

# iMaster-C1 INSTRUCTION MANUAL

### Precautions

Keep this manual close to the handler responsible for the operation and maintenance inspection. Be sure to familiarize yourself with the handling manual before performing an inspection, and use it correctly according to the instructions of the instrument's knowledge, safety information, precautions, operation, and handling methods. Always observe the various specifications in the handbook. Also, perform the correct inspection and repair to prevent the failure.

### Warranty for the unit

The warranty period for the delivery product is one year after delivery to the designated place of the order.

In the event of a failure under normal use within the product specifications in accordance with this manual, the defect shall be replaced or repaired free of charge.

However, the warranty will be void if the fault is due to:

- (1) In case of unfair treatment and use by the consumer;
- (2) If the cause of failure is due to a reason other than the product supplied;
- (3) In case of modifications or repairs other than suppliers;
- (4) In case the supplier is not responsible for other natural disasters or disasters;

In addition, the warranty is for the inverter only, any damage caused to other equipment by malfunction of the inverter is not covered by the warranty.

### Repair cost

Any repairs after the warranty period (1 year) will be paid. In addition, even during the warranty period, repairs for reasons other than the above warranty coverage and investigation into the cause of failure will be treated as a charge.

Please contact your place of purchase or service center – please refer to the list of back cover.

### Questions on Unit

If you have any questions regarding damage to the unit, unknown parts or for general inquiries, please contact service center with the following information.

- (1) Date of purchase
- (2) Company name of purchase
- (3) Manufacturing number (MFG. No.)
- (4) Failure details (as detailed as possible)

## SAFETY

- FOR THE SAFE OPERATION OF THE IMASTER-C1 SERIES VFD, READ THIS MANUAL AND ALL OF THE WARNING SIGNS ATTACHED TO THE INVERTER CAREFULLY BEFORE INSTALLING AND OPERATING IT, AND FOLLOW THE INSTRUCTION EXACTLY. KEEP THIS MANUAL HANDY FOR YOUR QUICK REFERENCE.

## SYMBOLS AND DEFINITION

- A SAFETY INSTRUCTION (MESSAGE) IS GIVEN WITH A HAZARD ALERT SYMBOL AND/OR A WARNING or CAUTION.
- EACH SIGNAL HAS THE FOLLOWING MEANING THROUGHOUT THIS MANUAL



### HAZARDOUS HIGH VOLTAGE.

IT USED TO CALL YOUR ATTENTION TO ITEMS OR OPERATIONS THAT COULD BE DANGEROUS TO YOU OR OTHER PERSONS OPERATING THIS EQUIPMENT.  
READ THESE MESSAGES AND FOLLOW THESE INSTRUCTIONS CAREFULLY.



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### WARNING

INDICATES A POTENTIALLY HAZARDOUS SITUATION WHICH, IF NOT AVOIDED, CAN RESULT IN SERIOUS INJURY OR DEATH.



### CAUTION

INDICATES A POTENTIALLY HAZARDOUS SITUATION WHICH, IF NOT AVOIDED, CAN RESULT IN MINOR TO MODERATE INJURY, OR SERIOUS DAMAGE OF PRODUCT.  
THE MATTERS DESCRIBED UNDER **CAUTION** MAY, IF NOT AVOIDED, LEAD TO SERIOUS RESULTS DEPENDING ON THE SITUATION. IMPORTANT MATTERS ARE DESCRIBED IN **CAUTION** (AS WELL AS WARNING), SO BE SURE TO OBSERVE THEM.

### NOTE

INDICATES AN AREA OR SUBJECT OF SPECIAL MERIT, EMPHASIZING EITHER THE PRODUCT'S CAPABILITIES OR COMMON ERRORS IN OPERATION OR MAINTENANCE.



### HAZARDOUS HIGH VOLTAGE

- MOTOR CONTROL EQUIPMENT AND ELECTRONIC CONTROLLERS ARE CONNECTED TO THE HAZARDOUS LINE VOLTAGE.
- WHEN SERVICING VFD AND ELECTRONIC CONTROLLERS, THERE MIGHT BE EXPOSED COMPONENTS OR ABOVE LINE POTENTIAL.
- EXTREME CARE SHOULD BE TAKEN TO PRODUCT AGAINST SHOCK. STAND ON AN INSULATING PAD AND MAKE IT A HABIT TO USE ONLY ONE HAND WHEN CHECKING COMPONENTS.
- ALWAYS WORK WITH ANOTHER PERSON IN CASE AN EMERGENCY OCCURS.
- DISCONNECT POWER BEFORE CHECKING CONTROLLER OR PERFORMING MAINTENANCE.
- BE SURE EQUIPMENT IS PROPERLY GROUNDED. WEAR SAFETY GLASSES WHENEVER WORKING ON AN ELECTRIC CONTROLLER OR ROTATING ELECTRICAL EQUIPMENT.

### PRECAUTION

- A SAFETY INSTRUCTION (MESSAGE) IS GIVEN WITH A HAZARD ALERT SYMBOL AND A WARNING or CAUTION.



**WARNING** THIS IS EQUIPMENT SHOULD BE INSTALLED, ADJUSTED AND SERVICED BY QUALIFIED ELECTRICAL MAINTENANCE PERSONAL FAMILIAR WITH THE CONSTRUCTION AND OPERATION OF THE EQUIPMENT AND THE HAZARDS INVOLVED. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULTS IN BODILY INJURY.



**WARNING** THE USER IS RESPONSIBLE FOR ENSURING THAT ALL DRIVEN MACHINERY, DRIVE TRAIN MECHANISM NOT SUPPLIED BY HYUNDAI AND PROCESS LINE MATERIAL ARE CAPABLE OF SAFE OPERATION AT AN APPLIED FREQUENCY OF 150% OF THE MAXIMUM SELECTED FREQUENCY RANGE TO THE AC MOTOR. FAILURE TO DO SO CAN RESULT IN DESTRUCTION OF EQUIPMENT AND INJURY TO PERSONNEL SHOULD A SINGLE POINT FAILURE OCCUR.



**WARNING** FOR PROTECTION, INSTALL AN EARTH LEAKAGE BREAKER WITH A HIGH FREQUENCY CIRCUIT CAPABLE OF LARGE CURRENTS TO AVOID AN UNNECESSARY OPERATION. THE GROUND FAULT PROTECTION CIRCUIT IS NOT DESIGNED TO PROTECT PERSONAL INJURY.



**CAUTION** HEAVY OBJECT. TO AVOID MUSCLE STRAIN OR BACK INJURY, USE LIFTING AIDS AND PROPER LIFTING TECHNIQUES WHEN REMOVING OR REPLACING.



**CAUTION** THESE INSTRUCTIONS SHOULD BE READ AND CLEARLY UNDERSTOOD BEFORE WORKING ON IMASTER-C1 SERIES EQUIPMENT.



**CAUTION** PROPER GROUNDS, DISCONNECTING DEVICES AND OTHER SAFETY DEVICES AND THEIR LOCATION ARE THE RESPONSIBILITY OF THE USER AND ARE NOT PROVIDED BY HYUNDAI.



**CAUTION** BE SURE TO CONNECT A MOTOR THERMAL SWITCH OR OVERLOAD DEVICES TO THE IMASTER-C1 SERIES VFD TO ASSURE THAT INVERTER WILL SHUT DOWN IN THE EVENT OF AN OVERLOAD OR AN OVERHEATED MOTOR



**CAUTION** ROTATING SHAFTS AND ABOVE GROUND ELECTRICAL POTENTIALS CAN BE HAZARDOUS. THEREFORE, IT IS STRONGLY RECOMMENDED THAT ALL ELECTRICAL WORK CONFORM TO THE NATIONAL ELECTRICAL CODES AND LOCAL REGULATIONS. ONLY QUALIFIED PERSONNEL SHOULD PERFORM INSTALLATION, ALIGNMENT AND MAINTENANCE. FACTORY RECOMMENDED TEST PROCEDURES, INCLUDED IN THE INSTRUCTION MANUAL, SHOULD BE FOLLOWED. ALWAYS DISCONNECT ELECTRICAL POWER BEFORE WORKING ON THE UNIT.

**NOTE: POLLUTION DEGREE 2**

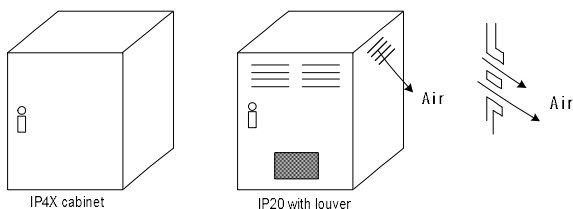
- THE VFD MUST BE USED IN THE ENVIRONMENT OF THE POLLUTION DEGREE 2.
- TYPICAL CONSTRUCTIONS THAT REDUCE THE POSSIBILITY OF CONDUCTIVE POLLUTION ARE,
  - 1) THE USE OF AN UNVENTILATED ENCLOSURE.
  - 2) THE USE OF A FILTERED VENTILATED ENCLOSURE WHEN THE VENTILATION IS FAN FORCED THAT IS, VENTILATION IS ACCOMPLISHED BY ONE OR MORE BLOWERS WITHIN THE ENCLOSURE THAT PROVIDE A POSITIVE INTAKE AND EXHAUST.

## CONFORMITY TO THE UNDERVOLTAGE DIRECTIVE (UVD)

THE PROTECTIVE ENCLOSURE MUST CONFORM TO THE UNDERVOLTAGE DIRECTIVE.  
THE VFD CAN CONFORM TO THE UVD BY MOUNTING INTO A CABINET OR BY ADDING  
COVERS AS FOLLOWS.

### CABINET AND COVER

THE VFD MUST BE INSTALLED INTO A CABINET WHICH HAS THE PROTECTION DEGREE  
OF TYPE IP2X.  
IN ADDITION THE TOP SURFACES OF CABINET ARE EASILY ACCESSIBLE SHALL MEET AT  
LEAST THE REQUIREMENTS OF THE PROTECTIVE TYPE IP4X, OR WHICH IS CONSTRUCTED  
TO PREVENT SMALL OBJECTS FROM ENTERING INVERTER.



**Fig 1. INVERTER CABINET**

### General Safety Information

A SAFETY INSTRUCTION (MESSAGE) INCLUDES A HAZARD ALERT SYMBOL AND A SIGNAL WORD, DANGER OR CAUTION. EACH SIGNAL WORD HAS THE FOLLOWING MEANING: THIS SYMBOL IS THE "SAFETY ALERT SYMBOL." IT OCCURS WITH EITHER OF TWO SIGNAL WORDS: DANGER OR CAUTION, AS DESCRIBED BELOW.



DANGER

: INDICATES A POTENTIALLY HAZARDOUS SITUATION WHICH, IF NOT AVOIDED, CAN RESULT IN SERIOUS INJURY OR DEATH.



CAUTION

: INDICATES A POTENTIALLY HAZARDOUS SITUATION WHICH, IF NOT AVOIDED, CAN RESULT IN MINOR TO MODERATE INJURY, OR SERIOUS DAMAGE TO THE PRODUCT.

THE SITUATION DESCRIBED IN THE CAUTION MAY, IF NOT AVOIDED, LEAD TO SERIOUS RESULTS. IMPORTANT SAFETY MEASURES ARE DESCRIBED IN CAUTION (AS WELL AS DANGER), SO BE SURE TO OBSERVE THEM.

#### CAUTION

- All illustrations in this handbook may be depicted with the cover or blockage removed to explain the details.  
When operating the machine, operate the machine in accordance with the handling manual, with the specified covers.
- No notification is given if the contents change due to product improvement or manual re-organization. The changes are indicated by the number in the revised manual.
- If you have lost or damaged the manual, please contact your dealer or your nearest dealer.
- Product damage caused by user arbitrary operation is not within the scope of maintenance and is not liable for it.

## General Safety Information

### 1. Installation

#### CAUTION

- Be sure to install the unit on flame resistant material such as metal.
- Be sure not to place anything highly flammable in the vicinity.
- Do not carry unit by top cover, always carry by supporting base of unit.
- Be sure not to let foreign matter enter VFD such as cut wire refuse, spatter from welding, iron refuse, wire, dust, etc.
- Be sure to install inverter in a place which can support the weight according to the specifications in the text. (Chapter 2. Installation)
- Be sure to install the unit on a perpendicular wall which is not subject to vibration
- Be sure not to install and operate a VFD which is damaged or has parts which are missing.
- Be sure to install the inverter in an area which is not exposed to direct sunlight and is well ventilated. Avoid environments which tend to be high in temperature, high in humidity or to have condensation, as well as places with dust, corrosive gas, explosive gas, highly flammable gas, grinding-fluid mist, salt damage, etc.

### 2. Wiring

#### CAUTION

- Be sure to ground the unit.  
Electrical wiring work should be carried out by qualified electricians.
- Do the wiring work by an electrician.  
There is a possibility of electric shock and fire.
- Check the input power OFF before wiring.  
There is a possibility of electric shock and fire.
- Be sure to attach the main body and wire it.  
There are concerns of electric shock and injury.



## General Safety Information



### CAUTION

- Make sure that the rated voltage and AC power voltage of the product match.  
There are concerns about accidents and fires.
- Do not use single phase input.  
There is a fire hazard.
- Do not connect AC power to the output terminals (U,V,W).  
Risk of injury and fire.
- Tighten to the specified torque of the screw. Check that the screws are not loose.  
There is a fire hazard.
- Install a short circuit breaker on the input side.  
There is a fire hazard.
- Install the fuse in the operating circuit (same as main power).  
There is a fire hazard.
- Use power lines, short-circuit breakers and electronic contactors at the specified capacity (qualification).  
There is a fire hazard.

## 3. Control and Operation



### CAUTION

- Be sure to put the input power after you remove the front cover.  
Do not open the cover while it is energized.  
There is a possibility of electric shock.
- Do not operate the switch with wet hands.  
There is a possibility of electric shock.
- Do not contact the inverter terminals during powering or shutdown of the inverter.  
There is a possibility of electric shock.
- If retriever mode is selected, a sudden restart will occur even the inverter stopped by trip.  
(Please designed a machine can protect with retriever mode.)  
Please keep away from the machine. There are concerns of an accident.
- If a short power outage occurs, the driver's command can be entered to re-run after the power outage. If there is a possibility of danger to a person, use the circuit that is not re-driving after power-up. There are concerns of an accident.
- STOP keys are valid only when the function is set.  
Prepare the emergency stop switch separately. There are concerns of an accident.
- Do not set the alarm reset with the operation command together, it will re-start without caution.  
Make sure operation command is off and set the alarm rest.  
There are concerns of an accident.
- Do not put any contacts or sticks inside the inverter while it is on.  
There is a possibility of electric shock and fire.

## General Safety Information

### CAUTION

- The heat sink fins will have a high temperature. Be sure not to touch them.  
There is a risk of burns.
- Low to high speed operation of the inverter can be easily set. Be sure to operate it after checking the tolerance of the motor and machine.  
There are concerns of an accident.
- Install an external braking system if needed.  
There are concerns of an accident.
- If the motor needs to operate at a frequency higher than standard Max Frequency setting (50Hz/60Hz), be sure to check with the manufacturers of both the motor and the machine for their approval.  
There is a concern of machine failure.
- Check the following before and during the test run.  
Was the direction of the motor correct?  
Were the RPM and frequency motor correct?  
Were there any abnormal motor vibrations or noises?
- The AC reactor must be installed when the power is not stable in order to avoid damage to the VFD.
- Do not switch drive inputs when starting or stopping the motor.  
Turning the drive on and off often shortens the life of the drive.  
Damage to the DC bus charging circuit and the DC bus capacitor may result in premature drive failure.  
For maximum performance, the maximum number of charging cycles (i.e. power-up by power supply) of the DC capacitor is:  
Less than five times in ten minutes.

## 4. Maintenance, Inspection and Part Replacement

### CAUTION

- After turning off the input power supply, do not perform the maintenance and inspection for at least 10 minutes.  
There is a possibility of electric shock.
- Make sure that only qualified persons will perform maintenance, inspection and/or part replacement. (Before starting the work, remove metallic objects (wristwatch, bracelet, etc.)  
(Be sure to use insulated tools.)

## 5. Others

### CAUTION

- Never modify the unit.  
There is a possibility of electric shock and accident.

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## 1. GENERAL INFORMATION

### 1.1 Inspection on purchase

#### 1.1.1 Product inspection

Please inspect following before installation.

- (1) No damage made to the unit during transportation?
- (2) One Instruction manual is enclosed?
- (3) Check the label specification if the correct product is delivered per your order.

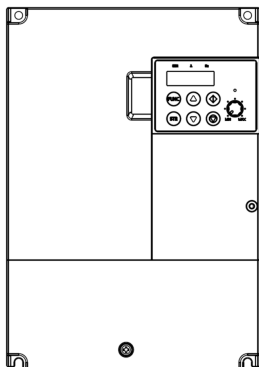


Figure 1-1 Outlook of iMaster C1

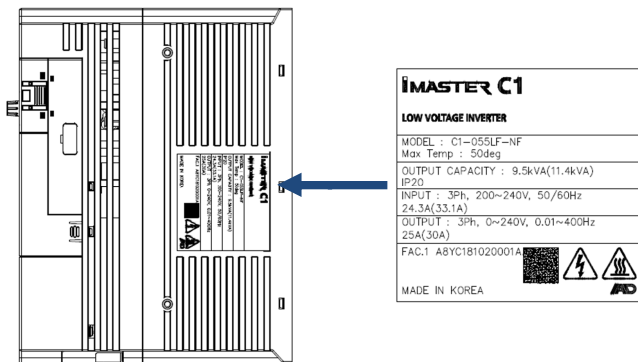


Figure 1-2 iMaster C1 Specification on label

## 1.1.2 Instruction manual

This instruction manual is for the iMaster C1 series.

Carefully read the manual before operating the inverter and please read this manual and keep it as a reference.

In addition, this manual is intended to be delivered to the final user.

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## 1.2 Inquiry and warranty

### 1.2.1 Inquiry

- If you have any questions about damage to the inverter, unknown parts, or other information, please contact the place of purchase with the following information.

- (1) Product model name
- (2) Manufacturing number (MFG. No.)
- (3) Date of purchase
- (4) Failure details (as detailed as possible)
  - Damaged parts, condition, etc.
  - Unknown parts, condition, etc.

### 1.2.2 Warranty of unit

- The warranty period for the delivery product is one year after delivery.  
However, the warranty will be void if the fault is due to:
  - (1) In case of unfair treatment and use by the consumer
  - (2) If the cause of failure is due to a reason other than the product supplied
  - (3) When using a product that is out of specification
  - (4) In case the supplier is not responsible for other natural disasters (earthquake, lightning)
- Since the warranty mentioned here means the inverter itself, the damage caused by the inverter failure shall not be liable.

- After warranty period, the entire test or repair will be charged.

Any failure caused by above mentioned items within the warranty period will be claimed.

Please contact your place of purchase for any problems that have occurred within the warranty period

### 1.3 Panel view

#### 1.2.3 IMASTER-C1-055LF/075LFP ~ 075LF/110LFP, 055HF/075HFP ~ 075HF/110HFP

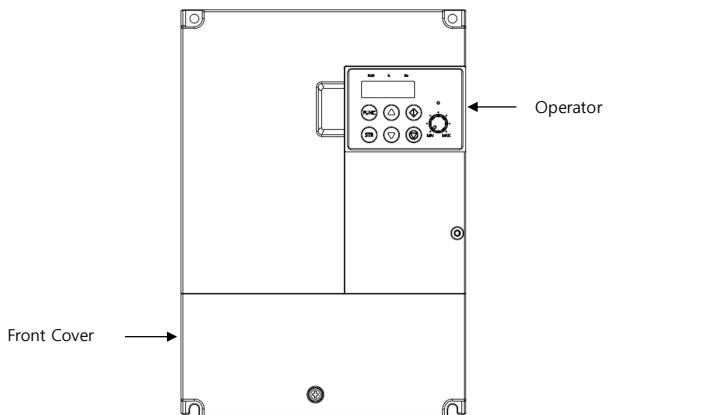


Figure 1-3 Front view with front cover

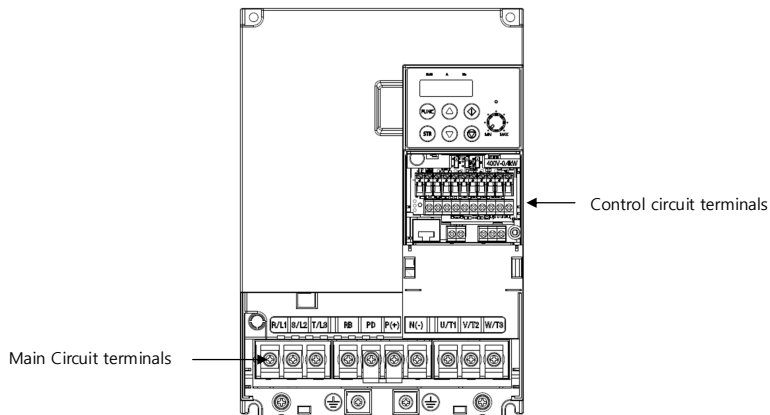


Figure 1-4 Front view without front cover

1.2.4 IMASTER-C1-110LF/150LFP, 110HF/150HFP ~ 150HF/185HFP

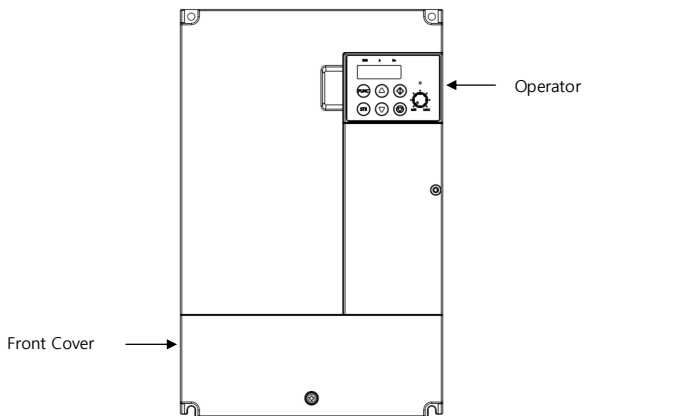


Figure 1-5 Front view with front cover

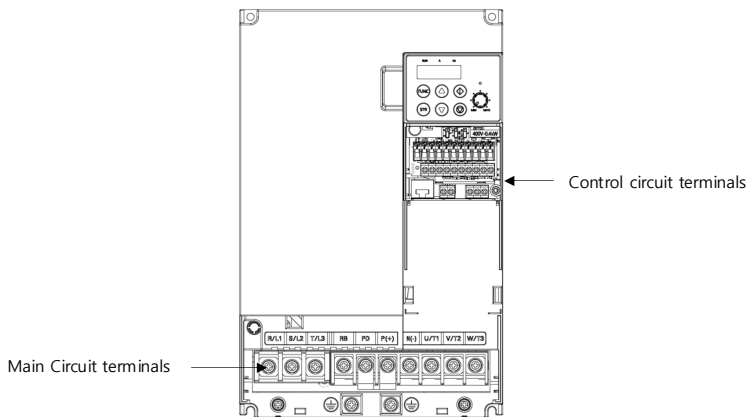


Figure 1-6 Front view without front cover



1.2.5 IMASTER-C1-150LF/185LFP, 185HF/220HFP ~ 220HF/300HFP

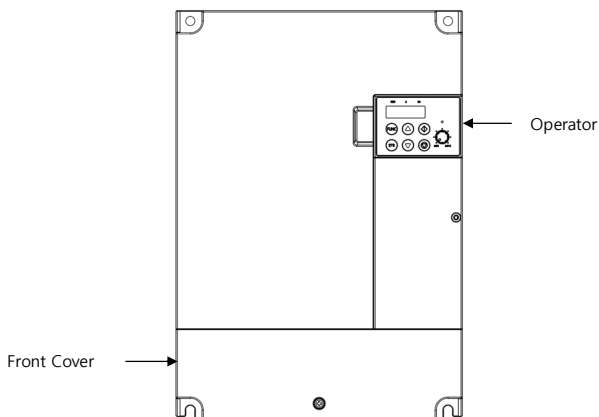


Figure 1-7 Front view with front cover

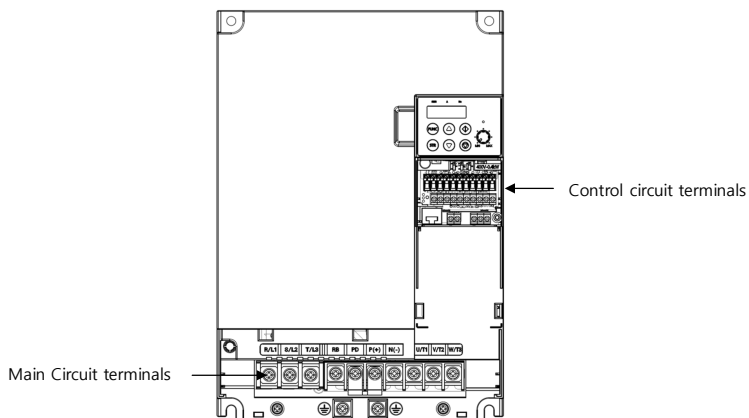


Figure 1-8 Front view without front cover

## 2. INSTALLATION AND WIRE

### 2.1 Installation

|                                                                                                  |
|--------------------------------------------------------------------------------------------------|
|  <b>CAUTION</b> |
|--------------------------------------------------------------------------------------------------|

- Be sure to install the unit on flame resistant material such as metal.  
There is a fire hazard.
- Be sure not to place anything flammable such as corrosive gas, explosive gas, inflammable gas, grinding fluid mist, salt in the vicinity.
- Do not carry the unit by the top cover, but always by supporting the base of the unit  
There is a possibility of an accident by falling down.
- Be sure not to let foreign matter enter such as cut wire refuse, spatter from welding, iron refuse, wire, dust, etc.
- Be sure to install the VFD in a place which can support the weight according to the specification in the manual.
- Do not install or run the damaged inverter.  
There are concerns of an accident.
- Avoid high temperature, humidity, condensation dust corrosive gas, explosive gas, combustible gas and install the inverter with good ventilation without direct sunlight.  
There is a fire hazard.
- To prevent injury, make sure to wear electric working gloves before working.

## 2.1.1 Precaution

### (1) Caution in transport

- The inverter uses plastic parts. Care must be taken to avoid damage.  
In particular, fasten it with designated parts to ensure that it is firmly secured to the wall or panel.  
Also, do not operate the inverter with damage and loss of parts.

### (2) Install it on the non-flammable (metal, etc.) surface

- Inverter heat shield temperatures can be very high.  
As there is a risk of fire, place it on a non-flammable vertical wall (metal, etc.).  
Attention should also be made to the air gap surrounding the inverter.  
Especially, when there is a heat source such as a braking resistor or reactor.  
Keep sufficient space to prevent clogging of cooling ventilation by the up/down wiring.

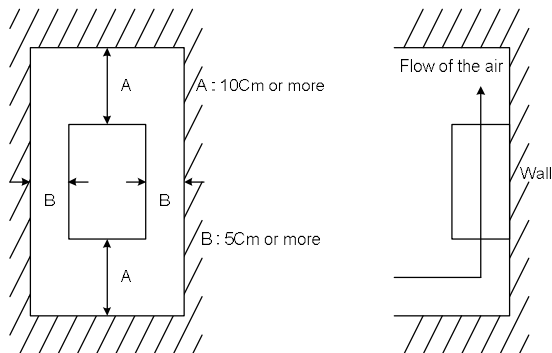


Figure 2-1 Air gap (Installation)

### (3) Ambient temperature

- The ambient temperature surrounding the inverter should not exceed the allowable temperature range (HD:  $-10$  to  $50^{\circ}\text{C}$ /ND:  $-10$  to  $40^{\circ}\text{C}$ ). Measure the ambient temperature about 5cm from the bottom center of the inverter body and make sure that it is within the allowable temperature range.  
If the temperature exceeds the allowable temperature, component life will become shortened especially in the case of the bus capacitors.

### (4) Humidity

- The humidity surrounding the inverter should be within the limit of the allowable percentage range (20% to 90% / RH).

Under no circumstances should the inverter be in an environment where there is the possibility of moisture entering the inverter.

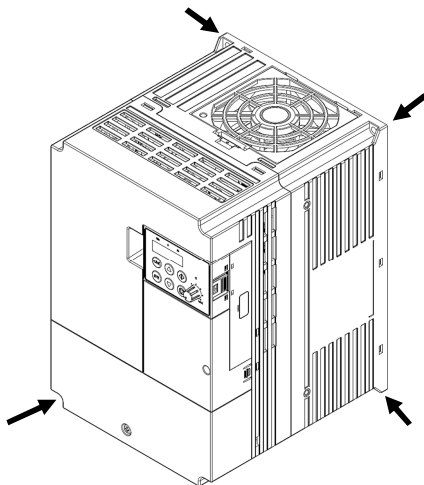
Also avoid having the inverter mounted in a place that is exposed to the direct sunlight.

### (5) Caution in the installation

- Please be install the inverter avoid dust, corrosive gases, explosive gases, combustible gases.

(6) Installation of inverter

- Mount the inverter in a vertical position using screws or bolts. The mounting surface should also be free from vibration and can easily hold the weight of the inverter.



**Figure 2-2 Mounting Position**

(7) Ventilation in panel

- Install a ventilation fan when installing the inverter inside the panel. The position of the inverter cooling fan and air inlet is critical. If the position is incorrect, the air flow around the inverter will decrease and the temperature around the inverter will increase. Make sure that the ambient temperature is within the allowable range.

### 2.2 Wiring



#### DANGER

- Be sure to ground the unit.  
There is a possibility of electric shock and fire.
- Wiring work should be carried out by qualified electricians  
There is a possibility of electric shock and fire.
- Implement wiring after checking that the power supply is off.  
There is a possibility of electric shock.
- After mounting the VFD, carry out wiring.  
There is a possibility of electric shock.



#### CAUTION

- Make sure that the rated voltage and AC power voltage are same.  
There are concerns of an accident and fire
- Be sure not to connect AC power supply to the output terminals (U, V, W).  
There are concerns of an accident and fire
- Install the short circuit breaker on the input side.  
There is a fire hazard.
- Use rated power lines, short circuit breakers and electronic contactors.  
There is a fire hazard.
- Do not use the electromagnetic contactors on the primary side of the inverter as means of start/stop control.

## 2.2.1 Terminal connection diagram and description

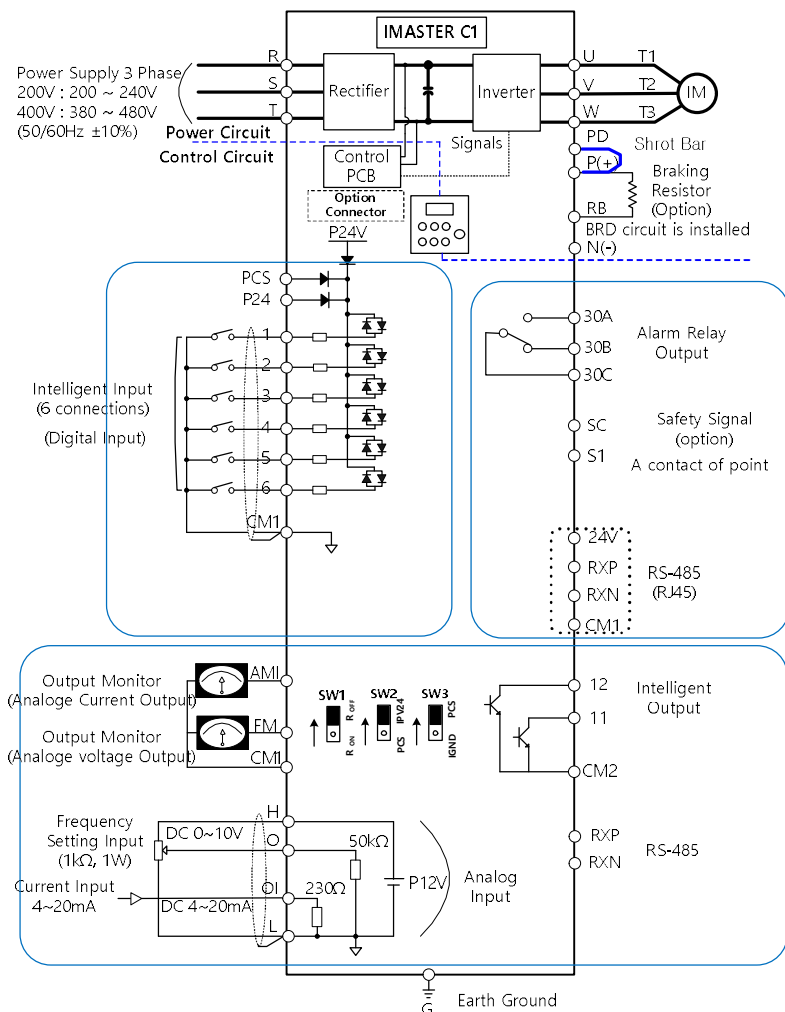


Figure 2-3 Terminal connection diagram (Sink type)

## 2.2.2 Main circuit terminal description

Table 2-1 Main circuit terminal description

| Terminal         | Terminal Name                          | Function                                                               |
|------------------|----------------------------------------|------------------------------------------------------------------------|
| R,S,T (L1,L2,L3) | Main power input                       | AC input power supply                                                  |
| U,V,W (T1,T2,T3) | Inverter output                        | PWM output power for motor                                             |
| PD,P (+,+)       | DC Reactor Connection                  | Remove the shorting bar between PD and P for connection to DC Reactor. |
| P, RB (+,-)      | External Braking Resistance Connection | Optional External Braking Resistor Connector.                          |
| P, N             | External Braking Unit Connection       | Optional External Braking Unit Connector.                              |
| G                | Inverter ground                        | Ground Terminal                                                        |

Table 2-2 Main circuit terminals view

| Main circuit terminals |  |  |  |  |  |  |  |  |  |  | Corresponding type                                           | Screw size | width (mm) |
|------------------------|--|--|--|--|--|--|--|--|--|--|--------------------------------------------------------------|------------|------------|
|                        |  |  |  |  |  |  |  |  |  |  | 055LF/075LFP<br>075LF/110LFP<br>055HF/075HFP<br>075HF/110HFP | M4         | 10.3       |
|                        |  |  |  |  |  |  |  |  |  |  | 110LF/150LFP<br>110HF/150HFP<br>150HF/185HFP                 | M5         | 13         |
|                        |  |  |  |  |  |  |  |  |  |  | 150LF/185LFP<br>185HF/220HFP<br>220HF/300HFP                 | M5         | 13         |

Step1) Connecting 3-phase power to the input end of the inverter.

Connect 3-phase power to the inverter power input terminal R(L1), S(L2), T(L3) as table 2-2.

Step2) Connect the inverter to the three-phase motor.

Connect the inverter output stage U(T1), V(T2), W(T3) to the three-phase motor as table 2-2

Step3) The optional direct current reactors are hardwired to the P and PD terminals as shown.

However, remove the shorting bar when connecting the DC reactor.



Do not connect AC power to the output terminals (U,V,W). There is a fire hazard.

### 2.2.3 Main circuit terminal wiring

#### (1) Warning on wiring

When carrying out work on the inverter wiring make sure to wait for at least ten minutes before you remove the cover. Be sure to verify that the charge lamp is not illuminated.

A final check should always be made with a voltage meter.

After removing the power supply, there is a time delay before the capacitors will dissipate their charge.

#### 1) Main power terminals: R(L1), S(L2), T(L3)

- Connect the main power terminals (R(L1), S(L2) and T(L3)) to the power supply through an electromagnetic contactor or an earth-leakage breaker. Use a high harmonic sensitivity current value as the short circuit breaker may malfunction due to harmonic effects. Install an electronic contactor to turn off the inverter power to prevent failure or accident when inverter's protection function is activated.
- This unit is for a three-phase power supply. Be sure not to power a three-phase only inverter with single phase power.
- Do not stop operation by switching off the electromagnetic contactors on the primary or secondary sides of the inverter.
- The inverter enters into the following condition at the occurrence of open phase if it is selected open phase protection is valid: R phase, S phase or T phase, open phase condition:  
It becomes single-phase operation condition. Trip operation, such as a deficiency voltage or over current, may occur.
- A converter module may be damaged as a result of the following conditions. Use caution when,
  - Unbalanced power supply voltage more than 3%
  - Power supply capacity is more than 10 times of the capacity of inverter
  - A drastic change in the power supply
- Turning on/off the power supply more than three times in one minute. Could be damaged.

#### 2) Inverter output terminals: U(T1), V(T2), W(T3)

- Make sure to use a heavier gauge wire when you have long motor leads. This will help to reduce the voltage drop.
- Do not install power factor correction capacitors or a surge absorber to the output of the inverter.  
Inverter will trip or sustain damage to the output transistors.
- In the case of the cable length being more than 20 meters, it is possible that a surge voltage will



be generated and damage to the motor is caused by the floating capacity or the inductance in the wire. When an EMC filter is to be installed, please contact to us.

- In the case of two or more motors, install a thermal relay to each motor.
- Make the RC value of the thermal relay the value of 1.1 times of motor rated electric current

### 3) Direct current reactor (DCL) connection terminals (PD, P)

- These are the terminals to connect the current reactor DCL (optional) to help improve the power factor.

The short bar is connected to the terminals when shipped from the factory, if you are to connect a DCL you will need to disconnect the short bar first.

- The cable length should be less than 5 meters.

### 4) External braking resistor connection terminals (P, RB)

- The regenerative braking circuit (BRD) is built-in as standard.
- When braking is required, install an external braking resistor to these terminals.
- The cable length should be less than 16 feet, and twist the two connecting wires to reduce inductance.
- Do not connect any other device other than the external braking resistor to these terminals. When installing an external braking resistor make sure that the resistance is correctly rated to limit the current drawn through the BRD.

### 5) Earth ground (G)

- Make sure that you securely ground the inverter and motor for prevention of electric shock. The inverter and motor must be connected to an appropriate safety earth ground and follow all local electrical codes.
- In case connecting 2 or more inverters, use caution not to use a loop which can cause some malfunction of the inverter.

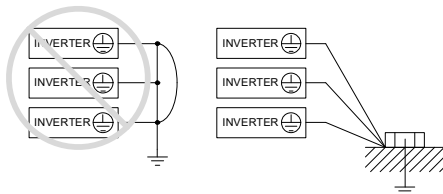


Figure 2-4 Earth Ground (G)

## 2.2.4 Control circuit terminal description

Table 2-3 Control Circuit Terminal Description

| Signal                          | Terminal | Terminal Name                                                                                                                                                        | Function                                                                                                               |
|---------------------------------|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|
| Input signal                    | P24      | Power terminal for input signal                                                                                                                                      | 24VDC $\pm$ 15%, 100mA                                                                                                 |
|                                 | PCS      | Power supply for external device                                                                                                                                     | DC 27V Max                                                                                                             |
|                                 | 6        | Intelligent input terminal (C01~C06)                                                                                                                                 | Contact input:<br>Close: ON (Operating)<br>Open: OFF (Stop)<br><br>Minimum<br>ON TIME:12ms                             |
|                                 | 5        | Forward run command (FW), Reverse run command (RV), Multi-speed commands1-4(CF1-4),                                                                                  |                                                                                                                        |
|                                 | 4        | 2-stage accel/decel (2CH), Reset (RS), Free run stop (FRS), External trip (EXT), Terminal software lock (SFT), Current input selection (AT), Jogging operation (JG), |                                                                                                                        |
|                                 | 3        | Unattended start protection (USP),                                                                                                                                   |                                                                                                                        |
|                                 | 2        | 3 wires input (STA,STP,F/R), Up/Down (Up, Down), Local keypad operation(O/R),                                                                                        |                                                                                                                        |
|                                 | 1        | Local terminal input operation(T/R), PID integral reset (PIDIR), PID disable (PIDD)                                                                                  |                                                                                                                        |
|                                 | CM1      | Common terminal for input or monitors signal                                                                                                                         |                                                                                                                        |
| Monitor signal                  | FM       | Analog Monitor (Frequency, Current, Voltage, Power)                                                                                                                  | 0~10Vdc, 1mA                                                                                                           |
|                                 | AMI      | Analog Monitor (Frequency, Current, Voltage, Power)                                                                                                                  | 4~20mA, 250 $\Omega$                                                                                                   |
| Frequency command signal        | H        | Frequency power                                                                                                                                                      | 10.5VDC                                                                                                                |
|                                 | O        | Frequency command power terminal (voltage)                                                                                                                           | 0~10VDC, Input impedance: 50k $\Omega$                                                                                 |
|                                 | OI       | Frequency command terminal (current)                                                                                                                                 | 4~20mA, Input impedance: 230 $\Omega$                                                                                  |
|                                 | L        | Analog power common                                                                                                                                                  | -                                                                                                                      |
| Intelligent relay output signal | 30A      | Relay output terminal (C13)                                                                                                                                          | AC 250V<br>2.5A (Resistor load)<br>0.2A (Inductor load)<br><br>DC 30V<br>3.0A (Resistor load)<br>0.7A (Induction load) |
|                                 | 30B      | Run status signal (RUN), Frequency arrival signal (FA1), Set frequency arrival signal (FA2),                                                                         |                                                                                                                        |
|                                 | 30C      | Overload advance notice signal (OL), PID error deviation signal (OD), Alarm signal (AL)                                                                              |                                                                                                                        |

| Signal                                        | Terminal | Terminal Name                                                                                                                                                                                                                       | Function                                      |
|-----------------------------------------------|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|
| Intelligent output signal                     | 11       | Open collector output (C14~C15)<br>Run status signal (RUN),<br>Frequency arrival signal (FA1),<br>Set frequency arrival signal (FA2),<br>Overload advance notice signal (OL),<br>PID error deviation signal (OD), Alarm signal (AL) | 24VDC, 50mA max                               |
|                                               | 12       |                                                                                                                                                                                                                                     |                                               |
|                                               | CM2      | Common terminal for output                                                                                                                                                                                                          | -                                             |
| 1 <sup>st</sup> communication (RJ-45)         | RXP      | RJ-45 connector no. 3                                                                                                                                                                                                               | RS-485 communication terminal                 |
|                                               | RXN      | RJ-45 connector no. 6                                                                                                                                                                                                               |                                               |
| Safety input signal                           | SC       | Common terminal for safety input                                                                                                                                                                                                    | Intelligent input                             |
|                                               | S1       | Safety A point input                                                                                                                                                                                                                |                                               |
| 2 <sup>nd</sup> communication (speed set b31) | RXP      | RS-485 (+)                                                                                                                                                                                                                          | 2 <sup>nd</sup> RS-485 communication terminal |
|                                               | RXN      | RS-485 (-)                                                                                                                                                                                                                          |                                               |

## 2.2.5 Control circuit terminal wiring

### (1) Wiring of control circuit terminal

The control circuit terminal of iMaster C1 is as below.

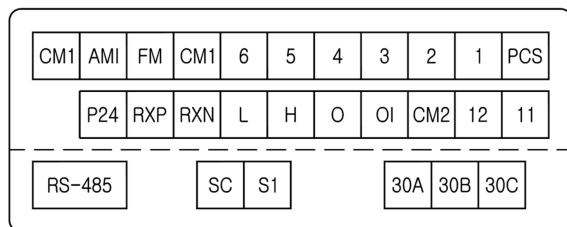


Figure 2-5 Control circuit terminal

### (2) Example of control circuit wiring

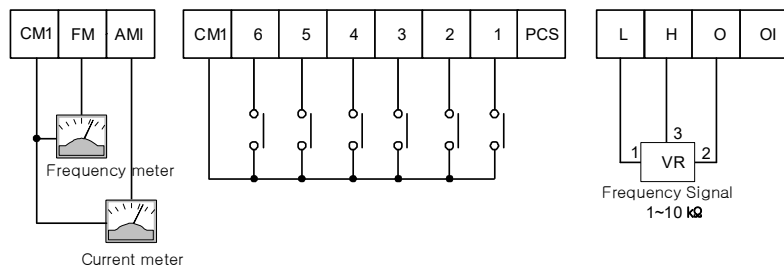


Figure 2-6 Example of control circuit wiring

### (3) Precaution of wiring

- 1) Control terminals are insulated to its power lines (R, S, T, U, V, W, PD, N, RB).  
Do not connect those terminals to power lines or ground.
- 2) Use twisted screened cable, for the input and output wires of the control circuit terminals.  
Connect the screened cable to the common terminal.
- 3) Limit the connection wires to 20 meters.
- 4) Separate the control circuit wiring from the main power and relay control wiring.  
If it is inevitable to cross, make it orthogonal. There is a concern of inverter malfunction.

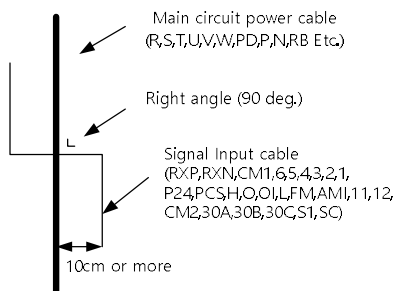


Figure 2-7 Separate of main circuit and control circuit wire

- 5) When using relays for the FW terminal or an intelligent input terminal use a control relay that is designed to work with 24V/dc.
- 6) When a relay is used as an intelligent output, connect a diode for surge protection parallel to the relay coil.
- 7) Do not short the analog voltage terminals H and L or the internal power terminals P24 and all CM1's. Otherwise there is risk of Inverter damage.

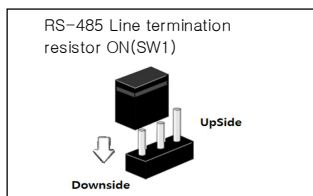
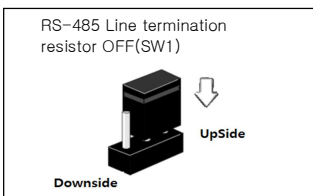
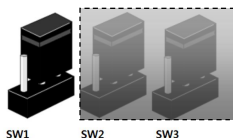
## (4) Selection the switches

### 1) RS-485-line termination resistor

Line termination resistor is used to decrease delay of distortion and attenuation at the long distance. It inserts one on the line termination. line termination resistor of inverter is build-in and it can be selected by SW1 switch.

<Line termination resistor switch selection >

SW1: Default value is OFF



### 2) Connections between Relay output and PLC

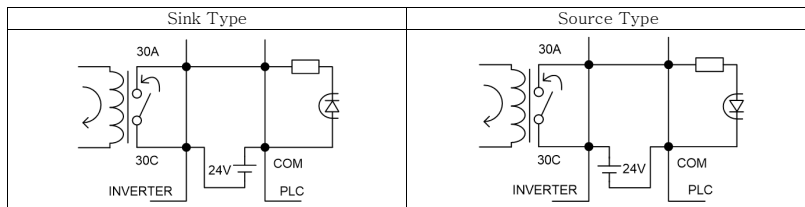
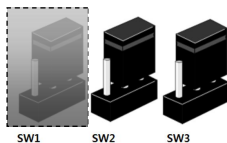


Figure 2-8 Connections between Relay and PLC

### 3) Connection between Input terminal and PLC: Factory setting is Sink type mode

- SW2: Power Source switch for Internal 24V (factory setting) or external PCS input
- SW3: Select switch for Sink type mode (factory setting) and Source type mode



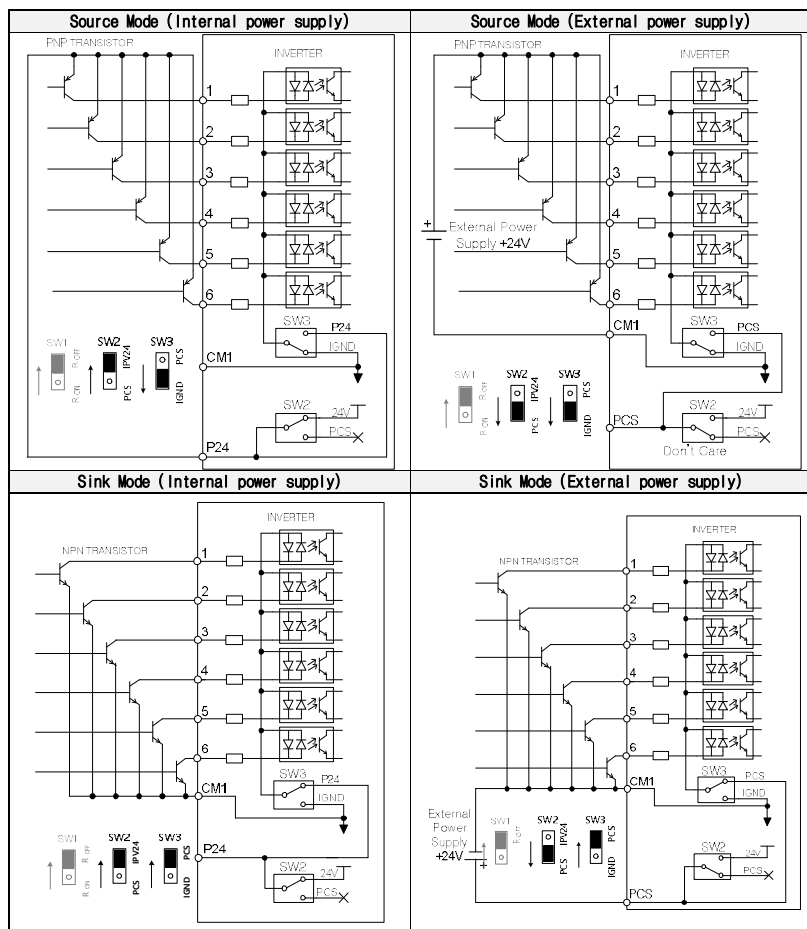
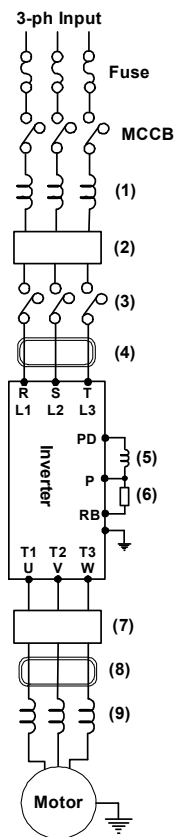


Figure 2-9 Input Terminal and PLC Connection Diagram

## 2.2.6 Accessory wiring



Note1: The applicable equipment is for HYUNDAI standard four pole squirrel cage motor.

Note2: Be sure to consider the capacity of the circuit breaker to be used.

Note3: Be sure to use larger wire for power lines if the distance exceeds 20m.

Note4: Be sure to use MCCB for the safety.

Note5: Do not operate the electronic contactor when the inverter is running.

Note6: Use 0.75mm<sup>2</sup> for AL relay and RN relay. Separate by the sum (wiring distance from inverter to power supply, from inverter to motor) for the sensitive current of leakage breaker (MCCB).

Note7: When using CV line and wiring by rigid metal conduit, leak flows

| Wiring distance | Sensitive current(mA) |
|-----------------|-----------------------|
| 100m and less   | 50mA                  |
| 300m and less   | 100mA                 |

Note8: IV line is high dielectric constant that is why the current will be increased 8 times. Therefore, use the sensitive current 8 times as large as that of the left list.

And if the distance of wire is over 100m, use CV line.

Note9: Do not stop operation by switching off the electromagnetic contactors. If you need to use electromagnetic contactors for predation because of bypass operation, be sure the protective circuit must be configured so that it cannot be switched on or off during inverter operation.

Figure 2-10  
Example of accessories connection



**Table 2-4 Optional accessories for improved performance**

| Name |                                                                                            | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|------|--------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| (1)  | Input AC Reactor                                                                           | Recommended to use when the unbalance voltage rate is 3% or more and power supply is 500 kVA or more, and there is a rapid change in the power supply. It also reduces harmonics and improves the power factor.                                                                                                                                                                                                                                             |
| (2)  | Noise filter for Inverter                                                                  | Reduces common noise generated between the power supply and the ground, as well as normal noise. Put it in the primary side of inverter.                                                                                                                                                                                                                                                                                                                    |
| (3)  | Radio Noise Filter (zero-phase reactor)                                                    | Helps to reduce noise on a peripheral radio when an inverter is running.                                                                                                                                                                                                                                                                                                                                                                                    |
| (4)  | Input Radio Noise Filter                                                                   | Reduces radiation noise emitted from wire at the input.                                                                                                                                                                                                                                                                                                                                                                                                     |
| (5)  | DC Reactor                                                                                 | Helps to improve power factor for the inverter.                                                                                                                                                                                                                                                                                                                                                                                                             |
| (6)  | Breaking Resistor/ Regenerative Breaking Unit                                              | Used for applications that need to increase the brake torque of the inverter or to frequently start/stop and to run high inertia load.                                                                                                                                                                                                                                                                                                                      |
| (7)  | Output Noise Filter                                                                        | Reduces noise emitted from the inverter motor leads. This helps to minimize interference with sensitive equipment (i.e.: sensors or weight scale).                                                                                                                                                                                                                                                                                                          |
| (8)  | Radio Noise Filter (Zero-phase reactor)                                                    | Reduces noise generated at the output of the inverter. (It is possible to use for both input and output.)                                                                                                                                                                                                                                                                                                                                                   |
| (9)  | Output alternation reactor<br>Reducing vibration, thermal Relay, preventing Misapplication | Running motors with the inverter generates vibration greater than that with commercial power supply. This part installed between the inverter and motor reduces torque ripple. When the cable length between the inverter and motor is long (10m or more), a countermeasure for a malfunction of the thermal relay by harmonic due to switching on inverter is taken by inserting reactor. There is the way to use current sensor instead of thermal relay. |
|      | LCR filter                                                                                 | Sine-wave filter for output                                                                                                                                                                                                                                                                                                                                                                                                                                 |

## 2.2.7 Torque and wire specification

Table 2-5 Applicable tools for N700E (Heavy duty)

| Class      | Motor Output (kW) | Inverter model (IMASTER-C1) | Power lines <sup>note1</sup><br>R,S,T,<br>U,V,W,PD,P | External resistor between P and RB | Screw size of Terminal | Torque (N·m) | Applicable Tools    |      |                                  |
|------------|-------------------|-----------------------------|------------------------------------------------------|------------------------------------|------------------------|--------------|---------------------|------|----------------------------------|
|            |                   |                             |                                                      |                                    |                        |              | Leak breaker (MCCB) |      | Electro-magnetic Controller (MC) |
| 200V Class | 5.5               | 055LF/075LFP                | More than 6                                          | 6                                  | M4                     | 1.2          | UCB100R             | 50A  | HIMC32                           |
|            | 7.5               | 075LF/110LFP                | More than 10                                         | 6                                  | M4                     | 1.2          | UCB100R             | 50A  | HIMC32                           |
|            | 11                | 110LF/150LFP                | More than 16                                         | 6                                  | M5                     | 3.0          | UCB100R             | 75A  | HIMC50                           |
|            | 15                | 150LF/185LFP                | More than 25                                         | 16                                 | M5                     | 3.0          | UCB100R             | 100A | HIMC65                           |
| 400V Class | 5.5               | 055HF/075HFP                | More than 4                                          | 4                                  | M4                     | 1.2          | UAB30C              | 30A  | HIMC18                           |
|            | 7.5               | 075HF/110HFP                | More than 4                                          | 4                                  | M4                     | 1.2          | UAB30C              | 30A  | HIMC18                           |
|            | 11                | 110HF/150HFP                | More than 6                                          | 6                                  | M4                     | 1.2          | UCB100R             | 50A  | HIMC32                           |
|            | 15                | 150HF/185HFP                | More than 10                                         | 10                                 | M5                     | 3.0          | UCB100R             | 50A  | HIMC40                           |
|            | 18.5              | 185HF/220HFP                | More than 16                                         | 10                                 | M5                     | 3.0          | UCB100R             | 75A  | HIMC40                           |
|            | 22                | 220HF/300HFP                | More than 25                                         | 10                                 | M5                     | 3.0          | UCB100R             | 75A  | HIMC50                           |

Note 1) Use a 600V, 75°C copper wire for wires.

Table 2-6 Applicable tools for N700E P-TYPE (Normal duty)

| Class      | Motor Output (kW) | Inverter model (IMASTER-C1) | Power lines <sup>note1</sup><br>R,S,T,<br>U,V,W,PD,P | External resistor between P and RB | Screw size of Terminal | Torque (N·m) | Applicable Tools    |      |                     |
|------------|-------------------|-----------------------------|------------------------------------------------------|------------------------------------|------------------------|--------------|---------------------|------|---------------------|
|            |                   |                             |                                                      |                                    |                        |              | Leak breaker (MCCB) |      | Leak breaker (MCCB) |
| 200V Class | 7.5               | 055LF/075LFP                | More than 10                                         | 6                                  | M4                     | 1.2          | UCB100R             | 50A  | HIMC32              |
|            | 11                | 075LF/110LFP                | More than 16                                         | 6                                  | M5                     | 3.0          | UCB100R             | 75A  | HIMC50              |
|            | 15                | 110LF/150LFP                | More than 25                                         | 16                                 | M5                     | 3.0          | UCB100R             | 100A | HIMC65              |
|            | 18.5              | 150LF/185LFP                | More than 30                                         | 16                                 | M6                     | 4.5          | UCB250S             | 150A | HIMC80              |
| 400V Class | 7.5               | 055HF/075HFP                | More than 4                                          | 4                                  | M4                     | 1.2          | UAB30C              | 30A  | HIMC18              |
|            | 11                | 075HF/110HFP                | More than 6                                          | 6                                  | M4                     | 1.2          | UCB100R             | 50A  | HIMC32              |
|            | 15                | 110HF/150HFP                | More than 10                                         | 10                                 | M5                     | 3.0          | UCB100R             | 50A  | HIMC40              |
|            | 18.5              | 150HF/185HFP                | More than 16                                         | 10                                 | M5                     | 3.0          | UCB100R             | 75A  | HIMC40              |
|            | 22                | 185HF/220HFP                | More than 25                                         | 10                                 | M5                     | 3.0          | UCB100R             | 75A  | HIMC50              |
|            | 30                | 220HF/300HFP                | More than 25                                         | —                                  | M6                     | 4.5          | UCB100R             | 100A | HIMC65              |

Note 1) Use a 600V, 75°C copper wire for wires.

### 3. SPECIFICATION

#### 3.1 Specification

##### 3.1.1 200V Class specification

| Inverter model                                  |    | 055LF/<br>075LFP                                         | 075LF/<br>110LFP | 110LF/<br>150LFP | 150LF/<br>185LFP |      |
|-------------------------------------------------|----|----------------------------------------------------------|------------------|------------------|------------------|------|
| Applicable motor<br>(4P, kW) <sup>(Note1)</sup> | HD | 5.5                                                      | 7.5              | 11               | 15               |      |
|                                                 | ND | 7.5                                                      | 11               | 15               | 18.5             |      |
| Rated capacity<br>(kVA)                         | HD | 200V                                                     | 8.3              | 11.1             | 15.6             | 22.2 |
|                                                 |    | 240V                                                     | 10.0             | 13.3             | 18.7             | 26.6 |
|                                                 | ND | 200V                                                     | 10.4             | 15.2             | 20.0             | 25.2 |
|                                                 |    | 240V                                                     | 12.5             | 18.2             | 24.1             | 30.3 |
| Rated input voltage                             |    | Three Phase 200 ~ 240 V +/- 10 %, 50/60 Hz +/- 5%        |                  |                  |                  |      |
| Rated output voltage <sup>(Note2)</sup>         |    | Three Phase 200 ~ 240 V (Corresponding to Input Voltage) |                  |                  |                  |      |
| Rated output current (A)                        | HD | 25                                                       | 33               | 47               | 64               |      |
|                                                 | ND | 30                                                       | 40               | 56               | 73               |      |
| Weight (Kg)                                     |    | 4.2                                                      | 4.5              | 4.5              | 6.5              |      |
| Protection Design                               |    | IP20                                                     |                  |                  |                  |      |

##### 3.1.2 400V Class specification

| Inverter model                                         |    | 055HF/<br>075HFP                                                                   | 075HF/<br>110HFP | 110HF/<br>150HFP | 150HF/<br>185HFP | 185HF/<br>220HFP | 220HF/<br>300HFP |      |
|--------------------------------------------------------|----|------------------------------------------------------------------------------------|------------------|------------------|------------------|------------------|------------------|------|
| Applicable motor<br>(4P, kW)<br><small>(Note1)</small> |    | HD                                                                                 | 5.5              | 7.5              | 11               | 15               | 18.5             | 22   |
|                                                        |    | ND                                                                                 | 7.5              | 11               | 15               | 18.5             | 22               | 30   |
| Rated capacity<br>(kVA)                                | HD | 380V                                                                               | 7.9              | 10.5             | 15.1             | 21.1             | 25.0             | 29.6 |
|                                                        |    | 480V                                                                               | 10.0             | 13.3             | 19.1             | 26.6             | 31.6             | 37.4 |
|                                                        | ND | 380V                                                                               | 10.4             | 15.2             | 20.0             | 25.6             | 29.7             | 39.4 |
|                                                        |    | 480V                                                                               | 12.5             | 18.2             | 24.1             | 30.7             | 35.7             | 47.3 |
| Rated input voltage                                    |    | Three Phase 380 ~ 480 V +/- 10 %, 50/60 Hz +/- 5%                                  |                  |                  |                  |                  |                  |      |
| Rated output voltage                                   |    | Three Phase 380 ~ 480 V (Corresponding to Input Voltage)<br><small>(Note2)</small> |                  |                  |                  |                  |                  |      |
| Rated output current(A)                                | HD | 14.8                                                                               | 18               | 24               | 32               | 39               | 45               |      |
|                                                        | ND | 17.5                                                                               | 23               | 31               | 38               | 44               | 58               |      |
| Weight (Kg)                                            |    | 4.2                                                                                | 4.5              | 4.5              | 7                | 7                | 7.5              |      |
| Protection Design                                      |    | IP20                                                                               |                  |                  |                  |                  |                  |      |

Note 1: The applicable motor refers to HYUNDAI standard 3-phase motor (4-pole).

To use other motors, care must be taken to prevent the rated motor current (50/60Hz) from exceeding the rated output current of the inverter.

Note 2: The output voltage decreases as the main supply voltage decreases (except for use of the AVR function).

In any case, the output voltage cannot exceed the input power supply voltage.

**3.1.3 Performance specification**

| Features                                  |                                              |                                                                                                                                                                                 | Performance specification                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-------------------------------------------|----------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Control method <sup>(Note3)</sup>         |                                              |                                                                                                                                                                                 | Space vector PWM                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Output frequency range <sup>(Note4)</sup> |                                              |                                                                                                                                                                                 | 0.01~400Hz (Sensorless Vector Control: 0.5 ~ 300Hz)                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Frequency accuracy <sup>(Note5)</sup>     |                                              |                                                                                                                                                                                 | Digital command $\pm 0.01\%$ of Max Frequency / Analog Frequency $\pm 0.1\%$                                                                                                                                                                                                                                                                                                                                                                                             |
| Frequency resolution                      |                                              |                                                                                                                                                                                 | Digital setting: 0.01Hz (Under 100Hz), 0.1Hz (Over 100Hz)<br>Analog setting: Max. frequency 500(DC5V),<br>Max. setting frequency 1000 (DC 0 ~ 10V, 4~20mA)                                                                                                                                                                                                                                                                                                               |
| Voltage/frequency characteristic          |                                              |                                                                                                                                                                                 | Base Frequency 0~400Hz setting                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Overload current rate                     |                                              |                                                                                                                                                                                 | Heavy Duty (150%, 60sec), Normal Duty (120%, 60sec)                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Acceleration/deceleration                 |                                              |                                                                                                                                                                                 | 0.0~6,000 sec (Linear, S curve, U curve)<br>Second acc/dcc can be set                                                                                                                                                                                                                                                                                                                                                                                                    |
| DC injection braking                      |                                              |                                                                                                                                                                                 | Operation level and time can be set when above the minimum frequency and below the braking set frequency                                                                                                                                                                                                                                                                                                                                                                 |
| Input signal                              | Frequency                                    | Operator external signal                                                                                                                                                        | Set by Keypad (Potentiometer or Arrow Keys)<br>Variable resistance 1W, 1k $\Omega$ ~10k $\Omega$<br>DC 0~10V (Input impedance 10k $\Omega$ ), DC 4~20mA (Input impedance 200 $\Omega$ )                                                                                                                                                                                                                                                                                  |
|                                           | Run/Stop                                     | Operator external signal                                                                                                                                                        | Run/Stop key<br>Forward run/stop<br>Reverse operation/stop is possible for terminal assignment (select 1a, 1b)                                                                                                                                                                                                                                                                                                                                                           |
|                                           | Intelligent input terminal                   |                                                                                                                                                                                 | FW (Forward Run), RV (Reverse Run), CF1~4(Multi-speed Inputs 1~4), RS(Reset), AT (Analog input current/voltage selection signal), USP (Unattended Start Protection), EXT (External trip), FRS (Free-Run Stop), JG(Jogging), SFT (software lock), 2CH (2nd Acceleration / Deceleration), STA, STP, F/R, UP, DOWN(Up/down), UP/DOWN initial value clear O/R (Local Keypad Operation), T/R (Local Terminal Input Operation), PIDR (PID Integral Reset), PIDD (PID Disabled) |
| Output signal                             | Intelligent output terminal (11~CM2, 12~CM2) | RUN (Run Status Signal), FA1 (Frequency Arrival Signal 1), FA2 (Frequency Arrival Signal 2), OL (Overload Alarm), OD (PID Error Deviation Signal), AL (Alarm signal)            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|                                           | Alarm relay output terminal                  |                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|                                           | FM output                                    | Analog output meter (DC0~10V full scale. Max $\cdot$ 1mA)<br>Output Frequency, Output Current, Output Voltage, Output Power, Output Torque, Operation by Communication          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|                                           | AMI output                                   | Analog output meter (4~20mA full scale. Max $\cdot$ 250 $\Omega$ )<br>Output Frequency, Output Current, Output Voltage, Output Power, Output Torque, Operation by Communication |                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

| 항목                                  |                     | 사양                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-------------------------------------|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Application specification functions |                     | Auto tuning, AVR function, V/F characteristic selection, Curved acceleration/deceleration, Upper and lower limiters, 16-stage speed profile, Fine adjustment of start frequency, Carrier frequency change (0.5~16kHz), PID, Frequency jump, Gain and Bias setting, Jogging, Electronic thermal level adjustment, Retry function, Automatic torque boost, Trip history monitor, Software lock, S-curved acc/dcc, Frequency conversion display, UPS, IOLT protection, Flying start, BRD |
| Protection functions                |                     | Over current, Over voltage, Communication error, Under voltage, Output short circuit detection, UPS error, EEPROM error, External trip1~6, Ground fault, Over temperature, Input phase loss, Overload, Inverter overload, Braking resistor overload, CPU error, Safety function, HW trip 1~2, Option trip 1~2, OVS fail, Fan fault                                                                                                                                                    |
| Environment                         | Ambient temperature | -10~50°C (ND: 40°C)                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|                                     | Storage temperature | -20~60°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|                                     | Ambient humidity    | Below 90%RH (Installed with no dew condensation)                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|                                     | Vibration           | 5.9m/s <sup>2</sup> (0.6G), 10~55Hz                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|                                     | Location            | Under 1000m above sea level, indoors (Installed away from corrosive gasses dust)                                                                                                                                                                                                                                                                                                                                                                                                      |
| Option                              |                     | Noise filter, DC reactor, AC reactor<br>Remote operator, cable for remote operator, Braking resistor <sup>(Note6)</sup>                                                                                                                                                                                                                                                                                                                                                               |

(Note3) Control method setting A31 to 2 (sensorless vector control) Selected, set carrier frequency more than 2.1kHz.

Sensorless vector performance will be reduced when using a motor less than half of the rated capacity of the inverter.

Multiple motors cannot be driven by sensorless vector control.

(Note4) To operate the motor over 50/60Hz, consult the motor manufacturer about the maximum allowable rotation speed.

(Note5) For motor stabilization control, the output frequency can exceed the maximum frequency set in [A04] up to 1.5 Hz.

(Note6) The inverter also has a regenerative braking circuit built in. However, if a large regenerative torque is required, use the optional braking resistance.

**3.1.4 Braking resistor specification**

- Resistor values in below table are calculated on the basis of 150% rated braking torque, 5% ED<sup>(Note1)</sup>
- Wattage rating of resistor should be doubled for 10% ED.

Recommended DB Resistors for the Rated Inverter Capacity (5% ED<sup>(Note1)</sup>)

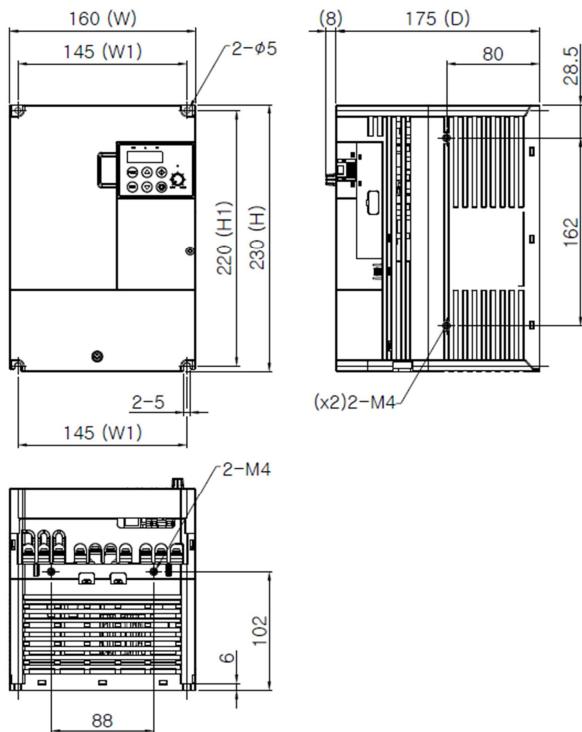
| Inverter capacity | Ohm [ $\Omega$ ] | Wattage [W] <sup>(Note2)</sup> |
|-------------------|------------------|--------------------------------|
| 055LF/075LFP      | 17               | 1000                           |
| 075LF/110LFP      | 17               | 1000                           |
| 110LF/150LFP      | 17               | 1000                           |
| 150LF/185LFP      | 8,7              | 2500                           |
| 055HF/075HFP      | 70               | 1200                           |
| 075HF/110HFP      | 50               | 1200                           |
| 110HF/150HFP      | 50               | 2000                           |
| 150HF/185HFP      | 40               | 2500                           |
| 185HF/220HFP      | 20               | 3000                           |
| 220HF/300HFP      | 20               | 4000                           |

(Note1) ED is duty cycle, 100sec based (5%ED = 5sec)

(Note2) In case of self-cooled DB

## 3.2 Dimension

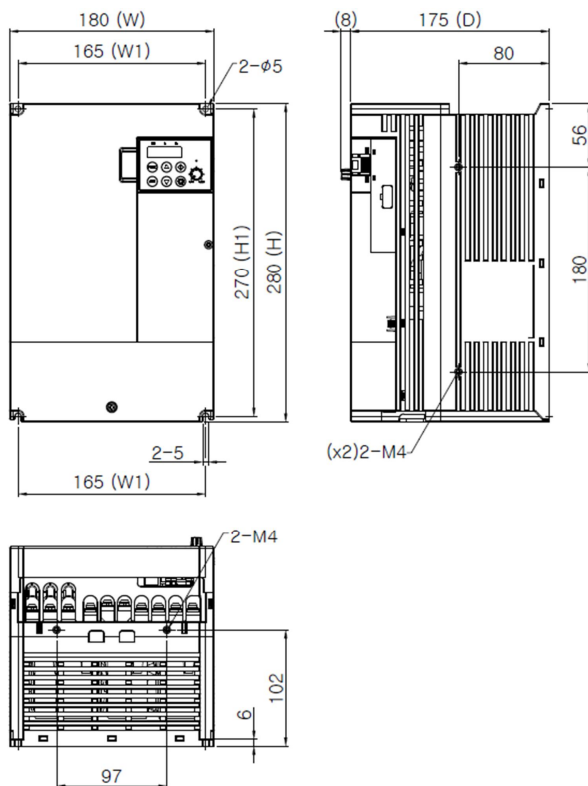
### 3.2.1 IMASTER-C1-055LF/075LFP~075LF/110LFP, 055HF/075HFP~075HF/110HFP



iMaster C1-1Frame Dimensions

| Model              | W<br>[mm] | W1<br>[mm] | H<br>[mm] | H1<br>[mm] | D<br>[mm] | $\phi$<br>[mm] | Weight<br>[kg] |
|--------------------|-----------|------------|-----------|------------|-----------|----------------|----------------|
| 055LF/075LFP       | 160       | 145        | 230       | 220        | 175       | 5              | 2.6            |
| 075LF/110LFP       | 160       | 145        | 230       | 220        | 175       | 5              | 2.6            |
| 055HF/075HFP (FLT) | 160       | 145        | 230       | 220        | 175       | 5              | 2.5(2.8)       |
| 075HF/110HFP (FLT) | 160       | 145        | 230       | 220        | 175       | 5              | 2.5(2.8)       |

### 3.2.2 IMASTER-C1-110LF/150LFP, 110HF/150HFP~150HF/185HFP

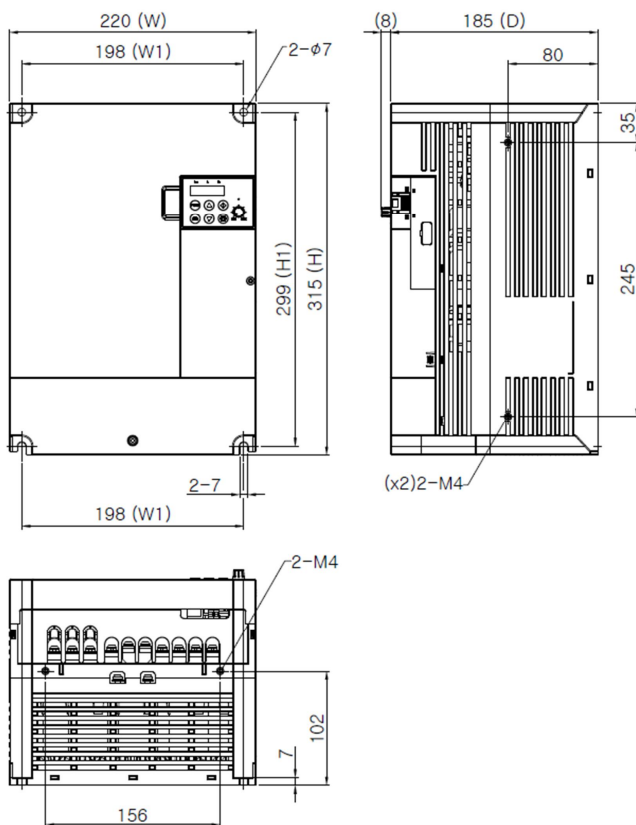


iMaster C1-2Frame Dimensions

| Model              | W<br>[mm] | W1<br>[mm] | H<br>[mm] | H1<br>[mm] | D<br>[mm] | $\phi$<br>[mm] | Weight<br>[kg] |
|--------------------|-----------|------------|-----------|------------|-----------|----------------|----------------|
| 110LF/150LFP       | 180       | 165        | 280       | 270        | 175       | 5              | 3.8            |
| 110HF/150HFP (FLT) | 180       | 165        | 280       | 270        | 175       | 5              | 3.9(4.1)       |
| 150HF/185HFP (FLT) | 180       | 165        | 280       | 270        | 175       | 5              | 3.9(4.1)       |



### 3.2.3 IMASTER-C1-150LF/185LFP, 185HF/220HFP~220HF/300HFP



iMaster C1-3Frame Dimensions

| Model             | W<br>[mm] | W1<br>[mm] | H<br>[mm] | H1<br>[mm] | D<br>[mm] | $\phi$<br>[mm] | Weight<br>[kg] |
|-------------------|-----------|------------|-----------|------------|-----------|----------------|----------------|
| 150LF/185LFP      | 220       | 198        | 315       | 299        | 185       | 7              | 5.5            |
| 185HF/220HFP(FLT) | 220       | 198        | 315       | 299        | 185       | 7              | 5.8(6.1)       |
| 220HF/300HFP(FLT) | 220       | 198        | 315       | 299        | 185       | 7              | 5.8(6.1)       |

## 4. OPERATION



### DANGER

- Be sure not to touch the main terminal or to check the signal add or remove wires and/or connectors.
- Be sure not to turn the input power supply on until after front case is closed. While the inverter is energized, be sure not to remove the front cover.
- Be sure not to operate the switches with wet hands.
- While the inverter is energized, be sure not to touch the inverter terminals even while the unit is not running.
- If the retry mode is selected, it may suddenly restart during the trip stop. Be sure not to approach the equipment. (Be sure) to design the equipment so that personnel safety will be secured even if equipment restarts.
- Even if the power supply is cut for a short period of time, the inverter may restart operation after the power supply is restored if the operation command is given. If a restart may incur danger to personnel, be sure to make a circuit so that it will not restart after power recovery.
- The stop key is valid only when a function is on. Ensure that there is a hardware emergency stop that is separate from the stop key of the inverter.
- With the operation command on, if the alarm reset is ordered, the inverter can restart suddenly. Be sure to set the alarm reset after checking the operation command is off.
- Be sure not to touch the inside of the energized inverter or to put a bar into it.



### CAUTION

- The cooling fins will have high temperature. Be sure not to touch them.
- Low to high speed operation of the inverter can be easily set. Be sure to operate it after checking the tolerance of the motor and machine.
- Install an external braking system if needed.
- If a motor is operated at a frequency higher than standard setting value(50Hz/60Hz), be sure to check the speeds of the motor and the machine from their manufacturers. After getting their consent, operate them.

## 4.1 Keypad overview

iMaster C1 inverter's digital operator is LED type. Please use attached LED operator for running.

### 4.1.1 Keypad description

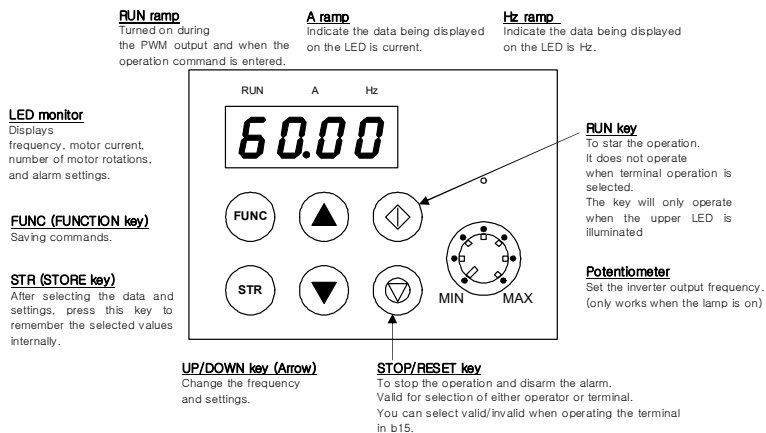


Figure 4-1 LED Keypad description

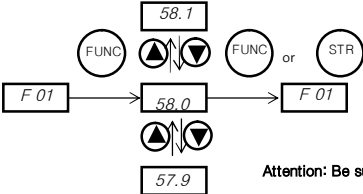
#### Initial keypad display description

Default mode of keypad display is d01 – output frequency of inverter. Enter b30, you can set the mode of display: d01~d13.

## 4.1.2 Keypad navigation

## 1) Keypad navigation

Table 4-1 Keypad navigation

| Key                                                                                                                                                                                                                                                                                              | Function description                                                                                                                                                                                      |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <br><br>Attention: Be sure press  for saving. | <p><b>[FUNC(FUNCTION key)]</b> . . . Use to switch mode to command saving, data setting, extension function and default mode. Pressing this key will change the display to the following at any time.</p> |
| <br>                                                                                                                           | <p><b>[RUN key]</b> . . . . . It executes the inverter to running.  determines a forward run or reverse run.</p>         |
| <br>                                                                                                                           | <p><b>[STOP/RESET key]</b> . . . It executes the inverter to stop. For trips, it reset the inverter.</p>                                                                                                  |
| <br><br><b>[UP key, DOWN key]</b> . . . . .Select the value of setting or command by moving key.                               |                                                                                                                                                                                                           |

※ Attention for STR key

If you want to store the data using STR key, please stay at least 6sec without any change or moving up/down key.

If you change anything such as key operations, reset operations, and power down before 6 seconds, the correct data may not be stored.

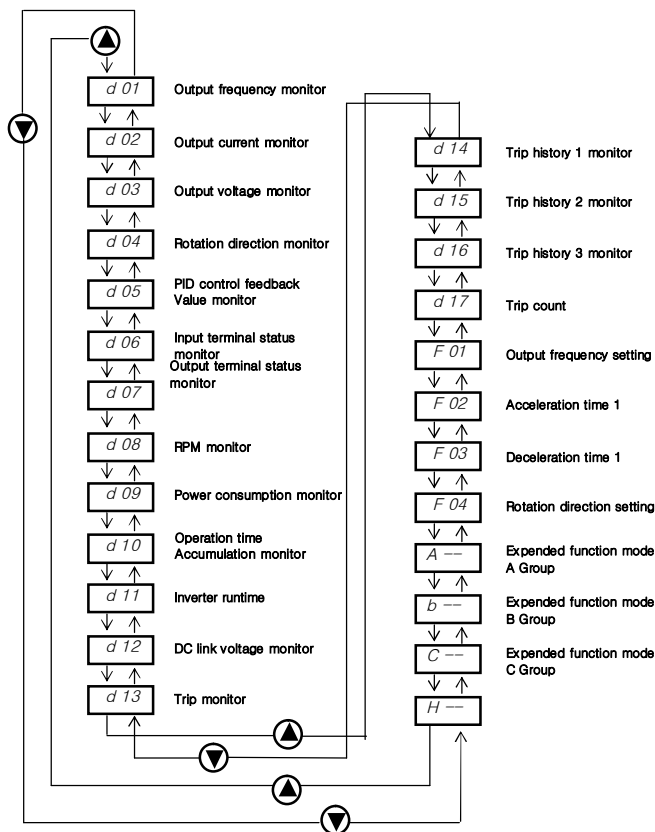


Figure 4-2 Up/Down key basic operation

## 2) Expanded function mode navigation

Using the ▲ / ▼ key to enter the expanded function mode, select expanded Function command NO. in **A--**, **b--**, **C--** and **H--** mode.

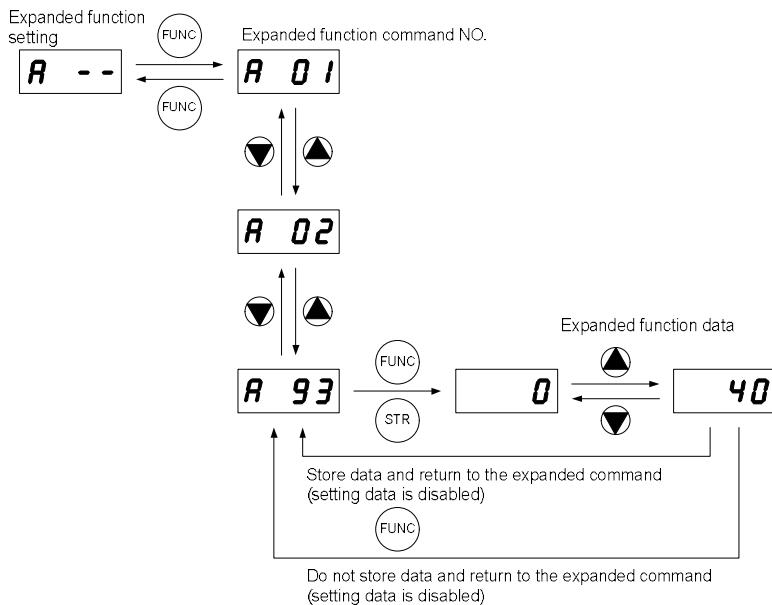


Figure 4-3 Expanded function mode navigation

### 3) Navigation example: Mode change with arrow keypad

(Change the way of frequency setting from potentiometer to up/down key.  
Running the inverter by up/down key operation)

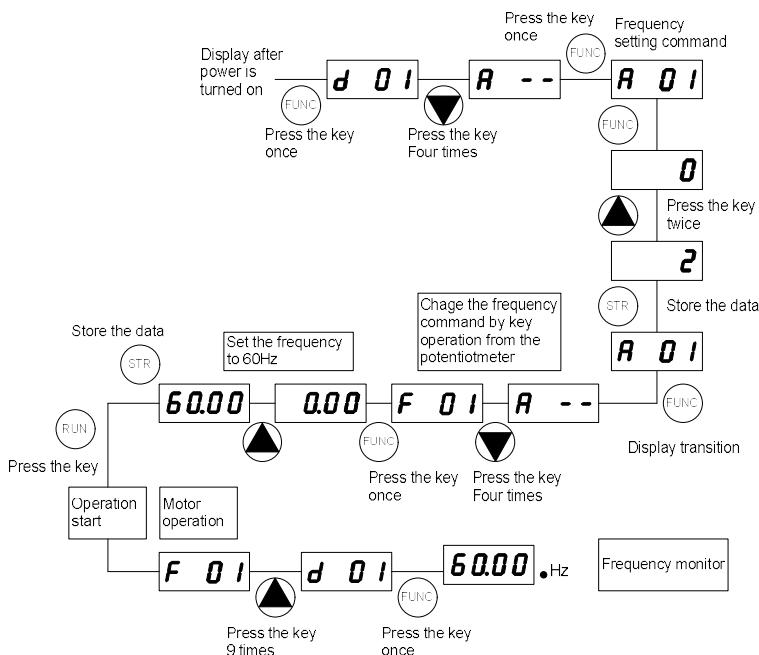


Figure 4-4 Navigation example: Mode change with arrow keypad

## 4.1.3 Shift key function

The "SHIFT" function is enabled to press both up and down key simultaneously. The left segment digit is blinked and if press store key, the blinked segment moves to the right digit.

When the 'store' key is pressed, it moved to the right digits again.

When the right most digit is blinked and press the 'store' key, it turned back to the function code display.

### 1. Display digit movement

- Press the UP key and Down key at the same time in data setting mode.
  - Change scroll mode to shift mode.

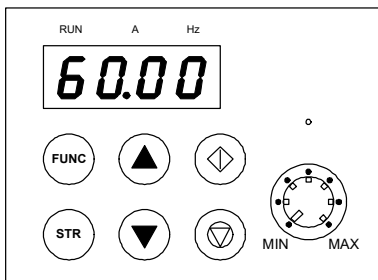


Figure 4-5 How to use Shift key

### 2. Data setting method

Stop in target group using UP/DOWN key → Press the function key, Change to data setting mode.

- 1) Press the UP key and DOWN key at the same time. → First number is flashing on the left
- 2) Change the data using UP/DOWN key → Press the Store-key → Third number is flashing.
- 3) Change the data using UP/DOWN key → Press the Store-key → Second number is flashing
- 4) Change the data using UP/DOWN key → Press the Store-key → First number is flashing
- 5) Change the data using UP/DOWN key → Press the Store-key → Target function code is setting



### 4.2 Frequency and run sources

In order to run the inverter, the run command source and frequency command source must be determined. Select one frequency command source and one run command source from list below and follow the instruction in the section referenced

#### 4.2.1 Control terminal operation

Connect external signal to control terminal then running the inverter with this signal. Start operation by operation command (FW, RV) after inverter turning on. However, there are 2 ways for setting the terminal frequency – run or frequency command, please select for each system.

For detailed specifications, refer to the control circuit terminal description (required for operation)

- 1) Run command: The inverter is run/stop by external signal inputs such as switches and relays. (Please refer 4-3)
- 2) Frequency command: Operating frequency is determined external signals 0 to 10V or 4 to 20mA. (Please refer 4-3)

#### 4.2.2 Digital keypad operation

Operation the inverter with mounted keypad – arrow key and potentiometer.

<Operation navigation>

1. Set frequency command source to potentiometer (A01=0)
2. Set run command source to standard operator (A02=0)
3. Press RUN button on the mounted operator, inverter will be run.
4. Change frequency using potentiometer.  
(If set A01=2, can change frequency with up/down key ▲▼.)

#### 4.2.3 Combination control terminal and digital keypad

Operation the inverter with combined way.

You can select the way of setting for frequency command and run command each.

#### 4.2.4 Communication (RS-485) operation

The inverter can be driven by a communication command from an external control device, such as a PLC. You can also control the inverter through the optional Remote Operator (ROP).

See '6. Communication Functions' for details.

### 4.3 Test run

This is an example of a common connection. If you prefer to use digital operator, please refer to detailed use of the digital operator.

#### 4.3.1 To input the operation setting and the frequency setting from the terminal

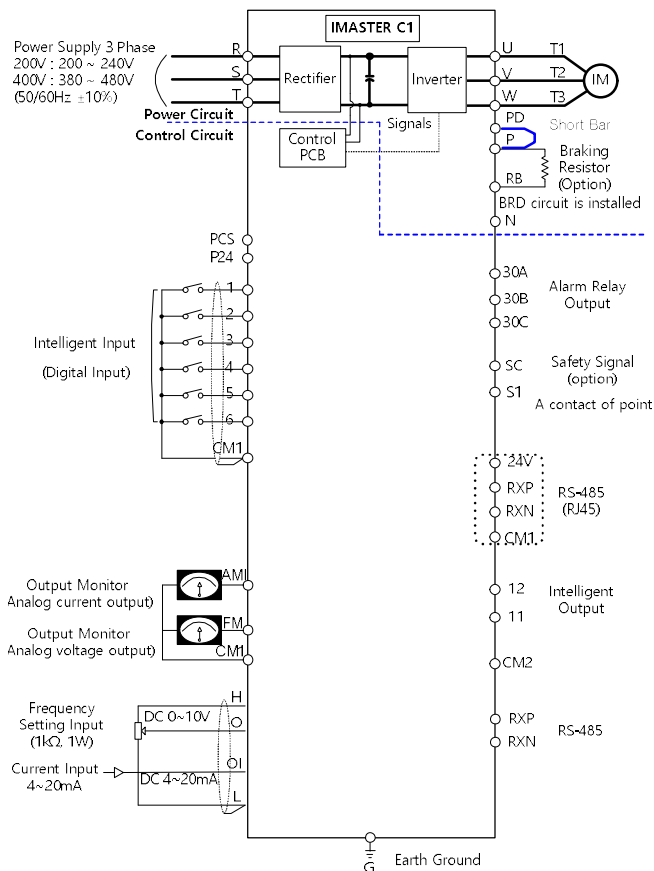


Figure 4-6 Setting diagram from the terminal

### <Procedure>

**(1) Please make sure that the connections are secured correctly.**

- Connect the power supply to R(L1), S(L2), T(L3)
- Connect the motor to U(T1), V(T2), W(T3)

**(2) Turn on power supply to the inverter**

- Please make sure the operator should illuminate.

**(3) Set the terminal with the frequency setting selection.**

- Set A01 as the indication code, press the **FUNC** once. (Code values are shown)
- Set 1 with **A**, press the **STR** once to set the operation setting for the operator.  
(Indication code turns back to A01)

**(4) Set terminal with the operation setting selection.**

- Set A02 as indication code, press the **FUNC** once.
- Set 1 with the **Δ V** key, press the **STR** key once to set the operation setting for the operator.  
(Indication code turns back to A02.)

**(5) Set monitor mode**

- When monitoring the output frequency, set indication code to d01.  
Or when monitoring the operation direction, set indication code to d04.

**(6) Input start operation setting**

- Turn on between [FW] and [CM1] of terminal.  
(Run command to the inverter)
- Apply voltage [O] and [L] of terminal to start operation.  
(Frequency command to the inverter)

**(7) Input stop operation setting.**

- Turn OFF between [FW (1)] and [CM1] to slowly stop.

## 4.3.2 Operation setting and the frequency setting from the digital operator

(Remote operator is also same use.)

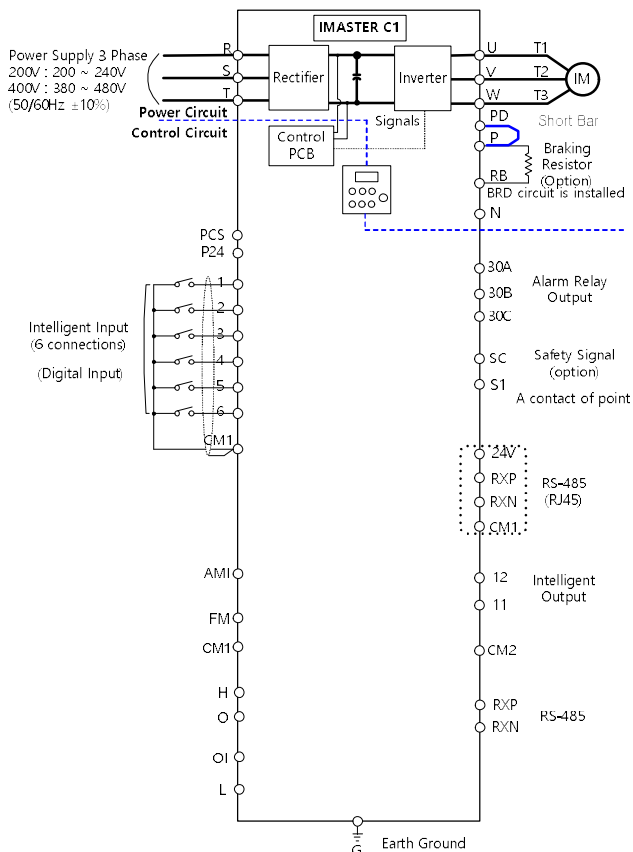


Figure 4-7 Setting diagram from the digital operator

### <Procedure>

**(1) Please make sure that the connections are secured correctly.**

- Connect the power supply to R(L1), S(L2), T(L3)
- Connect the motor to U(T1), V(T2), W(T3)

**(2) Turn on power supply to the inverter.**

- Please make sure the operator should illuminate.

**(3) Set the operator with the frequency setting selection.**

- Set A01 as indication code, press the **FUNC** key once. (Code values are shown.)
- Set 2 with **▲** key (In case of remote is 3), press **STR** key once to set the operation setting for the operator. (Indication code turns back to A01.)

**(4) Set the operator with the operation setting selection.**

- Set A02 as the indication code, and set 2. Press **STR** key to set the operation setting.

**(5) Set the output frequency.**

- Set F01 as indication code, and pressing **FUNC** key once. (Code values are shown.)
- Set to the desired output frequency with **▲**, **▼** key, press **STR** key once to store it.

**(6) Set Monitor mode.**

- When monitoring the output frequency, set indication code to d01.  
Or when monitoring the operation direction, set indication code to d04.

**(7) Press the **RUN** key to start operating.**

- "Run" lamp turns on a light.

**(8) Press the **STOP** key to decelerate to a stop.**

- When the frequency returns to 0, the RUN lamp light will switch off.

- Check whether there is no trip, number of turns, and frequency meter are correct during operation.
- Set the accel/decel time longer, when an over-current trip or over-voltage trip occurs.

## 5. PARAMETERS

### 5.1 Monitoring (d group)

Table 5-1 Monitor mode (d group)

| Func-code | Name                                | Description                                            |
|-----------|-------------------------------------|--------------------------------------------------------|
| d01       | Output frequency monitor            | Display of output frequency                            |
| d02       | Output current monitor              | Display of output current                              |
| d03       | Output voltage monitor              | Display of output voltage                              |
| d04       | DC link voltage                     | Display of DC link voltage                             |
| d05       | Rotation direction monitor          | Display of direction of operation                      |
| d06       | PID feedback monitor                | Displays the scaled PID process variable (%)           |
| d07       | Intelligent input terminal monitor  | Displays the state of the intelligent input terminals  |
| d08       | Intelligent output terminal monitor | Displays the state of the intelligent output terminals |
| d09       | RPM monitor                         | Display of output RPM                                  |
| d10       | Power consumption monitor           | Display of power consumption                           |
| d11       | Operation accumulated time(day)     | Display of cumulative time (day)                       |
| d12       | Operation accumulated time (minute) | Display of cumulative time (minute)                    |

### 5.2 Trip monitor (d group)

Table 5-2 Trip monitor mode (d group)

| Func-code | Name                        | Description                            |
|-----------|-----------------------------|----------------------------------------|
| d13       | Trip event monitor          | Display the current trip event         |
| d14       | Trip history 1 monitor      | Display the previous first trip event  |
| d15       | Trip history 2 monitor      | Display the previous second trip event |
| d16       | Trip history 3 monitor      | Display the previous third trip event  |
| d17       | Trip count                  | Displays the trip accumulation count   |
| d18       | Inverter S/W version        | Display software version of inverter   |
| d19       | Fan operation time (day)    | Display fan accumulation time (day)    |
| d20       | Fan operation time (minute) | Display fan accumulation time (minute) |

### 5.3 Basic function (F group)

Table 5-3 Basic function mode (F group)

| Func-code | Name                         | Range                                                                         | Defaults | Runtime edit |
|-----------|------------------------------|-------------------------------------------------------------------------------|----------|--------------|
| F01       | Output frequency setting     | 0.00~400.0[Hz]<br>Sensorless 0.00~300.0 [Hz]                                  | 0.00Hz   | ○            |
| F02       | Acceleration time 1 setting  | 0.0 ~ 6000.0 [sec]                                                            | 5.0 sec  | ○            |
| F03       | Deceleration time 1 setting  | 0.0 ~ 6000.0 [sec]                                                            | 10.0 sec | ○            |
| F04       | Rotation direction setting   | 0 - Forward<br>1 - Reverse                                                    | 0        | X            |
| F05       | Rotation direction selection | 0 - Enable both way (FW and RV)<br>1 - Disable forward<br>2 - Disable reverse | 0        | X            |
| F06       | Define custom display        | 0 ~ 65535                                                                     | 1.0      | ○            |

## 5.4 Extended function A mode (A group)

Table 5-4 Extended function A mode (A group)

| Func-code                                                 | Name                                           | Range                                                                                                                                                                                                                                                         | Defaults | Runtime edit |  |
|-----------------------------------------------------------|------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|--------------|--|
| <b>Basic parameter setting</b>                            |                                                |                                                                                                                                                                                                                                                               |          |              |  |
| A01                                                       | Frequency command (Multi-speed command method) | 0 – Keypad potentiometer<br>1 – Control terminal input<br>2 – Standard operator<br>3 – Remote operator (1 <sup>st</sup> communication – RJ45)<br>4 – Remote operator (2 <sup>nd</sup> communication – terminal)<br>5 – Option<br>6 – Potentiometer and remote | 1        | X            |  |
| A02                                                       | Run command                                    | 0 – Standard operator<br>1 – Control terminal input<br>2 – Remote operator (RJ45)<br>3 – Remote operator (Terminal)<br>4 – Option                                                                                                                             | 1        | X            |  |
| A03                                                       | Base frequency setting                         | 0.00 ~ Max. frequency(A04) [Hz]                                                                                                                                                                                                                               | 60.00Hz  | X            |  |
| A04                                                       | Maximum frequency setting                      | Base frequency (A03) ~ 400 [Hz]<br>In case of sensorless vector (A31=2),<br>Base frequency (A03) ~ 300 [Hz]                                                                                                                                                   | 60.00Hz  | X            |  |
| <b>Analog Input Settings (External frequency setting)</b> |                                                |                                                                                                                                                                                                                                                               |          |              |  |
| A05                                                       | External frequency setting start (O, Ol)       | 0.00 ~ Max. frequency (A04) [Hz]                                                                                                                                                                                                                              | 0.00Hz   | X            |  |
| A06                                                       | External frequency Setting end (O, Ol)         | 0.00 ~ Max. frequency (A04) [Hz]                                                                                                                                                                                                                              | 0.00Hz   | X            |  |
| A07                                                       | External frequency start rate setting (O, Ol)  | 0.0~100.0 [%]                                                                                                                                                                                                                                                 | 0.0%     | X            |  |
| A08                                                       | External frequency start rate setting (O, Ol)  | 0.0~100.0 [%]                                                                                                                                                                                                                                                 | 100.0%   | X            |  |
| A09                                                       | External frequency start pattern setting       | 0 – Start at start frequency (A05)<br>1 – Start at 0 Hz                                                                                                                                                                                                       | 0        | X            |  |
| A10                                                       | External frequency sampling setting            | 1~5000                                                                                                                                                                                                                                                        | 10       | X            |  |



| Func-code                            | Name                                  | Range                                                                                                                                                      | Defaults                                                                                                                        | Runtime edit |  |
|--------------------------------------|---------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|--------------|--|
| <b>Multi-speed Frequency Setting</b> |                                       |                                                                                                                                                            |                                                                                                                                 |              |  |
| A11 ~ A25                            | Multi-speed frequency setting         | 0.00 ~ Max. frequency (A04) [Hz]                                                                                                                           | speed1:5Hz<br>speed2:10Hz<br>speed3:15Hz<br>speed4:20Hz<br>speed5:30Hz<br>speed6:40Hz<br>speed7:50Hz<br>speed8:60Hz<br>etc. 0Hz | ○            |  |
| A26                                  | Jogging frequency setting             | 0.50~10.00 [Hz]                                                                                                                                            | 0.50Hz                                                                                                                          | ○            |  |
| A27                                  | Jogging stop operation selection      | 0 – Free-run stop<br>1 – Deceleration stop<br>(depending on deceleration time)<br>2 – DC injection braking stop<br>(necessary to set DC injection braking) | 0                                                                                                                               | X            |  |
| <b>V/F Characteristics</b>           |                                       |                                                                                                                                                            |                                                                                                                                 |              |  |
| A28                                  | Torque boost mode selection           | 0 – Manual torque boost<br>1 – Automatic torque boost<br>* For use automatic torque boost, Need to set for motor (H group)                                 | 0                                                                                                                               | X            |  |
| A29                                  | Manual torque boost Setting (forward) | 0.0~50.0 [%]                                                                                                                                               | (Note 1)                                                                                                                        | ○            |  |
| A30                                  | Manual torque boost Setting (reverse) | 0.0~100.0 [%]                                                                                                                                              | 100.0%                                                                                                                          | ○            |  |
| A31                                  | V/F characteristic curve selection    | 0 – Constant torque<br>1 – Reduced torque<br>(reduction of the 1.7thpower)<br>2 – Sensorless vector control<br>3 – VF_USER                                 | 0                                                                                                                               | X            |  |
| A32                                  | V/F gain setting                      | 20.0~110.0 [%]                                                                                                                                             | 100.0%                                                                                                                          | ○            |  |

(Note 1) Depends on inverter power range

200V Class – 5.5kW:4.9[%], 7.5kW:4.4[%], 11kW:3.5[%], 15kW:2.8[%]

400V Class – 5.5kW:4.9[%], 7.5kW:4.4[%], 11kW:3.5[%], 15kW:2.8[%], 18.5kW:2.5[%], 22kW:2.5[%]

| Func-code                            | Name                                            | Range                                                   | Defaults | Runtime edit |  |
|--------------------------------------|-------------------------------------------------|---------------------------------------------------------|----------|--------------|--|
| <b>DC Injection Braking Settings</b> |                                                 |                                                         |          |              |  |
| A33                                  | DC injection braking function selection         | 0 – Disable<br>1 – Enable                               | 0        | X            |  |
| A34                                  | DC injection braking Frequency setting          | 0.50~10.00 [Hz]                                         | 0.50Hz   | X            |  |
| A35                                  | DC injection braking output delay time setting  | 0.0~5.0 [sec]                                           | 0.0 sec  | X            |  |
| A36                                  | DC injection braking force setting              | 0.0~100.0 [%]                                           | (Note2)  | X            |  |
| A37                                  | DC injection braking time setting               | 0.0~10.0 [sec]                                          | 0.0 sec  | X            |  |
| <b>Frequency-related Functions</b>   |                                                 |                                                         |          |              |  |
| A38                                  | Frequency upper limit setting                   | Frequency lower limit (A39) ~ Max. frequency (A04) [Hz] | 0.00Hz   | X            |  |
| A39                                  | Frequency lower limit setting                   | 0.00~Frequency upper limit (A38) [Hz]                   | 0.00Hz   | X            |  |
| A40<br>A42<br>A44                    | Jump(center)frequency setting                   | 0.00~ Max. frequency (A04) [Hz]                         | 0.00Hz   | X            |  |
| A41<br>A43<br>A45                    | Jump(hysteresis) frequency width setting        | 0.00~10.00 [Hz]                                         | 0.00Hz   | X            |  |
| A46                                  | Manual torque boost (Reverse)                   | 0.0~50.0[%]                                             | (Note 3) | O            |  |
| A47                                  | Manual torque boost Frequency setting (Reverse) | 0.0~100.0[%]                                            | 100.0%   | O            |  |

(Note 2) 50.0% ( $\leq 22\text{kW}$ )

(Note 3) Depends on inverter power range

200V Class – 5.5kW:4.9[%], 7.5kW:4.4[%], 11kW:3.5[%], 15kW:2.8[%]

400V Class – 5.5kW:4.9[%], 7.5kW:4.4[%], 11kW:3.5[%], 15kW:2.8[%], 18.5kW:2.5[%], 22kW:2.5[%]

| Func-code                                             | Name                                                           | Range                                                                             | Defaults | Runtime edit |  |
|-------------------------------------------------------|----------------------------------------------------------------|-----------------------------------------------------------------------------------|----------|--------------|--|
| <b>Automatic Voltage Regulation (AVR) Function</b>    |                                                                |                                                                                   |          |              |  |
| A52                                                   | AVR function selection                                         | 0 – Constant ON<br>1 – Constant OFF<br>2 – OFF during deceleration                | 2        | X            |  |
| A53                                                   | Motor input voltage setting                                    | 200V Class –80~240V<br>400V Class –160~500V                                       | (Note 4) | X            |  |
| <b>Second Acceleration and Deceleration Functions</b> |                                                                |                                                                                   |          |              |  |
| A54                                                   | Second acceleration time setting                               | 0.0~6000 [sec]                                                                    | 30.0 sec | ○            |  |
| A55                                                   | Second deceleration time setting                               | 0.0~6000 [sec]                                                                    | 30.0 sec | ○            |  |
| A56                                                   | Two stage acc1/dece1 switching method selection                | 0 – 2CH input from terminal<br>1 – Transition frequency from acc/dec1 to acc/dec2 | 0        | X            |  |
| A57                                                   | Acc1 to Acc2 frequency transition point <sup>note5</sup>       | 0.00~Max. frequency (A04) [Hz]                                                    | 0.00Hz   | X            |  |
| A58                                                   | Decel 1 to Decel 2 frequency transition point <sup>note5</sup> | 0.00~Max. frequency (A04) [Hz]                                                    | 0.00Hz   | X            |  |
| A59                                                   | Acceleration curve selection                                   | 0 – Linear<br>1 – S curve<br>2 – U curve                                          | 0        | X            |  |
| A60                                                   | Deceleration curve setting                                     | 0 – Linear<br>1 – S curve<br>2 – U curve                                          | 0        | X            |  |
| <b>Others</b>                                         |                                                                |                                                                                   |          |              |  |
| A61                                                   | Input voltage offset setting                                   | -10.0~10.0 [%]                                                                    | 0.0%     | ○            |  |
| A62                                                   | Input voltage gain setting                                     | 0.0~200.0 [%]                                                                     | 100.0%   | ○            |  |
| A63                                                   | Input current offset setting                                   | -10.0~10.0 [%]                                                                    | 0.0%     | ○            |  |
| A64                                                   | Input current gain setting                                     | 0.0~200.0 [%]                                                                     | 100.0%   | ○            |  |
| A65                                                   | FAN operation mode                                             | 0 – Always ON<br>1 – ON in the run time                                           | 0        | X            |  |

(Note 4) LF/LFP: 220V, 055HF/075HFP~220HF/300HFP: 380V

(Note 5) If the acceleration and deceleration times are set to a value less than or equal to 1 second, the saving frequency will be inaccurate.

| Func-code                    | Name                                        | Range                                                                                                                                                                                       | Defaults | Runtime edit |  |
|------------------------------|---------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|--------------|--|
| <b>S curve ratio setting</b> |                                             |                                                                                                                                                                                             |          |              |  |
| A66                          | S curve start ratio setting of acceleration | 0.0~100.0[%]                                                                                                                                                                                | 50.0%    | ○            |  |
| A67                          | S curve stop ratio setting of acceleration  | 0.0~100.0[%]                                                                                                                                                                                | 50.0%    | ○            |  |
| A68                          | S curve start ratio setting of deceleration | 0.0~100.0[%]                                                                                                                                                                                | 50.0%    | ○            |  |
| A69                          | S curve stop ratio setting of deceleration  | 0.0~100.0[%]                                                                                                                                                                                | 50.0%    | ○            |  |
| <b>PID Control</b>           |                                             |                                                                                                                                                                                             |          |              |  |
| A70                          | PID Function selection                      | 0 - PID control disable<br>1 - PID control enable<br>2 - F/F control enable                                                                                                                 | 0        | X            |  |
| A71                          | PID Reference                               | 0.00 ~ 100.00 [%]                                                                                                                                                                           | 0.00%    | ○            |  |
| A72                          | PID Reference source                        | 0 - Keypad potentiometer<br>1 - Control terminal input<br>2 - Standard operator<br>3 - Remote operator (RJ45)<br>4 - Remote operator (Terminal)<br>5 - Option<br>6 - Potentiometer and RJ45 | 6        | X            |  |
| A73                          | PID Feed-back source                        | 0 - Current input (OI)<br>1 - Voltage input (O)                                                                                                                                             | 0        | X            |  |
| A74                          | PID P gain                                  | 0.1 ~ 1000.0 [%]                                                                                                                                                                            | 100.0%   | ○            |  |
| A75                          | PID I gain                                  | 0.0 ~ 3600.0 [sec]                                                                                                                                                                          | 1.0sec   | ○            |  |
| A76                          | PID D gain                                  | 0.00 ~ 10.00 [sec]                                                                                                                                                                          | 0.00sec  | ○            |  |
| A77                          | PID Err limit                               | 0.0 ~ 100.0 [%]                                                                                                                                                                             | 100.0%   | ○            |  |
| A78                          | PID Output high limit                       | PID Output low limit (A79)<br>~ 100.0 [%]                                                                                                                                                   | 100.0%   | ○            |  |

| Func-code | Name                     | Range                                                           | Defaults | Runtime edit |
|-----------|--------------------------|-----------------------------------------------------------------|----------|--------------|
| A79       | PID Output low limit     | ~100.0 ~ PID Output high limit (A78) [%]                        | 0.0%     | ○            |
| A80       | PID Output reverse       | 0 - PID output reverse disable<br>1 - PID output reverse enable | 0        | X            |
| A81       | PID scale factor         | 0.1 ~ 1000.0 [%]                                                | 100.0%   | X            |
| A82       | Pre PID frequency        | 0.00 ~ Max. frequency(A04) [Hz]                                 | 0.00Hz   | X            |
| A83       | Sleep frequency          | 0.00 ~ Max. frequency(A04) [Hz]                                 | 0.00Hz   | X            |
| A84       | Sleep/wake up delay time | 0.0 ~ 30.0 [sec]                                                | 0.0sec   | X            |
| A85       | Wake up frequency        | 0.00 ~ Max. frequency(A04) [Hz]                                 | 0.00Hz   | X            |

#### Set user V/F pattern ratio

|     |                              |                                                               |         |   |
|-----|------------------------------|---------------------------------------------------------------|---------|---|
| A86 | User V/F setting frequency 1 | 0 ~ V/F setting frequency 2 (A88)                             | 15.00Hz | X |
| A87 | User V/F setting voltage 1   | 0 ~ V/F setting voltage 2 (A89)                               | 25.0%   | X |
| A88 | User V/F setting frequency 2 | V/F setting frequency 1 (A86) ~ V/F setting frequency 3 (A90) | 30.00Hz | X |
| A89 | User V/F setting voltage 2   | V/F setting voltage 1 (A87) ~ V/F setting voltage 3 (A91)     | 50.0%   | X |
| A90 | User V/F setting frequency 3 | V/F setting frequency 2 (A88) ~ V/F setting frequency 4 (A92) | 45.00Hz | X |
| A91 | User V/F setting voltage 3   | V/F setting voltage 2 (A89) ~ V/F setting voltage 4 (A93)     | 75.0%   | X |
| A92 | User V/F setting frequency 4 | V/F setting frequency 3 (A90) ~ Max. frequency (A04)          | 60.00Hz | X |
| A93 | User V/F setting voltage 4   | V/F setting voltage 3 (A91) ~ 100.0 [%]                       | 100.0%  | X |

## 5.5 Extended function b mode (b group)

Table 5-5 Extended function b mode (b group)

| Func-code                         | Name                                                          | Range                                                                                                                                                                                                    | Defaults            | Runtime edit |  |
|-----------------------------------|---------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|--------------|--|
| <b>Restart Mode</b>               |                                                               |                                                                                                                                                                                                          |                     |              |  |
| b01                               | Selection of restart mode                                     | 0 – Alarm output after trip<br>1 – Restart at 0Hz<br>2 – Resume operation after frequency matching<br>3 – Resume previous freq. after freq. matching, then decelerate to stop.<br>And display trip info. | 0                   | X            |  |
| b02                               | Allowable instantaneous power failure time setting            | 1.0~10.0 [sec]                                                                                                                                                                                           | 2.0 sec<br>(Note 6) | X            |  |
| b03                               | Reclosing standby after instantaneous power failure recovered | 0.3~10 [sec]                                                                                                                                                                                             | 1.0 sec             | X            |  |
| <b>Electronic Thermal Setting</b> |                                                               |                                                                                                                                                                                                          |                     |              |  |
| b04                               | Electronic thermal level setting                              | Motor rated current x 20.0%~ 120.0%                                                                                                                                                                      | 100.0%              | X            |  |
| b05                               | Electronic thermal characteristic, selection                  | 0 – Cooling fan is mounted on the motor shaft (Self-cool)<br>1 – Cooling fan is powered by external source (Forced-cool)                                                                                 | 1                   | X            |  |
| <b>Overload Restriction</b>       |                                                               |                                                                                                                                                                                                          |                     |              |  |
| b06                               | Overload overvoltage Restriction mode selection               | 0 – Overload restriction mode OFF<br>1 – Overload restriction mode ON<br>* Overvoltage setting is b67                                                                                                    | 1                   | X.           |  |
| b07                               | Overload restriction level setting (constant speed)           | Set Between 20%~200% of rated current of inverter HD: 20.0%~ 200.0%<br>ND: 20.0%~ 165.0%<br>* If there is speed change, you can set at b49                                                               | HD:180%<br>ND:150%  | X            |  |
| b08                               | Overload restriction constant setting                         | 0.1~10.0 [sec]                                                                                                                                                                                           | 10.0 sec            | X            |  |

(Note 6) Allowable instantaneous power failure time is depending on machine or load conditions. So, please check and verification test before using.

| Func-code     | Name                                        | Range                                                                                                                                                                                                                                                                                                                                                                             | Defaults | Runtime edit |  |
|---------------|---------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|--------------|--|
| <b>Others</b> |                                             |                                                                                                                                                                                                                                                                                                                                                                                   |          |              |  |
| b09           | Software lock mode selection                | 0 – All parameters locked<br>(Except b09, when SFT from terminal is on)<br>1 – All parameters locked<br>(Except b09 and F01, when SFT from terminal is ON)<br>2 – All parameters locked<br>(Except b09, when function set)<br>3 – All parameters locked<br>(Except b09 and F01, when function set)<br>4 – All parameters locked<br>(Except b09, F01, F02, F03, when function set) | 0        | X            |  |
| b10           | Start frequency Adjustment                  | 0.50~10.00 [Hz]                                                                                                                                                                                                                                                                                                                                                                   | 0.50Hz   | X            |  |
| b11           | Carrier frequency setting                   | 1.0~10.0[kHz] (5.5kW~22kW)                                                                                                                                                                                                                                                                                                                                                        | 5.0kHz   | ○            |  |
| b12           | Initialization mode                         | 0 – Trip history clear<br>1 – Parameter initialization                                                                                                                                                                                                                                                                                                                            | 0        | X            |  |
| b13           | Country code for initialization             | 0 – Korean version<br>1 – Europe version<br>2 – US version                                                                                                                                                                                                                                                                                                                        | 0        | X            |  |
| b14           | RPM conversion factor setting               | 0.01~99.99                                                                                                                                                                                                                                                                                                                                                                        | 1.00     | ○            |  |
| b15           | STOP key validity during terminal operation | 0 – STOP enable<br>1 – STOP disable                                                                                                                                                                                                                                                                                                                                               | 0        | X            |  |
| b16           | Resume on FRS cancellation mode             | 0 – Restart from 0Hz<br>1 – Restart from frequency detected from real speed of motor                                                                                                                                                                                                                                                                                              | 0        | X            |  |
| b17           | Communication number                        | 1~32 [count]                                                                                                                                                                                                                                                                                                                                                                      | 1        | X            |  |
| b18           | Ground fault setting<br>(Note7)             | 0.0~100.0 [%]<br>0 – Do not detect ground fault.                                                                                                                                                                                                                                                                                                                                  | 0.0%     | X            |  |

(Note 7) Below 22kW, disable ground fault setting. (value is always 0)  
 Upper 30kW, able to use as above range.

| Func-code | Name                                                                  | Range                                                                                                                                                                                                               | Defaults | Runtime edit          |  |
|-----------|-----------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|-----------------------|--|
| b19       | Speed Search Current Suppression Level                                | 0.0~30.0[sec]                                                                                                                                                                                                       | 2.0 sec  | <input type="radio"/> |  |
| b20       | Voltage increase Level during Speed Search                            | 0.1~10.0[sec]                                                                                                                                                                                                       | 1.0 sec  | <input type="radio"/> |  |
| b23       | Frequency match operation selection                                   | 0 - 0Hz Starting operation<br>1 - Frequency matching & start operation                                                                                                                                              | 0        | <input type="radio"/> |  |
| b24       | Failure status output selection by relay in case of failure           | 0 - Inactive at low voltage failure<br>1 - Active at voltage failure (Inactive at restart mode)<br>2 - Active of all failure occurred<br>3 - Active at voltage failure (For low voltage failure, automatic restart) | 0        | <input type="radio"/> |  |
| b25       | Stop method selection                                                 | 0 - Decelerating stop<br>1 - Free run stop                                                                                                                                                                          | 0        | <input type="radio"/> |  |
| b26       | Inverter type change to P-type (Normal Duty)                          | 0 - Heavy Duty (Standard Type)<br>1 - Normal Duty (P-Type)                                                                                                                                                          | 0        | X                     |  |
| b27       | Input phase loss                                                      | 0~30 [sec]<br>0 - Disable                                                                                                                                                                                           | 10 sec   | <input type="radio"/> |  |
| b28       | Communication time out setting                                        | 0~60 [sec]<br>0 - Disable                                                                                                                                                                                           | 0 sec    | <input type="radio"/> |  |
| b29       | Communication time out operation mode                                 | 0 - Always active<br>1 - Active in case of inverter is running                                                                                                                                                      | 0        | <input type="radio"/> |  |
| b30       | Display code setting                                                  | 1~13                                                                                                                                                                                                                | 1        | <input type="radio"/> |  |
| b31       | 2 <sup>nd</sup> communication channel 485 communication speed setting | 1 - 2400 [bps]<br>2 - 4800 [bps]<br>3 - 9600 [bps]<br>4 - 19200 [bps]<br>5 - 38400 [bps]                                                                                                                            | 3        | <input type="radio"/> |  |



| Func-code                                     | Name                                                      | Range                                                                | Defaults           | Runtime edit |  |
|-----------------------------------------------|-----------------------------------------------------------|----------------------------------------------------------------------|--------------------|--------------|--|
| <b>BRD (Dynamic braking) Function</b>         |                                                           |                                                                      |                    |              |  |
| b32                                           | BRD selection                                             | 0 – Disable<br>1 – Enable only during inverter running<br>2 – Enable | 1                  | X            |  |
| b33                                           | BRD using ratio                                           | 0~50 [%] (5.5kW~22kW)                                                | 10%                | X            |  |
| <b>Overvoltage Suppression (OVS) Function</b> |                                                           |                                                                      |                    |              |  |
| b34                                           | Maximum OVS output frequency                              | 0.00~300.00 [Hz]                                                     | 20.00Hz            | O            |  |
| b35                                           | OVS P gain                                                | 0~100.00 [%]                                                         | 10.00%             | O            |  |
| b36                                           | OVS I gain                                                | 0~100.00 [%]                                                         | 1.00%              | O            |  |
| b37                                           | OVS D gain                                                | 0~100.00 [%]                                                         | 1.00%              | O            |  |
| b38                                           | Q axis reference                                          | -100.0~100.0                                                         | 0                  | O            |  |
| b39                                           | Filter bandwidth                                          | 0~1000                                                               | 1                  | O            |  |
| b40                                           | Overvoltage suppression                                   | 0 – Disable<br>1 – Enable for current<br>2 – Enable for voltage      | 0                  | O            |  |
| b41                                           | Limit Time                                                | 0.0~100.0 [sec]                                                      | 0.5 sec            | O            |  |
| <b>DC Injection Braking</b>                   |                                                           |                                                                      |                    |              |  |
| b42                                           | VFD start delay time after DC Injection braking           | 0.0~60.0 [sec]                                                       | 0.0 sec            | X            |  |
| b43                                           | DC Injection braking time at start                        | 0.0~6000.0[sec]                                                      | 0.0 sec            | O            |  |
| b44                                           | Current controller P gain in DC braking                   | 0~100.00 [%]                                                         | 5.00%              | O            |  |
| b45                                           | Current controller I Gain time in DC braking              | 0~100.00 [%]                                                         | 5.00%              | O            |  |
| b46                                           | DC Injection braking force                                | 0.0~100.0[%] of inverter rated current                               | 50.0%              | O            |  |
| <b>Overload Restriction</b>                   |                                                           |                                                                      |                    |              |  |
| b49                                           | Overload restriction level at acceleration & deceleration | HD: 20.0%~ 200.0%<br>ND: 20.0%~ 165.0%                               | HD:180%<br>ND:150% | O            |  |

| Func-code                            | Name                                   | Range                                                                                                                                                                                                                                                 | Defaults | Runtime edit |  |
|--------------------------------------|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|--------------|--|
| <b>Droop Control function</b>        |                                        |                                                                                                                                                                                                                                                       |          |              |  |
| b50                                  | Droop control start freq.              | 0.00 ~ Max. frequency (A04) [Hz]                                                                                                                                                                                                                      | 0.00Hz   | O            |  |
| b51                                  | Droop control standard freq.           | 10.00 ~ Max. frequency (A04) [Hz]                                                                                                                                                                                                                     | 60.00Hz  | O            |  |
| b52                                  | Droop control gain                     | 0.00~50.00 [%]                                                                                                                                                                                                                                        | 5.00%    | O            |  |
| b53                                  | Droop star torque                      | 0.0~100.0 [%]                                                                                                                                                                                                                                         | 0.0%     | O            |  |
| b54                                  | Droop acceleration time                | 1.0~100.0 [sec]                                                                                                                                                                                                                                       | 20sec    | O            |  |
| b55                                  | Droop control mode                     | 0 – Disable<br>1 – Enable                                                                                                                                                                                                                             | 0        | O            |  |
| <b>Motor Load Detection Function</b> |                                        |                                                                                                                                                                                                                                                       |          |              |  |
| b56                                  | Motor load detection selection         | 0 – Disable<br>1 – Overload detection<br>2 – Underload detection<br>3 – Overload/Underload detection<br>4 – Overload detection with fault (E23)<br>5 – Underload detection with fault (E24)<br>6 – Overload/Underload detection with fault (E23, E24) | 0        | X            |  |
| b57                                  | Motor overload detection level         | 20.0~200.0 [%] of motor rated current                                                                                                                                                                                                                 | 100.0%   | X            |  |
| b58                                  | Motor underload detection level        | 20.0~200.0 [%] of motor rated current                                                                                                                                                                                                                 | 100.0%   | X            |  |
| b59                                  | Overload/Underload detection time      | 0.0~60.0 [sec]                                                                                                                                                                                                                                        | 10.0sec  | X            |  |
| b60                                  | Overload/Underload detection safe zone | 0.00 ~ Max. frequency (A04) [Hz]                                                                                                                                                                                                                      | 0.00Hz   | X            |  |
| <b>Dwell Function</b>                |                                        |                                                                                                                                                                                                                                                       |          |              |  |
| b61                                  | Dwell frequency at start               | 0.00 ~ Max. frequency (A04) [Hz]                                                                                                                                                                                                                      | 0.00Hz   | O            |  |
| b62                                  | Dwell time at start                    | 0.0~10.0 [sec]                                                                                                                                                                                                                                        | 0.0sec   | O            |  |
| b63                                  | Dwell frequency at stop                | 0.00 ~ Max. frequency (A04) [Hz]                                                                                                                                                                                                                      | 0.00Hz   | O            |  |
| b64                                  | Dwell time at stop                     | 0.0~10.0 [sec]                                                                                                                                                                                                                                        | 0.0sec   | O            |  |

| Func-<br>code                  | Name                        | Range                                                                                                                                                                                                                                                                                                                                                                                                        | Defaults | Runtime<br>edit |  |
|--------------------------------|-----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|-----------------|--|
| <b>KEB Function</b>            |                             |                                                                                                                                                                                                                                                                                                                                                                                                              |          |                 |  |
| b65                            | KEB control selection       | 0 – Disable<br>1 – Enable                                                                                                                                                                                                                                                                                                                                                                                    | 0        | X               |  |
| b66                            | KEB control gain            | 0.1~100.0[%]                                                                                                                                                                                                                                                                                                                                                                                                 | 10.0%    | X               |  |
| <b>Overcurrent Restriction</b> |                             |                                                                                                                                                                                                                                                                                                                                                                                                              |          |                 |  |
| b67                            | Overcurrent selection       | 0 – Disable<br>1 – Enable                                                                                                                                                                                                                                                                                                                                                                                    | 1        | X               |  |
| b68                            | Overcurrent time at running | 0.0~60.0 [sec]                                                                                                                                                                                                                                                                                                                                                                                               | 0.0sec   | O               |  |
| b69                            | Stop frequency setting      | 0.00 ~ Max. frequency (A04) [Hz]                                                                                                                                                                                                                                                                                                                                                                             | 0.00Hz   | O               |  |
| b70                            | Overcurrent time at stop    | 0.0~60.0 [sec]                                                                                                                                                                                                                                                                                                                                                                                               | 0.0sec   | O               |  |
| <b>Display Function</b>        |                             |                                                                                                                                                                                                                                                                                                                                                                                                              |          |                 |  |
| b71                            | User parameter setting      | 1 – Output frequency monitor<br>2 – Output current monitor<br>3 – Output voltage monitor<br>4 – Rotation direction monitor<br>5 – PID feedback monitor<br>6 – Intelligent terminal input monitor<br>7 – Intelligent terminal output monitor<br>8 – RPM monitor<br>9 – Power consumption monitor<br>10 – Display of cumulative time (day)<br>11 – Display of cumulative time (minute)<br>12 – DC link voltage | 1        | O               |  |
| b72                            | User mathematical sign      | 0 – '+' calculation<br>1 – '-' calculation<br>2 – 'X' calculation<br>3 – '/' calculation                                                                                                                                                                                                                                                                                                                     | 0        | O               |  |
| b73                            | Define user setting         | 0.01~600.00                                                                                                                                                                                                                                                                                                                                                                                                  | 1.00     | O               |  |

## 5.6 Extended function C mode (C group)

Table 5-6 Extended function C mode (C group)

| Func-code | Name                                 | Range                                                                                                                                                                                                                                                | Defaults | Runtime edit |
|-----------|--------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|--------------|
| 입력단자 기능   |                                      |                                                                                                                                                                                                                                                      |          |              |
| C01       | Intelligent input terminal 1 setting | 0 - FW (Forward run command)<br>1 - RV (Reverse run command)<br>2 - CF1 (1 <sup>st</sup> multi speed command)<br>3 - CF2 (2 <sup>nd</sup> multi speed command)<br>4 - CF3 (3 <sup>rd</sup> multi speed command)<br>5 - CF4 (4th multi speed command) | 0        | X            |
| C02       | Intelligent input terminal 2 setting | 6 - JG (Jogging operation command)<br>8 - 2CH (2 stage accel/decel command)<br>9 - FRS (Free run stop command)<br>10 - EXT (External trip)<br>11 - USP (Unattended Start Protection)                                                                 | 1        | X            |
| C03       | Intelligent input terminal 3 setting | 12 - SFT (Software lock)<br>13 - AT (Analog input current/voltage selection signal)<br>14 - RS (Reset)<br>15 - STA (Start)<br>16 - STP (Keep)                                                                                                        | 2        | X            |
| C04       | Intelligent input terminal 4 setting | 17 - F/R (Forward/Reverse)<br>18 - UP (Remote control UP)<br>19 - DOWN (Remote control DOWN)<br>20 - O/R (Local keypad operation)<br>21 - T/R (Local terminal input operation)                                                                       | 3        | X            |
| C05       | Intelligent input terminal 5 setting | 22 - PIDIR (PID Integral reset)<br>23 - PIDD (PID Disable)<br>24 - Add A11 to setting frequency<br>25 - Cancel add A11<br>26 - External alarm 2<br>27 - External alarm 3                                                                             | 13       | X            |
| C06       | Intelligent input terminal 6 setting | 28 - External alarm 4<br>29 - External alarm 5<br>30 - External alarm 6<br>31 - Up/Down Value Clear                                                                                                                                                  | 14       | X            |

| Func-code                            | Name                                            | Range                                                                                                                                                                                                                                                                                                                                                 | Defaults | Runtime edit |
|--------------------------------------|-------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|--------------|
| Input Terminal Status                |                                                 |                                                                                                                                                                                                                                                                                                                                                       |          |              |
| C07                                  | Input terminal 1 a/b contact setting (NO/NC)    | 0 - a contact (Normal open) [NO]<br>1 - b contact (Normal close) [NC]                                                                                                                                                                                                                                                                                 | 0        | X            |
| C08                                  | Input terminal 2 a/b contact setting (NO/NC)    |                                                                                                                                                                                                                                                                                                                                                       | 0        | X            |
| C09                                  | Input terminal 3 a/b contact setting (NO/NC)    |                                                                                                                                                                                                                                                                                                                                                       | 0        | X            |
| C10                                  | Input terminal 4 a/b contact setting (NO/NC)    |                                                                                                                                                                                                                                                                                                                                                       | 0        | X            |
| C11                                  | Input terminal 5 a/b contact setting (NO/NC)    |                                                                                                                                                                                                                                                                                                                                                       | 0        | X            |
| C12                                  | Input terminal 6 a/b contact setting (NO/NC)    |                                                                                                                                                                                                                                                                                                                                                       | 0        | X            |
| Output Terminal and Related Function |                                                 |                                                                                                                                                                                                                                                                                                                                                       |          |              |
| C13                                  | Replay output(30A/30B/30C) terminal setting     | 0 - RUN (Run signal)<br>1 - FA1 (Frequency command arrival)<br>2 - FA2 (Setting frequency or more)<br>3 - OL (Overload advance notice)<br>4 - OD (Output deviation for PID)<br>5 - AL (Alarm signal)<br>6 - MO (Modbus communication)<br>7 - SOL (System Overload)<br>8 - SUL (System Underload)<br>9 - SOL/SUL (System Overload/Underload detection) | 5        | X            |
| C14                                  | Open collector output (11-CM2) terminal setting |                                                                                                                                                                                                                                                                                                                                                       | 1        | X            |
| C15                                  | Open collector output (12-CM2) terminal setting |                                                                                                                                                                                                                                                                                                                                                       | 0        | X            |
| C16                                  | Output terminal 11 - CM2 a/b contact setting    | 0 - a contact (Normal open) [NO]<br>1 - b contact (Normal close) [NC]                                                                                                                                                                                                                                                                                 | 0        | X            |
| C17                                  | Output terminal 12 - CM2 a/b contact setting    |                                                                                                                                                                                                                                                                                                                                                       | 0        | X            |
| C18                                  | FM output selection                             | 0 - Output frequency monitor<br>1 - Output current monitor<br>2 - Output voltage monitor<br>3 - Output electric power monitor<br>4 - Output torque monitor<br>5 - Control by Modbus communication<br>6 - DC voltage                                                                                                                                   | 0        | X            |
| C19                                  | FM gain adjustment                              | 0~250.0 [%]                                                                                                                                                                                                                                                                                                                                           | 100.0%   | ○            |
| C20                                  | FM offset adjustment                            | -3.0~10.0 [%]                                                                                                                                                                                                                                                                                                                                         | 0.0%     | ○            |

| Func-code                         | Name                                                     | Range                                                                                                                                                                                                               | Defaults | Runtime edit |  |
|-----------------------------------|----------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|--------------|--|
| C21                               | Overload advance notice signal level setting             | 10.0~200.0 [%] of rated current                                                                                                                                                                                     | 100.0%   | X            |  |
| C22                               | Acceleration arrival signal frequency setting            | 0.00~Max. frequency (A04) [Hz]                                                                                                                                                                                      | 0.00Hz   | X            |  |
| C23                               | Deceleration arrival signal frequency setting            | 0.00~Max. frequency (A04) [Hz]                                                                                                                                                                                      | 0.00Hz   | X            |  |
| C24                               | PID deviation level setting                              | 0.0~100.0 [%]                                                                                                                                                                                                       | 10.0%    | X            |  |
| C25                               | AMI output selection                                     | 0 – Output frequency monitor<br>1 – Output current monitor<br>2 – Output voltage monitor<br>3 – Output electric power monitor<br>4 – Output torque monitor<br>5 – Control by Modbus communication<br>6 – DC voltage | 1        | X            |  |
| C26                               | AMI gain adjustment                                      | 0 ~ 250.0%                                                                                                                                                                                                          | 100.0%   | ○            |  |
| C27                               | AMI offset adjustment                                    | -99.9 ~ 100.0%                                                                                                                                                                                                      | 0.0%     | ○            |  |
| <b>Up/Down Function</b>           |                                                          |                                                                                                                                                                                                                     |          |              |  |
| C28                               | Up/Down value saving selection                           | 0 – Disable<br>1 – Enable                                                                                                                                                                                           | 0        | X            |  |
| C29                               | Up/Down initial value setting                            | 0 ~ Max. frequency [A04]                                                                                                                                                                                            | 0        | ○            |  |
| C30                               | Up/Down Acc/decel time setting                           | 0.1~3000.0[sec]                                                                                                                                                                                                     | 10.0sec  | ○            |  |
| C31                               | Up/Down function selection                               | 0 – Disable<br>1 – Enable                                                                                                                                                                                           | 0        | X            |  |
| C32                               | Up/Down value setting                                    | 0.00~400.00[%]                                                                                                                                                                                                      | 0        | ○            |  |
| <b>Keypad/Communication fault</b> |                                                          |                                                                                                                                                                                                                     |          |              |  |
| C33                               | Decel time at fault occur                                | 0.0~6000.0[sec]                                                                                                                                                                                                     | 10.0sec  | ○            |  |
| C34                               | Selection of running state when keypad connection failed | 0 – Run<br>1 – Stop                                                                                                                                                                                                 | 0        | X            |  |
| C35                               | Selection of keypad detection                            | 0 – Disable<br>1 – Abnormal move detection<br>2 – Detect keypad fault and occur E61<br>3 – Detect abnormal move and occur E61                                                                                       | 0        | ○            |  |

| Func-code                      | Name                                                                 | Range                                                                                                                                                                | Defaults | Runtime edit |  |
|--------------------------------|----------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|--------------|--|
| C36                            | Selection of communication or analog speed command failure detection | 0 - Disable<br>1 - Loss frequency (50%)<br>(Less than 50% of A07)<br>2 - Loss frequency (100%)<br>(Under than A07)<br>3 - Loss frequency when speed command by RS485 | 0        | ○            |  |
| C37                            | Selection of run command when speed losing                           | 0 - Disable<br>1 - Free run stop (Output block)<br>2 - Stop<br>3 - Run by C38 frequency                                                                              | 0        | ○            |  |
| C38                            | Waiting time in case of frequency command loss                       | 0.0~120.0[sec]                                                                                                                                                       | 1.0sec   | ○            |  |
| C39                            | Frequency setting in case of analog command loss                     | 0.00 ~ Max. frequency [A04]                                                                                                                                          | 30.00Hz  | ○            |  |
| <b>Overload Caution Time</b>   |                                                                      |                                                                                                                                                                      |          |              |  |
| C40                            | Overload caution time                                                | Detection time of overload advance notice signal level (C21) 0.0~30.0[sec]                                                                                           | 10.0sec  | ○            |  |
| <b>External Brake Function</b> |                                                                      |                                                                                                                                                                      |          |              |  |
| C41                            | Current of external brake                                            | 0.0~200.0 [%] of rated current                                                                                                                                       | 100.0%   | ○            |  |
| C42                            | Frequency of external brake                                          | 0.00 ~ 25.00[Hz]                                                                                                                                                     | 10.00Hz  | ○            |  |
| C43                            | Timer of external brake                                              | 0.0 ~ 5.0[sec]                                                                                                                                                       | 1.0sec   | ○            |  |
| C44                            | Stop frequency of external brake                                     | 0.00 ~ 25.00[Hz]                                                                                                                                                     | 10.00Hz  | ○            |  |
| C45                            | Stop timer of external brake                                         | 0.0 ~ 5.0[sec]                                                                                                                                                       | 1.0sec   | ○            |  |

## 5.7 Motor (H group)

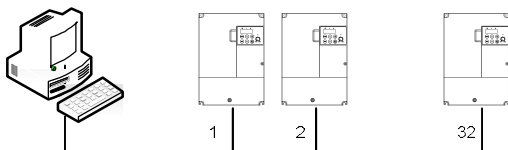
Table 5-7 Motor setting (H group)

| Func-code | Name                                    | Runtime edit | Range                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Default |
|-----------|-----------------------------------------|--------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| H01       | Auto-tuning mode selection              | X            | 0 - Auto-tuning OFF<br>1 - Auto-tuning ON                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 0       |
| H02       | Motor data selection                    | X            | 0 - Standard motor data<br>1 - Use auto-tuning data                                                                                                                                                                                                                                                                                                                                                                                                                                          | 0       |
| H03       | Motor capacity                          | X            | <div> <div> 0 - MOT_004LF<br/>1 - MOT_007LF<br/>2 - MOT_015LF<br/>3 - MOT_022LF<br/>4 - MOT_037LF<br/>5 - MOT_055LF<br/>6 - MOT_075LF<br/>7 - MOT_110LF<br/>8 - MOT_150LF<br/>9 - MOT_185LF<br/>10 - MOT_220LF<br/>11 - MOT_300LF </div> <div> 12 - MOT_004HF<br/>13 - MOT_007HF<br/>14 - MOT_015HF<br/>15 - MOT_022HF<br/>16 - MOT_037HF<br/>17 - MOT_055HF<br/>18 - MOT_075HF<br/>19 - MOT_110HF<br/>20 - MOT_150HF<br/>21 - MOT_185HF<br/>22 - MOT_220HF<br/>23 - MOT_300HF </div> </div> | -       |
| H04       | Motor poles setting                     | X            | 2~48[P]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 4       |
| H05       | Motor rated current                     | X            | Range is 0.1 - 800.0 [A]                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | -       |
| H06       | Motor no-load current (I <sub>0</sub> ) | X            | Range is 0.1 - 400.0 [A]                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | -       |
| H07       | Motor rated slip                        | X            | Range is 0.01 - 20.0 [Hz]                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | -       |
| H08       | Motor Resistance R1                     | X            | Range is 0.1 - 3000.00 [mΩ]                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | -       |
| H09       | Transient Inductance                    | X            | Range is 0.001 - 30.000 [mH]                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | -       |
| H10       | Motor Resistance R1                     | X            | Range is 0.1 - 3000.00 [mΩ]                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | -       |
| H11       | Transient Inductance auto tuning data   | X            | Range is 0.001 - 30.000 [mH]                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | -       |
| H12       | State of Auto-tuning                    | O            | 0:AT_READY<br>1:AT_RSTUNE<br>2:AT_LSIGMATUNE<br>3:AT_TRTUNE<br>4:AT_LSTUNE<br>5:AT_ENDING<br>6:AT_ENDAT                                                                                                                                                                                                                                                                                                                                                                                      | 0       |



## 6. COMMUNICATION

iMaster C1 offers two communication interfaces between the inverter and external controller through RS485. Use RJ-45 modular connector and RXP, PXN as second way. By communication, the main controller (iMaster C1) can control 1~32 pcs controllers as slave.



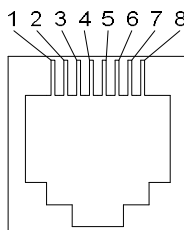
RS485 Serial Network  
Figure 6-1 RS485 Serial Communication Network

### ■ RS485 Communication specification

| Item                 | Description                                                           | Remark                                  |
|----------------------|-----------------------------------------------------------------------|-----------------------------------------|
| Interface            | RS485                                                                 |                                         |
| Communication method | Half duplex                                                           |                                         |
| Communication speed  | 9600 (1 <sup>st</sup> RJ-45)<br>2400~38400 (2 <sup>nd</sup> terminal) | Fixing<br>Changeable setting(b31)       |
| Communication code   | Binary code                                                           |                                         |
| Date bit             | 8                                                                     | Fixing                                  |
| Parity               | No                                                                    | Fixing                                  |
| Stop bit             | 1                                                                     | Fixing                                  |
| Starting method      | External request                                                      | Inverter is only slave part             |
| Wait time            | 10~1000ms                                                             |                                         |
| Connection type      | 1: N (Max 32) (Note1)                                                 |                                         |
| Error check          | Frame/CRC/CMD/MAXREQ/Parameter                                        | Communication number is selected at b17 |

(Note 1) Depending on the installation environment, there is a high probability of communication malfunction due to wiring type, wiring method, and other noise. For reliable communication, we recommend fewer than 16 connections.

■ RJ45 specification (1<sup>st</sup> Communication)



| Pin No. | Signal Descriptions |
|---------|---------------------|
| 1       |                     |
| 2       |                     |
| 3       | RS - 485+           |
| 4       |                     |
| 5       |                     |
| 6       | RS - 485-           |
| 7       | 24V                 |
| 8       | 24V GND             |

■ Terminal specification (2<sup>nd</sup> communication)

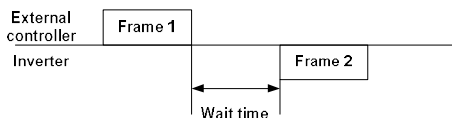
| Name | Description |
|------|-------------|
| RXP  | RS485 (+)   |
| RXN  | RS485 (-)   |

■ RS485 related code

| Func-code | Range                                                                                                                                                                                                                                   | Default | Setting                                             |
|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|-----------------------------------------------------|
| b17       | 1 ~ 32                                                                                                                                                                                                                                  | 1       | Setting communication number                        |
| b31       | 1 - 2400 [bps]<br>2 - 4800 [bps]<br>3 - 9600 [bps]<br>4 - 19200 [bps]<br>5 - 38400 [bps]                                                                                                                                                | 3       | Setting 485 and 2 <sup>nd</sup> communication speed |
| A01       | 0 - Keypad potentiometer<br>1 - Control input terminal<br>2 - Standard operator<br>3 - Remote (1 <sup>st</sup> communication RJ45)<br>4 - Remote (2 <sup>nd</sup> communication Terminal)<br>5 - Option<br>6 - Potentiometer and remote | 1       |                                                     |
| A02       | 0 - Keypad potentiometer<br>1 - Control input terminal<br>2 - Remote (1 <sup>st</sup> communication RJ45)<br>3 - Remote 2 <sup>nd</sup> communication Terminal)<br>4 - Fieldbus (option)                                                | 1       |                                                     |

## ■ Communication sequence

The communication sequence is as follows.



Frame start: Frame start is recognized by signal line data transmitted.

Frame completion: Frame completion is recognized by no data during correspond 4, 5-character time.

Frame 1: Transmit from external controller to inverter.

Frame 2: Indication reflects from inverter to external controller

## ■ Communication frame type and form

### ● External controller transmit frame

| Communication number | Command | Parameter | Parameter count | CRC Hi | CRC Lo |
|----------------------|---------|-----------|-----------------|--------|--------|
|----------------------|---------|-----------|-----------------|--------|--------|

|                      | Description                     | Data size | Specifications                                                   |
|----------------------|---------------------------------|-----------|------------------------------------------------------------------|
| Communication number | Inverter communication number   | 1 byte    | 1~32                                                             |
| Command              | Frame type                      | 1 byte    | 0x03                                                             |
| Parameter            | Parameter                       | 2 bytes   | 1 <sup>st</sup> byte: Group<br>2 <sup>nd</sup> byte: Index       |
| Parameter count      | Request parameter number(count) | 2 bytes   | 1 <sup>st</sup> byte: 0x00<br>2 <sup>nd</sup> byte: N(0x01~0x08) |
| CRC Hi               | –                               | 1 byte    | Higher 8bit of 16bit CRC                                         |
| CRC Lo               | –                               | 1 byte    | Lower 8bit of 16bit CRC                                          |

### ● Inverter response frame

| Communication number | Command | Byte Number | Data 1 | ... | Data N | CRC Hi | CRC Lo |
|----------------------|---------|-------------|--------|-----|--------|--------|--------|
|----------------------|---------|-------------|--------|-----|--------|--------|--------|

|                      | Description                   | Data size | Specifications           |
|----------------------|-------------------------------|-----------|--------------------------|
| Communication number | Inverter communication number | 1 byte    | 1~32                     |
| Command              | Frame type                    | 1 byte    | 0x03                     |
| Byte Number          | Data Byte Number              | 1 byte    | Request parameter * 2    |
| Data 1               | Parameter 1                   | 2 bytes   | Parameter value          |
| Data N               | Parameter N                   | 2 bytes   | Nth parameter value      |
| CRC Hi               | –                             | 1 byte    | Higher 8bit of 16bit CRC |
| CRC Lo               | –                             | 1 byte    | Lower 8bit of 16bit CRC  |

※ Frame Size = 5 + Request parameter number x 2

## ■ Parameter frame type and form

Set 1 parameter and command to inverter.

### ● External transmit frame

| Communication number | Command | Parameter | Data | CRC Hi | CRC Lo |
|----------------------|---------|-----------|------|--------|--------|
|----------------------|---------|-----------|------|--------|--------|

|                      | Description                          | Data size | Specifications                                                      |
|----------------------|--------------------------------------|-----------|---------------------------------------------------------------------|
| Communication number | Target inverter communication number | 1 byte    | 1~32                                                                |
| Command              | Frame type                           | 1 byte    | 0x06                                                                |
| Parameter            | Parameter                            | 2 bytes   | 1 <sup>st</sup> byte: Group<br>2 <sup>nd</sup> byte: Index (Note 1) |
| Data                 | Data                                 | 2 bytes   | Setting value (Note 2)                                              |
| CRC Hi               | –                                    | 1 byte    | Higher 8bit of 16bit CRC                                            |
| CRC Lo               | –                                    | 1 byte    | Lower 8bit of 16bit CRC                                             |

### ● Inverter response frame

| Communication number | Command | Parameter | Data | CRC Hi | CRC Lo |
|----------------------|---------|-----------|------|--------|--------|
|----------------------|---------|-----------|------|--------|--------|

|                      | Description                          | Data size | Specifications                                                      |
|----------------------|--------------------------------------|-----------|---------------------------------------------------------------------|
| Communication number | Target inverter communication number | 1 byte    | 1~32                                                                |
| Command              | Frame type                           | 1 byte    | 0x06                                                                |
| Parameter            | Parameter                            | 2 bytes   | 1 <sup>st</sup> byte: Group<br>2 <sup>nd</sup> byte: Index (Note 1) |
| Data                 | Data                                 | 2 bytes   | Setting value (Note 3)                                              |
| CRC Hi               | –                                    | 1 byte    | Higher 8bit of 16bit CRC                                            |
| CRC Lo               | –                                    | 1 byte    | Lower 8bit of 16bit CRC                                             |

### (Note 1) Parameter setting

#### 1) Basic parameter

Set each group to 1<sup>st</sup> byte and set the parameter number to 2<sup>nd</sup> byte.

For example, A60 parameter reading or writing, set 0x03 to 1<sup>st</sup> byte and 0x3C to 2<sup>nd</sup> byte.

| 1 <sup>st</sup> byte |      | 2 <sup>nd</sup> byte |
|----------------------|------|----------------------|
| Group                | Set  | Parameter number     |
| d                    | 0x01 |                      |
| F                    | 0x02 |                      |
| A                    | 0x03 |                      |
| B                    | 0x04 |                      |
| C                    | 0x05 |                      |
| H                    | 0x06 |                      |

Trip information is 4 parameters.  
(output frequency, output current, DC link voltage at trip occurs)

|                      | Trip information (d13) | Previous first trip (d14) | Previous second trip (d15) | Previous third trip (d16) | Trip count (d17) |
|----------------------|------------------------|---------------------------|----------------------------|---------------------------|------------------|
| 1 <sup>st</sup> byte | 0x01                   | 0x01                      | 0x01                       | 0x01                      | 0x01             |
| 2 <sup>nd</sup> byte | 0x0D                   | 0x11                      | 0x15                       | 0x19                      | 0x1D             |

✱ Trip information data

| Trip data | Description                   | Trip data | Description               |
|-----------|-------------------------------|-----------|---------------------------|
| 1         | Over current trip             | 19        | OVS fail                  |
| 2         | Over voltage trip             | 20        | HW power trip 1           |
| 3         | Under voltage trip            | 21        | HW power trip 2           |
| 4         | Arm short trip                | 22        | External trip 2           |
| 5         | Reserved                      | 23        | External trip 3           |
| 6         | Inverter over heat            | 24        | External trip 4           |
| 7         | Electric thermal trip         | 25        | External trip 5           |
| 8         | External trip                 | 26        | External trip 6           |
| 9         | EEPROM error                  | 27        | Fan trip                  |
| 10        | Communication error           | 28        | Option trip (Profibus)    |
| 11        | USP trip                      | 29        | Option trip (DeviceNet)   |
| 12        | Ground Fault trip (Over 30kW) | 30        | System overload trip      |
| 15        | Input phase loss              | 31        | System underload trip     |
| 14        | IOLT                          | 32        | Keypad communication trip |
| 16        | Communication error           |           |                           |
| 17        | Safety function               |           |                           |
| 18        | Braking resistor overload     |           |                           |

**(Note 2) Data value setting**

Data value is transmitted except decimal point.

(Please contact to ADT for more details)

| Description    | Related code  | Scale | Remark                                                    |
|----------------|---------------|-------|-----------------------------------------------------------|
| Frequency      | d01, F01 etc. | 0.01  | Communication data 6000<br>Conversion hexadecimal 60 [Hz] |
| Acc/decel time | F02, F03 etc. | 0.1   | Communication data 100<br>Conversion hexadecimal 10 [sec] |
| Current        | d02 etc.      | 0.1   | Communication data 100<br>Conversion hexadecimal 10[A]    |

**(㉔3) Special parameter**

## 1) Run command

Parameter frame: 0x0002

Setting data: Forward (0x0001), Reverse (0x0002), Reset (0x0004), Stop (0x0000)

## 예) Forward run command frame

| Description | Comm.no. | Command | Parameter | Data   | CRC    |
|-------------|----------|---------|-----------|--------|--------|
| Data        | 0x01     | 0x06    | 0x0002    | 0x0001 | 0xe9ca |

## 2) Frequency command

Parameter frame: 0x0004

Setting data: Hexadecimal of (Output frequency command \* 100)

## 예) Frequency command (60Hz) frame

| Description | Comm.no. | Command | Parameter | Data   | CRC    |
|-------------|----------|---------|-----------|--------|--------|
| Data        | 0x01     | 0x06    | 0x0004    | 0x1770 | 0xc61f |

Data additional explanation: 60Hz → 6000(Scale) → 0x1770

## (Reference) 16bit CRC generation

The step of CRC generation is as follows:

- 1) All of 16-bit Parameter is 1.0xffff
- 2) The exclusive OR of 16-bit Parameter and 8-bit Parameter.
- 3) Shift right side 1bit 16-bit Parameter
- 4) If the result of step 3 is 1, exclusive OR 16-bit Parameter and 0xa001.
- 5) Execute 8 times step 3 and step 4.
- 6) Execute step 2~6 until data completion.
- 7) Exchange the step 6 result of higher 8bit and lower 8bit.

Example) The case of d01 output frequency reading

| Byte 1               | Byte 2  | Byte 3    | Byte 4 | Byte 5           | Byte 6 |
|----------------------|---------|-----------|--------|------------------|--------|
| Communication number | Command | Parameter |        | Parameter Number |        |
| 0x01                 | 0x03    | 0x01      | 0x01   | 0x00             | 0x01   |

## The sequence of addition Byte (01x01)

| 16-BIT REGISTER    | MSB  |      |      |      | Flag |
|--------------------|------|------|------|------|------|
| (Exclusive OR)     | 1111 | 1111 | 1111 | 1111 |      |
| 01                 | 0000 | 0001 |      |      |      |
|                    | 1111 | 1111 | 1111 | 1110 |      |
| Shift 1            | 0111 | 1111 | 1111 | 1111 |      |
| Shift 2            | 0011 | 1111 | 1111 | 1111 | 1    |
| Polynomial(0xa001) | 1010 | 0000 | 0000 | 0001 |      |
|                    | 1001 | 1111 | 1111 | 1110 |      |
| Shift 3            | 0100 | 1111 | 1111 | 1111 |      |
| Shift 4            | 0010 | 0111 | 1111 | 1111 | 1    |
| Polynomial(0xa001) | 1010 | 0000 | 0000 | 0001 |      |
|                    | 1000 | 0111 | 1111 | 1110 |      |
| Shift 5            | 0100 | 0011 | 1111 | 1111 |      |
| Shift 6            | 0010 | 0001 | 1111 | 1111 | 1    |
| Polynomial(0xa001) | 1010 | 0000 | 0000 | 0001 |      |
|                    | 1000 | 0001 | 1111 | 1110 |      |
| Shift 7            | 0100 | 0000 | 1111 | 1111 |      |
| Shift 8            | 0010 | 0000 | 0111 | 1111 | 1    |
| Polynomial(0xa001) | 1010 | 0000 | 0000 | 0001 |      |
|                    | 1000 | 0000 | 0111 | 1110 |      |

| Byte 1~6 | CRC of operation results |
|----------|--------------------------|
| 0x01     | 0x807e                   |
| 0x03     | 0x3364                   |
| 0x01     | 0x30e1                   |
| 0x01     | 0x8831                   |
| 0x00     | 0xd449                   |
| 0x01     | 0x36d4                   |

Change upper and lower 8 bit of result 0x36d4: 0xd436

Byte7: Upper 8 bit of CRC = 0xd4

Byte8: Lower 8 bit of CRC = 0x36

## 7. PROTECTIVE FUNCTION

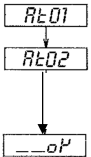
The various functions are provided for the protection of the inverter itself. When the protective function is occurred, motor is stopped as free-run and stay the trip once user reset the inverter.

| Name                                 | Cause(s)                                                                                                                                                                                                                                                                                                                               | Error code |
|--------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| Overcurrent protection               | When the inverter output current exceeds the rated current during the motor locked or reduced in speed.<br>Protection circuit activates, halting inverter output.                                                                                                                                                                      | E04        |
| Overload protection                  | When the inverter output current causes the motor to overload, the electronic thermal trip in the inverter cuts off the inverter output.                                                                                                                                                                                               | E05        |
| Overvoltage protection               | If regenerative energy from the motor or the main power supply voltage is high, the protective circuit activates to cut off the inverter output when the voltage of DC link exceeds the specification                                                                                                                                  | E07        |
| Communication error                  | Communication error between inverter and its operator.<br>If the Reset signal persists for more than 4 seconds, it will occur.                                                                                                                                                                                                         | E60        |
| Under-voltage protection             | When input voltage drops below the low-voltage detection level, the control circuit does not function normally. It will cause of overheat of motor and lack of torque that is why if receiving voltage is under 150~160V (200V class) or 300~320V (400V class), the inverter output is cut off.                                        | E09        |
| Output short-circuit                 | The inverter output was short-circuited.<br>This condition causes excessive current for the inverter that is why, the inverter output is turned off.                                                                                                                                                                                   | E04 or E34 |
| USP error                            | The USP error is indicated when the power is turned on with the Inverter in RUN state. (Enabled when the USP function selected)                                                                                                                                                                                                        | E13        |
| EEPROM                               | The inverter output is cut off when EEPROM in the inverter has an error due to external noise, excessive temperature rise, or other factors.<br>If the error is occurred, please check setting data again.<br>If error is occurred when power-on and does not off, please turn off the inverter at least 10minutes and power on again. | E08        |
| External trip                        | When the external equipment or unit has an error, the inverter receives the corresponding signal and cuts off the output.                                                                                                                                                                                                              | E12        |
| Temperature trip                     | When the temperature in the main circuit increases due to cooling fan stop, the inverter output is cut off.                                                                                                                                                                                                                            | E21        |
| Ground fault                         | When ground fault is detected on running condition, the output is cut off.                                                                                                                                                                                                                                                             | E14        |
| Inverter overload                    | The power device IGBT is protected from over heat. The operating time of inverter is 1 minute with 150% load of HD or 120% load of ND.<br>The operating time is changed depending on carrier frequency, load, ambient temperature and power rating.                                                                                    | E17        |
| Input phase loss                     | A function that detects phase loss in the input AC source to prevent damages.                                                                                                                                                                                                                                                          | E20        |
| Braking resistor overload protection | When BRD exceeds the usage ratio of the regenerative braking resistor, the over-voltage circuit activates and the inverter output is switched off.                                                                                                                                                                                     | E06        |



| <b>Name</b>                      | <b>Cause(s)</b>                                                                                                                                                                        | <b>Error code</b> |
|----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| OVS fail                         | The OVS output frequency is higher than maximum OVS output frequency during the setting time when the OVS function is enabled.                                                         | E02               |
| CPU error                        | It occurred it has error between inverter logic board and I/O board or communication error occurred. Turn off inverter completely, check there is any connection losses then power on. | E11               |
| System overload detection fault  | The output current of the drive is greater than the detection level set for this feature when it is enabled.                                                                           | E23               |
| System underload detection fault | The output current of the drive is less than the detection level set for this feature when it is enabled.                                                                              | E24               |
| FAN fault                        | The Fan fault is occurred, inverter output is cut off.                                                                                                                                 | E33               |
| Profibus fault (Option)          | ProfibusDP optional card only. Host disconnection, or invalid host setting cause this error.                                                                                           | E40               |
| DeviceNet fault (Option)         | DeviceNet optional card only. Communication cable power loss, disconnect to host, or invalid host setting cause this error.                                                            | E41               |
| HW Power fault 1                 | It occurred when inverter internal power is problem. Turn off power completely and try power on again.                                                                                 | E50               |
| HW Power fault 2                 | It occurred when inverter internal power is problem. Turn off power completely and try power on again.                                                                                 | E51               |
| Keypad fault                     | It occurred keypad communication error. Turn off power completely and try power on again.                                                                                              | E61               |
| External trip 2                  | When the external equipment or unit has an error, the inverter receives the corresponding signal and cuts off the output. (Need setting for intelligent input terminal)                | EE2               |
| External trip 3                  | When the external equipment or unit has an error, the inverter receives the corresponding signal and cuts off the output. (Need setting for intelligent input terminal)                | EE3               |
| External trip 4                  | When the external equipment or unit has an error, the inverter receives the corresponding signal and cuts off the output. (Need setting for intelligent input terminal)                | EE4               |
| External trip 5                  | When the external equipment or unit has an error, the inverter receives the corresponding signal and cuts off the output. (Need setting for intelligent input terminal)                | EE5               |
| External trip 6                  | When the external equipment or unit has an error, the inverter receives the corresponding signal and cuts off the output. (Need setting for intelligent input terminal)                | EE6               |

## Other display

| Contents                                                                                                                         | Display                                                                           |
|----------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| It is displayed when initialization of data is processing<br>(It is not displayed when initialization of history is processing.) |  |
| There is no data available<br>(Trip history, PID feedback data)                                                                  |  |
| The auto-tuning operation terminates normally                                                                                    |  |

## 8. TROUBLESHOOTING TIPS

| Symptom                                              |                                                           | Probable Cause                                                                                                                                                                                                              | Countermeasure                                                                                                                                                                                                                                                                                                     |
|------------------------------------------------------|-----------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| The motor will not move                              | The inverter outputs U, V and W are not supplying voltage | <ul style="list-style-type: none"><li>•Is the frequency command source A01 parameter setting correct?</li><li>•Is the Run command source A02 parameter setting correct?</li></ul>                                           | <ul style="list-style-type: none"><li>•Make sure the parameter A01 setting correct?</li><li>•Make sure the parameter A02 setting correct?</li></ul>                                                                                                                                                                |
|                                                      |                                                           | <ul style="list-style-type: none"><li>•Is power being supplied to terminals R, S and T?<br/>If so, the power lamp should be on.</li></ul>                                                                                   | <ul style="list-style-type: none"><li>•Check terminals R, S and T then U, V, and W.</li><li>•Turn on the power supply/</li></ul>                                                                                                                                                                                   |
|                                                      |                                                           | <ul style="list-style-type: none"><li>•Is there an error code E□□displayed?</li></ul>                                                                                                                                       | <ul style="list-style-type: none"><li>•Press the Func key and determine the error types.<br/>Then clear the error (Reset).</li></ul>                                                                                                                                                                               |
|                                                      |                                                           | <ul style="list-style-type: none"><li>•Are the signals to the intelligent input terminals correct?</li><li>•Is the Run Command active?</li><li>•Is the [FW] terminal (or [RV] connected to CM1 (via switch, etc.)</li></ul> | <ul style="list-style-type: none"><li>•Verify the terminal functions for C01–C06 are correct.</li><li>•Turn on Run Command</li><li>•Supply 24V to [FW] or [RV] terminal, if configured.<br/>(Terminal mode selection)</li></ul>                                                                                    |
|                                                      |                                                           | <ul style="list-style-type: none"><li>•Has the frequency setting for F01 been set greater than zero?</li><li>•Are the control circuit terminals H, O, and L connected to the potentiometer?</li></ul>                       | <ul style="list-style-type: none"><li>•Set the parameter for F01 to a safe, non-zero value.</li><li>•If the potentiometer is the frequency setting source, verify voltage at "O" &gt; 0V</li></ul>                                                                                                                 |
|                                                      |                                                           | <ul style="list-style-type: none"><li>•Is the RS(reset) function or FRS (free-run stop) function on?</li></ul>                                                                                                              | <ul style="list-style-type: none"><li>• Turn off the command(s)</li></ul>                                                                                                                                                                                                                                          |
|                                                      | Inverter outputs U, V, W are supplying voltage            | <ul style="list-style-type: none"><li>•Is the motor load too heavy?</li><li>•Is the motor locked?</li></ul>                                                                                                                 | <ul style="list-style-type: none"><li>•Reduce load, and test the motor independently.</li></ul>                                                                                                                                                                                                                    |
|                                                      | The direction of the motor is reversed                    |                                                                                                                                                                                                                             | <ul style="list-style-type: none"><li>•Are the connections of output terminal U, V, and W correct?</li><li>•Is the phase sequence of the motor forward or reverse with respect to U, V, and W?</li><li>•Are the control terminals [FW] and [RV] wired correctly?</li><li>•Is parameter F04 properly set?</li></ul> |
| The motor speeds will not reach the target frequency |                                                           | <ul style="list-style-type: none"><li>• If using the analog input, is the current or voltage at "O" or "OI"?</li><li>• Is the load too heavy?</li></ul>                                                                     | <ul style="list-style-type: none"><li>•Change the wiring</li><li>•Reduce the load.</li><li>•Heavy loads activate the overload restriction feature.</li></ul>                                                                                                                                                       |

| Symptom                                                                   |                                                                  | Probable Cause                                                                                                                                                                                                                                               | Countermeasure                                                                                                                                                                                                                                             |
|---------------------------------------------------------------------------|------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| The rotation is unstable                                                  |                                                                  | <ul style="list-style-type: none"> <li>Is the load fluctuation too great?</li> <li>Is the supply voltage unstable?</li> <li>Is the problem occurring at a particular frequency?</li> </ul>                                                                   | <ul style="list-style-type: none"> <li>Increase the motor capacity (both inverter and motor)</li> <li>Fix power supply problem.</li> <li>Change the output frequency slightly, or use the jump frequency setting to skip the problem frequency.</li> </ul> |
| The RPM of the motor does not match the inverter output frequency setting |                                                                  | <ul style="list-style-type: none"> <li>Is the maximum frequency setting A04 correct?</li> </ul>                                                                                                                                                              | <ul style="list-style-type: none"> <li>Verify the V/F settings match motor specifications</li> <li>Make sure all scaling is properly set</li> </ul>                                                                                                        |
| Inverter data is not correct                                              | No down-Load shave occurred                                      | <ul style="list-style-type: none"> <li>Was power turned off after a parameter edit but before pressing the store key?</li> <li>Edits to data are permanently stored at power down. Was the time from power off to power on less than six seconds?</li> </ul> | <ul style="list-style-type: none"> <li>Edit the data and press the store key once</li> <li>Wait six seconds or more before turning power off after edit data.</li> </ul>                                                                                   |
|                                                                           | The frequency setting will not change. Run/Stop does not operate | <ul style="list-style-type: none"> <li>Was the standard operator mode and terminal mode changed correctly?</li> </ul>                                                                                                                                        | <ul style="list-style-type: none"> <li>Make sure the setting mode of [A01], [A02] (Refer to 5-4)</li> </ul>                                                                                                                                                |
| A parameter is not change                                                 | Parameter is not change                                          | <ul style="list-style-type: none"> <li>Is the SFT setting selected? SFT (b09 -2,3) selected?</li> </ul>                                                                                                                                                      | <ul style="list-style-type: none"> <li>Turn off SFT function and check the b09 parameter. (b09=0)</li> </ul>                                                                                                                                               |

## 9. MAINTENANCE AND INSPECTION

Regularly perform maintenance and inspection. Failure to carry out regular maintenance checks will result in failure in some cases.



### DANGER

- Wait at least ten (10) minutes after turning off the input power supply before performing maintenance of an inspection.  
Otherwise, there is the danger of electric shock.
- Make sure that only qualified personnel will perform maintenance, inspection, and part replacement. (Before starting to work, remove any metallic objects wristwatch, bracelet, etc.)  
Otherwise, there is a danger of electric shock and/or injury.

### 9.1 General precautions and notes

Always keep the unit clean so that dust of other foreign matter does not enter the inverter.

Firmly connect terminals and connectors.

Keep electronic equipment away from moisture and oil. Dust, steel filings and other foreign matter can damage insulation, causing unexpected accidents, so take special care.

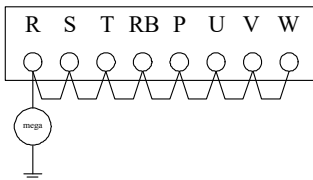
When removing connectors, never pull the wires (wires for the cooling fan and logic P.C. board.)

Otherwise, there is danger of fire due to wire breakage and/or injury

### 9.2 Inspection items

- (1) Daily inspection
- (2) Periodic inspection (approximately once a year)
- (3) Insulation resistance test (approximately once two years)

Conduct the insulation resistance test by short circuiting the terminals as shown below.



- Measure the above terminals and ground clearance with a 500 V mega tester and check if it is more than 5 MΩ.

We recommend that you stock spare parts to reduce down time, which include

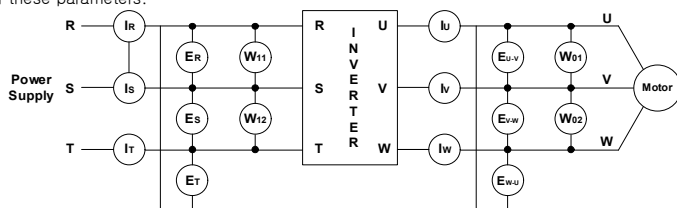
### Recommend spare parts for stocks

| Parts       | Symbol | Quantity |       | Note                                                                                                                                                 |
|-------------|--------|----------|-------|------------------------------------------------------------------------------------------------------------------------------------------------------|
|             |        | Used     | Spare |                                                                                                                                                      |
| Cooling Fan | FAN    | 1~2      | 1~2   | Depends on power range<br>1EA: 055LF/075LFP~075LF/110LFP<br>055HF/075HFP~075HF/110HFP<br>2EA: 110LF/150LFP~150LF/185LFP<br>110HF/150HFP~220HF/300HFP |
| Case        | -      | 1        | 1     | Front case<br>Main case<br>Bottom case                                                                                                               |

## 9.2 Inverter electrical measurements

The following table specifies how to measure key system electrical parameters.

The diagrams on the next page show inverter-motor systems the location of measurement points for these parameters.



| Parameter                  | Measurement location                                                                                                                                                          | Measuring instrument                             | Notes                            | Reference value                                                                                                               |
|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|----------------------------------|-------------------------------------------------------------------------------------------------------------------------------|
| Supply voltage<br>E1       | R-S, S-T, T-R<br>(ER) (ES) (RT)                                                                                                                                               | ⚡ Moving-coil type voltmeter<br>+ type voltmeter | Fundamental wave effective value | Commercial supply voltage<br>(200V class)<br>200-220V 50Hz<br>200-240V 60Hz<br>(400V class)<br>380-415V 50Hz<br>400-480V 60Hz |
| Supply current<br>I1       | R S T current<br>(IR) (IS) (IT)                                                                                                                                               | ⚡ Moving-coil type ammeter                       | Total effective value            |                                                                                                                               |
| Supply power<br>W1         | R-S, S-T<br>(W11) + (W12)                                                                                                                                                     | ⚡ Electronic type wattmeter                      | Total effective value            | 2wattmeter method                                                                                                             |
| Supply power factor<br>Pf1 | Calculate the output power factor from the output voltage E1, output current I1, and output power W1.<br>$P_{f1} = \frac{W_1}{\sqrt{3} \times E_1 \times I_1} \times 100(\%)$ |                                                  |                                  |                                                                                                                               |
| Output voltage<br>E0       | U-V, V-W, W-U<br>(EU) (EV) (EW)                                                                                                                                               | *Rectifier type voltmeter                        | Total effective value            |                                                                                                                               |
| Output current<br>I0       | U, V, W current<br>(IU) (IV) (IW)                                                                                                                                             | ⚡ Moving-coil type ammeter                       | Total effective value            |                                                                                                                               |
| Output power<br>W0         | U-V, V-W<br>(W01) + (W02)                                                                                                                                                     | ⚡ Electronic type wattmeter                      | Total effective value            | 2wattmeter method                                                                                                             |
| Output power factor<br>Pf0 | Calculate the output power factor from the output voltage E0, output current I0, and output power W0.<br>$P_{f0} = \frac{W_0}{\sqrt{3} \times E_0 \times I_0} \times 100(\%)$ |                                                  |                                  |                                                                                                                               |

Use a meter indicating a fundamental wave effective value for voltage, and meters indicating total effective values for current and power.

The inverter output has a PWM waveform, and low frequencies may cause erroneous readings. However, the measuring instruments and methods listed above provide comparably accurate results.

A general-purpose digital volt meter (DVM) is not usually suitable to measure a PWM waveform.

## iMASTER-C1 INSTRUCTION MANUAL REVISION HISTORY

[illegible]