | - | R | Operating command | 0 (Terminal), 1 (keypad), 2 (option), 3 (Int. 485) |
| 8~14 | - | R | Frequency command | A. When operating command is issued via Terminal, Keypad or Option 0 : DRV-00, 1 : Not used, 2 : Multi-step speed 1, 3 : Multi-step speed 2, 4 : Multi-step speed 3, 5 : Multi-step speed 4, 6 : Multi-step speed 5, 7 : Multi-step speed 6, 8 : Multi-step speed 7, 9 : Multi-step speed 8, 10 : Multi-step speed 9, 12 : Multi-step speed 11, 11 : Multi-step speed 10, 13 : Multi-step speed 12, 14 : Multi-step speed 13, 15 : Multi-step speed 14 , 16 : Multi-step speed 15, 17 :Up, 18 : Down, 19 : Up/Down Zero 20~21 : RESERVE, 22 : V1, 23 : V1S, |

| Bit | Value | R/W | Name | Description |
|-----|--------|-----|---------------|--|
| | | | | 24 : I, 25 : V1+I, 26 : Pulse 27 : Sub, 28 : Int. 485, 29 : Option 30 : Jog, 31 : PID |
| 15 | 0x8000 | R | Network error | Network malfunction |

8.5.1 iP5A operating status in Address E, Common area



< iP5A Address usage area by groups >

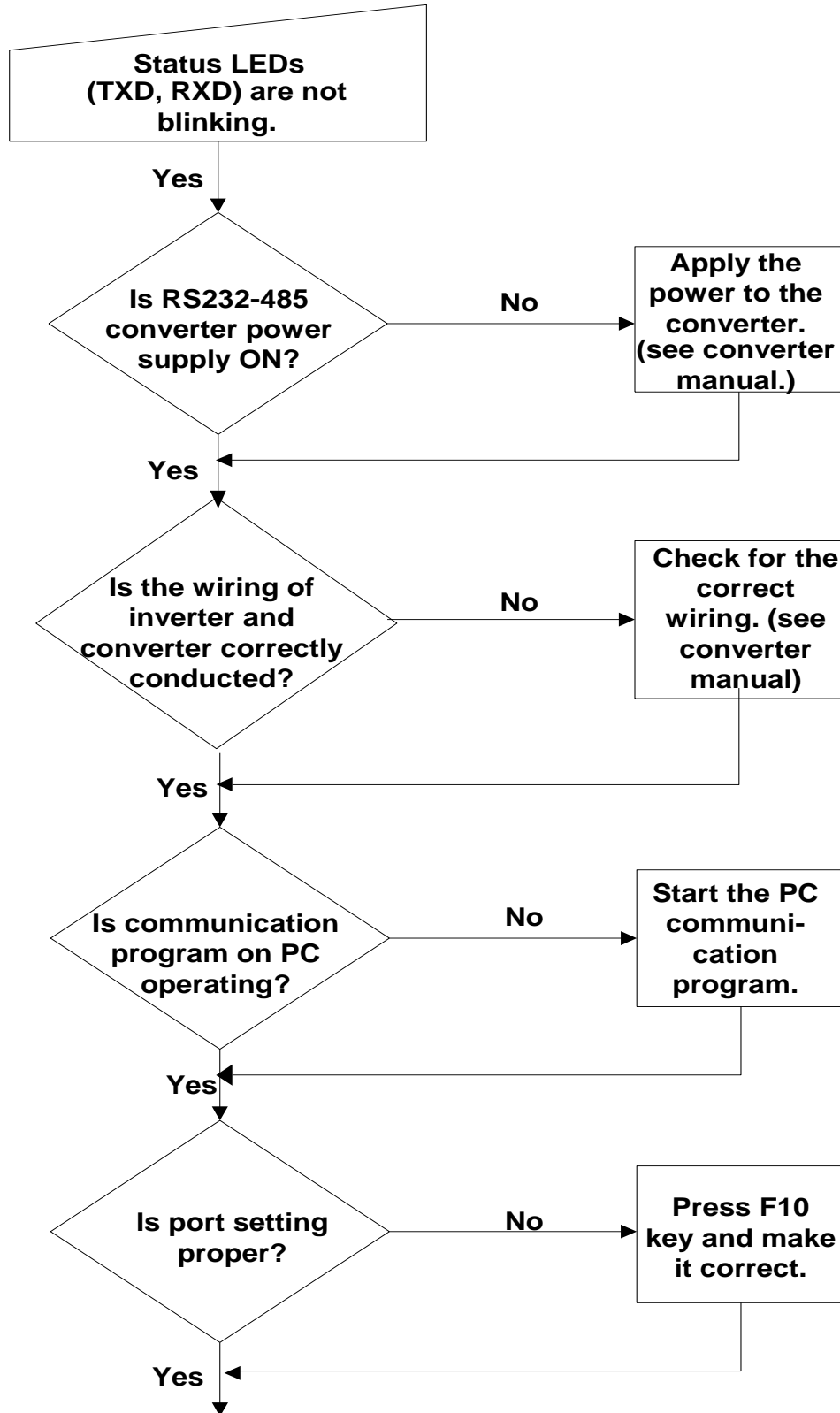
| | |
|------------|-------------|
| DRV | 9100 - 91FF |
| FU1 | 9200 – 92FF |
| FU2 | 9300 – 93FF |
| I/O | 9400 - 94FF |
| EXT | 9500 - 95FF |
| COM | 9600 - 96FF |
| APP | 9700 - 97FF |

Address setting method to access the parameter using RS485 : Area assigned by inverter + Address usage area by groups + Code no. (Hex).

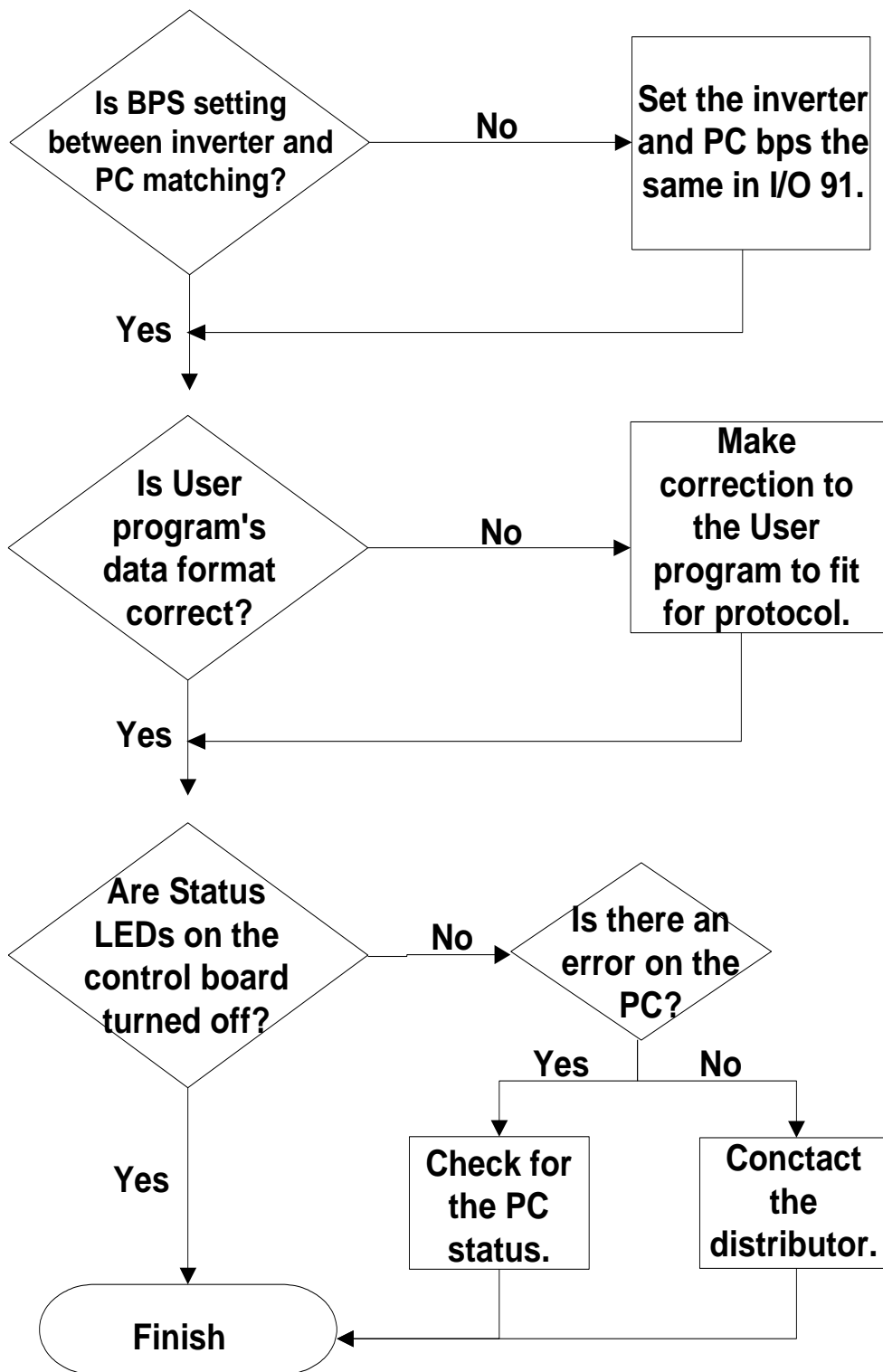
Ex) To check the content of I/O-93 [COM Time Out], perform Read or Write the address 0x945D.

8.6 Troubleshooting

Refer to the below chart when RS485 communication error occurs.



(Continued from previous page)



8.7 ASCII Code List

| Character | Hex | Character | Hex | Character | Hex |
|-----------|-----|-----------|-----|-----------|-----|
| A | 41 | q | 71 | @ | 40 |
| B | 42 | r | 72 | [| 5B |
| C | 43 | s | 73 | \ | 5C |
| D | 44 | t | 74 |] | 5D |
| E | 45 | u | 75 | | 5E |
| F | 46 | v | 76 | | 5F |
| G | 47 | w | 77 | | 60 |
| H | 48 | x | 78 | { | 7B |
| I | 49 | y | 79 | | 7C |
| J | 4A | z | 7A | } | 7D |
| K | 4B | 0 | 30 | ~ | 7E |
| L | 4C | 1 | 31 | BEL | 07 |
| M | 4D | 2 | 32 | BS | 08 |
| N | 4E | 3 | 33 | CAN | 18 |
| O | 4F | 4 | 34 | CR | 0D |
| P | 50 | 5 | 35 | DC1 | 11 |
| Q | 51 | 6 | 36 | DC2 | 12 |
| R | 52 | 7 | 37 | DC3 | 13 |
| S | 53 | 8 | 38 | DC4 | 14 |
| T | 54 | 9 | 39 | DEL | 7F |
| U | 55 | space | 20 | DLE | 10 |
| V | 56 | ! | 21 | EM | 19 |
| W | 57 | " | 22 | ACK | 06 |
| X | 58 | # | 23 | ENQ | 05 |
| Y | 59 | \$ | 24 | EOT | 04 |
| Z | 5A | % | 25 | ESC | 1B |
| A | 61 | & | 26 | ETB | 17 |
| B | 62 | ' | 27 | ETX | 03 |
| C | 63 | (| 28 | FF | 0C |
| D | 64 |) | 29 | FS | 1C |
| E | 65 | * | 2A | GS | 1D |
| F | 66 | + | 2B | HT | 09 |
| G | 67 | , | 2C | LF | 0A |
| H | 68 | - | 2D | NAK | 15 |
| I | 69 | . | 2E | NUL | 00 |
| J | 6A | / | 2F | RS | 1E |
| K | 6B | : | 3A | S1 | 0F |
| L | 6C | ; | 3B | SO | 0E |
| M | 6D | < | 3C | SOH | 01 |
| N | 6E | = | 3D | STX | 02 |
| O | 6F | > | 3E | SUB | 1A |
| P | 70 | ? | 3F | SYN | 16 |
| | | | | US | 1F |
| | | | | VT | 0B |

CHAPTER 9 - APPLYING DRIVES TO SINGLE-PHASE INPUT APPLICATION

9.1 Introduction

SV-IP5A is a three-phase standard variable frequency drive(VFD). When applying single-phase power to a three-phase VFD, there are several constraints that need to be considered. Standard Pulse-Width-Modulated (PWM) VFDs use a 6-pulse diode rectifier. The 6-pulse rectification results in 360 Hz DC bus ripple when used with a three-phase 60 Hz supply. However, under single-phase use, the DC bus ripple becomes 120 Hz and the VFDs DC bus circuit is subject to higher stress in order to deliver equivalent power.

Additionally, input currents and harmonics increase beyond those encountered with three-phase input. Input current distortion of 90% THD and greater can be expected under single-phase input, compared to approximately 40% with three-phase input as indicated in Figure 2. Therefore, single-phase use requires the three-phase VFD power rating be reduced (derated) to avoid over stressing the rectifier and DC link components.

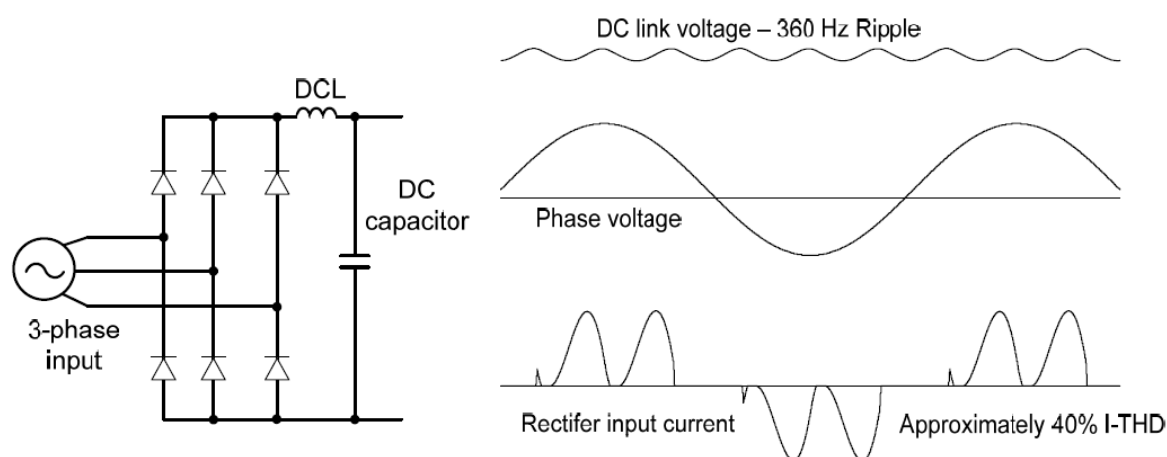


Figure-1 Typical Three-Phase Configuration

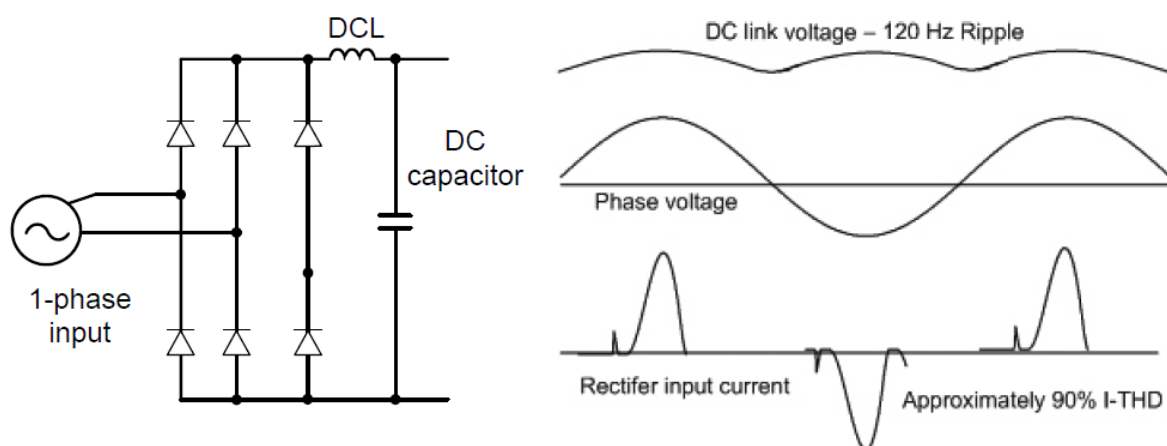


Figure-2 Typical Single-Phase Configuration

9.2 Power(HP), Input Current and Output Current

When using a three-phase VFD with single-phase input, derating the drive's output current and horsepower will be necessary because of the increase in DC bus ripple voltage and current. In addition, the input current through the remaining two phases on the diode bridge converter will approximately double, creating another derating consideration for the VFD. Input current harmonic distortion will increase beyond that with a three-phase supply making the overall input power factor low. Input current distortion over 100% is likely under single-phase conditions without a Reactor. Therefore, the Reactor is always required. When using a motor that is selected by the three-phase drive rating criteria when using single-phase input, it may result in poor performance, premature drive failure.

The selected drive of single-phase current ratings must meet or exceed the motor current ratings as indicated in Table 1.

9.3 Input Frequency and Voltage Tolerance

The drive ratings in Table 1 are valid for 60Hz input only. Operation at input frequencies other than 60Hz will require further review by LSIS.

The AC supply voltage must be within the required voltage range of 240/480Vac +10% to -5% to maximize motor power production. Standard product with three-phase voltage input as an allowable range of +10% to -15%. Therefore, a stricter input voltage tolerance of +10 to -5% applies when using the drive with a single-phase supply.

The average bus voltage with single-phase input is lower than the equivalent of a three-phase input. Therefore, the maximum output voltage (motor voltage) will be lower with a single-phase input. The minimum input voltage must be no less than 228Vac for 240 volt models and 456Vac for 480 volt models, to ensure motor voltage production of 207Vac and 415Vac, respectively. Thus, if full motor torque must be developed near base speed (full power) it will be necessary to maintain a rigid incoming line voltage so that adequate motor voltage can be produced. Operating a motor at reduced speed (reduced power), or using a motor with a base voltage that is lower than the incoming AC supply rating (ex. 208Vac motor with a 240Vac supply), will also minimize the effect of voltage deprivation.

(240VAC Input → 208V motor, 480VAC Input → 400V motor)

9.4 Wiring and Peripheral Device

It is important that input wiring and branch circuit protection be selected based on the drive's single-phase input current rating indicated in Table 1-2.

The single-phase input current after derating differs from the three-phase input indicated on the VFD nameplate. Connect single-phase AC input wiring below Figure-3 (R(L1)-T(L3)).

Chapter 9 Applying Drives to Single-Phase Input Application

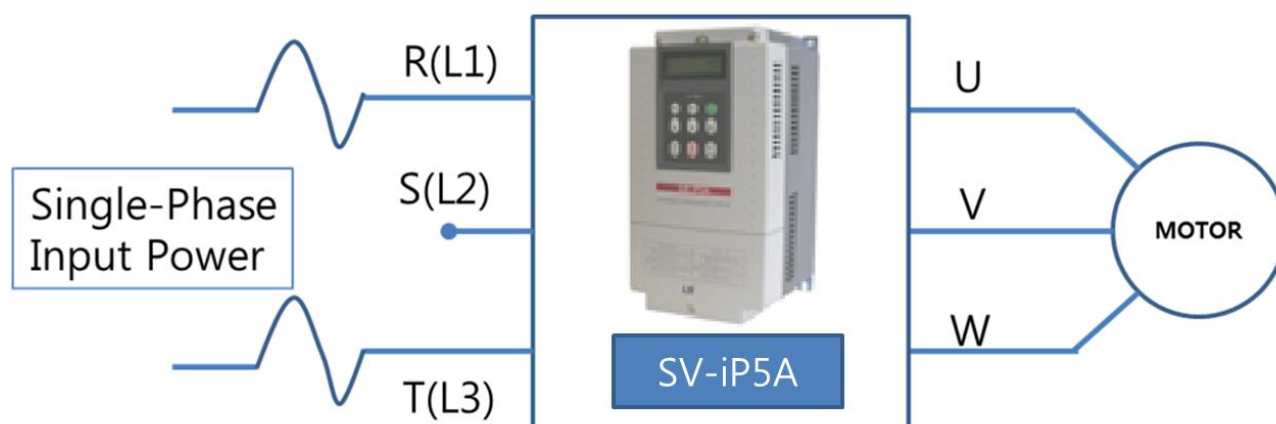


Figure-3 Terminal Wiring Diagram

| Single-Phase Rating (240V/60Hz) | | | | | | | | | | | |
|---------------------------------|------|-----------------------------|--------|-----------|--------|---------------|-------|------|------|---------------|----------------------|
| [kW] | [HP] | Single-Phase Current Rating | | | | Wire Seletion | | FUSE | | MCCB | Electronic Contactor |
| | | Output Amp | | Input Amp | | AWG | | | | | |
| | | HD [A] | ND [A] | HD [A] | ND [A] | R,S,T | U,V,W | [A] | [V] | LSIS(UL Type) | |
| 5.5kW | 7.5 | 17 | 24 | 8.5 | 12 | 10 | 10 | 40 | 500V | UTS150/50A | MC-32a |
| 7.5kW | 10 | 23 | 32 | 12 | 16 | 8 | 8 | 60 | | UTS150/60A | MC-40a |
| 11kW | 15 | 33 | 46 | 17 | 24 | 6 | 6 | 80 | | UTS150/100A | MC-50a |
| 15kW | 20 | 44 | 60 | 23 | 31 | 4 | 4 | 100 | | UTS150/125A | MC-65a |
| 18.5kW | 25 | 54 | 74 | 28 | 38 | 2 | 2 | 125 | | UTS150/150A | MC-100a |
| 22kW | 30 | 68 | 88 | 35 | 46 | 2 | 2 | 150 | | UTS250/175A | MC-130a |
| 30kW | 40 | 84 | 115 | 43 | 59 | 1/0 | 1/0 | 200 | | UTS250/225A | MC-150a |

Table 1. Single_Phase Rating(240V/60Hz)

| Single-Phase Rating (480V/60Hz) | | | | | | | | | | | |
|---------------------------------|------|-----------------------------|--------|-----------|--------|---------------|-------|------|------|---------------|----------------------|
| [kW] | [HP] | Single-Phase Current Rating | | | | Wire Seletion | | FUSE | | MCCB | Electronic Contactor |
| | | Output Amp | | Input Amp | | AWG | | | | | |
| | | HD [A] | ND [A] | HD [A] | ND [A] | R,S,T | U,V,W | [A] | [V] | LSIS(UL Type) | |
| 5.5kW | 7.5 | 8.8 | 12 | 4.8 | 6.6 | 12 | 12 | 20 | 500V | UTE100/30A | MC-22b |
| 7.5kW | 10 | 12 | 16 | 6.7 | 8.9 | 12 | 12 | 30 | | UTE100/30A | MC-22b |
| 11kW | 15 | 16 | 24 | 9.1 | 14 | 10 | 10 | 40 | | UTS150/50A | MC-40a |
| 15kW | 20 | 24 | 30 | 12 | 16 | 8 | 8 | 60 | | UTS150/60A | MC-50a |
| 18.5kW | 25 | 30 | 39 | 15 | 20 | 6 | 6 | 70 | | UTS150/60A | MC-50a |
| 22kW | 30 | 39 | 45 | 20 | 23 | 4 | 4 | 80 | | UTS150/100A | MC-65a |
| 30kW | 40 | 45 | 61 | 23 | 32 | 4 | 4 | 100 | | UTS150/125A | MC-75a |
| 37kW | 50 | 61 | 75 | 31 | 39 | 2 | 2 | 125 | | UTS150/150A | MC-105a |
| 45kW | 60 | 75 | 91 | 39 | 47 | 2 | 2 | 150 | | UTS250/200A | MC-130a |
| 55kW | 75 | 91 | 110 | 47 | 57 | 2 | 2 | 175 | | UTS250/250A | MC-150a |
| 75kW | 100 | 110 | 152 | 57 | 78 | 1/0 | 1/0 | 250 | | UTS400/300A | MC-185a |
| 90kW | 120 | 152 | 183 | 79 | 95 | 1/0 | 1/0 | 300 | | UTS400/350A | MC-225a |
| 110kW | 150 | 183 | 223 | 95 | 116 | 4/0 | 4/0 | 350 | 700V | UTS400/400A | MC-330a |
| 132kW | 180 | 223 | 264 | 113 | 134 | 4/0 | 4/0 | 400 | | UTS600/500A | MC-400a |
| 160kW | 225 | 264 | 325 | 135 | 166 | 300 | 300 | 450 | | UTS600/600A | MC-400a |

Table 2. Single-Phase Rating(480V/60Hz)

9.5 Considerations When Using a Three-Phase Drive with Single-Phase Input

Depending on the increased DC ripple, sensorless mode may result in poor performance, If phase open trip occurs, cancel the input phase open protection bit setting (FU1-69)

When applying single-phase power to a three-phase VFD, you can not limit the current to exceed the single-phase rating. Therefore, motor capacity, motor overload trip and E-thermal function must be set to protect motor.

The Reactor is always required. Therefore, Please purchase a built-in DC reactor product. IP5A 200V 5.5 ~ 30kW, 400V 5.5 ~ 11kW capacity products does not have a built-in DC reactor. The product does not have a built-in DC reactor, install an external AC reactor because it can not be equipped with a DC reactor.

APPENDIX A- UL MARKING

1. SHORT CIRCUIT RATING

Maximum allowed prospective short-circuit current at the input power connection is defined in IEC 60439-1 as 100 kA. The drive is suitable for use in a circuit capable of delivering not more than **100 kA RMS** at the drive's maximum rated voltage.

Le courant maximum de court-circuit présumé autorisé au connecteur d'alimentation électrique est défini dans la norme CEI 60439-1 comme égal à 100 kA. L'entraînement convient pour une utilisation dans un circuit capable de délivrer pas plus de 100 kA RMS à la tension nominale maximale de l'entraînement.

2. SHORT CIRCUIT FUSE/BREAKER

Use Class H or K5 UL Listed Input Fuse and UL Listed Breaker Only. See the table below for the Voltage and Current rating of the fuses and the breakers.

| Input Voltage | Motor [kW] | Inverter | External Fuse | | Breaker | | Internal Fuse | | | |
|---------------|------------|---------------|---------------|-------------|-------------|-------------|---------------|-------------|--------------|-----------------|
| | | | Current [A] | Voltage [V] | Current [A] | Voltage [V] | Current [A] | Voltage [V] | Manufacturer | Model Number |
| 200V Class | 5.5 | SV055iP5A-2 | 40 | 500 | 50 | 230 | | | | |
| | 7.5 | SV075iP5A-2 | 60 | 500 | 60 | 230 | | | | |
| | 11 | SV110iP5A-2 | 80 | 500 | 100 | 230 | | | | |
| | 15 | SV150iP5A-2 | 100 | 500 | 100 | 230 | | | | |
| | 18.5 | SV185iP5A-2 | 125 | 500 | 225 | 230 | | | | |
| | 22 | SV220iP5A-2 | 150 | 500 | 225 | 230 | | | | |
| | 30 | SV300iP5A-2 | 200 | 500 | 225 | 230 | | | | |
| 400V Class | 5.5 | SV055iPS5-4 | 20 | 500 | 30 | 460 | | | | |
| | 7.5 | SV075iP5A-4 | 30 | 500 | 30 | 460 | | | | |
| | 11 | SV110iPS5-4 | 40 | 500 | 50 | 460 | | | | |
| | 15 | SV150iP5A-4 | 60 | 500 | 60 | 460 | | | | |
| | 18.5 | SV185iP5A-4 | 70 | 500 | 75 | 460 | | | | |
| | 22 | SV0220iP5A-4 | 80 | 500 | 100 | 460 | | | | |
| | 30 | SV0300iP5A-4 | 100 | 500 | 125 | 460 | | | | |
| | 37 | SV0370iP5A-4 | 125 | 500 | 125 | 460 | 160 | 660 | Hinode | 660GH-160SUL |
| | 45 | SV0450iP5A-4 | 150 | 500 | 150 | 460 | 160 | 660 | Hinode | 660GH-160SUL |
| | 55 | SV0550iP5A-4 | 175 | 500 | 175 | 460 | 200 | 660 | Hinode | 660GH-200SUL |
| | 75 | SV0750iP5A-4 | 250 | 500 | 225 | 460 | 250 | 660 | Hinode | 660GH-250SUL |
| | 90 | SV0900iP5A-4 | 300 | 500 | 300 | 460 | 315 | 660 | Hinode | 660GH-315SUL |
| | 110 | SV01100iP5A-4 | 350 | 700 | 400 | 460 | 200x2P | 660 | Hinode | 660GH-200SULx2P |
| | 132 | SV01320iP5A-4 | 400 | 700 | 500 | 460 | 250x2P | 660 | Hinode | 660GH-250SULx2P |
| | 160 | SV01600iP5A-4 | 450 | 700 | 600 | 460 | 315x2P | 660 | Hinode | 660GH-315SULx2P |
| | 220 | SV02200iP5A-4 | 700 | 700 | 800 | 460 | 250x3P | 660 | Hinode | 660GH-250SULx3P |
| | 280 | SV02800iP5A-4 | 800 | 700 | 1000 | 460 | 315x3P | 660 | Hinode | 660GH-315SULx3P |
| | 315 | SV03150iP5A-4 | 900 | 700 | 1000 | 460 | 800 | 690 | Ferraz | 6.9URD32TTF0800 |
| | 375 | SV03750iP5A-4 | 1000 | 700 | 1200 | 460 | 900 | 690 | Ferraz | 6.9URD32TTF0900 |
| | 450 | SV04500iP5A-4 | 1200 | 700 | 1200 | 460 | 1000 | 690 | Ferraz | 6.9URD32TTF1000 |

Appendix A – UL Marking

Use Class H or RK5 UL listed Input fuses and UL listed breakers ONLY. See the table above for the voltage and current ratings for the fuses and breakers.

Utiliser UNIQUEMENT des fusibles d'entrée homologués de Classe H ou RK5 UL et des disjoncteurs UL. Se reporter au tableau ci-dessus pour la tension et le courant nominal des fusibles et des disjoncteurs.

3. OVER LOAD PROTECTION

IOLT : IOLT (inverter Overload Trip) protection is activated at 110% of the inverter rated current for 1 minute and greater.

OLT : Inverter shuts off its output when inverter output current exceeds its overload trip level for overload trip time. OLT is selected when FU1-66 [Overload Trip Selection] is set to "Yes" and activated at 120% of FU1-67 [Overload Trip Level] for 60 sec set in FU1-68 [Overload Trip Delay Time].

4. OVER SPEED PROTECTION

Not Provided With Overspeed Protection.

5. FIELD WIRING TERMINAL

Apply rated torques to the terminal screws. Loose screws may cause short circuits and malfunctions. Tightening the screw too much may damage the terminals and cause short circuits and malfunctions.

Use copper wires only with 600V, 90 °C rating for the power terminal wiring, and 300V, 75 °C rating for the control terminal wiring.

Power supply wirings must be connected to the R, S, and T terminals. Connecting them to the U, V, W terminals causes internal damages to the inverter. Motor should be connected to the U, V, and W Terminals. Arrangement of the phase sequence is not necessary.

Appliquer des couples de marche aux vis des bornes. Des vis desserrées peuvent provoquer des courts-circuits et des dysfonctionnements. Ne pas trop serrer la vis, car cela risque d'endommager les bornes et de provoquer des courts-circuits et des dysfonctionnements.

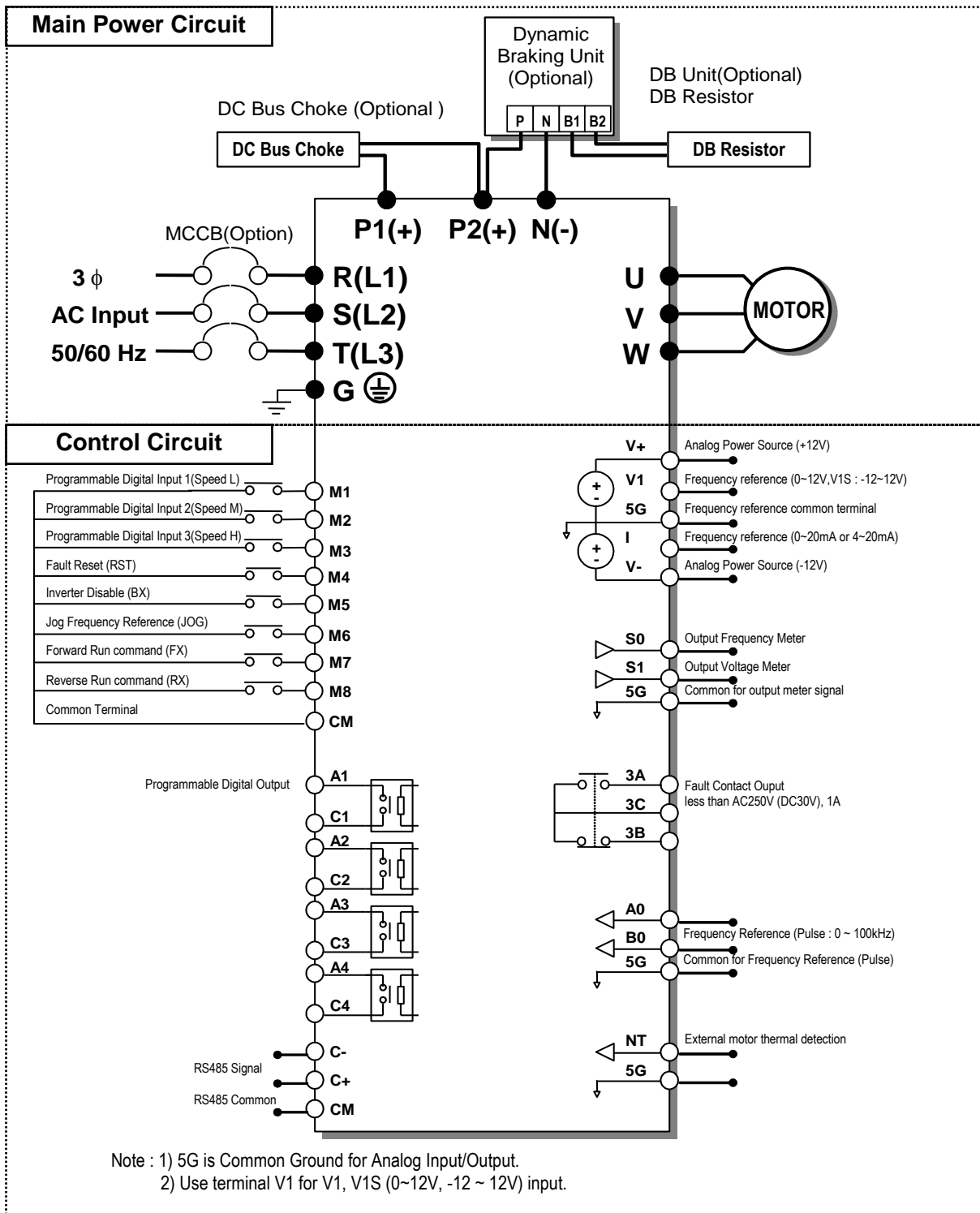
Utiliser uniquement des fils de cuivre avec une valeur nominale de 600 V, 90 °C pour le câblage de la borne d'alimentation, et une valeur nominale de 300 V, 75 °C pour le câblage de la borne de commande.



Les câblages de l'alimentation électrique doivent être connectés aux bornes R, S et T. Leur connexion aux bornes U, V et W provoque des dommages internes à l'onduleur. Le moteur doit être raccordé aux bornes U, V et W. L'arrangement de l'ordre de phase n'est pas nécessaire.

| Inverter Capacity [kW] | | Terminal Screw Size | Screw Torque ¹ | | Wire ² | | | |
|------------------------|------|---------------------|---------------------------|-------------|-------------------|-------|--------------|-------|
| | | | Kgf·cm | lb-in | mm ² | | AWG or kcmil | |
| | | | | | R,S,T | U,V,W | R,S,T | U,V,W |
| 200V Class | 5.5 | M4 | 7.1 ~ 12.2 | 6.2~10.6 | 5.5 | 5.5 | 10 | 10 |
| | 7.5 | M5 | 24.5 ~ 31.8 | 21.2~27.6 | 8 | 8 | 8 | 8 |
| | 11 | M5 | | | 14 | 14 | 6 | 6 |
| | 15 | M6 | 30.6 ~ 38.2 | 26.6~33.2 | 22 | 22 | 4 | 4 |
| | 18.5 | M6 | | | 38 | 38 | 2 | 2 |
| | 22 | M8 | 61.2 ~ 91.8 | 53.1~79.7 | 38 | 38 | 2 | 2 |
| | 30 | M8 | | | 60 | 60 | 1/0 | 1/0 |
| 400V Class | 5.5 | M4 | 7.1 ~ 12.2 | 6.2~10.6 | 3.5 | 3.5 | 12 | 12 |
| | 7.5 | M4 | | | 3.5 | 3.5 | 12 | 12 |
| | 11 | M4 | | | 5.5 | 5.5 | 10 | 10 |
| | 15 | M6 | 30.6~38.2 | 26.6~33.2 | 8 | 8 | 8 | 8 |
| | 18.5 | M6 | | | 14 | 14 | 6 | 6 |
| | 22 | M8 | 61.2~91.8 | 53.1~79.7 | 22 | 22 | 4 | 4 |
| | 30 | M8 | | | 22 | 22 | 4 | 4 |
| | 37 | M8 | 67.3~87.5 | 58.4~75.9 | 38 | 38 | 2 | 2 |
| | 45 | M8 | | | 38 | 38 | 2 | 2 |
| | 55 | M8 | | | 38 | 38 | 2 | 2 |
| | 75 | M10 | 89.7~122.0 | 77.9~105.9 | 60 | 60 | 1/0 | 1/0 |
| | 90 | M10 | | | 60 | 60 | 1/0 | 1/0 |
| | 110 | M12 | 182.4~215.0 | 158.3~186.6 | 100 | 100 | 4/0 | 4/0 |
| | 132 | M12 | | | 100 | 100 | 4/0 | 4/0 |
| | 160 | M12 | | | 150 | 150 | 300 | 300 |
| | 220 | M12 | 182.4~215.0 | 158.3~186.6 | 200 | 200 | 400 | 400 |
| | 280 | M12 | | | 250 | 250 | 500 | 500 |
| | 315 | M12 | | | 325 | 325 | 700 | 700 |
| | 375 | M12 | | | 2x200 | 2x200 | 2x400 | 2x400 |
| | 450 | M12 | | | 2x250 | 2x250 | 2x500 | 2x500 |

For 7.5~11kW 240V type inverters, Input and motor output terminal blocks are intended only for use with ring type connectors.

6. BASIC WIRING (Refer to 3.2 Wiring)



|  CAUTION | |
|--|---|
|  | ■ Risk of Electric Shock <ul style="list-style-type: none">• Read the manual carefully and follow the safety Instructions before installing or using the device.• Before opening the cover, disconnect all power sources and wait for at least 10 minutes. |
| | ■ Risque de blessure ou de choc électrique <ul style="list-style-type: none">• Avant d'installer ou d'utiliser l'appareil, vous devez lire attentivement le manuel et suivre les consignes de sécurité.• Avant d'ouvrir le capot, débrancher toutes les sources d'alimentation et attendre au moins 10 minutes. |

7. Maximum Temperature

- SV008IP5A~SV900IP5A : Maximum Ambient Temperature – 40°C.
- SV1100IP5A~SV4500IP5A : Maximum Surrounding Air Temperature – 40°C.
- SV150IP5A~SV300IP5A - L : Maximum Ambient Temperature – 40°C.
- SV370IP5A~SV900IP5A - L : Maximum Ambient Temperature – 50°C.

UL mark



The UL mark applies to products in the United States and Canada. This mark indicates that UL has tested and evaluated the products and determined that the products satisfy the UL standards for product safety. If a product received UL certification, this means that all components inside the product had been certified for UL standards as well.

CE mark



The CE mark indicates that the products carrying this mark comply with European safety and environmental regulations. European standards include the Machinery Directive for machine manufacturers, the Low Voltage Directive for electronics manufacturers and the EMC guidelines for safe noise control.

Low Voltage Directive

We have confirmed that our products comply with the Low Voltage Directive (EN 61800-5-1).

EMC Directive

The Directive defines the requirements for immunity and emissions of electrical equipment used within the European Union. The EMC product standard (EN 61800-3) covers requirements stated for drives.

EAC mark



The EAC (EurAsian Conformity) mark is applied to the products before they are placed on the market of the Eurasian Customs Union member states.

It indicates the compliance of the products with the following technical regulations and requirements of the Eurasian Customs Union:

Technical Regulations of the Customs Union 004/2011 “On safety of low voltage equipment”
Technical Regulations of the Customs Union 020/2011 “On electromagnetic compatibility of technical products”

APPENDIX B- PERIPHERAL DEVICES

1. MCCB(Molded Case Circuit Breaker) and MC(Magnetic Contactor)

| Voltage | CAP. [kW] | MCCB | | | | ELCB | | MC | |
|---------------|--------------|----------|---------------|----------|---------------|----------|---------------|---------|---------------|
| | | Model | Rating (A) | Model | Rating (A) | Model | Rating (A) | Model | Rating (A) |
| 200V Class | 0.75 | UTE100N | 15 | ABS33c | 15 | EBS33c | 10 | MC-9b | 11 |
| | 1.5 | | 15 | | 15 | | 15 | MC-9b | 11 |
| | 2.2 | | 30 | | 30 | | 30 | MC-12b | 13 |
| | 3.7 | | 30 | | 30 | | 30 | MC-18b | 18 |
| | 5.5 | UTS150L | 50 | ABS53c | 50 | EBS53c | 50 | MC-32a | 32 |
| | 7.5 | | 60 | ABS63c | 60 | EBS63c | 60 | MC-40a | 40 |
| | 11 | | 100 | ABS103c | 100 | EBS103c | 100 | MC-50a | 55 |
| | 15 | | 125 | | 125 | EBS203c | 125 | MC-65a | 65 |
| | 18.5 | | 150 | ABS203c | 150 | | 150 | MC-100a | 105 |
| | 22 | UTS250L | 175 | | 175 | | 175 | MC-130a | 130 |
| | 30 | | 225 | | 225 | | 225 | MC-150a | 150 |
| 400V Class | 0.75 | UTE100N | 15 | ABS33c | 15 | EBS33c | 15 | MC-9b | 9 |
| | 1.5 | | 15 | | 15 | | 15 | | 9 |
| | 2.2 | | 15 | | 15 | | 15 | | 9 |
| | 3.7 | | 15 | | 15 | | 15 | MC-12b | 12 |
| | 5.5 | | 30 | | 30 | | 30 | MC-22b | 22 |
| | 7.5 | | 30 | | 30 | | 30 | | 22 |
| | 11 | UTS150L | 50 | ABS53c | 50 | EBS53c | 50 | MC-40a | 40 |
| | 15 | | 60 | ABS63c | 60 | EBS63c | 60 | MC-50a | 50 |
| | 18.5 | | 60 | | 60 | EBS103c | 60 | | 50 |
| | 22 | | 100 | ABS103c | 100 | | 100 | MC-65a | 65 |
| | 30 | | 125 | ABS203c | 125 | EBS203c | 125 | MC-75a | 75 |
| | 37 | | 150 | | 150 | | 150 | MC-100a | 105 |
| | 45 | UTS250L | 200 | | 200 | | 200 | MC-130a | 130 |
| | 55 | | 250 | | 250 | | 250 | MC-150a | 150 |
| | 75 | UTS400L | 300 | ABS403c | 300 | EBS403c | 300 | MC-185a | 185 |
| | 90 | | 350 | | 350 | | 350 | MC-225a | 225 |
| | 110 | | 400 | | 400 | | 400 | MC-330a | 330 |
| | 132 | UTS600L | 500 | ABS603c | 500 | EBS603c | 500 | | 400 |
| | 160 | | 600 | | 630 | | 630 | MC-400a | 400 |
| | 220 | UTS800L | 800 | ABS803c | 800 | EBS803c | 800 | MC-630a | 630 |
| | 280 | UTS1200L | 1000 | ABS1003b | 1000 | EBS1003c | 1000 | | 630 |
| | 315 | | 1200 | ABS1203b | 1200 | EBS1203c | 1200 | MC-800a | 800 |
| | 375 | 1400A | 1400 | 1400A | 1400 | 1400A | 1400 | 900A | 900 |
| | 450 | 1600A | 1600 | 1600A | 1600 | 1600A | 1600 | 1000A | 1000 |

2. AC Input Fuse and AC / DC Reactor

| Voltage | Motor [kW] | Inverter Model | AC Input Fuse [A] | AC Reactor | | DC Reactor | |
|---------------|---------------|-------------------|----------------------|------------|-----|------------|------|
| | | | | [mH] | [A] | [mH] | [A] |
| 200V Class | 0.75 | SV008iP5A-2 | 10 | 2.13 | 5.7 | 4 | 8.7 |
| | 1.5 | SV015iP5A-2 | 15 | 1.2 | 10 | 3 | 13 |
| | 2.2 | SV022iP5A-2 | 20 | 0.88 | 14 | 2 | 19 |
| | 3.7 | SV037iP5A-2 | 30 | 0.56 | 20 | 1.5 | 27 |
| | 5.5 | SV055iP5A-2 | 40 | 0.39 | 30 | 1.37 | 29 |
| | 7.5 | SV075iP5A-2 | 60 | 0.28 | 40 | 1.05 | 38 |
| | 11 | SV110iP5A-2 | 80 | 0.20 | 59 | 0.74 | 56 |
| | 15 | SV150iP5A-2 | 100 | 0.15 | 75 | 0.57 | 71 |
| | 18.5 | SV185iP5A-2 | 125 | 0.12 | 96 | 0.49 | 91 |
| | 22 | SV220iP5A-2 | 150 | 0.10 | 112 | 0.42 | 107 |
| | 30 | SV300iP5A-2 | 200 | 0.07 | 160 | 0.34 | 152 |
| 400V Class | 0.75 | SV008iP5A-4 | 10 | 8.63 | 2.8 | 16 | 4.5 |
| | 1.5 | SV015iP5A-4 | 10 | 4.81 | 4.8 | 12 | 7 |
| | 2.2 | SV022iP5A-4 | 10 | 3.23 | 7.5 | 8 | 9 |
| | 3.7 | SV037iP5A-4 | 15 | 2.34 | 10 | 6.4 | 12 |
| | 5.5 | SV055iP5A-4 | 20 | 1.22 | 15 | 5.34 | 14 |
| | 7.5 | SV075iP5A-4 | 30 | 1.14 | 20 | 4.04 | 19 |
| | 11 | SV110iP5A-4 | 40 | 0.81 | 30 | 2.76 | 29 |
| | 15 | SV150iP5A-4 | 60 | 0.61 | 38 | 2.18 | 36 |
| | 18.5 | SV185iP5A-4 | 70 | 0.45 | 50 | 1.79 | 48 |
| | 22 | SV220iP5A-4 | 80 | 0.39 | 58 | 1.54 | 55 |
| | 30 | SV300iP5A-4 | 100 | 0.287 | 80 | 1.191 | 76 |
| | 37 | SV370iP5A-4 | 125 | 0.232 | 98 | 0.975 | 93 |
| | 45 | SV450iP5A-4 | 150 | 0.195 | 118 | 0.886 | 112 |
| | 55 | SV550iP5A-4 | 175 | 0.157 | 142 | 0.753 | 135 |
| | 75 | SV750iP5A-4 | 250 | 0.122 | 196 | 0.436 | 187 |
| | 90 | SV900iP5A-4 | 300 | 0.096 | 237 | 0.352 | 225 |
| | 110 | SV1100iP5A-4 | 350 | 0.081 | 289 | Built-in | |
| | 132 | SV1320iP5A-4 | 400 | 0.069 | 341 | | |
| | 160 | SV1600iP5A-4 | 450 | 0.057 | 420 | | |
| | 220 | SV2200iP5A-4 | 700 | 0.042 | 558 | | |
| | 280 | SV2800iP5A-4 | 800 | 0.029 | 799 | | |
| | 315 | SV3150iP5A-4 | 900 | 0.029 | 799 | 0.090 | 836 |
| | 375 | SV3750iP5A-4 | 1000 | 0.024 | 952 | 0.076 | 996 |
| | 450 | SV4500iP5A-4 | 1200 | 0.024 | 952 | 0.064 | 1195 |

* Use circuit breaker 1.5 ~ 2 time to output rated current of inverter

APPENDIX C- RELATED PARAMETERS

| Use | Related parameter codes |
|--|---|
| Adjusting Accel/Decel time and pattern | DRV-01 [Acceleration Time], DRV-02 [Deceleration Time], FU1-02 [Acceleration Pattern], FU1-03 [Deceleration Pattern] |
| Reverse rotation prevention | FU1-01 [Run Prevention (Forward/Reverse Prevention)] |
| Accel/Decel at continuous rating range | FU1-02 [Acceleration Pattern], FU1-03 [Deceleration Pattern] |
| Adjusting braking operation | FU1-20 [Start Mode], FU1-21~22 [DC Injection Braking Time and Value at Starting], FU1-23 [Stop Mode], FU1-24~27 [DC Injection Braking On-delay Time, Frequency, Time and Value] |
| Operations at freq. over 60 Hz | FU1-30 [Max. Frequency], FU1-35 [High Limit Frequency], I/O-05 [V1 Input Maximum Voltage], I/O-10 [Frequency Corresponding to I Input Max. Current], I/O-16 [Frequency Corresponding to Pulse Input Max. Freq.] |
| Selecting an appropriate output characteristics for the load | FU1-30 [Max. Frequency], FU1-31 [Basic Frequency] |
| Adjusting motor output torque | FU1-32 [Starting Frequency], FU1-71 [Stall Prevention Level], FU2-67~69 [Torque Boost], FU2-40 [Motor Capacity Selection] |
| Output frequency limit | FU1-33~35 [Frequency Limit selection, High/Low Limit Freq.], I/O-01~16 [Analog Frequency Setting] |
| Motor overheat protection | FU1-60~62 [Electronic Thermal Selection and Level], FU2-40 [Motor Capacity Selection], I/O-97, 98 [Overheat trip selection and Motor overheat trip temperature] |
| Multi-step operation | I/O-20~27 [Programmable Digital Input Terminal Define], DRV-00 [Command Frequency], 05~07, I/O-31~42 [Multi-step Frequency], FU1-34~35 [High/Low Limit Freq.] |
| Jog operation | I/O-30 [Jog Frequency Setting] |
| Frequency jump operation | FU2-10 [Frequency Jump Selection], FU2-11~16 [Jump Frequency High/Low Limit] |
| Electronic brake operation Timing | I/O-74,75 [Frequency Detection Level and Bandwidth], I/O-76~79 [Programmable Digital Output Terminal Define] |
| Display of rotating speed etc. | DRV-09 [Motor Speed (Rpm)], FU2-47 [Gain for Motor Speed Display] |
| Function change prevention | FU2-94 [Parameter Lock] |
| Energy saving | FU1-51~52 [Energy Save] |
| Auto-restart operation after alarm stop | FU2-20 [Power ON Start Selection], FU2-21 [Restart after Fault Reset] |
| 2 nd motor operation | APP-20~29 [2 nd Function] |
| PID feedback operation | APP-02~25 [PID Operation] |
| Adjusting frequency reference and output | I/O-01~16 [Analog Frequency Setting] |
| Switchover operation between Commercial Line and Inverter | I/O-20~27 [Programmable Digital Input Terminal Define], I/O-76~79 [Programmable Digital Output Terminal Define] |
| Frequency Meter Calibration | I/O-70~73 [S0/S1 Analog Output] |
| Operation via Communication with a PC | I/O-90 [Inverter Number], I/O-91 [Baud Rate Selection], I/O-92 [Operation method at loss of freq. reference], I/O-93 [Waiting time after loss of freq. reference] |

EC DECLARATION OF CONFORMITY

We, the undersigned,

Representative: **LSIS Co., Ltd.**
Address: **LS Tower, 127, LS-ro, Dongan-gu,
Anyang-si, Gyeonggi-do,
Korea**

Manufacturer: **LSIS Co., Ltd.**
Address: **56, Samsung 4-gil, Mokchon-Eup,
Chonan-si, Chungnam,
Korea**

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

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

Model Name: **SV-IP5A series**

Trade Mark: **LSIS Co., Ltd.**

Conforms with the essential requirements of the directives:

2014/35/EU Directive of the European Parliament and of the Council on the harmonisation of the laws of the Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits

2014/30/EU Directive of the European Parliament and of the Council on the harmonisation of the laws of the Member States relating to electromagnetic compatibility

Based on the following specifications applied:

**EN 61800-3:2004/A1:2012
EN 61800-5-1:2007**

and therefore complies with the essential requirements and provisions of the 2014/35/CE and 2014/30/CE Directives.

Place: **Chonan, Chungnam,
Korea**

무엇 상 회

2016.1.13

(Signature / Date)

Mr. Sang Chun Moon / General Manager
(Full name / Position)

EMI / RFI POWER LINE FILTERS

LS inverters, iP5A series

RFI FILTERS

THE LS RANGE OF POWER LINE FILTERS FF (Footprint) - FE (Standard) SERIES, HAVE BEEN SPECIFICALLY DESIGNED WITH HIGH FREQUENCY LS INVERTERS. THE USE OF LS FILTERS, WITH THE INSTALLATION ADVICE OVERLEAF HELP TO ENSURE TROUBLE FREE USE ALONG SIDE SENSITIVE DEVICES AND COMPLIANCE TO CONDUCTED EMISSION AND IMMUNITY STANDARDS TO EN 50081 -> EN61000-6-3:02 and EN61000-6-1:02

CAUTION

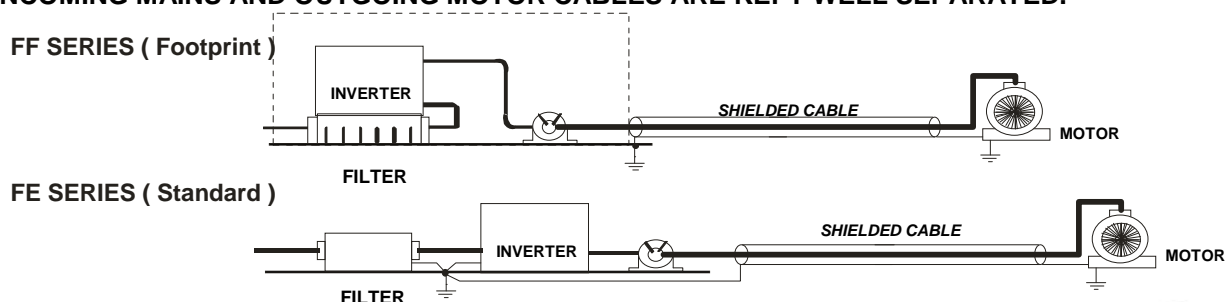
IN CASE OF A LEAKAGE CURRENT PROTECTIVE DEVICES IS USED ON POWER SUPPLY, IT MAY BE FAULT AT POWER-ON OR OFF. IN AVOID THIS CASE, THE SENSE CURRENT OF PROTECTIVE DEVICE SHOULD BE LARGER THAN VALUE OF LEAKAGE CURRENT AT WORST

RECOMMENDED INSTALLATION INSTRUCTIONS

To conform to the EMC directive, it is necessary that these instructions be followed as closely as possible. Follow the usual safety procedures when working with electrical equipment. All electrical connections to the filter, inverter and motor must be made by a qualified electrical technician.

- 1-) Check the filter rating label to ensure that the current, voltage rating and part number are correct.
- 2-) For best results the filter should be fitted as closely as possible to the incoming mains supply of the wiring enclosure, usually directly after the enclosures circuit breaker or supply switch.
- 3-) The back panel of the wiring cabinet of board should be prepared for the mounting dimensions of the filter. Care should be taken to remove any paint etc... from the mounting holes and face area of the panel to ensure the best possible earthing of the filter.
- 4-) Mount the filter securely.
- 5-) Connect the mains supply to the filter terminals marked LINE, connect any earth cables to the earth stud provided. Connect the filter terminals marked LOAD to the mains input of the inverter using short lengths of appropriate gauge cable.
- 6-) Connect the motor and fit the ferrite core (output chokes) as close to the inverter as possible. Armoured or screened cable should be used with the 3 phase conductors only threaded twice through the center of the ferrite core. The earth conductor should be securely earthed at both inverter and motor ends. The screen should be connected to the enclosure body via and earthed cable gland.
- 7-) Connect any control cables as instructed in the inverter instructions manual.

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



EMI/RFI Power Line Filters

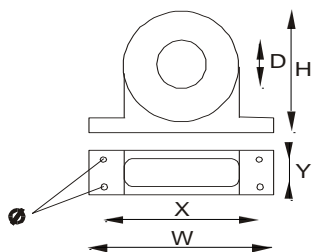
| iP5A series | | Footprint Filters | | | | | | | | |
|-------------|--------|-------------------|---------|---------|-----------------|---------------------|-----------------|---------|-------|------------------|
| INVERTER | POWER | CODE | CURRENT | VOLTAGE | LEAKAGE CURRENT | DIMENSIONS L W H | MOUNTING Y X | WEIGHT | MOUNT | OUTPUT CHOKES |
| THREE PHASE | | | | | NOM. MAX. | | | | | |
| SV008iP5A-2 | 0.75kW | FFP5-T012-3 | 12A | 250VAC | 0.3mA 18mA | 329x149.5x50 | 315x120 | 1.6 Kg. | M5 | FS – 1 |
| SV015iP5A-2 | 1.5kW | | | | | | | | | |
| SV022iP5A-2 | 2.2kW | FFP5-T020-3 | 20A | 250VAC | 0.3mA 18mA | 329x149.5x50 | 315x120 | 1.8 Kg. | M5 | FS – 2 |
| SV037iP5A-2 | 3.7kW | | | | | | | | | |
| SV055iP5A-2 | 5.5kW | FFP5-T040-3 | 40A | 250VAC | 0.3mA 18mA | 329x149.5x50 | 315x120 | 2.2 Kg. | M5 | FS – 2 |
| SV075iP5A-2 | 7.5kW | FFP5-T050-3 | 50A | 250VAC | 0.3mA 18mA | 329x199.5x60 | 315x160 | 2.5 Kg. | M5 | FS – 2 |
| SV110iP5A-2 | 11kW | | | | | | | | | |
| SV150iP5A-2 | 15kW | | | | | | | | | |
| SV185iP5A-2 | 18kW | | | | | | | | | |
| SV220iP5A-2 | 22kW | | | | | | | | | |
| SV300iP5A-2 | 30kW | | | | | | | | | |
| SV008iP5A-4 | 0.75kW | FFP5-T006-3 | 6A | 480VAC | 0.3mA 18mA | 329x149.5x50 | 315x120 | 1.6 Kg. | M5 | FS – 1 |
| SV015iP5A-4 | 1.5kW | | | | | | | | | |
| SV022iP5A-4 | 2.2kW | FFP5-T012-3 | 12A | 480VAC | 0.3mA 18mA | 329x149.5x50 | 315x120 | 1.6 Kg. | M5 | FS – 1 |
| SV037iP5A-4 | 3.7kW | | | | | | | | | |
| SV055iP5A-4 | 5.5kW | FFP5-T030-3 | 30A | 480VAC | 0.5mA 27mA | 329x149.5x50 | 315x120 | 2 Kg. | M5 | FS – 2 |
| SV075iP5A-4 | 7.5kW | FFP5-T031-3 | 31A | 480VAC | 0.5mA 27mA | 329x199.5x60 | 315x160 | 2.5 Kg. | M5 | FS – 2 |
| SV110iP5A-4 | 11kW | FFP5-T050-3 | 50A | 480VAC | 0.5mA 27mA | 329x199.5x60 | 315x160 | 2.5 Kg. | M5 | FS – 2 |
| SV150iP5A-4 | 15kW | FFP5-T060-3 | 60A | 480VAC | 0.5mA 27mA | 466x258x65 | 440.5x181 | 2.8 Kg. | M5 | FS – 2 |
| SV185iP5A-4 | 18kW | | | | | | | | | |
| SV220iP5A-4 | 22kW | FFP5-T070-3 | 70A | 480VAC | 0.5mA 27mA | 541x312x65 | 515.5x235.3 | 6.1 Kg. | M8 | FS – 2 |
| SV300iP5A-4 | 30kW | | | | | | | | | |

| iP5A series | | Standard Filters | | | | | | | | |
|-------------|--------|------------------|---------|---------|-----------------|---------------------|-----------------|----------|-------|------------------|
| INVERTER | POWER | CODE | CURRENT | VOLTAGE | LEAKAGE CURRENT | DIMENSIONS L W H | MOUNTING Y X | WEIGHT | MOUNT | OUTPUT CHOKES |
| THREE PHASE | | | | | NOM. MAX. | | | | | |
| SV008iP5A-2 | 0.75kW | FE-T012-3 | 12A | 250VAC | 0.5mA 27mA | 250x110x60 | 238x76 | 1.6 Kg. | --- | FS – 1 |
| SV015iP5A-2 | 1.5kW | | | | | | | | | |
| SV022iP5A-2 | 2.2kW | FE-T020-3 | 20A | 250VAC | 0.5mA 27mA | 270x140x60 | 258x106 | 2.4 Kg. | --- | FS – 2 |
| SV037iP5A-2 | 3.7kW | | | | | | | | | |
| SV055iP5A-2 | 5.5kW | FE-T050-3 | 50A | 250VAC | 0.5mA 27mA | 270x140x90 | 258x106 | 3.2 Kg. | --- | FS – 2 |
| SV075iP5A-2 | 7.5kW | | | | | | | | | |
| SV110iP5A-2 | 11kW | FE-T100-3 | 100A | 250VAC | 1.3mA 150mA | 420x200x130 | 408x166 | 13.8 Kg. | --- | FS – 3 |
| SV150iP5A-2 | 15kW | | | | | | | | | |
| SV185iP5A-2 | 18kW | FEP-T150 | 150A | 480VAC | 1.3mA 150mA | 332x170x120 | 115x155 | 8 Kg. | --- | FS – 3 |
| SV220iP5A-2 | 22kW | | | | | | | | | |
| SV300iP5A-2 | 30kW | FEP-T180 | 180A | 480VAC | 1.3mA 150mA | 332x170x120 | 115x155 | 8.4 Kg. | --- | FS – 3 |
| SV008iP5A-4 | 0.75kW | FE-T006-3 | 6A | 480VAC | 0.5mA 27mA | 250x110x60 | 238x76 | 1.6 Kg. | --- | FS – 2 |
| SV015iP5A-4 | 1.5kW | | | | | | | | | |

| iP5A series | | Standard Filters | | | | | | | | |
|--------------|-------|------------------|---------|---------|-----------------|---------------------|-----------------|----------|-------|---------------|
| INVERTER | POWER | CODE | CURRENT | VOLTAGE | LEAKAGE CURRENT | DIMENSIONS L W H | MOUNTING Y X | WEIGHT | MOUNT | OUTPUT CHOKES |
| THREE PHASE | | | | | NOM. MAX. | | | | | |
| SV022iP5A-4 | 2.2kW | FE-T012-3 | 12A | 480VAC | 0.5mA 27mA | 250x110x60 | 238x76 | 1.6 Kg. | --- | FS - 2 |
| SV037iP5A-4 | 3.7kW | | | | | | | | | |
| SV055iP5A-4 | 5.5kW | FE-T030-3 | 30A | 480VAC | 0.5mA 27mA | 270x140x60 | 258x106 | 2.4 Kg. | --- | FS - 2 |
| SV075iP5A-4 | 7.5kW | | | | | | | | | |
| SV110iP5A-4 | 11kW | FE-T050-3 | 50A | 480VAC | 0.5mA 27mA | 270x140x90 | 258x106 | 3.2 Kg. | --- | FS - 2 |
| SV150iP5A-4 | 15kW | | | | | | | | | |
| SV185iP5A-4 | 18kW | FE-T070-3 | 70A | 480VAC | 0.5mA 27mA | 350x180x90 | 338x146 | 7.5 Kg. | --- | FS - 3 |
| SV220iP5A-4 | 22kW | | | | | | | | | |
| SV300iP5A-4 | 30kW | FE-T100-3 | 100A | 480VAC | 1.3mA 150mA | 420x200x130 | 408x166 | 13.8 Kg. | --- | FS - 3 |
| SV370iP5A-4 | 37kW | | | | | | | | | |
| SV450iP5A-4 | 45kW | FEP-T150 | 150A | 480VAC | 1.3mA 150mA | 332x170x120 | 115x155 | 8 Kg. | --- | FS - 3 |
| SV550iP5A-4 | 55kW | | | | | | | | | |
| SV750iP5A-4 | 75kW | FEP-T180 | 180A | 480VAC | 1.3mA 150mA | 332x170x120 | 115x155 | 8.4 Kg. | --- | FS - 3 |
| SV900iP5A-4 | 90kW | FEP-T250 | 250A | 480VAC | 1.3mA 150mA | 392x190x116 | 240x165 | 9.1 Kg. | --- | FS - 4 |
| SV1100iP5A-4 | 110kW | FEP-T400 | 400A | 480VAC | 1.3mA 150mA | 392x260x116 | 240x235 | 10.3 Kg. | --- | FS - 4 |
| SV1320iP5A-4 | 132kW | | | | | | | | | |
| SV1600iP5A-4 | 160kW | FEP-T600 | 600A | 480VAC | 1.3mA 150mA | 392x260x116 | 240x235 | 11 Kg. | --- | FS - 4 |
| SV2200iP5A-4 | 220kW | | | | | | | | | |
| SV2800iP5A-4 | 280kW | FEP-T1000 | 1000A | 480VAC | 1.3mA 150mA | 460x280x166 | 290x255 | 18 Kg. | --- | FS - 4 |
| SV3150iP5A-4 | 315kW | | | | | | | | | |
| SV3750iP5A-4 | 375kW | | | | | | | | | |
| SV4500iP5A-4 | 450kW | FEP-T1600 | 1600A | 480VAC | 1.3mA 150mA | 592x300x166 | 340x275 | 27 Kg. | --- | FS - 4 |

| | | | | | |
|--------------------|----------|-----------|-----------|----------------|-------|
| SV008~037 iP5A-2/4 | EN 55011 | CLASS B | GROUP 1 | IEC/EN 61800-3 | C1 |
| SV055~075 iP5A-2/4 | EN 55011 | CLASS A/B | GROUP 1 | IEC/EN 61800-3 | C1/C2 |
| SV110~220 iP5A-2/4 | EN 55011 | CLASS A | GROUP 1/2 | IEC/EN 61800-3 | C2/C3 |
| SV300~4500 iP5A-24 | EN 55011 | CLASS A | GROUP 2 | IEC/EN 61800-3 | C3 |

FS SERIES (output chokes)

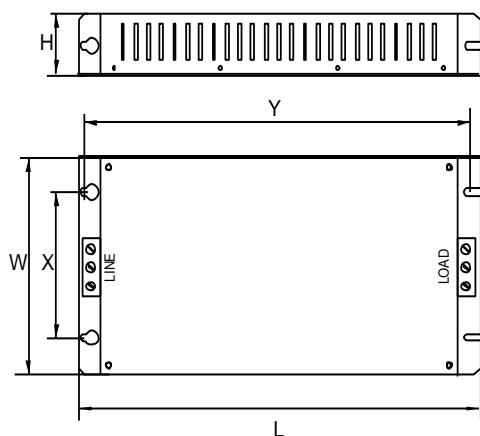


| CODE | D | W | H | X | Ø |
|--------|------|-----|-----|----------|---|
| FS - 1 | 21 | 85 | 46 | 70 | 5 |
| FS - 2 | 28.5 | 105 | 62 | 90 | 5 |
| FS - 3 | 48 | 150 | 110 | 125 x 30 | 5 |
| FS - 4 | 58 | 200 | 170 | 180 x 45 | 5 |

DIMENSIONS

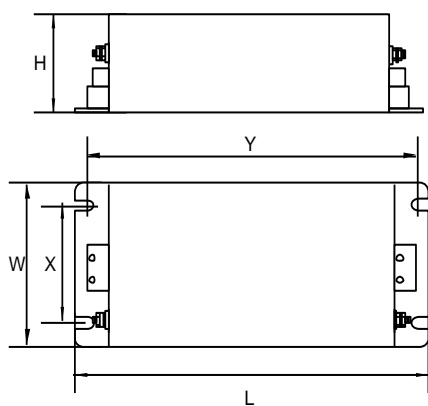
FF SERIES (Footprint)

FFP5-T006-3 ~ FFP5-T070-3

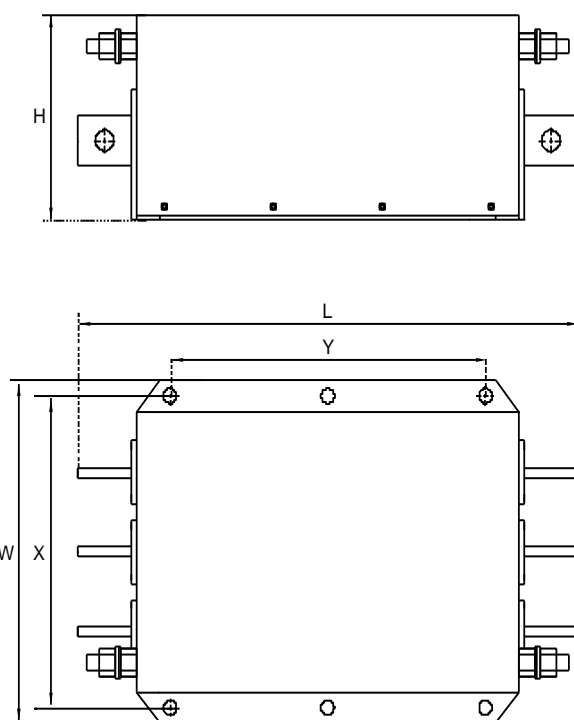


FE SERIES (Standard)

FE-T006-2 ~ FE-T100-2



FEP-T150 ~ FEP-T1600



LSiS VMC
vector motor control

Vector Motor Control Ibérica S.L.
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08130 Santa Perpètua de Mogoda
(BARCELONA) ESPAÑA
Tel. (+34) 935 748 206
Fax (+34) 935 748 248
info@vmc.es
www.vmc.es

Warrant

| | | | | |
|---------------------------------------|----------------|--|---|--|
| Maker | LSIS Co., Ltd. | | Installation (Start-up) Date | |
| Model No. | SV-iP5A | | Warranty Period | |
| Customer Information | Name | | | |
| | Address | | | |
| | Tel. | | | |
| Sales Office (Distributor) | Name | | | |
| | Address | | | |
| | Tel. | | | |

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, even if the guarantee term has not expired.

- Damage was caused by misuse, negligence or accident.
- Damage was caused by abnormal voltage and peripheral devices' malfunction (failure).
- Damage was caused by improper repair or altering by other than LS authorized distributor or service center.
- Damage was caused by an earthquake, fire, flooding, lightning, or other natural calamities.
- When LS nameplate is not attached.
- When the warranty period has expired.

Revision History

Revision History

| No. | Date | Edition | Changes |
|-----|----------------|--------------------------|---|
| 1 | October, 2004 | First Release | - |
| 2 | June, 2005 | 2 nd Edition | CI changed |
| 3 | June, 2006 | 3 rd Edition | Revised for new kW(HP) ratings |
| 4 | November, 2006 | 4 th Edition | S/W Version up (V0.4) |
| 5 | December, 2006 | 5 th Edition | Contents added and revised |
| 6 | June, 2008 | 6 th Edition | Contents added and revised |
| 7 | April, 2009 | 7 th Edition | New Controller contents added |
| 8 | Dec, 2010 | 8 th Edition | EMI / RFI power line filters changed |
| 9 | Dec 2011 | 9 th Edition | UL Making Changed |
| 10 | Dec 2014 | 10 th Edition | SW Version Up 2.3 & error revised . |
| 11 | Aug 2015 | 11 th Edition | Single-Phase input application and UL/CE/EAC Mark added. |
| 12 | JAN 2016 | 12 th Edition | CE Doc revised |