HITACHI INVERTER

SJH300 SERIES

INSTRUCTION MANUAL

Three phase input 200/400V class

After reading this manual, keep it handy for future reference.

NB5397CX

HITACHI

SAFETY

For the Best Results with **SJH300** Series inverter, read this manual and all of the warning sign attached to the inverter carefully before installing and operating it, and follow the instructions exactly. Keep this manual handy for your quick reference.

Definitions and Symbols

A safety instruction (message) is given with a hazard alert symbol and a signal word;
WARNING or **CAUTION**. Each signal word has the following meaning throughout this manual.

⚡	This symbol means 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 message and follow these instructions carefully.
⚠	This is the "Safety Alert Symbol" This symbol is 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.
⚠ WARNING	**WARNING** Indicates a potentially hazardous situation which, if not avoided, can result in serious injury or death.
⚠ CAUTION	**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 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	**NOTE** Notes indicate 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 hazardous line voltages. When servicing drives and electronic controllers, there might be exposed components with cases or protrusions at 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 controllers or performing maintenance. Be sure equipment is properly grounded. Wear safety glasses whenever working on an electronic controller or rotating electrical equipment.

PRECAUTION

⚠**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 Hitachi Industrial Equipment Systems Co., Ltd., 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.

⚡**WARNING** : HAZARD OF ELECTRICAL SHOCK. DISCONNECT INCOMING POWER BEFORE WORKING ON THIS CONTROL.

⚠**WARNING** : SEPARATE MOTOR OVERCURRENT, OVERLOAD AND OVERHEATING PROTECTION IS REQUIRED TO BE PROVIDED IN ACCORDANCE WITH THE SAFETY CODES REQUIRED BY JURISDICTIONAL AUTHORITIES.

⚠ **CAUTION** : These instructions should be read and clearly understood before working on SJH300 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 Hitachi Industrial Equipment Systems Co., Ltd.

⚠ **CAUTION** : Be sure to connect a motor thermal switch or overload devices to the SJH300 series controller to assure that inverter will shut down in the event of an overload or an overheated motor.

⚡ **CAUTION** : DANGEROUS VOLTAGE EXISTS UNTIL CHARGE LAMP IS OFF.

⚠ **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 inverter must be used environment of the 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.

Cautions for EMC (Electromagnetic Compatibility)

You are required to safety the EMC directive (89/336/EEC) when using the SJH300 inverter in a European country. To safety the EMC directive and to comply with standard, follows the checklist below.

⚠️**WARNING** : This equipment should be installed, adjusted, and serviced by qualified personal familiar with construction and operation of the equipment and the hazards involved. Failure to observe this precaution could result in bodily injury.

1. The power supply to SJH300 inverter must meet these specifications:

   a. Voltage fluctuation +/-10% or less.

   b. Voltage imbalance +/-3% or less.

   c. Frequency variation +/-4% or less.

   d. Voltage distortion THD = 10% or less.

2. Installation measure:

   a. Use a filter designed for SJH300 inverter.

3. Wiring

   a. Shielded wire (screened cable) is required for motor wiring, and the length must be less than 20 meters.

   b. Separate the main circuit from the signal/process circuit wiring.

   c. In case of remote operating with connector cable, the inverter does not conform to EMC.

4. Environmental conditions – when using a filter, follow these guidelines:

   a. Ambient air temperature: -10 - +50 ºC.

   b. Humidity: 20 to 90% RH (non-condensing)

   c. Vibration: 5.9 m/sec^2 (0.6 G) 10 – 55Hz. (SJH300-2.5-22LF/ 2.5-22HF)

   d. Location: 1000meters or less altitude, indoors (no corrosive gas or dust)

Conformity to the Low Voltage Directive (LVD)

The protective enclosure must conform to the Low Voltage Directive.

The inverter can conform to the LVD by mounting into a cabinet or by adding covers as follows.

1.Cabinet and Cover

The inverter must be installed into a cabinet which has the protection degree of Type IP2X. In addition the top surfaces of cabinet that 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.
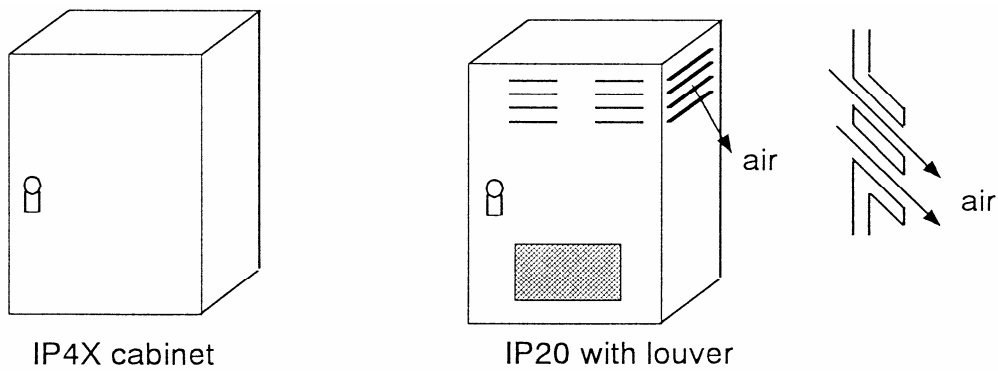
IP4X cabinet   IP20 with louver

Fig. Inverter cabinet

UL Warnings and Cautions Manual for SJH300 series

This auxiliary instruction manual should be delivered to the end user.

1.Wiring Warnings for Electrical Practices and Wire Specifications

(1) ⚠ WARNING :   "Use 60/75 ºC CU wire only" or equivalent.

(2) ⚠ WARNING :   "Suitable for use on a circuit capable or delivering not more than 10,000 rms symmetrical amperes, 240 V maximum." For models with suffix L.

(3) ⚠ WARNING :   "Suitable for use on a circuit capable or delivering not more than 10,000 rms symmetrical amperes, 480 V maximum." For models with suffix H.

2.Tightening Torque and Wire Range

(1) ⚠ WARNING :   Tightening torque and wire range for field wiring terminals are marked adjacent to the terminal or on the wiring diagram.

Model Name	Tightening Torque [N•m]	Wire Range (AWG)
SJH300-2.5L	1.5	14
SJH300-3.5L	1.5	14
SJH300-5.5L	1.5	10
SJH300-8L	2.5	8
SJH300-11L	2.5	6
SJH300-16L	4.9	4
SJH300-22L	4.9	2
SJH300-2.5H	1.5	18
SJH300-3.5H	1.5	16
SJH300-5.5H	1.5	14
SJH300-8H	2.5	12
SJH300-11H	2.5	10
SJH300-16H	4.9	8
SJH300-22H	4.9	6

3.Circuit Breaker / Fuse Size

(1) ⚠ WARNING :   Distribution fuse/circuit breaker size marking is included in the manual to indicate that the unit shall be connected with an UL Listed inverse time circuit breaker, rated 600 V with the current ratings or an UL Listed fuse as shown in the table below.

Model Name	Circuit Breaker [A]	Fuse [A]
SJH300-2.5L	10	10
SJH300-3.5L	15	15
SJH300-5.5L	20	20
SJH300-8L	30	30
SJH300-11L	40	40
SJH300-16L	60	60
SJH300-22L	80	80
SJH300-2.5H	10	10
SJH300-3.5H	10	10
SJH300-5.5H	15	15
SJH300-8H	15	15
SJH300-11H	20	20
SJH300-16H	30	30
SJH300-22H	40	40

4.Motor overload protection

These inverters provide solid state motor overload protection. Set parameter b012,b212,b312,b412 or b512 using the following instructions.

    b012 "electronic overload protection"
    b212 "electronic overload protection, 2nd motor"
    b312 "electronic overload protection, 3rd motor"
    b412 "electronic overload protection, 4th motor"
    b512 "electronic overload protection, 5th motor"

set the rated current [A] of the motor.
setting range is 0.2*rated current to 1.2*rated current.

(1) ⚠ WARNING :   When two or more motors are connected to the inverter, they cannot be protected bye the electronic overload protection. Install an external thermal relay to each motor.

5.Others

(1) ⚠ **WARNING** :　　　　"Field wiring connection must be made by an UL Listed and CSA Certified closed-loop terminal connector sized for the wire gauge involved. Connector must be fixed using the crimp tool specified by the connector manufacturer. ", or equivalent wording included in the manual.

Revision History Table

No.	Revision Contents	The Date of Issue	Operation Manual No.
1	Initial Release of Manual NB5397CX	Aug. 2003	NB5397CX

1.Installation

```
                          ⚠ CAUTION
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- Be sure to install the unit on flame resistant material such as metal.   ⋯⋯   p.2-2
    Otherwise, there is a danger of fire.

- Be sure not to place anything inflammable in the vicinity.   ⋯⋯   p.2-2
    Otherwise, there is a danger of fire.

- Do not carry unit by top cover, always carry by supporting base of unit.   ⋯⋯   p.2-2
    There is a risk of falling and injury.

- Be sure not to let the foreign matter enter such as cut wire refuse, spatter
  from welding, iron refuse, wire, dust, etc.   ⋯⋯   p.2-5
    Otherwise, there is a danger of fire.

- Be sure to install it in a place which can bear the weight according to the
  specifications in the text. (Chapter 6. Specifications)   ⋯⋯   p.2-1
    Otherwise, it may fall and there is a danger of injury.

- Be sure to install the unit on a perpendicular wall which is not subject to
  vibration.   ⋯⋯   p.2-3
    Otherwise, it may fall and there is a danger of injury.

- Be sure not to install and operate an inverter which is damaged or parts of
  which are missing.   ⋯⋯   p.2-2
    Otherwise, there is a danger of injury.

- Be sure to install it in a room 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 dew condensation, as well as places with dust,   ⋯⋯   p.2-2
  corrosive gas, explosive gas, inflammable gas, grinding-fluid mist, salt
  damage, etc.
    Otherwise, there is a danger of fire.

2.Wiring

⚠**WARNING**

• Be sure to ground the unit. Otherwise, there is a danger of electric shock and/or fire.	……	p.2-9
• Wiring work shall be carried out by electrical experts. Otherwise, there is a danger of electric shock and/or fire.	……	p.2-6
• Implement wiring after checking that the power supply is off. It might incur electric shock and/or fire.	……	p.2-8
• After installing the main body, carry out wiring. Otherwise, there is a danger of electric shock and/or injury.	……	p.2-5
• Do not remove the rubber bush. (2.5 to 22kVA) Due to the possibility that a wire may be damaged, shorted or may have a ground fault with the edge of the wiring cover.	……	p.2-4

⚠ **CAUTION**

• Make sure that the input voltage is: Three phase 200 to 240V 50/60Hz (for models with suffix L). Three phase 380 to 480V 50/60Hz (for models with suffix H).	……	p.2-6
• Be sure not to input a single phase. Otherwise, there is a danger of fire.	……	p.2-8
• Be sure not to connect AC power supply to the output terminals(U, V, W). Otherwise, there is a danger of injury and/or fire.	……	p.2-5
• Be sure not to connect the resistor to DC terminals (PD,P and N) directly. Otherwise, there is a danger of fire.	……	p.2-5
• Be sure to set the earth leakage breaker or the fuse(s) (the same phase as the main power supply) in the operation circuit. Otherwise, there is a danger of fire.	……	p.2-12
• As for motor leads, earth leakage breakers and electromagnetic contactors, be sure to use the equivalent ones with the specified capacity (rated). Otherwise, there is a danger of fire.	……	p.2-12
• Do not stop operation by switching off the electromagnetic contactors on the primary or secondary sides of the inverter. Otherwise, there is a danger of injury and/or machine breakage.	……	p.2-6
• Fasten the screws with the specified fastening torque. Check so that there is no loosening of screws. Otherwise, there is a danger of fire.	……	p.2-12

3.Control and operation

⚠**WARNING**

- While the inverter is energized, be sure not to touch the main terminal or to check the signal or put on/off wire and/or connector.
  Otherwise, there is a danger of electric shock. p.3-1

- Be sure to turn on the input power supply after closing the front case. While being energized, be sure not to open the front case.
  Otherwise, there is a danger of electric shock. p.3-1

- Be sure not to operate the switches with wet hands.
  Otherwise, there is a danger of electric shock. p.3-1

- While the inverter is energized, be sure not to touch the inverter terminals even during stoppage.
  Otherwise, there is a danger of electric shock. p.3-1

- If the retry mode is selected, it may suddenly restart during the trip stop. Be sure not to approach the machine. (Be sure to design the machine so that personnel safety will be secured even if it restarts.)
  Otherwise, there is a danger of injury. p.3-1

- Be sure not to select retry mode for up and down equipment or traveling equipment, because there is output free-running mode in term of retry.
  Otherwise, there is a danger of injury and/or machine breakage. p.3-1

- Even if the power supply is cut for a short period of time, it may restart operation after the power supply is recovered if the operation command is given. If it may incur danger to personnel, be sure to make a circuit so that it will not restart after power recovery.
  Otherwise, there is a danger of injury. p.3-1

- The Stop Key is effective only when the function is set. Be sure to prepare the Key separately from the emergency stop.
  Otherwise, there is a danger of injury. p.3-1

- After the operation command is given, if the alarm reset is conducted, it will restart suddenly. Be sure to set the alarm reset after checking the operation command is off.
  Otherwise, there is a danger of injury. p.3-1

- Be sure not to touch the inside of the energized inverter or to put a bar into it.
  Otherwise, there is a danger of electric shock and/or fire. p.3-1

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⚠ CAUTION

- Cooling fin will have high temperature. Be sure not to touch them. p.3-2
  Otherwise, there is a danger of getting burned.

- 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. p.3-2
  Otherwise, there is a danger of injury.

- Install external break system if needed. p.3-2
  Otherwise, there is a danger of injury.

- 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 with each manufacturer, and after getting their consent, operate p.3-2
  them.
  Otherwise, there is a danger of machine breakage.

- Check the following before and during the test run.
  Otherwise, there is a danger of machine breakage.
  Was the direction of the motor correct?
  Was the inverter tripped during acceleration or deceleration? p.3-2
  Were the rpm and frequency meter correct?
  Were there any abnormal motor vibrations or noise?

</div>

4.Maintenance, inspection and part replacement

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⚠WARNING

- After a lapse of more than 10 minutes after turning off the input power supply, perform the maintenance and inspection. p.5-1
  Otherwise, there is a danger of electric shock.

- Make sure that only qualified persons will perform maintenance, inspection and part replacement. (Before starting the work, remove metallic objects from your person (wristwatch, bracelet, etc.) p.5-1
  (Be sure to use tools protected with insulation.)
  Otherwise, there is a danger of electric shock and/or injury.

</div>

5.Others

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⚠WARNING

- Never modify the unit.
  Otherwise, there is a danger of electric shock and/or injury.

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TABLE OF CONTENTS

4.3.2 Function mode

Chapter 5 Maintenance, Inspection

Chapter 6 Specification

1.1 Inspection upon Unpacking

1.1.1 Inspection of the unit

Open the package and pick out the inverter, please check the following item.

If you discover any unknown parts or the unit is in bad condition, please contact your supplier or the local Hitachi Distributor.

(1) Make sure that there was no damage (injury, falling or dents in the body) during transportation of the unit.

(2) After unpacking the unit, make sure that the package contains one operation manual for the Inverter.

(3) Make sure that the product is the one you ordered by checking the specification label.

Specifications label
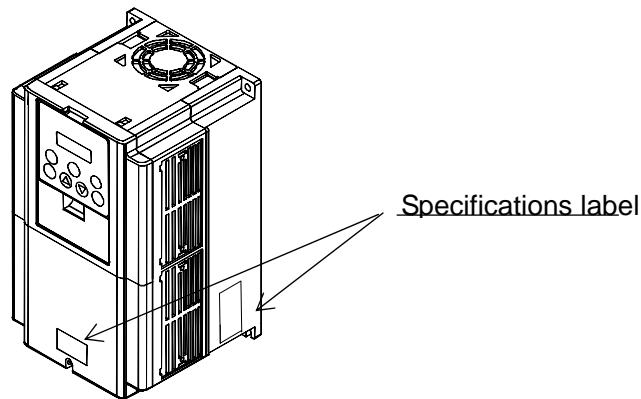
Picture 1-1 Position of specification label

		HITACHI			
Inverter model →	Model:	SJ300-055HF			
Maximum applicable motor →	kW/(HP):	5.5/(7.5)			
Input ratings →	Input/Entree:	50Hz,60Hz	V	1 Ph	A
		50Hz,60Hz	380-480V	3 Ph	13A
Output ratings →	Output/Sortie:	0 -400Hz	380-480V	3 Ph	12A
Production number →	MFGNo.	24AAT12345 20001		Date: 0204	
	Hitachi Industrial Equipment	MADE IN JAPAN	NE17123-27		

Picture 1-2 Contents of specifications label

1.1.2 Instruction manual

This instruction manual is the manual for the HITACHI Inverter SJH300 Series.

Before operation of the Inverter, read the manual carefully. After Reading this manual, keep it to hand for future reference.

When using optional units for this inverter; please refer to the instruction manuals packed with the optional units.

This instruction manual should be delivered to the end user.

1.2 Question and Warranty of the Unit

1.2.1 Request upon asking

If you have any questions regarding damage to the unit, unknown parts or for general enquiries please contact your supplier or the local Hitachi Distributor with the following information.

(1) Inverter Model

(2) Production Number (MFG No.)

(3) Date of Purchase

(4) Reason for Calling

Damaged part and its condition etc.

Unknown parts and their contents etc.

1.2.2 Warranty for the unit

The warranty period of the unit is one year after the purchase date. However within the warranty period, the warranty will be void if the fault is due to;

(1) Incorrect use as directed in this manual, or attempted repair by unauthorized personnel.

(2) Any damage sustained other than from transportation (Which should be reported immediately).

(3) Using the unit beyond the limits of the specification.

(4) Natural Disasters: Earthquakes, Lightning, etc

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

Any examination or repair after the warranty period (one-year) is not covered. And within the warranty period any repair and examination which results in information showing the fault was caused by any of the items mentioned above, the repair and examination cost are not covered. If you have any questions regarding the warranty please contact either your supplier or the local Hitachi Distributor. Please refer to the back cover for a list of the local Hitachi Distributors.

1.3 Appearance

1.3.1 Appearance and Names of Parts

Appearance from the front   Front cover removed

Power lamp

Alarm lamp

Digital operator

Spacer cover

Front cover

Terminals cover

Specifications

Label

Connector

Installation point

of self-contained option

Control circuit terminals

Main circuit terminals

Wiring blind cover
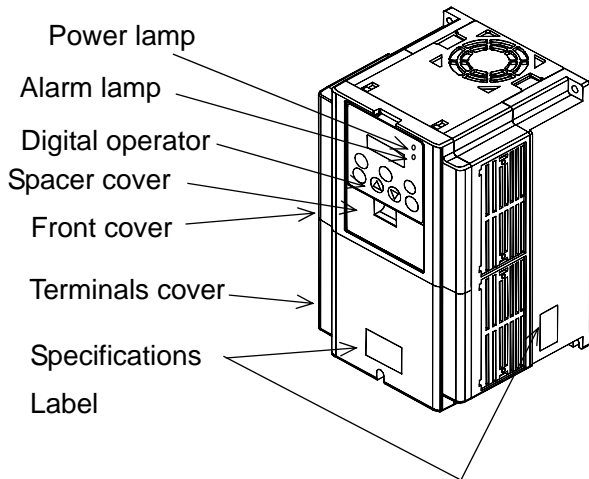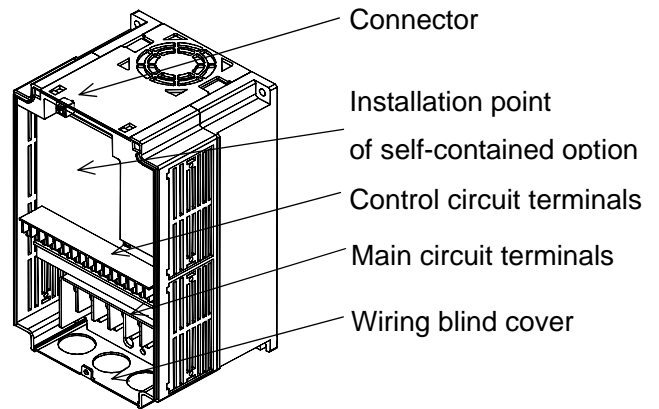
(Note) When you use cable for remote operation, please remove connector

2.1 Installation

⚠ **CAUTION**

- Be sure to install the unit on flame resistant material such as metal.
    Otherwise, there is a danger of fire.

- Be sure not to place anything inflammable in the vicinity.
    Otherwise, there is a danger of fire.

- Do not carry unit by top cover, always carry by supporting base of unit.
    There is a risk of falling and injury.

- Be sure not to let the foreign matter enter such as cut wire refuse, spatter from welding, iron refuse, wire, dust, etc.
    Otherwise, there is a danger of fire.

- Be sure to install it in a place which can bear the weight according to the specifications in the text.
 (Chapter 6. Specifications)
    Otherwise, it may fall and there is a danger of injury.

- Be sure to install the unit on a perpendicular wall which is not subject to vibration.
    Otherwise, it may fall and there is a danger of injury.

- Be sure not to install and operate an inverter which is damaged or parts of which are missing.
    Otherwise, there is a danger of injury.

- Be sure to install it in a room 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 dew condensation, as well as places with dust, corrosive gas, explosive gas, inflammable gas, grinding-fluid mist, salt damage, etc.
    Otherwise, there is a danger of fire.

2.1.1 Installation

1. Transportation

This inverter has plastic parts. So handle with care.

Do not over tighten the wall mounting fixings as the mountings may crack, causing is a risk of falling.

Do not install or operate the inverter if there appears to be damage or parts missing.

2. Surface for Mounting of Inverter

The temperature of the Inverter heatsink can become very high (the highest being about 150ºC). The surface, which you are mounting the Inverter onto, must be made of a non-flammable material (i.e steel) due to the possible risk of fire. Attention should also be made to the air gap surrounding the Inverter. Especially when there is a heat source such as a breaking resistor or a reactor.


```
                (Note 1)

              Inverter
5cm or more                 5cm or more

                (Note 2)
```

```
Flow of the air

Inverter

                        Wall
```

Keep the space enough not to be prevented the ventilation of cooling by up and down of wiring duct.
 (Note 1) 10cm or more for 2.5 to 22kVA

(Note 2) 10cm or more for 2.5 to 22kVA
        But for exchanging the DC bus
        capacitor , take a distance.
        10cm or more for 2.5 to 16 kVA
        22cm or more for 22 kVA
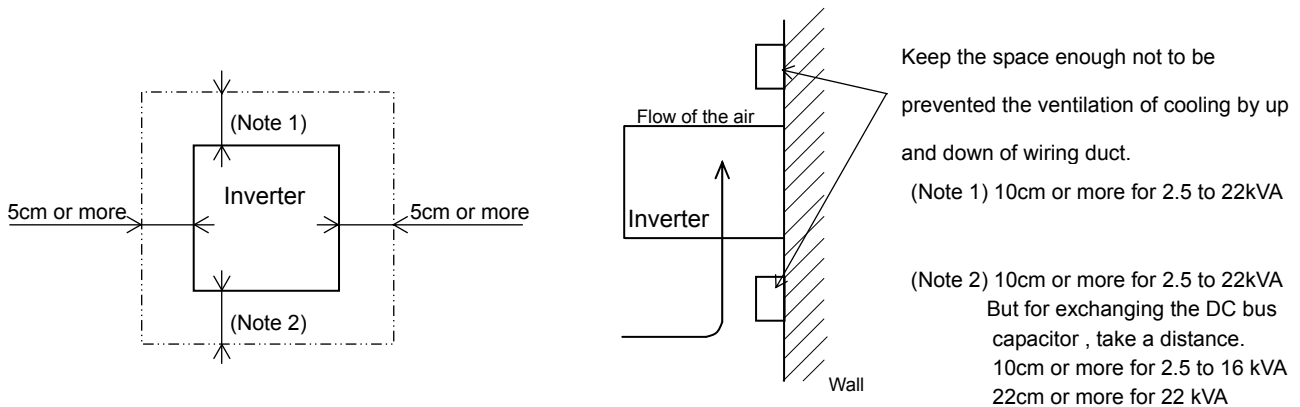
3. Operating Environment - Ambient Temperature

The ambient temperature surrounding the Inverter should not exceed the allowable temperature range (-10 to 50ºC). The temperature should be measured in the air gap surrounding the Inverter, shown in the diagram above. If the temperature exceeds the allowable temperature, the component life will become shortened especially in the case of the Capacitors.

4.Operating Environment - Humidity

The humidity surrounding the Inverter should be within the limit of the allowable percentage range (20% to 90%). 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. Operating Environment - Air

Install the Inverter avoiding any place that has dust, corrosive gas, explosive gas, combustible gas, mist of coolant and sea damage.

6. Mounting Position

Mount the Inverter in a vertical position using screws or bolts. The surface you mount onto should also be free from vibration and can easily hold the weight of the Inverter.
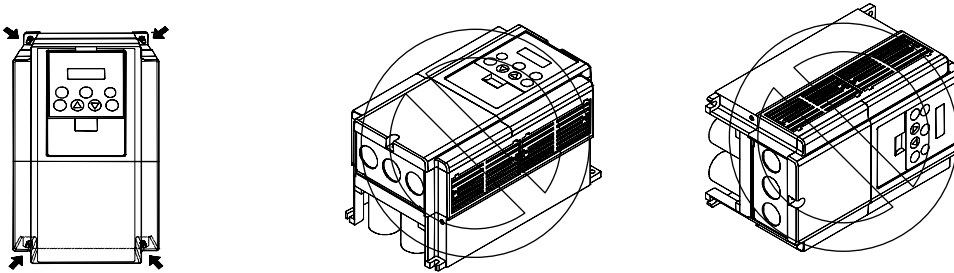
7. Ventilation within an Enclosure

If you are installing one or more Inverters in an enclosure a ventilation fan should be installed. Below is a guide to the positioning of the fan to take the airflow into consideration. The positioning of Inverter, cooling fans and air intake is very important. If these positions are wrong, airflow around the Inverter decreases and the temperature surrounding the Inverter will rise. So please make sure that the temperature around is within the limit of the allowable range.

(Good example)   (Bad example)
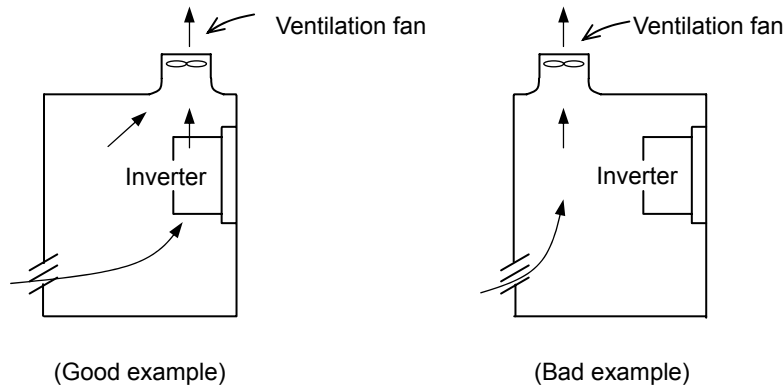
8.External cooling of Inverter

It is possible to install the inverter so that the heatsink is out of the back of the enclosure. This method has two advantages, cooling of the inverter is greatly increased and the size of the enclosure will be smaller.

To install it with the heatsink out of the enclosure, a metal fitting option is required to ensure heat transfer.

Do not install in a place where water, oil mist, flour and dust etc can come in contact with the inverter as there are cooling fans fitted to the heatsink.

9. Approximate loss for each capacity

Inverter capacity (kVA)	2.5	3.5	5.5	8	11	16	22
70% of rated output (W)	102	127	179	242	312	435	575
100% of rated output (W)	125	160	235	325	425	600	800
100% of rated efficiency(%)	92.3	93.2	94.0	94.4	94.6	94.8	94.9

2.1.2 Blind cover of wiring parts (2.5 to 22kVA)

(1) Cable entry through Rubber Bushes

The wiring should be done after making a cut in the rubber bushes with nippers or cutters.

Wiring cover
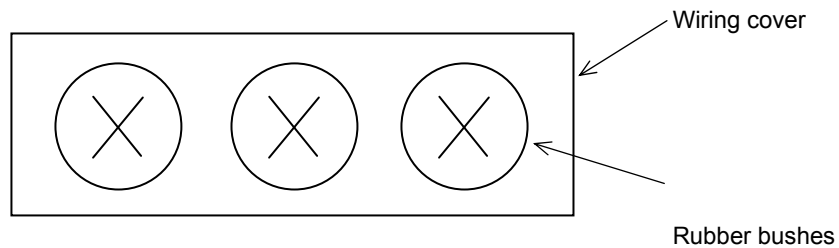
Rubber bushes

(2) Cable entry through Conduit

After taking out the rubber bushes, connect the conduit.
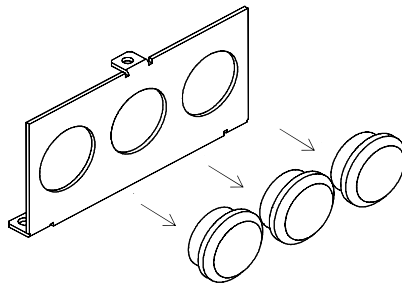
(Note) Except for when connecting conduit, do not take out the rubber bushes. It is possible that the wiring insulation is broken and a possible earth fault is caused.

2.2 Wiring

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⚠ **WARNING**

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・ Be sure to ground the unit.
　　Otherwise, there is a danger of electric shock and/or fire.

・ Wiring work shall be carried out by electrical experts.
　　Otherwise, there is a danger of electric shock and/or fire.

• Implement wiring after checking that the power supply is off.
　　It might incur electric shock and/or fire.

• After installing the main body, carry out wiring.
　　Otherwise, there is a danger of electric shock and/or injury.

・ Do not remove the rubber bush. (2.5 to 22kVA)
　　Due to the possibility that a wire may be damaged, shorted or may have a ground fault with the edge of the wiring cover.

<div style="border:1px solid">

⚠ **CAUTION**

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・ Make sure that the input voltage is:
　　Three phase 200 to 240V 50/60Hz (for models with suffix L)
　　Three phase 380 to 480V 50/60Hz (for models with suffix H)

・ Be sure not to input a single phase.
　　Otherwise, there is a danger of fire.

・ Be sure not to connect AC power supply to the output terminals(U, V, W).
　　Otherwise, there is a danger of injury and/or fire.

・ Be sure not to connect the resistor to DC terminals (PD,P and N) directly.
　　Otherwise, there is a danger of fire.

• Be sure to set the earth leakage breaker or the fuse(s) (the same phase as the main power supply) in the operation circuit.
　　Otherwise, there is a danger of fire.

• As for motor leads, earth leakage breakers and electromagnetic contactors, be sure to use the equivalent ones with the specified capacity (rated).
　　Otherwise, there is a danger of fire.

• Do not stop operation by switching off the electromagnetic contactors on the primary or secondary sides of the inverter.
　　Otherwise, there is a danger of injury and/or machine breakage.

• Fasten the screws with the specified fastening torque. Check so that there is no loosening of screws.
　　Otherwise, there is a danger of fire.

2.2.1 Terminal Connection Diagram (sink type)
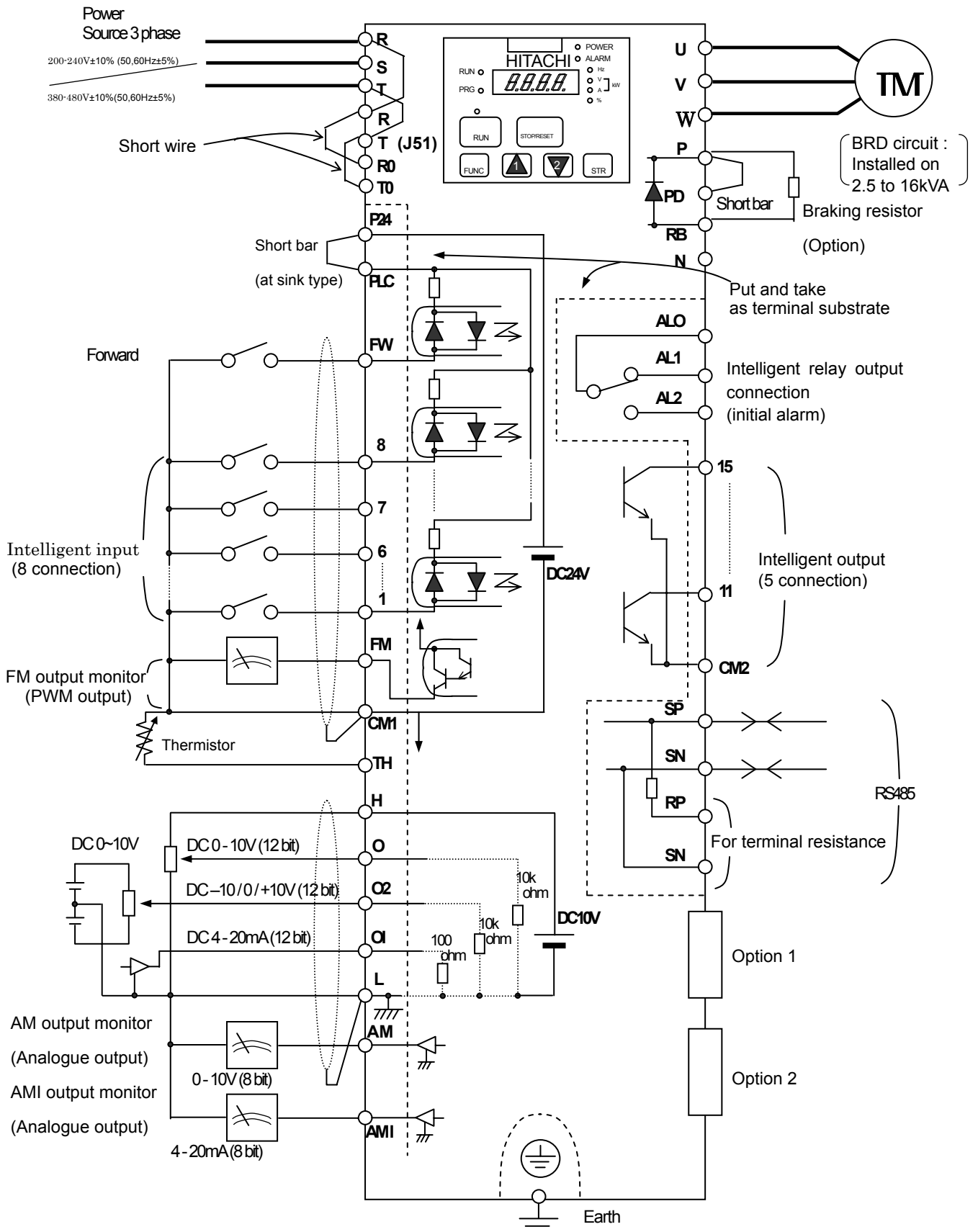
2.2.1 Terminal Connection Diagram (source type)
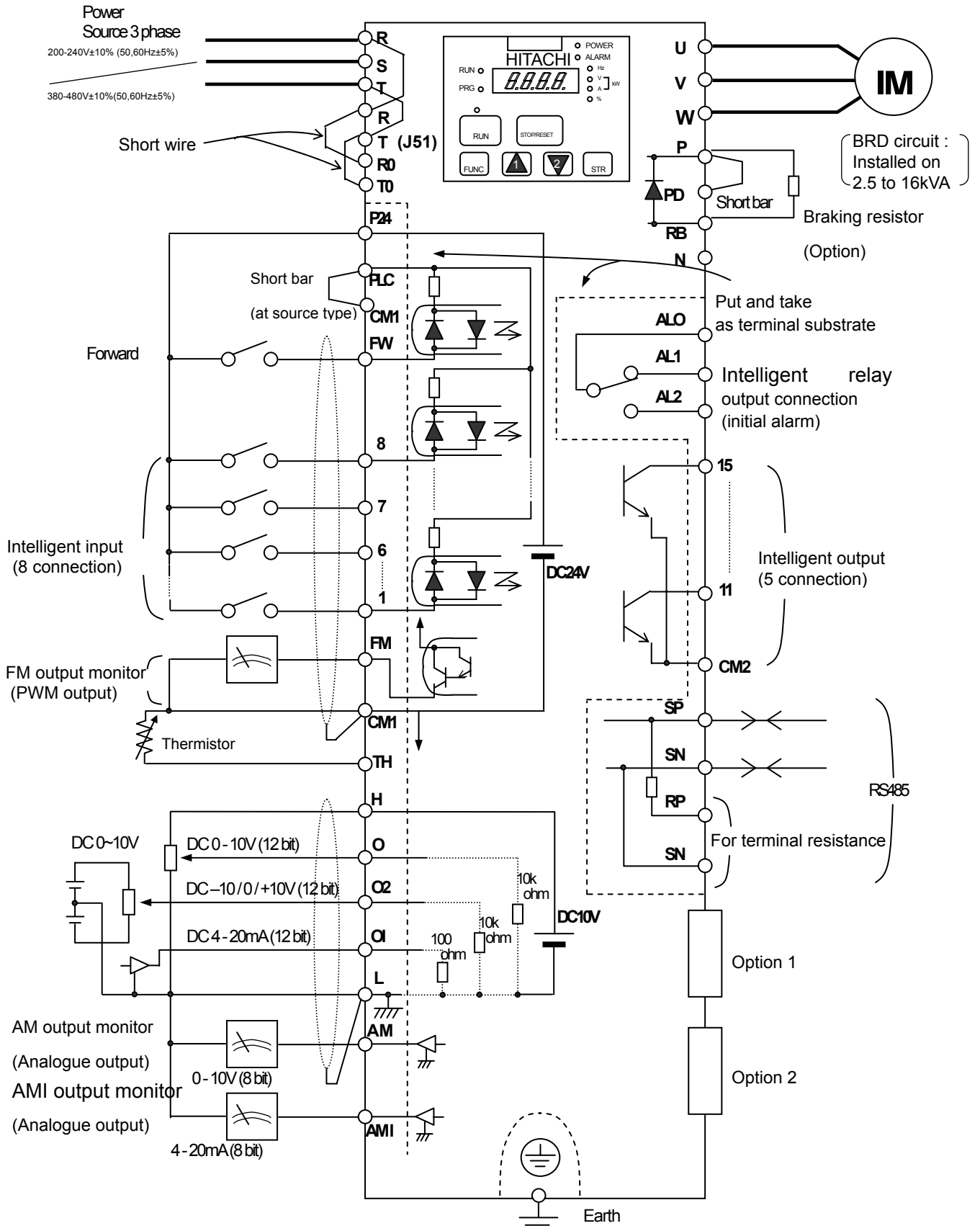
(1) Explanation of main circuit terminals

Symbol	Terminal Name	Explanation of contents
R, S, T (L1,L2,L3)	Main power	Connect alternating power supply. When using regenerative converter and HS900 series, don't connect.
U, V, W (T1,T2,T3)	Inverter output	Connect three-phase motor.
PD, P (+1,+)	D.C. reactor	Remove the short bar between PD and P, connect optional Power factor reactor (DCL-XX).
P, RB (+,RB)	External braking resistor	Connect optional External braking resistor. (Installed on 2.5kVA to 16kVA)
P, N (+,-)	External Regenerative unit	Connect optional Regenerative braking unit (BRD-XX).
G ⏚	Inverter earth terminals	It is earth terminals of inverter case.

(2) Explanation of control circuit terminal

		Symbol	Terminal Name	Explanation of contents	
Analogue	Power Source	L	Analogue power common	It is common terminal of frequency command signal (O, O2, OI) and analogue output, AM, AMI. Don't earth.	
		H	Frequency power	It is the DC+10V power for terminals.	Allowable load current 20mA
	Frequency setting	O	Frequency command power terminal (voltage)	When inputting DC 0 - 10V, it is maximum frequency on 10V. When maximum frequency is expected to be on being less than 10V, set with A014.	Input Impedance 10k ohm Allowable maximum voltage 12V
		O2	Frequency command support (voltage)	When inputting DC 0 - +-10V, this signal is added to frequency command of O or OI terminal.	Input Impedance 10k ohm Allowable maximum load current 20mA
		OI	Frequency command Terminal (current)	When inputting DC4 - 20mA, 20mA is maximum frequency. When only At terminal is ON, this input signal is effective.	Input Impedance 100 ohm Allowable maximum current 24mA
	Monitor	AM	Digital monitor (voltage)	Output one selected from monitor item, output frequency, output current, torque, output voltage, input electric power, electric thermal rate, LAD frequency	Allowable maximum current 2mA
		AMI	Analogue monitor (current)		Allowable output less than Impedance 250 ohm
Digital (connection)		FM	Digital monitor (voltage)	Output the output frequency with digital besides above monitor.	Allowable maximum current 1.2mA Maximum frequency 3.6kHz
	Power Source	P24	Interface power	It is DC24V power for connection input signal. When selecting source logic, it's for connection input common.	Allowable maximum output current 100mA
		CM1	Interface power common	The common terminal is FW terminal, 1 - 8 terminal, TH terminal, FM terminal, Don't earth.	
		PLC	Intelligent input common	Change sink type and source type by short bar on control terminals. P24-PLC : Sink type CM1-PLC :Source type	
	Input signal / Setting	FW	Forward command	About FW signal, ON is Forward and OFF is stop command.	Allowable maximum voltage 27V
	Input signal / Operation/ Function Selection etc	1 2 3 4 5 6 7 8	Input intelligent	Select 8 functions from 44 functions, and divide between 1 terminal and 8 terminals.	Input ON condition of terminal voltage Over 18V Input OFF condition of terminal voltage Under 3V Input impedance 4.7k ohm
	Output signal / Condition/Alarm	11 12 13 14 15	Intelligent output	Select 5 functions from 22 functions, and divide between 1 terminal and 5 terminals	Allowable maximum voltage 27V current 50mA
		AL1 AL2	Alarm output terminal	Assign output function. Output is c contact.	Allowable maximum AC250V,0.2A Allowable minimum AC100V,10mA
		AL0	Common terminal	It is common terminal of alarm output terminal	
Analogue	Sensor	TH	Thermistor input terminal	When a Thermistor is connected to terminals TH and CM1,the Inverter checks for over-temperature and will cause trip event and turn off output to motor.	Allowable minimum Thermistor Power 100mW

2.2.2 Main circuit 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.

Making sure to check 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, S, T)

Connect the main power terminals (R, S, and T) to the power supply through a electromagnetic contactor or an earth-leakage breaker.

We recommend connecting the electromagnetic contactor to the main power terminals. Because when the protective function of inverter operates, it isolates the powers supply and prevent the spread of damages and accidents.

This unit is for the three-phase power supply. It isn't for the single-phase power supply. If you require a single phase power supply unit, please contact us.

- Don't operate with on/off of the switch set up in the converter side and the inverter side. Do an operation stop by the operation order (FW/RV) terminals

- This inverter becomes the following condition at the time of open phase because open phase protection is being made ineffective by the early data.

- R phase or T phase, open phase condition: The power isn't turned on, and it doesn't operate.

  S phase, open phase condition : It becomes single-phase operation condition. Trip operation such as a deficiency voltage or over current may be done.

  Don't use it under open phase condition.

- A converter module may be damaged in the case shown below. Be careful.

  When an unbalance of the power supply voltage is more than 3%.

  Power supply capacity, 10 times of the capacity of inverter or a case beyond 500kVA.

  When a change in the rapid power supply voltage occur.

  (Example) When inverter of the plural is installed with the common electric wire whose it is short by each other.

  When there is insertion of the condenser or a removal.

- On/off of the power supply isn't to do it more than three times in one minute. It has the possibility that inverter is damaged.

2. Inverter output terminals (U, V, and W)

- Wire with thicker wire than the applicable wire to control the voltage drop.

  Particularly when outputting low frequencies, the torque of the motor will reduce by the voltage drop of the wire.

- Do not install power factor correction capacitors or a surge absorber to the output.

  The inverter will trip or sustain damage to the capacitors or the surge absorber.

- 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 (400V especially).

  An EMC Mains Filter is available, please contact 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. Install output ACL when a life becomes short by the length of wiring.

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

- These are the terminals to connect the current reactor DCL (Option) 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.
- When you don't use a DCL, don't disconnect the short bar.

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

- The regenerative braking circuit (BRD) is built-in as standard up to the 11kW Inverter.
  When braking is required, install an external-braking resistor to these terminals.
- The cable length should be less than 5 meters, and twist the two connecting wires to reduce inductance.
- Don't 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. Regenerative breaking unit connection terminals (P, N)

- The Inverters rated more than 15kW don't contain a BRD circuit. If regenerative braking is required an external BRD circuit (Option) is required along with the resistor (Option).
- Connect external regenerative braking unit terminals (P, N) to terminals (P,N) on the inverter. The braking resistor is then wired into the External Braking unit and not directly to the Inverter.
- The cable length should be less than 5 meters, and twist the two connecting wires to reduce inductance.

6. Earth (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 and follow the local standard.
  Failure to do so constitutes an electrical shock hazard.

(2) Wiring of main circuit terminals

The wiring of main circuit terminals for inverter is the following picture.

Wiring of terminals	Corresponding type
R0 T0 R(L1) S(L2) T(L3) U(T1) V(T2) W(T3) PD(+1) P(+) N(-) RB G⏚ G⏚ Short bar Charge lamp	SJH300-2.5-5.5LF/HF R0-T0 : M4 Other : M4
	SJH300-8LF/HF R0-T0 : M4 Other : M5
R(L1) S(L2) T(L3) U(T1) V(T2) W(T3) R0 T0 PD(+1) P(+) N(-) RB G⏚ G⏚ Short bar Charge lamp	SJH300-11LF/HF R0-T0 : M4 Other : M5
	SJH300-16LF/HF R0-T0 : M4 Other : M6
R0 T0 Charge lamp G⏚ R(L1) S(L2) T(L3) PD(+1) P(+) N(-) U(T1) V(T2) W(T3) G⏚ Short bar	SJH300-22LF/HF R0-T0 : M4 Other : M6

(3) Wiring Equipment
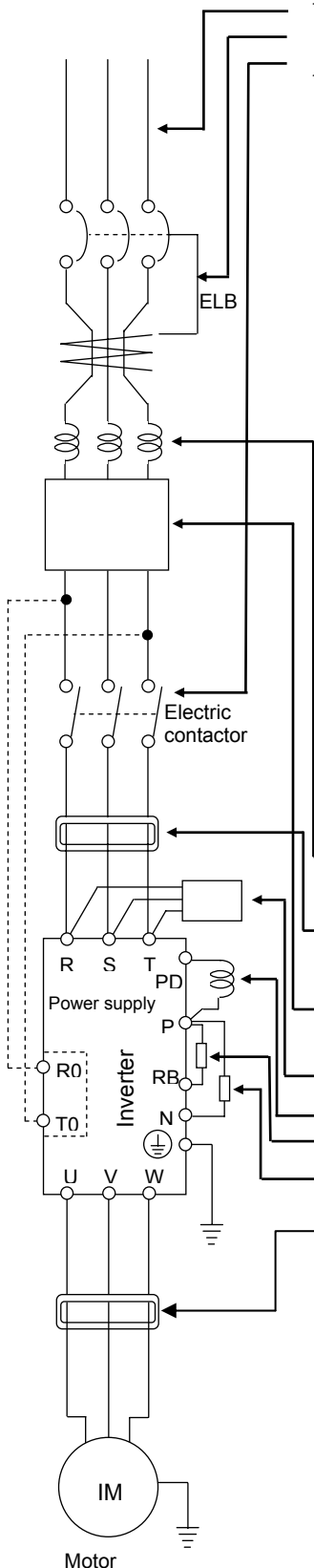
Refer to "(4) Common applicable tools"

(Note 1) The applicable tools indicate for Hitachi standard four-pole squirrel-cage Motor.

(Note 2) Select applicable tools for breakers examining the capacity of breakers. (Use Inverter type.)

(Note 3) Use earth-leakage breakers (ELB) for safety.

(Note 4) Use 60/75 °C copper electric wire.

(Note 5) It needs bigger wires for power lines, if the distance exceeds 20m.

(Note 6) Use 0.75mm^2 for Alarm output contact.

(Note 7) Separate by the sum wiring distance from Inverter to power supply, from inverter to motor for the sensitive current of leak breaker (ELB).

Wiring distance	Sensitive Current(mA)
100m and less	50
300m and less	100

(Note 8) When using CV wire and wiring by rigid metal conduit, leak flows.

(Note 9) IV wire is high dielectric constant. So the current increase 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 wire.

Name	Function
Input reactor(harmonic control, electrical coordination, power-factor improvement)(ALI-***)	This part is used 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 improves the power factor.
Radio noise filter (zero-phase reactor) (ZCL-***,FC-**)	Using the inverter may cause noise on the peripheral radio through the power lines. This part reduces noise.
Noise filter for Inverter (NF-***)	This part reduces common noise generated between the power supply and the ground, as well as normal noise. Put it in the primary side of inverter.
Input radio noise filter (capacitor filter)(CFI-*)	This part reduces radiation noise emitted from wire at the input.
Direct reactor(DCL-*-**)	This part control harmonic from inverter.
Breaking resistor Regenerative breaking unit	This part is used for applications that need to increase the brake torque of the inverter or to frequently turn on and off and to run high inertia load.
Radio noise filter(zero-phase reactor)(ZCL-***)	This part reduces noise generated at the output of the inverter. (It is possible to use for both input and output.)

ELB

Electric contactor

R S T
PD

Power supply

P

R0

RB

Inverter

T0

N

U V W

IM

Motor

(4) Common applicable tools

	Applicable Inverter model	Power lines R,S,T,U,V,W,P,PD,N		Earth line G			External resister between P and RB		Screw size of terminal	Terminal	Tightning Torque max (N·m)	Applicable tools		
		mm² or more	AWG or more	mm² or more	AWG or more	AWG or more (#1)	mm²	AWG				Leak breaker (ELB)	Circuit breaker or fuse	Electro-magnetic Controller (MC)
200V class	SJH300-2.5LF	2	14	1.25	16	14	2	14	M4	2-4	1.5	EX30(15A)	10A	H10C
	SJH300-3.5LF	2	14	1.25	16	14	2	14	M4	2-4	1.5	EX30(20A)	15A	H20
	SJH300-5.5LF	3.5	10	3.5	10	12	3.5	10	M4	3.5-4	1.5	EX30(30A)	20A	H20
	SJH300-8LF	5.5	8	5.5	8	10	5.5	8	M5	5.5-5	2.5	EX50B(50A)	30A	H25
	SJH300-11LF	8	6	8	8	10	5.5	8	M5	8-5	2.5	EX60B(60A)	40A	H35
	SJH300-16LF	14	4	14	4	10	5.5	8	M6	14-6	4.9	RX100(75A)	60A	H50
	SJH300-22LF	22	2	22	3	8	-	-	M6	22-6	4.9	RX100(100A)	80A	H65
400V class	SJH300-2.5HF	2	18	1.25	16	14	2	18	M4	2-4	1.5	EX30(10A)	10A	H10C
	SJH300-3.5HF	2	16	1.25	16	14	2	16	M4	2-4	1.5	EX30(10A)	10A	H10C
	SJH300-5.5HF	2	14	1.25	16	14	2	14	M4	2-4	1.5	EX30(15A)	15A	H20
	SJH300-8HF	2	12	2	14	14	2	12	M5	2-5	2.5	EX50C(30A)	15A	H20
	SJH300-11HF	3.5	10	3.5	10	12	3.5	10	M5	3.5-5	2.5	EX50C(30A)	20A	H20
	SJH300-16HF	5.5	8	5.5	8	10	5.5	8	M6	5.5-6	4.9	EX50C(50A)	30A	H25
	SJH300-22HF	8	6	8	8	10	-	-	M6	8-6	4.9	EX60B(60A)	40A	H35

#1 Conformity to the UL

(Note) Field wiring must be made by an UL-listed and CSA-certified closed-loop terminal connector sized for the wire gauge involved. Connector must be fixed by using the crimping tool specified by the connector manufacture or equivalent wording included in the manual.

⚠ WARNING

Use suitable circuit breaker or fuse listed in this manual for UL's listing purpose.
   Otherwise, there is a danger of fire.

---

5) Connecting power to the control circuit, separating from main power

When the protection circuit of inverter is activated and the electromagnetic contactor on the input supply to the inverter isolates the power supply, the control circuit power supply from the inverter will also switch off and the alarm output signal will not be hold.

The power terminals R0 and T0 are designed to allow a supply to go direct to the control circuit and therefore keep the alarm output signal on.

In this case, please connect power terminals R0 and T0, to the primary side of the electromagnetic contactor. (inverter unit side of ACL, EMI filter, on using input ACL, EMI filter).

(Connection)

[3] Connect power supply for control circuit to power terminals.

The specification of the receiving voltage

200 to 240V±10%(50/60Hz±5%)

(DC282 to 339V)

380 to 480V±10%(50/60Hz±5%)

(DC537 to 678V)

J51

[1] Remove the wires connected.

[2] Take off the wire of J51.
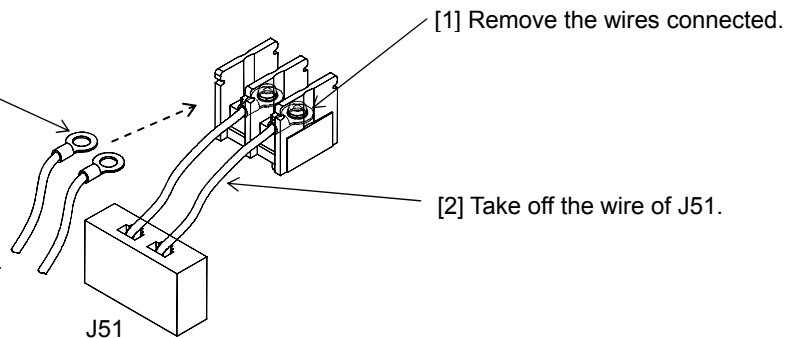
When you wire the control circuit power source (R0-T0) and the main circuit power source (R,S,T) separately. Please connect the 3A fuse to the power source electric wire, which is for the control circuit.

2.2.3 Terminal Connection Diagram

(1) Wiring

1. Both the CM1 and L terminal is insulated to both the common terminal of the input and output signals.
    Do not short or earth these common terminals.

2. Use twisted screened cable, for the input and output wires of the control circuit terminals.
    Connect the screen to the common terminal. The recommended wire gauge for all wiring to the logic connector
    is 28 AWG(0.75 mm^2).

3. Limit connection wires to 20m. When it is necessary to wire over 20m, use a VX applied controller RCD-A
    (Remoter operation bar) or a CVD-E (Insulated signal transducer).

4. Separate the control circuit wiring from the main power and relay control wiring.

5. If control and power wires must cross make sure they cross at 90 degrees to each other.

6. When connecting a thermistor to the TH and CM1 terminal, twist the thermistor cables separate from the rests.
    Limit connection wires to 20m.
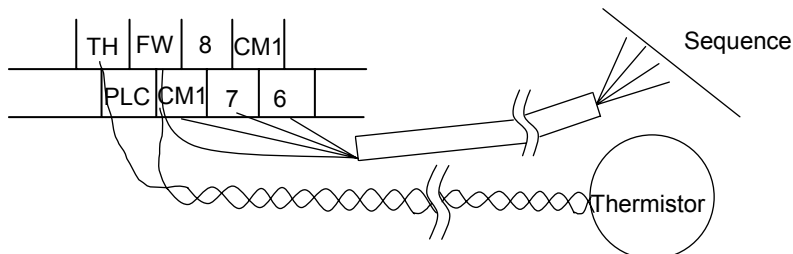
7. When using relays for the FW terminal or an intelligent input terminal use a control relay as they are designed
    to work with 24Vdc.

8. When the relay is used as an intelligent output, connect a diode for surge protection parallel to the coil.

9. Do not short the analogue voltage terminals H and L or the internal power terminals PV24 and CM1.
    There is risk of Inverter damage.

(2) Layout of control circuit terminals

H	O2	AM	FM	TH	FW	8	CM1	5	3	1	14	13	11	AL1
L	O	OI	AMI	P24	PLC	CM1	7	6	4	2	15	CM2	12	AL0	AL2

The terminal screw size; M3

(3)Change of input logic type

The logic type of intelligent input terminals is written following list (Factory Default).

SJH300 – xxx LF / HF	Sink type

The input logic type can be changed by changing the Short bar connection of control terminal.

Sink type	Between P24 and PLC on the control terminal.
Source type	Between PLC and CM1 on the control terminal.

(4) The connection to the input programmable logic controller (sequencer)
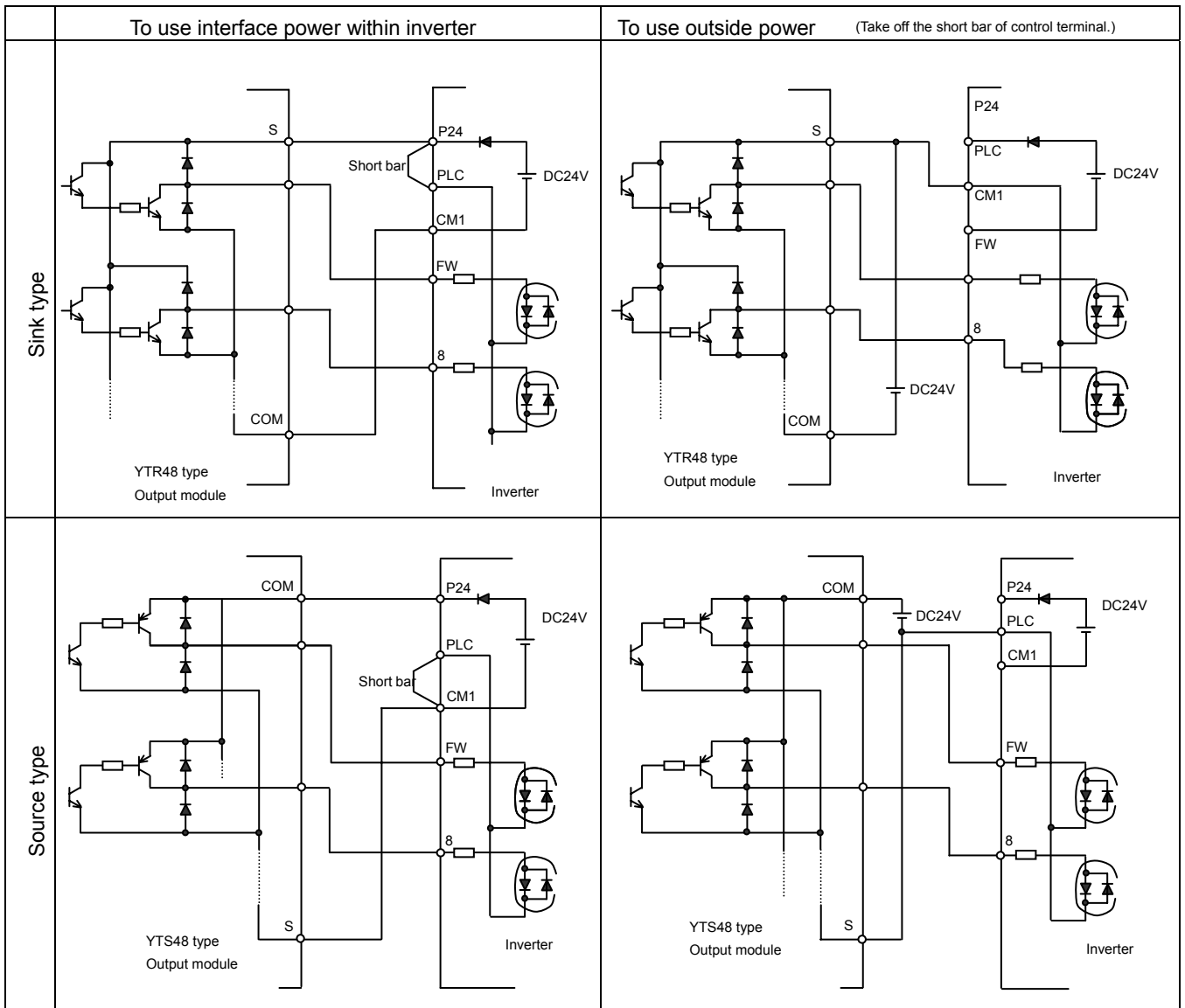
(5) The connection to the output programmable logic controller (sequencer)
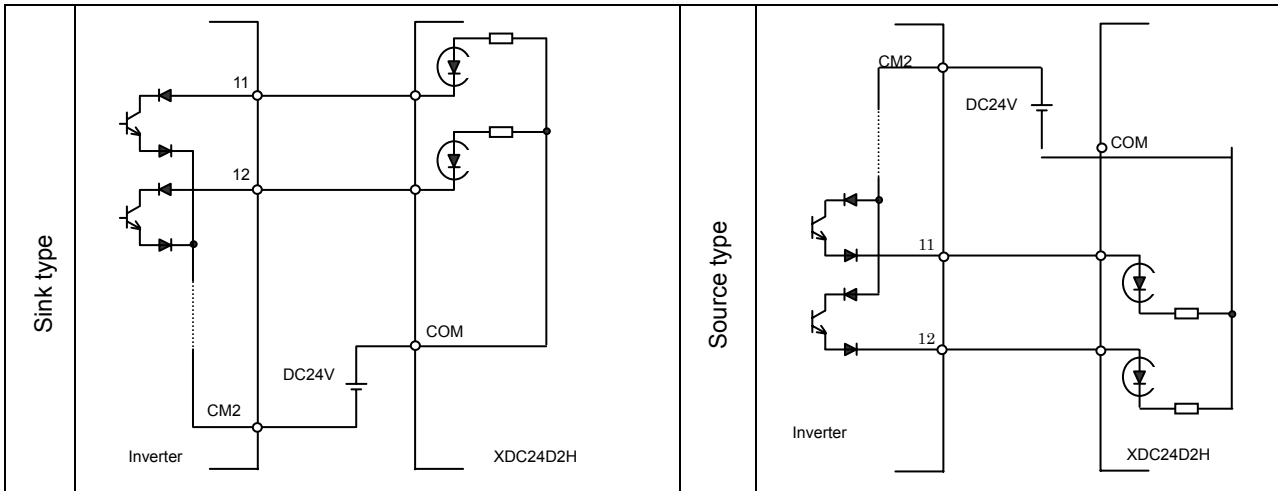
2.2.4 Digital operator wiring

For operating this inverter, it can use digital operator OPE-SR , OPE-SRE, OPE-S, SRW-0J and SRW-0EX. For remote operating, put off digital operator from inverter and use connector cable ICS-1(1m) or ICS-3(3m).

(Note 1) When using connector cable, be sure to use less than 3m length. Otherwise, there is a danger of malfunction.

(Note 2) In case of remote operating with connector cable, the inverter does not conform to EMC.

⚠**WARNING**

• Be sure not to touch the main terminal or to check the signal or put on/off wire and/or connector.
  Otherwise, there is a danger of electric shock.

• Be sure to turn on the input power supply after closing the front cover.
  While being energized, be sure not to open the front cover.
    Otherwise, there is a danger of electric shock.

• Be sure not to operate the switches with wet hands.
    Otherwise, there is a danger of electric shock.

• While the inverter is energized, be sure not to touch the inverter terminals even during stoppage.
    Otherwise, there is a danger of electric shock.

• If the retry mode is selected, it may suddenly restart during the trip stop. Be sure not to approach the machine.
  (Be sure to design the machine so that personnel safety will be secured even if it restarts.)
    Otherwise, there is a danger of injury.

• Be sure not to select retry mode for up and down equipment or traveling equipment, because there is output
  free-running mode in term of retry.
    Otherwise, there is a danger of injury and/or machine breakage.

• Even if the power supply is cut for a short period of time, it may restart operation after the power supply is
  recovered if the operation command is given. If it may incur danger to personnel, be sure to make a circuit so
  that it will not restart after power recovery.
    Otherwise, there is a danger of injury.

• The Stop Key is effective only when the function is set. Be sure to prepare the Key separately from the
  emergency stop.
    Otherwise, there is a danger of injury.

• After the operation command is given, if the alarm reset is conducted, it will restart suddenly. Be sure to set the
  alarm reset after checking the operation command is off.
    Otherwise, there is a danger of injury.

• Be sure not to touch the inside of the energized inverter or to put a bar into it.
    Otherwise, there is a danger of electric shock and/or fire.

⚠ **CAUTION**

• Cooling fin will have high temperature. Be sure not to touch them.
  Otherwise, there is a danger of getting burned.

• 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.
  Otherwise, there is a danger of injury.

• Install external break system if needed.
  Otherwise, there is a danger of injury.

• 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 with each manufacturer, and after getting their consent, operate them.
  Otherwise, there is a danger of machine breakage.

• Check the following before and during the test run.
    Otherwise, there is a danger of machine breakage.
      Was the direction of the motor correct?
      Was the inverter tripped during acceleration or deceleration?
      Were the rpm and frequency meter correct?
      Were there any abnormal motor vibrations or noise?

3.1 Operation

This inverter requires two different signals in order for the Inverter to operate correctly. The Inverter requires both an operation setting and a frequency setting.

The following indicates the details of each method of operation and the necessary instructions for operation.

(1) Operation setting and a frequency setting by the terminal control.

This is the method by connecting signals from the outside (the frequency setting, the starting switch etc.) with the control circuit terminals.

The operation is started when the operation setting (FW, RV) is turned ON while the input power is turned ON.

(Note) The methods of the setting frequency with terminal are the voltage setting and the electric setting. And they are selective by each system. The control circuit terminal list shows this in detail.

(Necessary things for operation)

[1] The operation setting: switch, relay etc.

[2] The frequency setting: signals from volume or external (DC0-10V, DC-10-10V, 4-20mA etc.)

Terminal

Operation Setting (switch)

Frequency setting (volume)
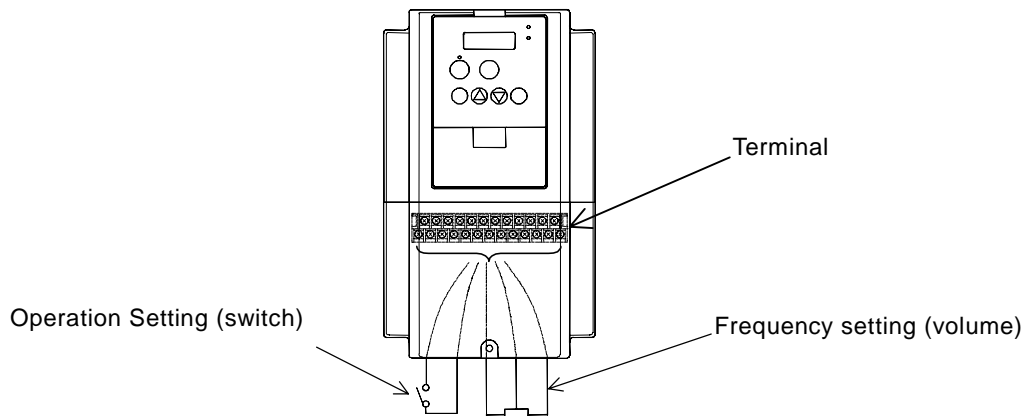
(2) Operation setting and frequency setting with the digital operator.

This is the method for operation from the digital operator, which comes equipped with the inverter as standard, or the remote operator (SRW) keypad.

When the digital operator sets the operation, the terminals (FW, RV) don't need to be linked.

And it is possible to select frequency from the digital operator as a method of the frequency setting too.

(Necessary things for operation)

[1] Remote Operator (SRW) (It's unnecessary in case of digital operator operation)

Power Lamp
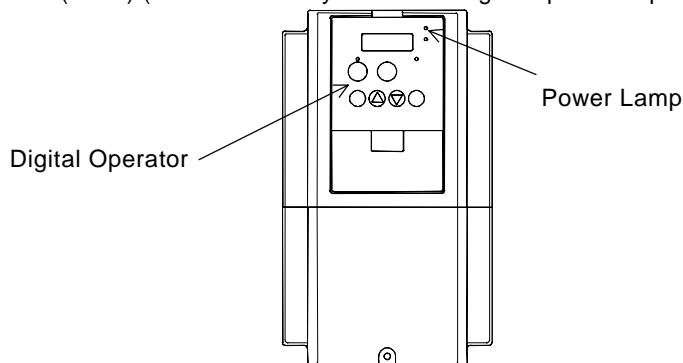
Digital Operator

(3) Operation setting and frequency setting from both digital operator and terminal operator

This is the method of inverter operating from both of the above two operating methods

It is possible that the operation setting and the frequency setting can be selected for both the digital operator and the terminal operator each separately.

3.2 Test Run

This is the common connection example. Please refer to 4.1 Digital Operator, for the detailed use of the digital operator (OPE-S).

(1) To input the operation setting and the frequency setting from terminal control.
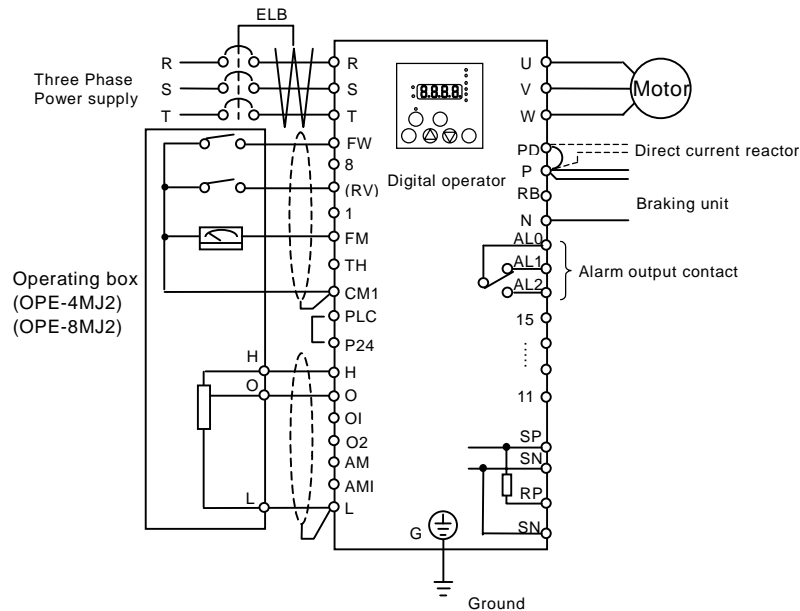
(Arrangements)

[1] Please make sure that the connections are correctly secure.

[2] Turn the ELB ON to supply power to the inverter.

(The red LED "POWER" on the digital operator should illuminate.)

[3] Set terminal with the frequency setting selection.

Set A001 as indication code, press the (FUNC) key once. (Two figures are shown.)

Set 01 with the (1) key or the (2) key, press the (STR) key once to set the frequency setting for terminal. (Indication code turns back to A001.)

[4] Set terminal with the operation setting selection.

Set A002 as indication code, press the (FUNC) key once. (Two figures are shown.)

Set 01 with the (1) key or the (2) key; press the (STR) key once to set the operation setting for terminal. (Indication code turns back to A002.)

[5] Set monitor mode.

When monitoring the output frequency, set indication code to d001, and press the (FUNC) key once.

Or when monitoring the operating direction, set indication code to d003, press the (FUNC) key once.

[6] Input starting operation setting.

Turn ON between [FW] and [CM1] of terminal.

Impress voltage between [O] and [L] of terminal to start operation.

[7] Input ending operation setting.

Turn OFF between [FW] and [CM1] to stop slowly down.

(2) Operation setting and the frequency setting from the digital operator
   (Remote Operator (SRW) is also same use.)
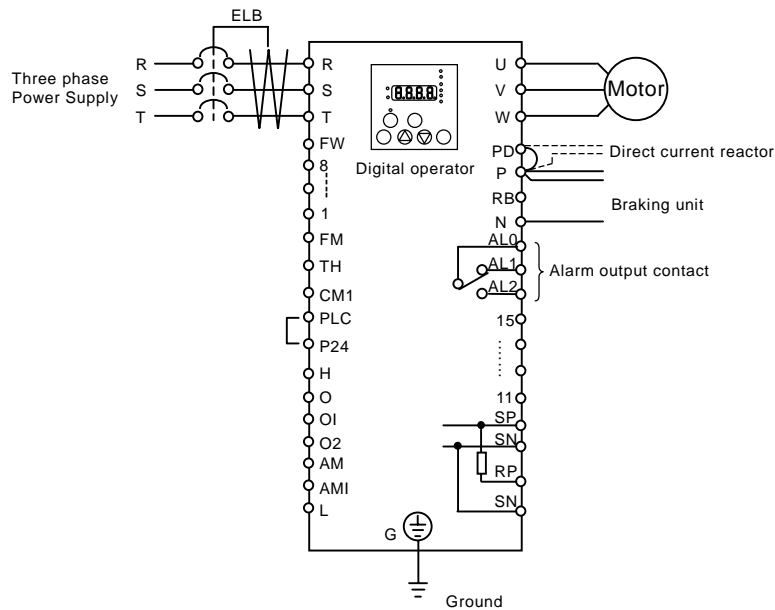
(Arrangements)

[1] Please make sure that there isn't matter about the connection.

[2] Turn the ELB on to supply power to the inverter.
   (The red LED "POWER" on the digital operator should illuminate.)

[3] Set operator with the frequency setting selection.
   Set A001 as indication code, press the (FUNC) key once.
   (Two figures are shown.)

   Set 02 with the (△) key or the (▽) key, press the (STR) key once to set the frequency setting for the operator.
   (Indication code turns back to A001.)

[4] Set operator with the operation setting selection.
   Set A002 as indication code, press the (FUNC) key once.
   (Two figures are shown.)

   Set 02 with the (△) key or the (▽) key, press the (STR) key once to set the operation setting for the operator.
   (Indication code turns back to A002.)

[5] Set the output frequency

Set F001 as indication code, as press the (FUNC) key once.

(Indication code of four figures is shown.)

Set to the desired output frequency with the (1) key or the (2) key, press the (STR) key once to store it.

(Indication code turns back to F001.)

[6] Set the operation direction.

Set F004 as indication code, press the (FUNC) key once.

(00 or 01 is shown.)

Set operation direction to 00 in case of forward, or to 01 in case of reverse with the (1) key or the (2) key. Press the (STR) key once to establish it.

(Indication code turns back to F004.)

[7] Set monitor mode.

When monitoring the output frequency, set indication code to d001, and press the (FUNC) key once.

Or when monitoring the operation direction, set indication code to d003, press the (FUNC) key once.

(Indication code are [] forward, [] reverse or [] stop.)

[8] Press the (RUN) key to start operating.

(The green LED "RUN" turns on a light, and the indication changes in response to the monitor mode set.

[9] Press the (STOP/RESET) key to decelerate to a stop.

(When the frequency turn back to 0, the green LED "RUN" light will switch off.)

⚠ **CAUTION**

Make sure that the direction of the motor is correct. It is in danger of injury or machine damage.

Make sure there is no abnormal noise and vibration. It is in danger of injury or machine damage.

Make sure that there is no tripping during the acceleration and deceleration and check that the revolution per minute and the frequency meter are correct.

When overcurrent tripping or overvoltage tripping occurs during the test run, increase the acceleration time or the deceleration time.

4.1 About Digital Operator (OPE-S)

Explanation of operating the digital operator (OPE-S)
SJH300 series operates by using the digital operator, which is fitted as standard.

1. Name and contents of each part of the digital operator
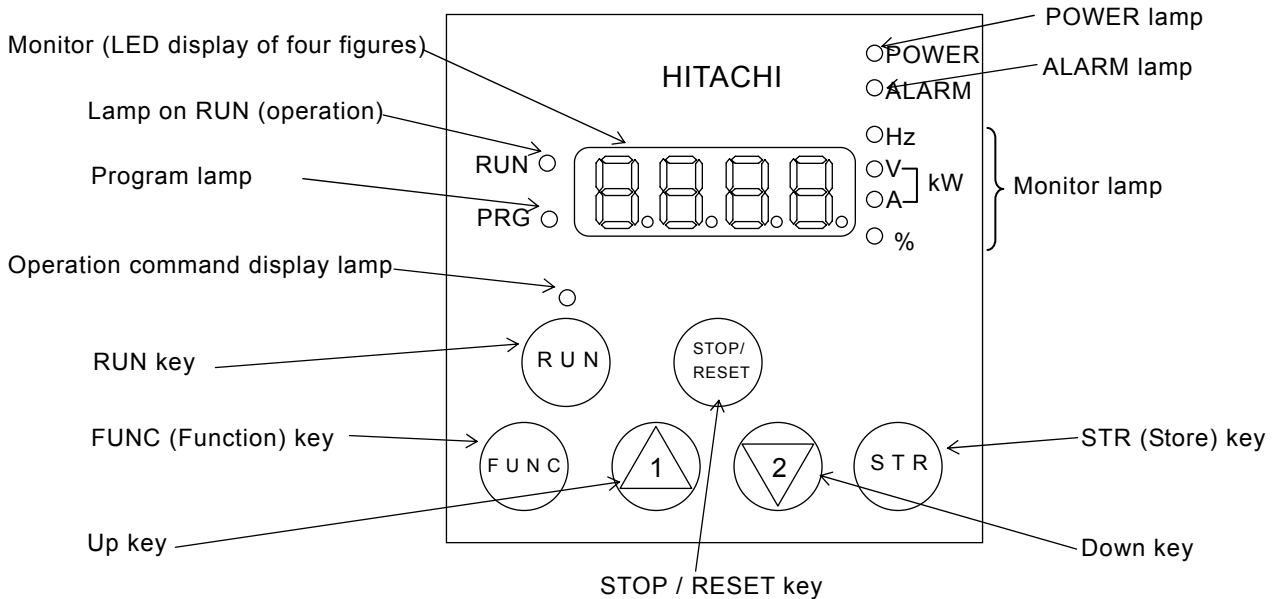
Name	Contents
Monitor	Display of frequency, output current and set value
Lamp on RUN (Operation)	Light on when the inverter is running
Program lamp	Light on when displaying set value of each function in monitor section Light will flash On and Off as a warning (when set value is incorrect)
POWER lamp	Power lamp of control circuit
ALARM lamp	Light on when the Inverter trips
Monitor lamp	Lamp display state of monitor section. Hz : Frequency V : Voltage A : Current kW : Electric power % : Rate
Operation command Display lamp	Light on only when operating command (RUN/STOP) is set in operator
RUN key	Run command to start the motor. But this is only valid when operation command is from the operator. (Be sure that the operation command display lamp is illuminated.)
STOP (STOP/RESET) key	This key is used to stop motor, or reset an alarm.
FUNC (Function) key	The key containing monitor mode, basic setting mode, extension functions mode.
STR (Store) key	The key to store the data set. (On changing set value, must be pushed or value is lost.)
UP/DOWN key	The keys to change extension function mode, function mode and set value.

...2. Operating method

(1) Method to display monitor mode, basic setting mode, extension function mode

Power on

[1] Display of monitor contents set

(Display 0.00 in initial state)

HITACHI
● POWER
○ ALARM
RUN ○ **0.00**
● Hz
○ V ⌐kW
○ A ⌐
PRG ●
○ %
RUN STOP/RESET
FUNC △1 ▽2 STR
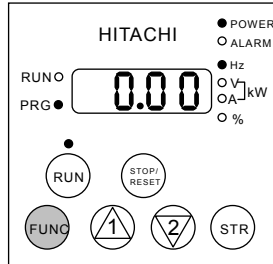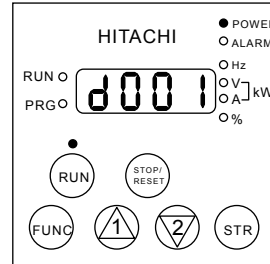
When power is turned off while the basic setting mode or the extension setting mode is displayed. The display will be different from the one above when the power is restored.

Push the FUNC key.

[2] Display monitor code No.

(Display d001)

HITACHI
● POWER
○ ALARM
RUN ○ **d001**
○ Hz
○ V ⌐kW
○ A ⌐
PRG ○
○ %
RUN STOP/RESET
FUNC △1 ▽2 STR
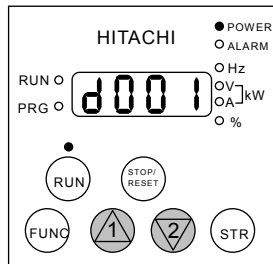
Monitor mode is displayed by pushing FUNC (Function) key once when display of Monitor mode No.

Push the ▽2 key. Push the △1 key.

(Display d002)

*1
Push the △1 key.

(19 times)

HITACHI
● POWER
○ ALARM
RUN ○ **d002**
○ Hz
○ V ⌐kW
○ A ⌐
PRG ○
○ %
RUN STOP/RESET
FUNC △1 ▽2 STR

Push the ▽2 key.

(19 times)

[5] Display monitor code No.

(Display d001)

HITACHI
● POWER
○ ALARM
RUN ○ **d001**
○ Hz
○ V ⌐kW
○ A ⌐
PRG ○
○ %
RUN STOP/RESET
FUNC △1 ▽2 STR

Return to the state of [2].

Push the △1 key. Push the ▽2 key.
(6 times) (6 times)

[4] Display extension function mode

(Display A - - -)

HITACHI
● POWER
○ ALARM
RUN ○ **A- - -**
○ Hz
○ V ⌐kW
○ A ⌐
PRG ○
○ %
RUN STOP/RESET
FUNC △1 ▽2 STR
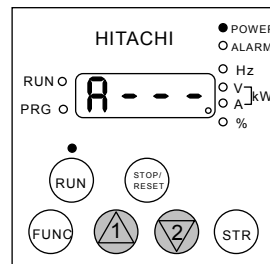
Extension function mode

Display in the order of

A ←→ b ←→ C ←→ H ←→ P ←→ U.

Push the △1 key. Push the ▽2 key.
(8 times) (8 times)
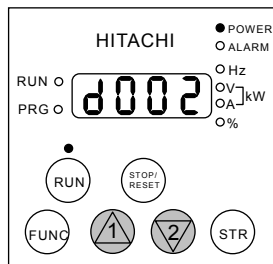
[3] Display code No. of basic setting mode.

(Display F001)

HITACHI
● POWER
○ ALARM
RUN ○ **F001**
○ Hz
○ V ⌐kW
○ A ⌐
PRG ○
○ %
RUN STOP/RESET
FUNC △1 ▽2 STR
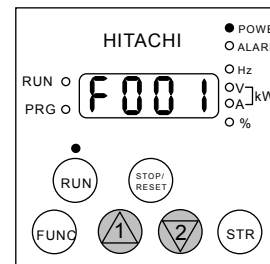
(Note1) Refer to (3)setting method of function code.

(2) Setting method of function

Change operation command part. (Operator ⟶ Control terminal)

[1] Display extension
function mode
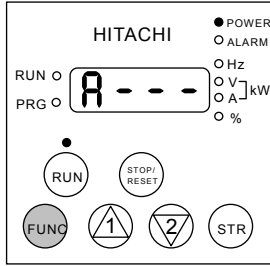
Make monitor display "A - - -" by referring to (1)
displaying method.

Now operating command part is by the operator,
so operating command display lamp should
illuminate.

Push the (F U N C) key.

[2] Display code No. of function
mode.
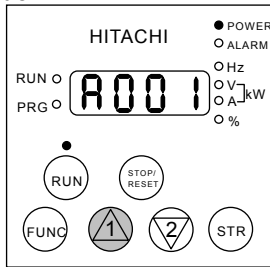
Push the (1) key.

(Display A002)
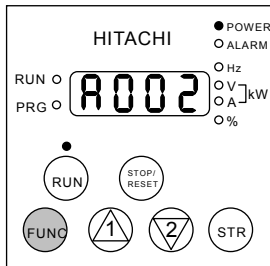
Push the (F U N C) key.

[3] Display contents of function mode

Push the (2) key.
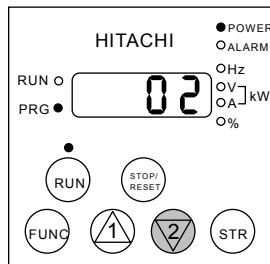
Operation command part displays
02(operator).

Program (PRG) light on by
displaying contents of function
mode.

[5] Display extension function
mode (Display A - - -)
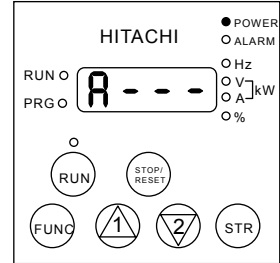
It is possible to shift to other extension
function modes, monitor modes and basic
modes in this state.

Push the (F U N C) key.

[4] Display code No. of monitor mode.
(Display A002)
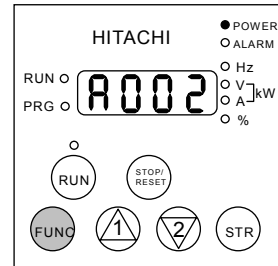
The changed set value is confirmed by pushing
the STR key.

Operation command display lamplight will switch
off so that operation command is now changed to
the control terminal.

Push the (S T R) key.
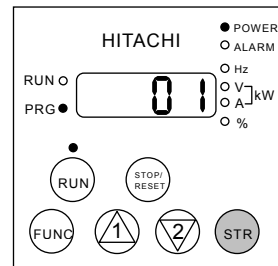
Change operation command
part to control terminal 01.

(3) Setting method of function code

Code No. of monitor modes, basic setting modes and extension function codes can be set easily.

Indicate the method to change code No.d001 of monitor mode to function code No. . A029 simply.

[1] Display code No. of monitor mode.

(Displayd001)

HITACHI ● POWER ○ ALARM
RUN○ **d001** ○ Hz
PRG○ ○ V] kW
○ A
○ %
RUN STOP/RESET
FUNC ①②STR
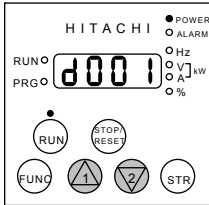
Push the ① ② key together.

[2] Change extension function mode

HITACHI ● POWER ○ ALARM
RUN○ **d001** ○ Hz
PRG○ ○ V] kW
○ A
○ %
RUN STOP/RESET
FUNC ①②STR

"d" blinks.

Push the ① key.
(2 times)

(Display A001)

HITACHI ● POWER ○ ALARM
RUN○ **A001** ○ Hz
PRG○ ○ V] kW
○ A
○ %
RUN STOP/RESET
FUNC ①②STR
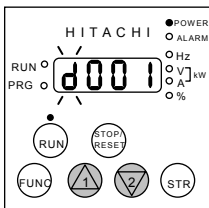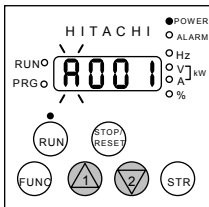
"A" blinks.

The figure lighting is decided by pushing STR key.

Push the STR key.
(Confirm "A")

[3] Change third figure of function code No. .

HITACHI ● POWER ○ ALARM
RUN○ **A001** ○ Hz
PRG○ ○ V] kW
○ A
○ %
RUN STOP/RESET
FUNC ①②STR

Push the STR key.
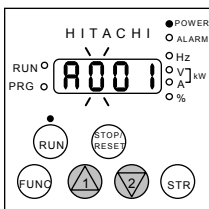
(Confirm "0")

Third figure "0" blinks.

Don't change third figure and push the STR key and confirm 0.

(Display A029)

HITACHI ● POWER ○ Hz
RUN○ **A029** ○ V] kW
PRG○ ○ A
○ %
RUN STOP/RESET
FUNC ①②STR
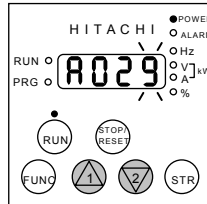
"9" of first figure blinks.

Push the ② or ① key.
(2 times) (9 times)

[5] Change first figure of function code No. .

HITACHI ● POWER ○ ALARM
RUN○ **A021** ○ Hz
PRG○ ○ V] kW
○ A
○ %
RUN STOP/RESET
FUNC ①②STR
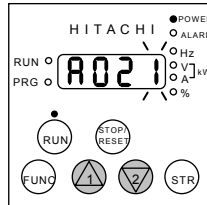
First figure, "1" blinks.

Push the STR key.

(Display A021)

HITACHI ● POWER ○ ALARM
RUN○ **A021** ○ Hz
PRG○ ○ V] kW
○ A
○ %
RUN STOP/RESET
FUNC ①②STR
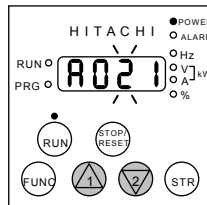
Second figures, "2" blinks.

Push the ① key.
(2 times)

[4] Change second figure of function code No. .

HITACHI ● POWER ○ ALARM
RUN○ **A001** ○ Hz
PRG○ ○ V] kW
○ A
○ %
RUN STOP/RESET
FUNC ①②STR
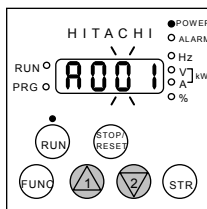
Second figure, "0" blinks.

Push the STR Key

(Decide "9")

[6] Finish setting function code No.

HITACHI ● POWER ○ Hz
RUN○ **A029** ○ V] kW
PRG○ ○ A
○ %
RUN STOP/RESET
FUNC ①②STR
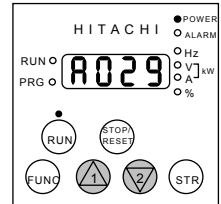
Finish setting A029

(Note) When you input code No. there isn't in the code list, "A" of left end blinks again. Confirm code No. and input it again.

4.2 Code list

Monitor Mode   (Note 1)

Dis-play code	Function name	SJH300 monitor or data range (digital operator)	Initial data	Setting on running	Change mode during running	Page
d001	Output frequency monitor	0.00-99.99/100.0-1500.0(Hz)	-	-	-	4-13
d002	Output current monitor	0.0-999.9(A)	-	-	-	4-13
d003	Operation direction monitor	F(forward)/o(stop)/r(reverse)	-	-	-	4-13
d005	Intelligent input terminal monitor	(Example) FW, terminal 7,2,1: ON Terminal 8,6,5,4,3:OFF	-	-	-	4-14
d006	Intelligent output terminal monitor	(Example) Terminal 12,11:ON AL, 15,14,13:OFF	-	-	-	4-14
d007	Frequency conversion monitor	0.00-99.99/100.0-999.9/1000. –9999. / 1000-3996	-	-	-	4-15
d013	Output voltage monitor	0.0-600.0 V	-	-	-	4-15
d014	Input electric power monitor	0.0-999.9 kW	-	-	-	4-15
d016	Accumulated time monitor during RUN	0.-9999./1000-9999/⌐100-⌐999 h	-	-	-	4-16
d017	Power ON time monitor	0.-9999./1000-9999/⌐100-⌐999 h	-	-	-	4-16
d080	Number of trip time monitor	0.-9999./1000-6553(10000-530) (times)	-	-	-	4-16
d081	Trip monitor 1		-	-	-	4-16
d082	Trip monitor 2		-	-	-	4-16
d083	Trip monitor 3	Trip Code, frequency(Hz), current(A), voltage(V),RUN time(h) power ON time(h)	-	-	-	4-16
d084	Trip monitor 4		-	-	-	4-16
d085	Trip monitor 5		-	-	-	4-16
d086	Trip monitor 6		-	-	-	4-16
d090	Warning monitor display	Warning code	-	-	-	4-78
F001	Output frequency setting	0.0, starting frequency-Max. frequency (2nd max. 5th max. frequency)(Hz)	0.00	○	○	4-17
F002	1st acceleration time	0.01-99.99/100.0-999.9/1000. -3600.(s)	30.00	○	○	4-19
F202	2nd acceleration time	0.01-99.99/100.0-999.9/1000. -3600.(s)	30.00	○	○	4-19
F302	3rd acceleration time	0.01-99.99/100.0-999.9/1000. -3600.(s)	30.00	○	○	4-19
F402	4th acceleration time	0.01-99.99/100.0-999.9/1000. -3600.(s)	30.00	○	○	4-19
F502	5th acceleration time	0.01-99.99/100.0-999.9/1000. -3600.(s)	30.00	○	○	4-19
F003	1st deceleration time	0.01-99.99/100.0-999.9/1000. -3600.(s)	30.00	○	○	4-19
F203	2nd deceleration time	0.01-99.99/100.0-999.9/1000. -3600.(s)	30.00	○	○	4-19
F303	3rd deceleration time	0.01-99.99/100.0-999.9/1000. -3600.(s)	30.00	○	○	4-19
F403	4th deceleration time	0.01-99.99/100.0-999.9/1000. -3600.(s)	30.00	○	○	4-19
F503	5th deceleration time	0.01-99.99/100.0-999.9/1000. -3600.(s)	30.00	○	○	4-19
F004	Operation direction selection	00(forward)/01(reverse)	00	×	×	4-17

(Note 1) Change mode during run by selection of b031 (software lock selection).

(Note)   Do not forget to press "STR" key when you change the display.

Function Mode

	Code	Function name	Setting range	Initial data	Setting on run	Change mode on run	JH300 ○:Setting on remote	Page
Base setting	A001	Frequency command selection	00(VR)(Note1)/01(terminal)/02(operator)/03(RS485) /04(option1)/05(option2)	02	×	×	F9	4-17
	A002	Operation command selection	01(terminal)/02(operator)/03(RS485) /04(option1)/05(option2)	02	×	×	F9	4-18
	A003	Base frequency, 1st motor	30. - Maximum. Frequency(Hz)	1000.	×	×	A62	4-20
	A203	Base frequency, 2nd motor	30. - 2nd Maximum. Frequency (Hz)	1000.	×	×	A62	4-20
	A303	Base frequency, 3rd motor	30. - 3rd Maximum. Frequency (Hz)	1000.	×	×	-	4-20
	A403	Base frequency, 4th motor	30. - 4th Maximum. Frequency (Hz)	1000.	×	×	-	4-20
	A503	Base frequency, 5th motor	30. - 5th Maximum. Frequency (Hz)	1000.	×	×	-	4-20
	A004	Maximum frequency 1st motor	30. - 1500. (Hz)	1000.	×	×	A63	4-21
	A204	Maximum frequency, 2nd motor	30. - 1500. (Hz)	1000.	×	×	A63	4-21
	A304	Maximum frequency, 3rd motor	30. - 1500. (Hz)	1000.	×	×	-	4-21
	A404	Maximum frequency, 4th motor	30. - 1500. (Hz)	1000.	×	×	-	4-21
	A504	Maximum frequency, 5th motor	30. - 1500. (Hz)	1000.	×	×	-	4-21
Analog input setting	A005	AT terminal selection	00(Changing of O and OI with AT terminal)/ 01(Changing of O and O2 with AT terminal)	00	×	×	-	4-21
	A006	02 selection	00(single)/01(auxiliary speed of O, OI) [no reversible] / 02(auxiliary speed of O, OI [reversible]	00	×	×	-	4-21
	A011	0 start	0.00-99.99/100.0-999.9/1000.-1500.0 (Hz)	0.00	×	○	A26	4-23
	A012	0 end	0.00-99.99/100.0-999.9/1000.-1500.0 (Hz)	0.00	×	○	A27	4-23
	A013	0 start rate	0.-100.0 (%)	0.	×	○	-	4-23
	A014	0 end rate	0.-100.0.(%)	100.	×	○	-	4-23
	A015	0 start selection	00 (external starting frequency)/01(0Hz)	01	×	○	-	4-23
	A016	O, OI, O2 sampling	1.-30.(times)	8.	×	○	-	4-24
Multistage speed・jogging frequency setting	A019	Multi-speed selection	00(binary : range is to 16 stage speed with 4 terminals)/ 01(bit : range is to 8 stage speed with 7 terminals)	00	×	×	-	4-44
	A020	Multi-speed 0 1st motor	0.00, starting frequency-maximum. Frequency(Hz)	0.00	○	○	○	4-44
	A220	Multi-speed 0 2nd motor	0.00, starting frequency-2nd maximum frequency(Hz)	0.00	○	○	○	4-44
	A320	Multi-speed 0 3rd motor	0.00, starting frequency-3rd maximum frequency(Hz)	0.00	○	○	-	4-44
	A420	Multi-speed 0 4th motor	0.00, starting frequency-4thmaximum. Frequency(Hz)	0.00	○	○	-	4-44
	A520	Multi-speed 0 5th motor	0.00, starting frequency-5thmaximum. Frequency(Hz)	0.00	○	○	-	4-44
	A021	Multi-speed1	0.00, starting frequency-maximum frequency(Hz)	0.00	○	○	A12	4-44
	A022	Multi-speed2	0.00, starting frequency-maximum frequency(Hz)	0.00	○	○	A13	4-44
	A023	Multi-speed3	0.00, starting frequency-maximum frequency(Hz)	0.00	○	○	A14	4-44
	A024	Multi-speed4	0.00, starting frequency-maximum frequency(Hz)	0.00	○	○	○(F-11)	4-44
	A025	Multi-speed5	0.00, starting frequency-maximum frequency(Hz)	0.00	○	○	○(F-11)	4-44
	A026	Multi-speed6	0.00, starting frequency-maximum frequency(Hz)	0.00	○	○	○(F-11)	4-44
	A027	Multi-speed7	0.00, starting frequency-maximum frequency(Hz)	0.00	○	○	○(F-11)	4-44
	A028	Multi-speed8	0.00, starting frequency-maximum frequency(Hz)	0.00	○	○	-	4-44
	A029	Multi-speed9	0.00, starting frequency-maximum frequency(Hz)	0.00	○	○	-	4-44
	A030	Multi-speed10	0.00, starting frequency-maximum frequency(Hz)	0.00	○	○	-	4-44
	A031	Multi-speed11	0.00, starting frequency-maximum frequency(Hz)	0.00	○	○	-	4-44
	A032	Multi-speed12	0.00, starting frequency-maximum frequency(Hz)	0.00	○	○	-	4-44
	A033	Multi-speed13	0.00, starting frequency-maximum frequency(Hz)	0.00	○	○	-	4-44
	A034	Multi-speed14	0.00, starting frequency-maximum frequency(Hz)	0.00	○	○	-	4-44
	A035	Multi-speed15	0.00, starting frequency-maximum frequency(Hz)	0.00	○	○	-	4-44
V/f characteristic	A042	Manual torque boost, 1st motor	0.0-20.0(%)	1.0	○	○	F8	4-27
	A242	Manual torque boost, 2nd motor	0.0-20.0(%)	1.0	○	○	F8	4-27
	A342	Manual torque boost, 3rd motor	0.0-20.0(%)	1.0	○	○	-	4-27
	A442	Manual torque boost, 4th motor	0.0-20.0(%)	1.0	○	○	-	4-27
	A542	Manual torque boost, 5th motor	0.0-20.0(%)	1.0	○	○	-	4-27
	A043	Manual torque boost break point, 1st motor	0.0-50.0(%)	5.0	○	○	-	4-27
	A243	Manual torque boost break point, 2nd motor	0.0-50.0(%)	5.0	○	○	-	4-27
	A343	Manual torque boost break point, 3rd motor	0.0-50.0(%)	5.0	○	○	-	4-27
	A443	Manual torque boost break point, 4th motor	0.0-50.0(%)	5.0	○	○	-	4-27
	A543	Manual torque boost break point, 5th motor	0.0-50.0(%)	5.0	○	○	-	4-27
	A044	1st control	00/(VC)/01(VP1.7power)/02(free V/f setting)	00	×	×	A0	4-25
	A244	2nd control	00/(VC)/01(VP1.7power)/02(free V/f setting)	00	×	×	A0	4-25
	A344	3rd control	00/(VC)/01(VP1.7power)/02(free V/f setting)	00	×	×	-	4-25
	A444	4th control	00/(VC)/01(VP1.7power)/02(free V/f setting)	00	×	×	-	4-25
	A544	5th control	00/(VC)/01(VP1.7power)/02(free V/f setting)	00	×	×	-	4-25
	A045	Output voltage gain	20. - 100.(%)	100.	○	○	○(F-12)	4-24

(Note1) Setting is possible at the time of the OPE-SR installation.

Function Mode

	Code	Function name	Setting range	Initial data	Setting on run	Change mode on run	JH300 ○:Setting on remote	Page
Direct current braking	A051	DC braking selection	00(invalid)/01(valid)	00	×	○	○(F-12)	4-28
	A052	DC braking frequency	0.00-500.(Hz)	0.50	×	○	○(F-12)	4-28
	A053	DC braking late time	0.0 - 5.0(s)	0.0	×	○	○(F-12)	4-28
	A054	DC braking power	0. - 100.(%)	0.	×	○	○(F-12)	4-28
	A055	DC braking time	0.0 - 60.0(s)	0.0	×	○	○(F-12)	4-28
	A056	DC braking edge/level selection	00(edge action)/01(level action)	01	×	○	○(F-12)	4-28
	A057	DC braking power (starting time)	0. - 100.(%)	0.	×	○	-	4-28
	A058	DC braking time(starting time)	0.00-60.0(s)	0.0	×	○	-	4-28
	A059	DC carrier frequency	0.5-10(kHz) Derating<0.5-10kHz>	5.0	×	×	-	4-28
Upper and lower limiter·jump frequency	A061	1st frequency maximum limiter	0.00, 1st frequency lower limiter-maximum frequency(Hz)	0.00	×	○	A05	4-31
	A261	2nd frequency maximum limiter	0.00, 2nd frequency lower limiter-2nd setting maximum frequency(Hz)	0.00	×	○	-	4-31
	A361	3rd frequency maximum limiter	0.00, 3rd frequency lower limiter-3rd setting maximum frequency(Hz)	0.00	×	○	-	4-31
	A461	4th frequency maximum limiter	0.00, 4th frequency lower limiter-4th setting maximum frequency(Hz)	0.00	×	○	-	4-31
	A561	5th frequency maximum limiter	0.00, 5th frequency lower limiter-5th setting maximum frequency(Hz)	0.00	×	○	-	4-31
	A062	1st frequency minimum limiter	0.00, start frequency- frequency maximum (Hz)	0.00	×	○	A06	4-31
	A262	2nd frequency minimum limiter	0.00, start frequency- 2nd frequency maximum (Hz)	0.00	×	○	-	4-31
	A362	3rd frequency minimum limiter	0.00, start frequency- 3rd frequency maximum (Hz)	0.00	×	○	-	4-31
	A462	4th frequency minimum limiter	0.00, start frequency- 4th frequency maximum (Hz)	0.00	×	○	-	4-31
	A562	5th frequency minimum limiter	0.00, start frequency- 5th frequency maximum (Hz)	0.00	×	○	-	4-31
	A063	Jump frequency1	0.00-99.99/100.0-999.9/1000.-1500.(Hz)	0.00	×	○	A07	4-32
	A064	Jump frequency Width 1	0.00-100.0(Hz)	0.50	×	○	○(F-19)	4-32
	A065	Jump frequency2	0.00-99.99/100.0-999.9/1000.-1500.(Hz)	0.00	×	○	A08	4-32
	A066	Jump frequency Width 2	0.00-100.0(Hz)	0.50	×	○	-	4-32
	A067	Jump frequency3	0.00-99.99/100.0-999.9/1000.-1500.(Hz)	0.00	×	○	A09	4-32
	A068	Jump frequency Width 3	0.00-100.0(Hz)	0.50	×	○	-	4-32
	A069	Acceleration stop frequency	0.00-99.99/100.0-999.9/1000.-1500.(Hz)	0.00	×	○	○(F-08)	4-32
	A070	Acceleration stop time	0.00-60.0(Hz)	0.0	×	○	○(F-08)	4-32
AVR	A081	AVR selection	00(ON always)/01(OFF always)/02(OFF on decelerating)	00	×	×	○(F-03)	4-20
	A082	Motor voltage selection	200/215/220/230/240/380/400/415/440/460/480, 575/600(V)	200/400	×	×	F11	4-20
Operation mode·adjustable function	A092	Acceleration time2(1st motor)	0.01-99.99/100.0-999.9/1000.-3600.(s)	15.00	○	○	○(F-06)	4-33
	A292	Acceleration time2(2nd motor)	0.01-99.99/100.0-999.9/1000.-3600.(s)	15.00	○	○	-	4-33
	A392	Acceleration time2(3rd motor)	0.01-99.99/100.0-999.9/1000.-3600.(s)	15.00	○	○	-	4-33
	A492	Acceleration time2(4th motor)	0.01-99.99/100.0-999.9/1000.-3600.(s)	15.00	○	○	-	4-33
	A592	Acceleration time2(5th motor)	0.01-99.99/100.0-999.9/1000.-3600.(s)	15.00	○	○	-	4-33
	A093	Deceleration time2(1st motor)	0.01-99.99/100.0-999.9/1000.-3600.(s)	15.00	○	○	○(F-07)	4-33
	A293	Deceleration time2(2nd motor)	0.01-99.99/100.0-999.9/1000.-3600.(s)	15.00	○	○	-	4-33
	A393	Deceleration time2(3rd motor)	0.01-99.99/100.0-999.9/1000.-3600.(s)	15.00	○	○	-	4-33
	A493	Deceleration time2(4th motor)	0.01-99.99/100.0-999.9/1000.-3600.(s)	15.00	○	○	-	4-33
	A593	Deceleration time2(5th motor)	0.01-99.99/100.0-999.9/1000.-3600.(s)	15.00	○	○	-	4-33
	A094	2nd stage adjustable selection (1st motor)	00(change with 2CH terminal)/01(change with setting)	00	×	×	-	4-33
	A294	2nd stage adjustable selection (2nd motor)	00(change with 2CH terminal)/01(change with setting)	00	×	×	-	4-33
	A394	2nd stage adjustable selection (3rd motor)	00(change with 2CH terminal)/01(change with setting)	00	×	×	-	4-33
	A494	2nd stage adjustable selection (4th motor)	00(change with 2CH terminal)/01(change with setting)	00	×	×	-	4-33
	A594	2nd stage adjustable selection (5th motor)	00(change with 2CH terminal)/01(change with setting)	00	×	×	-	4-33
	A095	2nd stage acceleration frequency (1st motor)	0.01-99.99/100.0-999.9/1000.-1500.(Hz)	0.00	×	×	-	4-33
	A295	2nd stage acceleration frequency (2nd motor)	0.01-99.99/100.0-999.9/1000.-1500.(Hz)	0.00	×	×	-	4-33
	A395	2nd stage acceleration frequency (3rd motor)	0.01-99.99/100.0-999.9/1000.-1500.(Hz)	0.00	×	×	-	4-33
	A495	2nd stage acceleration frequency (4th motor)	0.01-99.99/100.0-999.9/1000.-1500.(Hz)	0.00	×	×	-	4-33
	A595	2nd stage acceleration frequency (5th motor)	0.01-99.99/100.0-999.9/1000.-1500.(Hz)	0.00	×	×	-	4-33
	A096	2nd stage deceleration frequency (1st motor)	0.01-99.99/100.0-999.9/1000.-1500.(Hz)	0.00	×	×	-	4-33
	A296	2nd stage deceleration frequency (2nd motor)	0.01-99.99/100.0-999.9/1000.-1500.(Hz)	0.00	×	×	-	4-33
	A396	2nd stage deceleration frequency (3rd motor)	0.01-99.99/100.0-999.9/1000.-1500.(Hz)	0.00	×	×	-	4-33
	A496	2nd stage deceleration frequency (4th motor)	0.01-99.99/100.0-999.9/1000.-1500.(Hz)	0.00	×	×	-	4-33
	A596	2nd stage deceleration frequency (5th motor)	0.01-99.99/100.0-999.9/1000.-1500.(Hz)	0.00	×	×	-	4-33
	A097	Acceleration pattern selection	00(straight line)/01(S-curve)/02(U-curve)/ 03(reverse U-curve)	00	×	×	-	4-34
	A098	Deceleration pattern selection	00(straight line)/01(S-curve)/02(U-curve)/ 03(reverse U-curve)	00	×	×	-	4-34
	A131	Acceleration curve constant	01(small swelling)-10(large swelling)	02	×	○	-	4-34
	A132	Deceleration curve constant	01(small swelling)-10(large swelling)	02	×	○	-	4-34

Function mode

Code		Function name	Setting range	Initial data	Setting on run	Change mode on run	JH300 ○:Setting on remote	Page
External frequency adjustment	A101	OI start	0.00-99.99/100.0-999.9/1000.-1500.(Hz)	0.00	×	○	-	4-23
	A102	OI end	0.00-99.99/100.0-999.9/1000.-1500.(Hz)	0.00	×	○	-	4-23
	A103	OI start rate	0.0 - 100. (%)	20.	×	○	-	4-23
	A104	OI end rate	0.0 - 100. (%)	100.	×	○	-	4-23
	A105	OI start selection	00(external start frequency)/01(0Hz)	01	×	○	-	4-23
	A111	O2 start	-150.0 - -100.0/-999.9 - -100.0/-99.9 - 0.00 - 999.9/ 1000. - 1500.(Hz)	0.00	×	○	-	4-23
	A112	O2 end	-150.0 - -100.0/-999.9 - -100.0/-99.9 - 0.00 - 999.9/ 1000. - 1500.(Hz)	0.00	×	○	-	4-23
	A113	O2 start rate	-100. - 100. (%)	-100.	×	○	-	4-23
	A114	O2 end rate	-100. - 100. (%)	100.	×	○	-	4-23
Instantaneous power failure restart	b001	Retry selection	00(trip)/01(0Hz start)/02(start after equal frequency)/ 03(trip after equaling frequency and deceleration stop)/ 04(Restart with a frequency before IPF)	00	×	○	A34	4-23
	b002	Allowable under-voltage power failure time	0.3-25.0(s)	1.0	×	○	○(F-14)	4-35
	b003	Retry wait time	0.3-100.(s)	1.0	×	○	○(F-14)	4-35
	b004	Instantaneous power failure/ under-voltage trip during stop	00(invalid/01(valid)/02(invalid during stop and deceleration by stop command)	00	×	○	○(F-14)	4-35
	b005	Instantaneous power failure/ under-voltage retry time selection	00(16 times)/01(free)	00	×	○	-	4-35
	b006	Open-phase selection	00(invalid)/01(valid)	00	×	○	-	4-37
	b007	Frequency setting to match	0.00-99.99/100.0-999.9/1000.-1500.(Hz)	0.00	×	○	-	4-35
Electronic thermal	b012	1st Electronic thermal level	0.2∗constant current - 1.20∗constant current(A)	Rated Current of inverter	×	○	A23	4-37
	b013	1st electronic thermal characteristic selection	01(constant torque characteristic)/02(free setting)	01	×	○	A24	4-37
	b015	1st Free electronic thermal frequency 1	0.-1500.(Hz)	0.	×	○	○(F-15)	4-38
	b016	1st Free electronic thermal current 1	0.0-1000.(A)	0.0	×	○	○(F-15)	4-38
	b017	1st Free electronic thermal frequency 2	0.-1500.(Hz)	0.	×	○	○(F-15)	4-38
	b018	1st Free electronic thermal current 2	0.0-1000.(A)	0.0	×	○	○(F-15)	4-38
	b019	1st Free electronic thermal frequency 3	0.-1500.(Hz)	0.	×	○	○(F-15)	4-38
	b020	1st Free electronic thermal current 3	0.0-1000.(A)	0.0	×	○	○(F-15)	4-38
	b212	2nd Electronic thermal level	0.2∗constant current - 1.20∗constant current(A)	Rated Current of inverter	×	○	A23	4-37
	b213	2nd electronic thermal characteristic selection	01(constant torque characteristic)/02(free setting)	01	×	○	A24	4-37
	b215	2nd Free electronic thermal frequency 1	0.-1500.(Hz)	0.	×	○	-	4-38
	b216	2nd Free electronic thermal current 1	0.0-1000.(A)	0.0	×	○	-	4-38
	b217	2nd Free electronic thermal frequency 2	0.-1500.(Hz)	0.	×	○	-	4-38
	b218	2nd Free electronic thermal current 2	0.0-1000.(A)	0.0	×	○	-	4-38
	b219	2nd Free electronic thermal frequency 3	0.-1500.(Hz)	0.	×	○	-	4-38
	b220	2nd Free electronic thermal current 3	0.0-1000.(A)	0.0	×	○	-	4-38
	b312	Electronic thermal level	0.2∗constant current - 1.20∗constant current(A)	Rated Current of inverter	×	○	-	4-37
	b313	3rd electronic thermal characteristic selection	01(constant torque characteristic)/02(free setting)	01	×	○	-	4-37
	b315	3rd Free electronic thermal frequency 1	0.-1500.(Hz)	0.	×	○	-	4-38
	b316	3rd Free electronic thermal current 1	0.0-1000.(A)	0.0	×	○	-	4-38
	b317	3rd Free electronic thermal frequency 2	0.-1500.(Hz)	0.	×	○	-	4-38
	b318	3rd Free electronic thermal current 2	0.0-1000.(A)	0.0	×	○	-	4-38
	b319	3rd Free electronic thermal frequency 3	0.-1500.(Hz)	0.	×	○	-	4-38

Function mode

	Code	Function name	Setting range	Initial data	Setting on run	Change mode on run	JH300 ○:Setting on remote	Page
Electronic thermal	b320	3rd Free electronic thermal current 3	0.0-1000.(A)	0.0	×	○	-	4-38
	b412	4th Electronic thermal level	0.2＊constant current - 1.20＊constant current(A)	Rated Current of inverter	×	○	-	4-37
	b413	4th electronic thermal characteristic selection	01(constant torque characteristic)/02(free setting)	01	×	○	-	4-37
	b415	4th Free electronic thermal frequency 1	0.-1500.(Hz)	0.	×	○	-	4-38
	b416	4th Free electronic thermal current 1	0.0-1000.(A)	0.0	×	○	-	4-38
	b417	4th Free electronic thermal frequency 2	0.-1500.(Hz)	0.	×	○	-	4-38
	b418	4th Free electronic thermal current 2	0.0-1000.(A)	0.0	×	○	-	4-38
	b419	4th Free electronic thermal frequency 3	0.-1500.(Hz)	0.	×	○	-	4-38
	b420	4th Free electronic thermal current 3	0.0-1000.(A)	0.0	×	○	-	4-38
	b512	5th Electronic thermal level	0.2＊constant current - 1.20＊constant current(A)	Rated Current of inverter	×	○	-	4-37
	b513	5th electronic thermal characteristic selection	01(constant torque characteristic)/02(free setting)	01	×	○	-	4-37
	b515	5th Free electronic thermal frequency 1	0.-1500.(Hz)	0.	×	○	-	4-38
	b516	5th Free electronic thermal current 1	0.0-1000.(A)	0.0	×	○	-	4-38
	b517	5th Free electronic thermal frequency 2	0.-1500.(Hz)	0.	×	○	-	4-38
	b518	5th Free electronic thermal current 2	0.0-1000.(A)	0.0	×	○	-	4-38
	b519	5th Free electronic thermal frequency 3	0.-1500.(Hz)	0.	×	○	-	4-38
	b520	5th Free electronic thermal current 3	0.0-1000.(A)	0.0	×	○	-	4-38
Overload limit	b021	1st Overload restriction selection	00(invalid)/01(enabled on acceleration / constant speed)/ 02(constant speed)	01	×	○	○(F-16)	4-39
	b221	2nd Overload restriction selection	00(invalid)/01(enabled on acceleration / constant speed)/ 02(constant speed)	01	×	○	-	4-39
	b321	3rd Overload restriction selection	00(invalid)/01(enabled on acceleration / constant speed)/ 02(constant speed)	01	×	○	-	4-39
	b421	4th Overload restriction selection	00(invalid)/01(enabled on acceleration / constant speed)/ 02(constant speed)	01	×	○	-	4-39
	b521	5th Overload restriction selection	00(invalid)/01(enabled on acceleration / constant speed)/ 02(constant speed)	01	×	○	-	4-39
	b022	1st Overload restriction level	0.50* rated current-2.00* rated current(A)	Rated current of Inverter x 1.50	×	○	○(F-16)	4-39
	b222	2nd Overload restriction level	0.50* rated current-2.00* rated current(A)	Rated current of Inverter x 1.50	×	○	-	4-39
	b322	3rd Overload restriction level	0.50* rated current-2.00* rated current(A)	Rated current of Inverter x 1.50	×	○	-	4-39
	b422	4th Overload restriction level	0.50* rated current-2.00* rated current(A)	Rated current of Inverter x 1.50	×	○	-	4-39
	b522	5th Overload restriction level	0.50* rated current-2.00* rated current(A)	Rated current of Inverter x 1.50	×	○	-	4-39
	b023	1st Overload restriction limit constant	0.10-30.00(s)	1.00	×	○	○(F-16)	4-39
	b223	2nd Overload restriction limit constant	0.10-30.00(s)	1.00	×	○	-	4-39
	b323	3rd Overload restriction limit constant	0.10-30.00(s)	1.00	×	○	-	4-39
	b423	4th Overload restriction limit constant	0.10-30.00(s)	1.00	×	○	-	4-39
	b523	5th Overload restriction limit constant	0.10-30.00(s)	1.00	×	○	-	4-39

Function mode

Code		Function name	Setting range	Initial data	Setting on run	Change mode on run	JH300 ○:Setting on remote	Page
Lock	b031	Software lock mode selection	00(impossible to change the data except this item when SFT terminal is ON)/01(impossible to change the data except setting frequency item when SFT terminal is ON)/ 02(impossible to change the data except this item)/ 03(impossible to change the data except setting frequency item)/ 10(possible to change data on operating)	01	×	○	○(F-17)	4-47
Free V/f setting	b100	Free V/f frequency 1	0.- Free V/f frequency2(Hz)	0.	×	×	-	4-25
	b101	Free V/f voltage 1	0.-800.0(V)	0.0	×	×	-	4-25
	b102	Free V/f frequency 2	0.- Free V/f frequency3(Hz)	0.	×	×	-	4-25
	b103	Free V/f voltage 2	0.-800.0(V)	0.0	×	×	-	4-25
	b104	Free V/f frequency 3	0.- Free V/f frequency4(Hz)	0.	×	×	-	4-25
	b105	Free V/f voltage 3	0.-800.0(V)	0.0	×	×	-	4-25
	b106	Free V/f frequency 4	0.- Free V/f frequency5(Hz)	0.	×	×	-	4-25
	b107	Free V/f voltage 4	0.-800.0(V)	0.0	×	×	-	4-25
	b108	Free V/f frequency 5	0.- Free V/f frequency6(Hz)	0.	×	×	-	4-25
	b109	Free V/f voltage 5	0.-800.0(V)	0.0	×	×	-	4-25
	b110	Free V/f frequency 6	0.- Free V/f frequency7(Hz)	0.	×	×	-	4-25
	b111	Free V/f voltage 6	0.-800.0(V)	0.0	×	×	-	4-25
	b112	Free V/f frequency 7	0.-1500.0(V)	0.	×	×	-	4-25
	b113	Free V/f voltage 7	0.-800.0(V)	0.0	×	×	-	4-25
Intelligent input terminal setting	C001	Intelligent input 1 setting	01/(RV:Reverse is valid)/02(CF1:Multi-speed1)/ 03(CF2:Multi-speed2)/04(CF3:Multi-speed3)/ 05(CF4:Multi-speed4)/07(DB:External DC braking)/ 09(2CH:two-stage adjustable speed)/ 11(FRS:Free-run)/ 12(EXT:External trip)/13(USP:Unattended start protection)/ 15(SFT:software lock)/16(AT:Analog input voltage/current select)/ 18(RS:Reset inverter)/20(STA:3wire run)/21(STP:3wire keep)/ 22(F/R:3wire forward/reverse)/ 27(UP:Remote control UP function)/ 28(DWN:Remote control DOWN function)/ 29(UDC:Remote control data clear)/ 31(OPE:Operating by operator select)/32(SF1:Multi-speed bit1)/ 33(SF2:Multi-speed bit2)/34(SF3:Multi-speed bit3)/ 35(SF4:Multi-speed bit4)/36(SF5:Multi speed bit5)/ 37(SF6:Multi-speed bit6)/38(SF7:Multi-speed bit7)/ 39(OLR:Overload restriction change)/46(LAC:LAD cancel)/ 50(SET0:Control)/51(SET1:2nd Control)/52(SET2:2nd Control)/ no (NO: No assign)	18	×	○	C0	4-43
	C002	Intelligent input 2 setting		16	×	○	C1	4-43
	C003	Intelligent input 3 setting		13	×	○	C2	4-43
	C004	Intelligent input 4 setting		11	×	○	C3	4-43
	C005	Intelligent input 5 setting		09	×	○	C4	4-43
	C006	Intelligent input 6 setting		03	×	○	C5	4-43
	C007	Intelligent input 7 setting		02	×	○	C6	4-43
	C008	Intelligent input 8 setting		01	×	○	C7	4-43
	C011	Intelligent input 1 a/b (NO/NC) selection	00(NO)/01(NC)	00	×	○	C20	4-44
	C012	Intelligent input 2 a/b (NO/NC) selection	00(NO)/01(NC)	00	×	○	C20	4-44
	C013	Intelligent input 3 a/b (NO/NC) selection	00(NO)/01(NC)	00	×	○	C20	4-44
	C014	Intelligent input 4 a/b (NO/NC) selection	00(NO)/01(NC)	00	×	○	C20	4-44
	C015	Intelligent input 5 a/b (NO/NC) selection	00(NO)/01(NC)	00	×	○	C20	4-44
	C016	Intelligent input 6 a/b (NO/NC) selection	00(NO)/01(NC)	00	×	○	C20	4-44
	C017	Intelligent input 7a/b (NO/NC) selection	00(NO)/01(NC)	00	×	○	C20	4-44
	C018	Intelligent input 8 a/b (NO/NC) selection	00(NO)/01(NC)	00	×	○	C20	4-44
	C019	Input FW a/b (NO/NC) Selection	00(NO)/01(NC)	00	×	○	-	4-44
Intelligent output terminal setting	C021	Intelligent output 11 setting	00(RUN:running)/01(FA1:Frequency arrival type1 signal)/ 02(FA2:over setting frequency)/ 03(OL:Overload advance notice signal)/ 05(AL:Alarm signal)/06(FA3:Only setting frequency)/ 08(IP:On instantaneous stop)/09(UV:Under voltage)/ 11(RNT:RUN time over/12(ONT:ON time over)/ 13(THM:thermal caution)/ (Intelligent output terminal 11-13 or 11-14 becomes AC0-AC2 or AC0-AC3 (Can:Alarm cord output) forcibly when alarm cord output is selected in C062)	01	×	○	C10	4-52
	C022	Intelligent output 12 setting		00	×	○	C11	4-52
	C023	Intelligent output 13 setting		03	×	○	-	4-52
	C024	Intelligent output 14 setting		02	×	○	-	4-52
	C025	Intelligent output 15 setting		08	×	○	-	4-52
	C026	Alarm relay output		05	×	○	-	4-52

Function mode

Code		Function name	Setting range	Initial data	Setting on run	Change mode on run	JH300 ○:Setting on remote	Page
Monitor terminal	C027	FM selection	00(Output frequency)/01(Output current)/ 03(Digital output frequency)/04(Output voltage)/ 05(Output electric power)/06(thermal load rate)/ 07(LAD frequency)	00	×	○	A-44	4-57
	C028	AM selection	00(Output frequency)/01(Output current)/04(Output voltage)/ 05(Output electric power)/06(thermal load rate)/ 07(LAD frequency)	00	×	○	-	4-58
	C029	AMI selection	00(Output frequency)/01(Output current)/04(Output voltage)/ 05(Output electric power)/06(thermal load rate)/ 07(LAD frequency)	00	×	○	-	4-58
Output terminal state setting · Output level setting	C031	Intelligent output 11 a/b	00(NO)/01(NC)	00	×	○	C21	4-52
	C032	Intelligent output 12 a/b	00(NO)/01(NC)	00	×	○	C21	4-52
	C033	Intelligent output 13 a/b	00(NO)/01(NC)	00	×	○	-	4-52
	C034	Intelligent output 14 a/b	00(NO)/01(NC)	00	×	○	-	4-52
	C035	Intelligent output 15 a/b	00(NO)/01(NC)	00	×	○	-	4-52
	C036	Alarm relay output a/b	00(NO)/01(NC)	01	×	○	C21	4-52
	C040	Overload advance notice signal output mode	00(On accel. And decel, constant speed)/ 01(Only constant speed)	01	×	○	-	4-40
	C041	1st Overload advance notice level	0.0-2.0*rated current(A)	Inverter rated current	×	○	○(F-25)	4-40
	C241	2nd Overload advance notice level	0.0-2.0*rated current(A)	Inverter rated current	×	○	-	4-40
	C341	3rd Overload advance notice level	0.0-2.0*rated current(A)	Inverter rated current	×	○	-	4-40
	C441	4th Overload advance notice level	0.0-2.0*rated current(A)	Inverter rated current	×	○	-	4-40
	C541	5th Overload advance notice level	0.0-2.0*rated current(A)	Inverter rated current	×	○	-	4-40
	C042	Frequency arrival setting for acceleration.	0.00-99.99/100.0-999.9/1000.-1500.(Hz)	0.00	×	○	A39	4-54
	C043	Frequency arrival setting for deceleration.	0.00-99.99/100.0-999.9/1000.-1500.(Hz)	0.00	×	○	A40	4-54
	C061	Thermal warning level setting	0.-100.(%)	80	×	○	-	4-38
	C062	Alarm code selection	00(Invalid)/01(3bit)/02(4bit)	00	×	○	-	4-56
Communication function adjustment	C070	Data command	02(operator)/03(RS485)/04(option1)/05(option2)	02	×	×	-	4-62
	C071	Communicating transmission speed	02(loop-back test) 03(2400bps)/04(4800bps)/05(9600bps)/06(19200bps)	04	×	○	-	4-62
	C072	Communication code	1.-32.	1.	×	○	-	4-62
	C073	Communication bit	7(7bit)/8(8bit)	7	×	○	-	4-62
	C074	Communication parity	00(no parity name)/01(even parity)/02(odd parity)	00	×	○	-	4-62
	C075	Communication stop bit	1(bit)/2(bit)	1	×	○	-	4-62
	C078	Communication waiting time	0.-1000.(ms)	0.	×	○	-	4-62
Analog meter setting	C081	O adjustment	0.-9999./1000-6553(10000-65530) (Note1)	Setting on forwarding	○	○	A80	-
	C082	OI adjustment	0.-9999./1000-6553(10000-65530) (Note1)	Setting on forwarding	○	○	A81	-
	C083	O2 adjustment	0.-9999./1000-6553(10000-65530) (Note1)	Setting on forwarding	○	○	-	-
	C085	Thermistor adjustment	0.0 - 1000.	105.0	○	○	-	4-58
	C086	AM offset adjustment	0.0 - 10.0(V)	0.0	○	○	-	4-58
	C087	AMI adjustment	0. - 255.	80	○	○	-	4-58
	C088	AMI offset adjustment	0. - 20.0(mA)	Setting on forwarding	○	○	-	4-58

(Note1) Settings are factory-calibrated for each inverter. Do not change these setting unless absolutely necessary. Note that ib you restore factory defaults for all parameters, these settings will not change.

Function mode

	Code	Function name	Setting range	Initial data	Setting on run	Change mode on run	JH300 ○:Setting on remote	Page
The others	b034	RUN time/Power ON time level	0.-9999. (0-99990hr)/1000-6553(100000-655300) hr	0.	×	○	-	4-55
	b035	Operation direction restrict	00(Reverse is valid)/01(Only forward)/02(Only reverse)	00	×	×	○(F-21)	4-17
	b036	Start reduced voltage	00(Start reduced voltage time small)-06(Start reduced voltage time large)	06	×	○	-	4-41
	b037	Display selection	00(all display)/01(each function display)/02(User setting / main setting)	00	×	○	-	4-60
	b080	AM adjustment	0. - 255.	180	○	○	-	4-58
	b081	FM adjustment	0. - 255.	60	○	○	F10	4-57
	b082	Start frequency adjustment	0.10-50.00(Hz)	3.00	×	○	A04	4-41
	b083	Carrier frequency setting	0.5-10.0(kHz) Derating enable	5.0	×	○	-	4-21
	b084	Initialize mode	00(Trip history clear)/01(Data initialization)/02(Trip history clear + data initialization)	00	×	×	(F29)	4-59
	b085	Country code for initialization	00(Interior)/01(EC)/02(USA)	00	×	×	-	4-59
	b086	Frequency scalar conversion factor	0.1-99.9	1.0	○	○	-	4-15
	b087	STOP key enable	00(valid)/01(invalid)	00	×	○	(F20)	4-18
	b088	Resume on FRS cancellation mode	00(0Hz start)/01(Start f-equaling)	00	×	○	A54	4-48
	b090	BRD usage ratio	0.0-100.0(%)	0.0	×	○	A38	4-42
	b091	Stop mode selection	00(deceleration stop)/01(Free-run stop)	00	×	×	-	4-18
	b092	Cooling fan control	00(Always ON)/01(ON during run, After power ON, then for 5 minutes on stop is implied.)	00	×	×	-	4-42
	b095	BRD selection	00(invalid)/01(valid<invalid during stop>)/02(valid<valid during stop>)	00	×	○	-	4-42
	b096	BRD ON level	330-380/660-760(V)	360/720	×	○	-	4-42
	b098	Thermistor selection	00(invalid)/01(Positive temperature coefficient enable)/02 (NTC enable)	00	×	○	-	4-58
	b099	Thermistor error level	0. – 9999. (ohm)	3000.	×	○	-	4-58
	C091	Debug mode selection	00(No display)/01(Display)　　(Note)	00	×	○	○(F29)	-
	C101	UP/DWN selection	00(No frequency data)/01(Keep frequency data)	00	×	○	-	4-50
	C102	Reset selection	00(Trip cancel during ON)/01(Trip cancel during OFF)/02(Valid only during trip<Cancel during ON>)	00	○	○	-	4-49
	C103	Reset f frequency matching selection	00(0Hz start)/01(Start f-equaling)	00	×	○	-	4-49
	C121	O zero adjustment	0.-9999./1000-6553(10000-65530)　　(Note)	Set on forwarding	○	○	-	-
	C122	OI zero adjustment	0.-9999./1000-6553(10000-65530)　　(Note)	Set on forwarding	○	○	-	-
	C123	O2 zero adjustment	0.-9999./1000-6553(10000-65530)　　(Note)	Set on forwarding	○	○	-	-
Control factor	H003	1st allowable motor selection	0.20-75.0(kW)	Set on forwarding	×	×	A01	4-61
	H203	2nd allowable motor selection	0.20-75.0(kW)	Set on forwarding	×	×	A01	4-61
	H303	3rd allowable motor selection	0.20-75.0(kW)	Set on forwarding	×	×	-	4-61
	H403	4th allowable motor selection	0.20-75.0(kW)	Set on forwarding	×	×	-	4-61
	H503	5th allowable motor selection	0.20-75.0(kW)	Set on forwarding	×	×	-	4-61
	H004	1st motor pole selection	2/4/6/8(pole)	4	×	×	A02	4-61
	H204	2nd motor pole selection	2/4/6/8(pole)	4	×	×	A02	4-61
	H304	3rd motor pole selection	2/4/6/8(pole)	4	×	×	-	4-61
	H404	4th motor pole selection	2/4/6/8(pole)	4	×	×	-	4-61
	H504	5th motor pole selection	2/4/6/8(pole)	4	×	×	-	4-61
	H006	1st stabilized factor	0. - 255.	100.	○	○	-	4-61
	H206	2nd stabilized factor	0. - 255.	100.	○	○	-	4-61
	H306	3rd stabilized factor	0. - 255.	100.	○	○	-	4-61
	H406	4th stabilized factor	0. - 255.	100.	○	○	-	4-61
	H506	5th stabilized factor	0. - 255.	100.	○	○	-	4-61
Option	P001	Option1 operation selection on error	00(TRP)/01(RUN)	00	×	○	(F32)	4-61
	P002	Option2 operation selection on error	00(TRP)/01(RUN)	00	×	○	(F32)	4-61
	P031	Digital input option input mode selection (Acc/Dec)	00(operator)/01(option1)/02(option2)	00	×	×	-	(Note1)

(Note1) Refer to the expension card manual for more detaile.

4.3 Explanation of function

4.3.1 Monitor mode

Output frequency monitor

Indication code d001 displays the frequency the inveter outputs.

The data is displayed as follows.

When d001 is displayed, the monitor lamp "Hz" is illuminated.

(Display)

        0.   - 99.9   : Display is in 1Hz unit.

        100. - 999.   : Display is in 1Hz unit.

        1000. - 1500. : Display is in 1Hz unit.

> Relation code
>
> d001: Output frequency
> monitor

Output current monitor

Indication code d002 displays the output current value.

The data is displayed as follows.

In case of displaying d002, the monitor lamp "A" is illuminated.

(Display)

        0.0 - 999.9 : Display is in 0.1A unit.

> Relation code
>
> d002: Output current
> monitor

Operation direction monitor

Indication code d003 displays the direction that the Inverter output is
rotating. Forward, reverse or stop.

On operating the inverter (in case of forward or reverse), the RUN lamp
will illuminate.

(Display)

    F : Forward

    o : Stop

    r : Reverse

> Relation code
>
> d003: Operation direction
> monitor

Intelligent input monitor

The LED display will monitor the state of the intelligent inputs.

┌─── Relation code ───┐
d005: Intelligent input monitor
└─────────────────────┘

(Example)

FW; input intelligent terminal　7, 2, 1:ON

Input intelligent terminal　8, 6, 5, 4, 3:OFF

Display

● (Black): Lights up

◇ (White):Lights out

Input intelligent　8　7　6　5　4　3　2　1
terminal
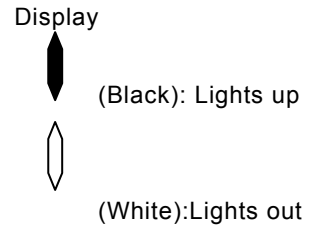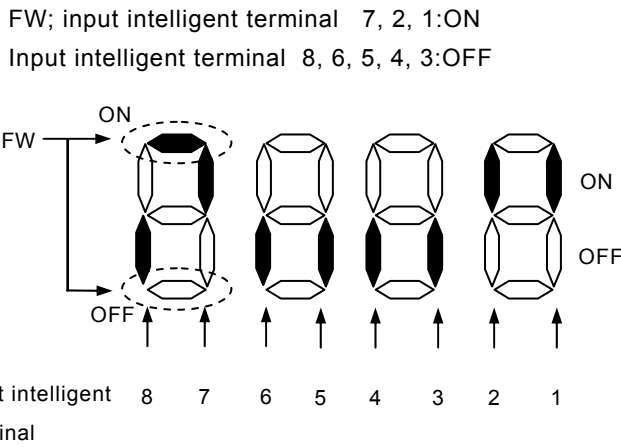
Intelligent output monitor

The LED display will monitor the state of the intelligent outputs.

┌─── Relation code ───┐
d006: Intelligent output monitor
└─────────────────────┘

(Example)

Output intelligent terminal 12, 11: ON

Output alarm AL, Output intelligent terminal 15, 14, 13: OFF

Display

● (Black): Lights up

◇ (White): Lights out

　　　　　　　15　14　13　12　11
　　　　　　　OFF OFF OFF ON ON

AL　　Output intelligent
OFF　terminal
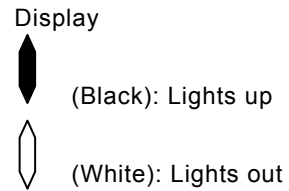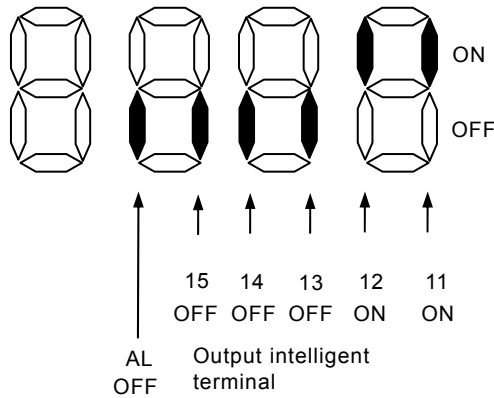
Frequency conversion monitor

This inverter displays the value changed by the Inverter output frequency and the value
set in b086 on the monitor part.
"Monitor part of display" = " output frequency(d001)" x " output frequency factor(b086)"

(Display) Display of d007
    0.00 - 99.99 : Display is in 0.01 unit.
    100.0 - 999.9 : Display is in 0.1 unit.
    100. - 9999 . : Display is in 1 unit.
    1000 - 3996 : Display is in 10 unit.

> **Relation code**
> d007: Frequency conversion
>   monitor
> b086: Frequency conversion
>   factor

(Range of setting) The setting range of b086
    0.1 - 99.9 : Set it with the 0.1 unit.

(Example)Output frequency (d001):50.00Hz
    When the frequency conversion factor (b086) is 1.1,
    the frequency conversion monitor (d007) displays "55.00"　as "50 x 1.1 = 55.00".

(Note)Output frequency of FM terminal becomes same as d007 at the time of setting up
    the digital output frequency to the FM terminal.

Output voltage monitor

This inverter displays the output voltage of the inverter converted into the
alternating Voltage.
  The monitor lamp "V" should illuminate while the contents of d013 are displayed.

> d013: Output voltage
>   monitor

(Display)
    0.0 – 600.0   :Display is in 0.1V unit.

Input electric power monitor

Display input electric power from inverter.
The monitor lamp "kW" ("V" and "A") should illuminate while the contents of
d014 is displayed.

> **Relation code**
> d014: Input electric
>   power monitor

(Display)
        0.0 – 999.9   :Display is in 0.1kW unit.

Accumulated time monitor during RUN

The operation time of inverter is accumulated and the value is displayed.

(Display)

    0.   - 9999.   : Display is in 1 hour units.

    1000 - 9999   : Display is in 10 hour units.

    ⌐100 - ⌐999   : Display is in 100 hour units.

> **Relation code**
>
> d016: Accumulated time monitor during RUN

Power ON time monitor

This accumulates the time running to the inverter and displays the value.

(Display)

    0.   - 9999.   : Display is in 1 hour units.

    1000 - 9999   : Display is in 10 hour units.

    ⌐100 - ⌐999   : Display is in 100 hour units.

> **Relation code**
>
> d017: Power ON time monitor

Number of trip time monitor

This displays the number of inverter trips.

(Display)

    0.   - 9999. : Display is in 1 times unit.

    1000 - 6553 : Display is in 10 times unit.

> **Relation code**
>
> d080: Trip time monitor

Trip monitor 1-6

This displays the details for the last six protective trips.

The trip monitor 1 displayed the details of the last trip.

(Display contents)

[1] Trip Code (Display anything from E01 to E79.)(Note 1)

[2] Output frequency on tripping (Hz)

[3] Output current on tripping (A)

[4] The direct voltage (between P and N) on tripping (V)

[5] The accumulated time inverter was operating until tripping (h)

[6] The accumulated time inverter was run until tripping (h)

(Note 1) Please refer to the pages 4.4 Protection function list (2) Trip monitor display.

> **Relation code**
>
> d081: Trip monitor 1
> d082: Trip monitor 2
> d083: Trip monitor 3
> d084: Trip monitor 4
> d085: Trip monitor 5
> d086: Trip monitor 6

The methods of trip monitor
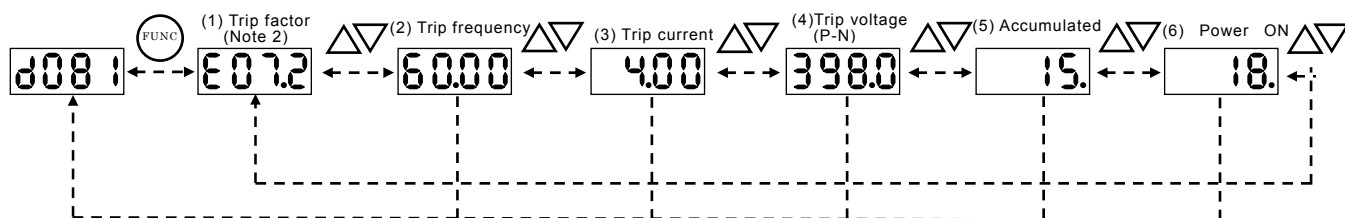
(Note 2) In case of no tripping ⌐ ⌐ ⌐ ⌐ is displayed.

4.3.2 Function mode

Output frequency setting

Setting the output frequency of the motor.

The output frequency is set by F001, when the frequency command select (A001) is set to 02.

Please refer to the frequency command select (A001) about other methods of frequency setting.

When a frequency is set in F001, the same value is automatically set in 1st multi-stage zero speed (A020).

Set up with F001 in the condition where turned on the SET terminal, whether or not it sets up with the 2nd multi-stage zero speed (A220)/ the 3rd - 5th multi-stage zero speed (A320-A520), in the case that the 2nd-5th control is set up.

In the case of using SET0-2, you will need to assign 50(SET0)/51(SET1)/52(SET2) to an intelligent input terminal.

> **Relation code**
> F001 :Output frequency setting
> A001 :Frequency command select
> A020/A220-A520: 1st /2nd - 5th multistage speed zero
> C001-C008: Intelligent input terminal

Set item	Function code	Data	Contents
Output frequency setting	F001	0.0, start frequency-1st/2nd-5th maximum frequency	Unit : Hz "F001" = "A020"
Multistage speed zero	A020/A220 -A520		Second control setting of "F001" = "A220" Third control setting of "F001" = "A320" Fourth control setting of "F001" = "A420" Fifth control setting of "F001" = "A520"

Operation direction selection

This is effective when the operating command is set by the digital operator.

Function code	Data	Contents
F004	00	Forward
	01	Reverse

> **Relation code**
> F004: Operation direction select

Selection with limits of operation direction

The direction of the motor can be restricted.

Function code	Data	Contents
b035	00	Forward/reverse is effective.
	01	Only forward
	02	Only reverse

> **Relation code**
> b035: Selection with limits of operation direction

Frequency command selection

Select the method of frequency command.

When 0-10Vdc is inputted to the frequency command by 02-L terminal, operation direction of motor reverses.

On output frequency monitor d001, you can't get information about forward/reverse. So be sure with operation direction monitor d002.

> **Relation code**
> A001:Frequency command selection

Function code	Data	Contents
A001	(00)	(Setting frequency with the potentiometer the digital operator has.) (Note 1)
	01	Setting frequency with control terminals (Terminals: O-L, OI-L, O2-L)
	02	Setting frequency with digital operator(F001), remote operator.
	03	Setting frequency with RS485 terminals for communication.
	04	Setting frequency with option board 1.
	05	Setting frequency with option board 2.

(Note 1): (Setting is possible at the time of the OPE-SR installation.)

Operation command selection

Select the control of RUN/STOP commands.

Operation command from the control terminals (Terminal)

  Start/Stop by ON/OFF of control terminals.

      Forward : FW-CM1 terminal

      Reverse : RV-CM1 terminal

Put 01(RV) to an intelligent Input terminal.

When using the FW terminal, it is possible to change the contact from NO to NC by settin a or b (respectively) in C019.

When operating from the digital operator, set operation direction in F004.

Or operate Start/Stop with RUN key/STOP key on the digital operator.

When forward command and reverse command entered simultaneously, operation command becomes stop command .

> **Relation code**
>
> A002   :Operation command selection
>
> C001-C008: Intelligent input terminal
>
> C019   :Inputting FW a/b (NO/NC) selection
>
> F004   :Operation direction select

Set item	Function code	Data	Contents
Operation command selection	A002	01	Start/Stop with control terminals(Terminal).(FW, RV)
		02	Start/Stop with digital operator, remote operator.
		03	Start/Stop with RS485 terminals for communications.
		04	Start/Stop with option board 1.
		05	Start/Stop with option board 2.
Input FW a/b (NO/NC) selection	C019 C011-C018	00	a contact (NO)
		01	b contact (NC)

Selection on stop

When stop is commanded from the digital operator or the control terminals (Terminal), select the stop after slowing-down according to slowing-down time or the free run stop.

When the second cycle is started while in free run stop, the inverter follows the free-run stop selection b088 and restarts.

  (Refer to the item of free-run stop.)

> **Relation code**
>
> b091   :Selection on stop
>
> F003/F203-F503: 1st/2nd-5th deceleration time
>
> b003   :Waiting time for retrying
>
> b007   :Frequency setting to match
>
> b088   :Select for free-run stop

Set item	Function code	Data	Contents
Selection on Stop	b091	00	Normal stop (Decelerated stop)
		01	Free-run stop
Selection of free-run stop	b088	00	0Hz start
		01	Start frequency matching
Frequency setting to match	b007	0.00-1500.	Unit : Hz
Waiting time for retrying	b003	0.3-100.	Unit : second

Selection of Stop key

Even though the control terminals are selected for the operation command, you can still set whether the stop key of operator (digital operator etc) is effective or not. Trip reset function by the stop key complies with this setting, too.

Function code	Data	Contents
b087	00	The stop key is effective.
	01	The stop key is ineffective.

> **Relation code**
>
> b087: Selection of stop key

Adjustable time

The acceleration and deceleration time can be set. Set a long time to accelerate or decelerate slowly or set a short time to accelerate or decelerate quickly.

The time setting is the time it takes to accelerate from zero to the maximum frequency and to decelerate from the maximum frequency to zero.

┌─── Relation code ───┐
F002/F202-F502: 1st / 2nd - 5th Acceleration time
F003/F203-F503: 1st /2nd - 5th Deceleration time
A004/A204-A504: 1st /2nd - 5th maximum frequency

When select the LAD cancel (LAC) function to intelligent input and turn on the signal acceleration/deceleration time is disregarded and the output frequency flatters the command frequency instantaneously.

Switching of the 1st /2nd - 5th acceleration time and the 1st /2nd - 5th deceleration time can be controlled with intelliginet input terminal assigned to 50(SET0)/51(SET1)/52(SET2).

Set item	Function code	Limit of setting	Contents
Acceleration time	F002/F202-F502	0.01-3600.	Unit : second Setting acceleration time from zero to maximum frequency.
Deceleration time	F003/F203-F503	0.01-3600.	Unit : second Setting deceleration time from maximum frequency to zero.
Intelligent input selection	C001-C008	46	LAD cancel
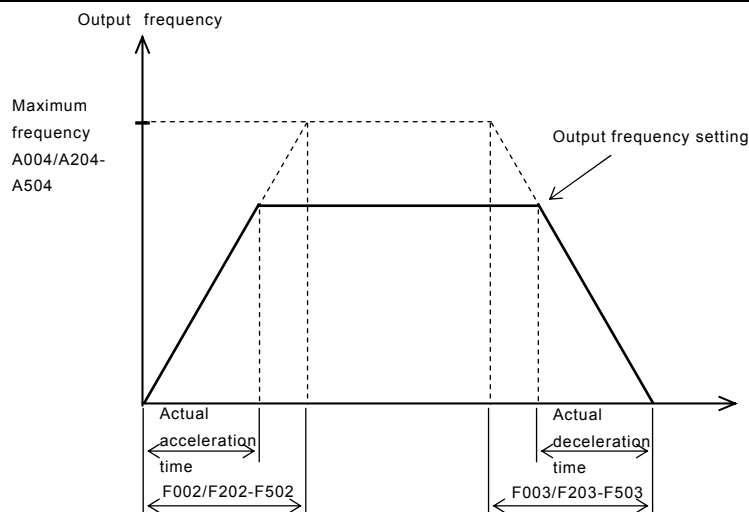
However short you set the adjustable time, the adjustable time of the actual motor can't be shorter than the shortest

adjustable time determined by the inertial Effect J of the mechanical system and motor torque.

If you set the time shorter than the shortest adjustable time, a protection trip of OC or OV may occur.

Acceleration time t_S

$$t_S = \frac{(J_L + J_M) \times N_M}{9.55 \times (T_S - T_L)}$$

Deceleration time t_B

$$t_B = \frac{(J_L + J_M) \times N_M}{9.55 \times (T_B + T_L)}$$

J_L: J of the load converted into motor shaft ($kg \cdot m^2$)

J_M: J of the motor ($kg \cdot m^2$)

N_M: Motor revolving (r/min)

T_S: The maximum motor acceleration torque on inverter driving (N•m)

T_B: The maximum motor deceleration torque on inverter driving (N•m)

T_L: Needed transit torque (N•m)

Base frequency

Base frequency and motor voltage
AVR function

(1) Base frequency and motor voltage

On selection of base frequency and motor voltage, set the output of the inverter (frequency voltage) to the motor rating.
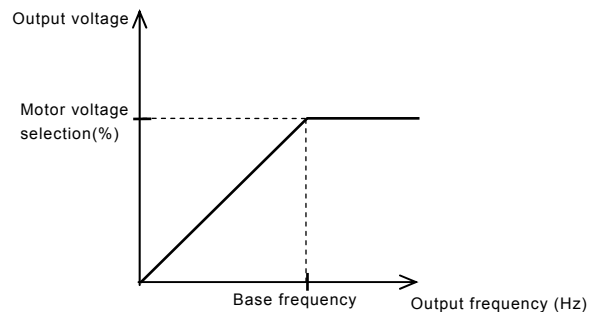
The Base frequency is the nominal frequency of the motor, this value can be found on the nameplate of the motor. It is important to match the Base frequency (A003) to this nominal value or there is risk of damage to the motor.

If a motor has a base frequency higher than 60Hz, it is considered to be a special motor. In this situation, it is important to make sure the maximum output current of the inverter is higher than the FLC of the motor.

The Motor Voltage Selection is the nominal voltage of the motor, this value can be found on the nameplate of the motor. It is important to match the Motor Voltage (A082) to this nominal value or there is risk of damage to the motor.

When changing base frequency (A003)/second base frequency (A203) - fifth base frequency(A503) an intelligent input terminal must be set to 50(SET0) / 51(SET1) / 52(SET2) and switched on.

Set item	Function code	Setting limit	Contents
Base frequency	A003/A203 -A503	30.-1st /2nd - 5th maximum frequency	Unit:Hz
Motor voltage selection	A082	200/215/220/230/240	Unit:V When inverter is 200V class, selection is possible.
		380/400/415/440/460/480	Unit:V When inverter is 400V class, selection is possible.

(2) AVR function

Even if the incoming voltage changes, this function will keep the output voltage and a constant voltage level. The output voltage to the motor in this function references to the voltage selected on motor voltage selection. Select Yes/No of this function on A081 AVR selection.

Function code	Data	Contents	Description
A081	00	Always ON	This function is effective on acceleration, constant speed, deceleration.
	01	Always OFF	This function is ineffective on acceleration, constant speed, deceleration.
	02	On decelerating OFF	This increases a loss of motor and reduces the energy regenerated to inverter on decelerating.

Maximum frequency

Set the maximum frequency value of the inverter.

This set value is the maximum frequncey that the inverter will achieve when

It receives top speed reference from the control terminals or the digital operator.

To the change the $1^{st}/2^{nd}$-5th maximum frequency, set an intelligent input terminal to 50(SET0) / 51(SET1) / 52(SET2) and switch the input ON.

The Inverter output voltage from the base frequency to the maximum frequency is the same level as the voltage selected on the motor voltage selection.

Relation code

A004/A204-A504: 1st /2nd - 5th

maximum frequency

Function code	Limit of setting	Contents
A004/ A204-A504	30.-1500.	Unit : Hz

Output voltage

Motor Voltage Selection(100%)

Base frequency   Maximum frequency

Carrier frequency

The carrier frequency of the PWM wave-form output from the inverter is adjustable by changing b083.

If the carrier frequency is set higher, the audible noise from motor will be reduced but the RFI noise and the leakage current may be increased.

This function may help to avoid the resonant frequency of the motor or the mechanical system.

Relation code

b083:Carrier frequency

Function code	Limit of setting	Contents
b083	0.5-10.0	Unit:kHz

External analog input (0, 02, 0I)

This inverter has three kinds of external analog input terminals.

O-L terminal   :   0 - 10V

OI-L termminal :   4 - 20mA

O2-L terminal   :   -10 / 0 / +10V

Relation code

A005: AT terminal selection

A006: 02 Selection

C001-C008: Intelligent input terminal

The setting contents of this function is as follows.

Setting item	Function code	Data	Contents		
AT terminal selection	A005	00	Change of O/OI with AT terminal	AT terminal ON : OI-L valid	AT terminal OFF : O-L valid
		01	Change of O/O2 with AT terminal	AT terminal ON : O2-L valid	AT terminal OFF : O-L valid
02 selection	A006	00	Single		
		01	Auxiliary frequency command of O, OI(No reverse)		
		02	Auxiliary frequency command of O, OI(Reverse)		

Assign 16(AT) to intelligent input terminal.

The frequency setting is the values from terminals O, OI and O2 when 16(AT) isn't assigned. The frequency set up when A006 is "00" becomes the value of O2. And, the frequency set up when A006 is "01" or "02" becomes the value which OI and O2 were added to.

The following frequency command methods are available by combining A005, A006 with the intelligent input AT terminal.

In the case that reverse and FW(forward) terminals are ON, the inverter operates reversely when (main frequency command + auxiliarly frequency command)< 0.

	A006	A005	AT terminal	Main frequency command	ExIstence of Auxiliarly frequency command(02-L)	Existence of Reverse
Intelligent input terminal on assigning AT	00	00	OFF	O-L	No	No
			ON	OI-L	No	
		01	OFF	O-L	No	
			ON	O2-L	No	Yes
	01	00 (Example 1)	OFF	O-L	Yes	No
			ON	OI-L	Yes	
		01	OFF	O-L	Yes	
			ON	O2-L	No	
	02	00 (Example 2)	OFF	O-L	Yes	Yes
			ON	OI-L	Yes	
		01	OFF	O-L	Yes	
			ON	O2-L	No	
Intelligent input Terminal when Don't assign AT	00	-	-	O2-L	No	Yes
	01	-	-	Adding O-L and OI-L	Yes	No
	02	-	-	Adding O-L and OI-L	Yes	Yes

(Example 1)
No reverse — FW, AT
Main frequency command OI or O terminal — f_{OI}, f_O, 0
Auxiliary Frequency Command O2 terminal — 0, f_{O2}
Real frequency command — $f_O + f_{O2}$ Forward, $f_{OI} + f_{O2}$, 0

(Example 2)
Reverse — FW, AT
Main frequency command OI or O terminal — f_{OI}, f_O, 0
Auxiliary Frequency Command O2 terminal — 0, f_{O2}
Real frequency command — $f_O + f_{O2}$ Forward, $f_{OI} + f_{O2}$, 0, Reverse

4- 22
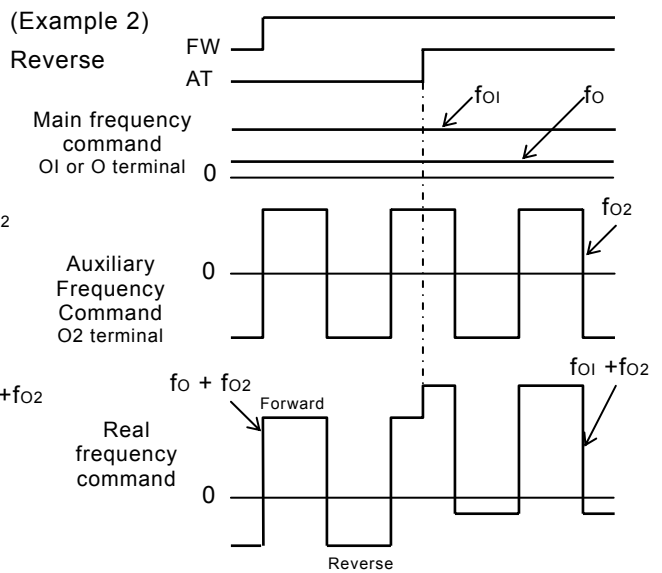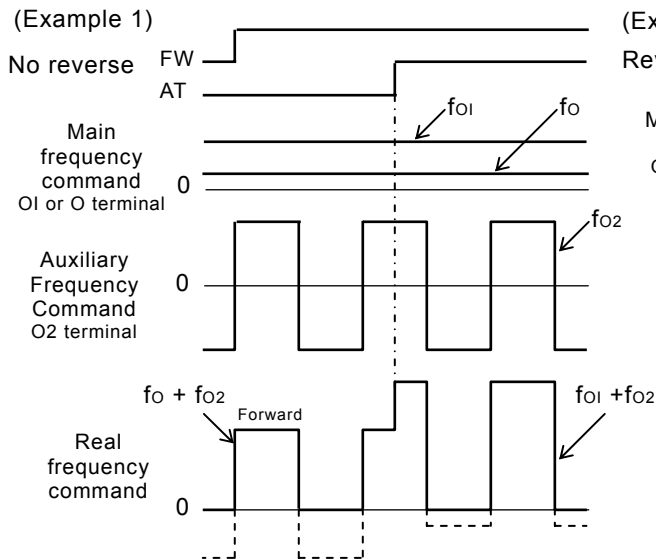
Input frequency Start/End

External analog signal from the control terminals

(frequency command)

O-L terminal : 0 - 10V

OI-L terminal : 4 - 20mA

O2-L terminal : -10 / 0 / +10V

Set output frequency for one of the above

(1)Start, End of O-L terminal, OI-L terminal

Set item	Function code	Data	Contents
O/OI start	A011/A101	0.00-1500.	Unit : Hz Set starting frequency
O/OI end	A012/A102	0.00-1500.	Unit : Hz Set ending frequency
O/OI start rate	A013/A103	0.-100.	Unit : % Set start rate for output frequency command 0-10V, 4-20mA
O/OI end rate	A014/A104	0.-100.	Unit : % Set end rate for output frequency command 0-10V, 4-20mA
O/OI start Selection	A015/A105	00	External start frequency Output frequency from 0 to A013/A103 outputs the value of A011/A101
		01	0Hz Output frequency from 0 to A013/A103 outputs the value of 0Hz

When the input is from 0 to 5V with O-L terminal, set A014 to 50%.

(Example 1) A015/A105 : 00   (Example 2) A015/A105 : 01
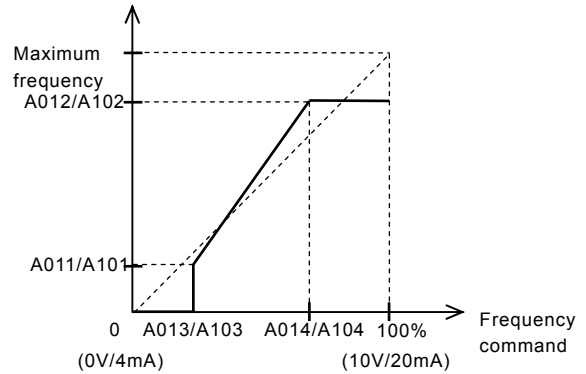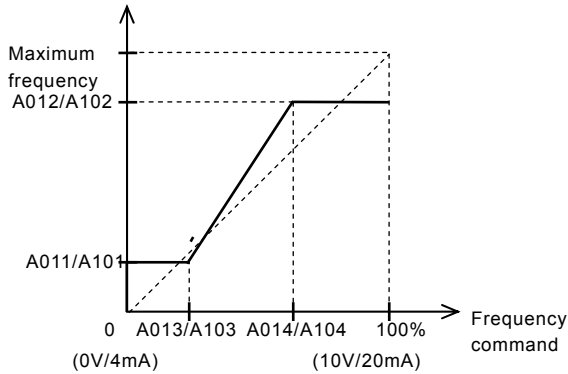
(2) Start, End of O2-L terminal

Set item	Function code	Data	Contents	Notes
O2 start	A111	-150.-150.	Unit : Hz Set starting frequency	
O2 end	A112	-150.-150.	Unit : Hz Set ending frequency	(Example 3)
O2 start rate	A113	-100.-100.	Unit : % Set starting rate for output frequency command –10-10V (Note 1)	
O2 end rate	A114	-100.-100.	Unit : % Set ending rate for output frequency command –10-10V (Note 1)	

(Note 1) The rates of –10V-10V is following.

     -10V- 0V:-100-0%

      0V-10V:0-100%

For example, in case of use with O2-L terminal, set -50% to A113,

50% to A114.

(Example 3)
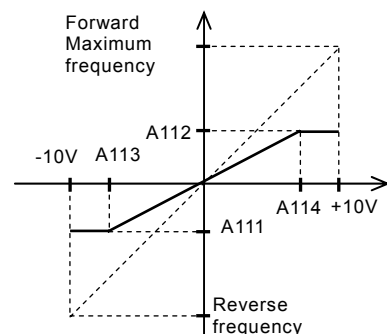
Setting analog input filter

Set the internal filter of the frequency setting signal of voltage or current

from the control terminals

It is important to first remove the source of the noise to the system.

When stable operation can not be achieved due to the effect of electrcal noise, set a larger value.

The response will be slower by setting a larger value. The limit of setting is about 2ms-60ms(set value : 1-30)

Function code	Limit to set	Contents
A016	1.-30.	Can set with the 1 unit.

Output voltage gain

Regarding the voltage selected on A082 motor voltage selection as 100 %,

set the rate of the voltage which the inverter outputs for the voltage selected.

Function code	Limit to set	Contents
A045	20.-100.	Unit:%
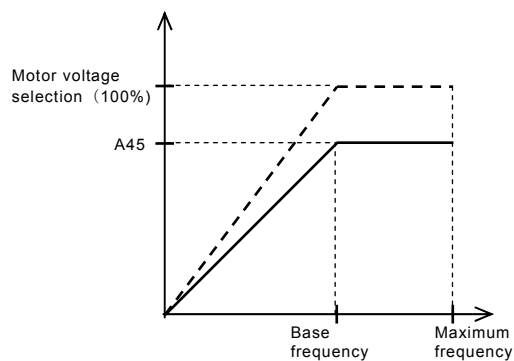
Control system (V/f Characteristic)

Set V/f (output voltage/output frequency) characteristic.

To change 1st /2nd-5th control system (V/f characteristic), set 50(SET0) / 51(SET1) / 52(SET2) to an intelligent input terminal and switch it ON.

Relation code

A044/A244-A544:1st/2nd-5th control system

b100/b102/b104/b106/b108/b110/b112

    : Free setting V/f frequency 1/2/3/4/5/6/7

b101/b103/b105/b107/b109/b111/b113

    : Free setting V/f voltage 1/2/3/4/5/6/7

Function code	Data	V/f characteristic
A044/A244	00	Constant torque characteristic(VC)
-A544	02	Free setting V/f characteristic

(1) Constant torque characteristic (VC)

    Output voltage outputs proportionally to the output frequency.

    Output voltage outputs proportionally from 0 to the base frequency, but the output voltage from the base frequency to the maximum frequency is constant regardless of frequency.
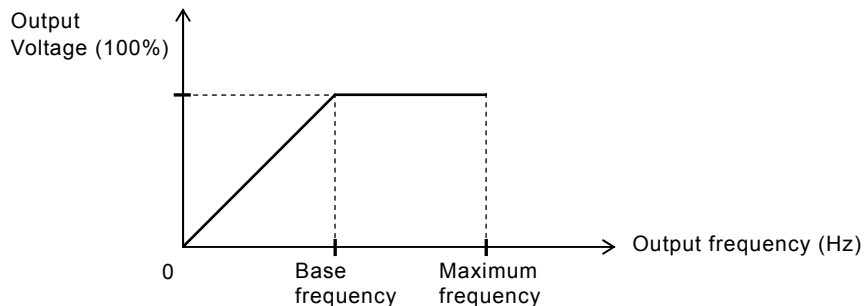
(2) Free V/f setting

The free V/f setting sets optional V/f characteristics by setting the voltage and frequency in seven parts. (b100-b113)

The setting of free V/f setting operates always to be $1 \le 2 \le 3 \le 4 \le 5 \le 6 \le 7$.

    Please set first free V/f setting 7 because the initial value is all 0Hz.

When the free V/f setting is valid, the function of torque boost(A041/A241), basic frequency(A003/A203), maximum frequency(A004/A204) is invalid. (Free V/f frequency7 is treated as maximum frequency.)

Set item	Function code	Data	Contents
Free V/f frequency7	b112	0.- 1500.	
Free V/f frequency6	b110	0.- Free V/f frequency7	
Free V/f frequency5	b108	0.- Free V/f frequency6	
Free V/f frequency4	b106	0.- Free V/f frequency5	Unit : Hz
Free V/f frequency3	b104	0.- Free V/f frequency4	
Free V/f frequency2	b102	0.- Free V/f frequency3	
Free V/f frequency1	b100	0.- Free V/f frequency2	
Free V/f voltage7	b113		
Free V/f voltage6	b111		
Free V/f voltage5	b109		
Free V/f voltage4	b107	0.0 - 800.0	Unit : V (Note 1)
Free V/f voltage3	b105		
Free V/f voltage2	b103		
Free V/f voltage1	b101		

(Example)

Output voltage (V)

V7

V6

V5

V4
V1
V2, V3

0　　f1　f2　f3　　f4　f5　f6　f7　　Output frequency (Hz)
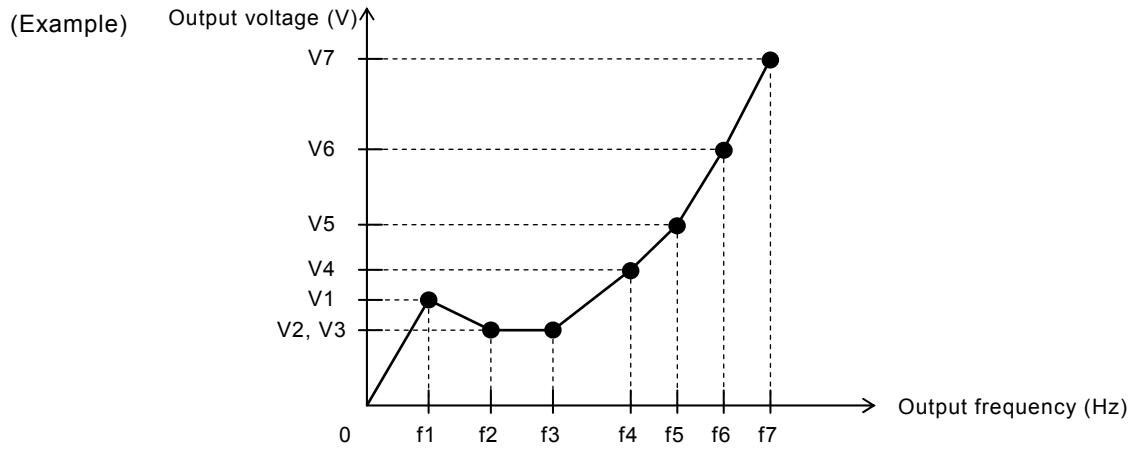
(Note 1) Even if you set 800V for free V/f voltage1-7, output of inverter can't be more than the input voltage or the AVR setting voltage.

Output voltage(V)

V7

V6

Voltage to output or AVR voltage

0　　f6　　f7　　Output frequency(Hz)
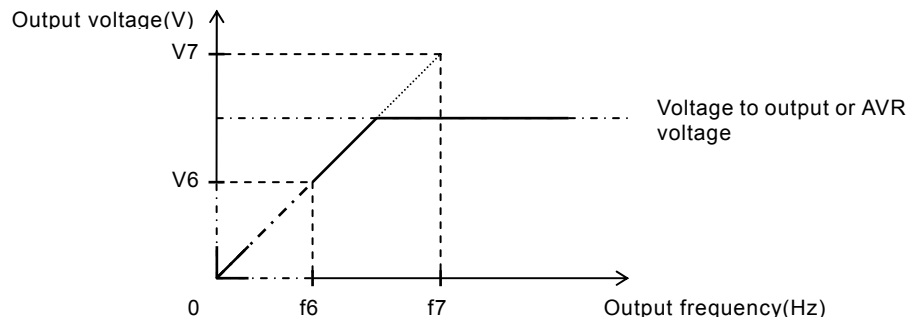
Torque boost

A correctly installed motor and careful attention to voltage
drop in the wiring will improve the motor torque at low speed.

Relation code

A042/A242:1st/2nd manual operation torque
boost
A043/A243:1st/2nd manual operation torque
boost break point

Set item	Function code	Data	Contents
Manual torque boost	A042/A242 -A542	0.0-20.0	Unit:**%** Level corresponding to output Voltage (100%)
Manual torque boost break point	A043/A243 -A543	0.0-50.0	Unit:**%** Level corresponding to base frequency

(1) Manual torque boost

The values set up with A042/A242 and A043/A243 is outputted.

A042/A242 sets a percentage level where the base frequency voltage is 100%.

The level set is the value of torque boost output voltage at 0 Hz.

When using the manual torque boost, it should be noted that overuse will cause saturation of the motor and may cause damage.

The manual torque boost break point is the frequency at which the voltage torgue boost is switched off and normal operation resumes.

To change of A041,A042/A241-A541,A242-A542 an intelligent input needs to be set to 50(SET0)/ 51(SET1)/52(SET2) and switched on.

Output voltage (%)

100

A042/A242/A342

A043/A243/A343   Base frequency   Output frequency

(100%)
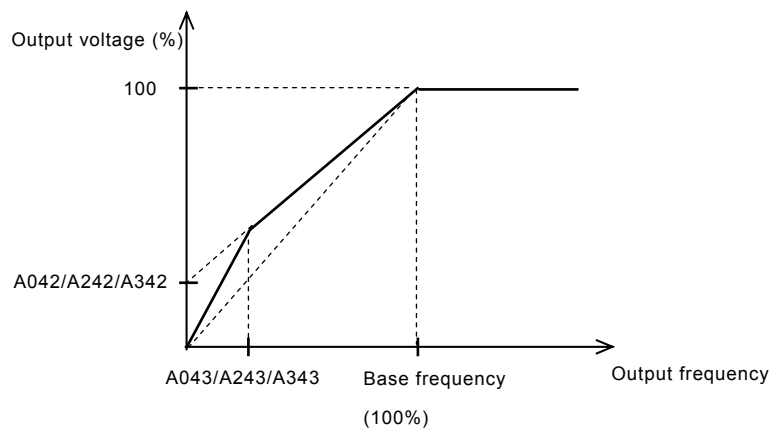
Direct current braking(DB)

A dc voltage can be applied to the motor windings
in order to lock the motor shaft and avoid overrun
at low speeds.

There are two methods of activating the dc braking,
Outside which is through the intelligent input
terminals and Inside which is automatically started
at a specific frequency.

Relation code

A051: DC braking selection A056: DC braking edge/level
A052: DC braking frequency   selection
A053: DC braking late time A057: Starting DC braking power
A054: DC braking power   A058: Starting DC braking time
A055: DC braking time   A059: DC carrier frequency
C001-C008: Intelligent input terminal

Set item	Functin code	Data	Contents
DC braking selection	A051	00	Inside DC braking : invalid
		01	Inside DC braking : valid
DC braking frequency	A052	0.00-500.00	Unit : Hz When the output reaches the set frequency and Inside DC braking is valid, DC braking is started.
DC braking late time	A053	0.0-5.0	Unit : second After DC braking time is reached, or DB terminal is ON, the late time is a delay before DC braking is started.
DC braking power /Starting DC braking power	A054/A057	0. ⇕ 100. (80.)	Unit : % Weak (Zero current) ⇕ Strong (0.4 to 55kW: Range is from 0 to 100%) (75 to 150kW: Range is from 0 to 80%)
DC braking time	A055	0.0-60.0	Unit : second The DC braking is stopped after this time delay has elapsed. The time is tarted when the late time has elapsed.
DC braking edge/level selection	A056	00	Edge movement (Example 1-6-a)
		01	Level movement (Example 1-6-b)
Starting DC braking time	A058	0.0-60.0	Unit : second It is valid for inside DC braking. When operating command is ON, DC current is started.
DC braking carrier Frequency	A059	0.5-10	Unit : kHz

(1) DC braking carrier frequency

It is possible to alter the DC braking carrier frequency. Set DC braking carrier frequency with A059.

However, Maximum braking power level is automatically reduced by DC breaking carrier freqency as follows.

Direct braking power limiter
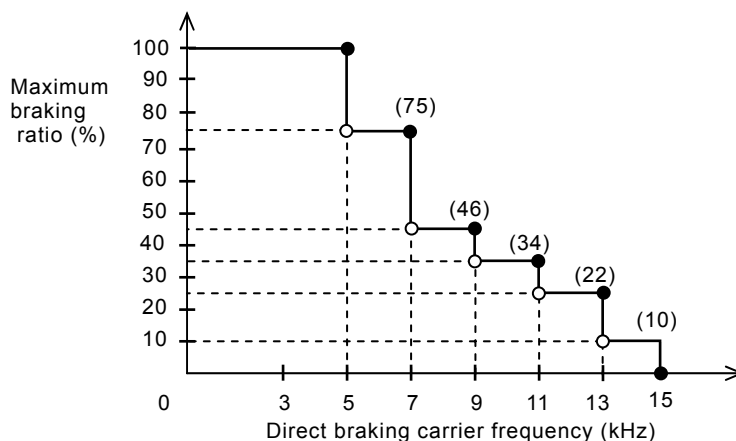
(2) Outside DC braking

Set 07(DB) to an intelligent input terminal.

DC braking is then switched by ON/OFF of DB terminal irrespective of DC braking selection A051.

Set strength of DC braking power with A054.

If DC braking late time A053 is set, the Inverter outpuit is cut off for this time period, the motor will be free running.

After the late time passes, DC braking is started.

Please set DC braking time A055 or DC braking time by DB terminal paying attention to the heat of the motor.

Please set each setting in accordance with the system, after level action or edge action are selected with A056.

(a) Edge operation (A056:00)	(b) Level operation (A056:01)
(Example 1-a) FW DB Output frequency A055	(Example 1-b) FW DB Output frequency
(Example 2-a) FW DB Output frequency A055	(Example 2-b) FW DB Output frequency
(Example 3-a) FW DB Free running Output frequency A053 A055	(Example 3-b) FW DB Free running Output frequency A053
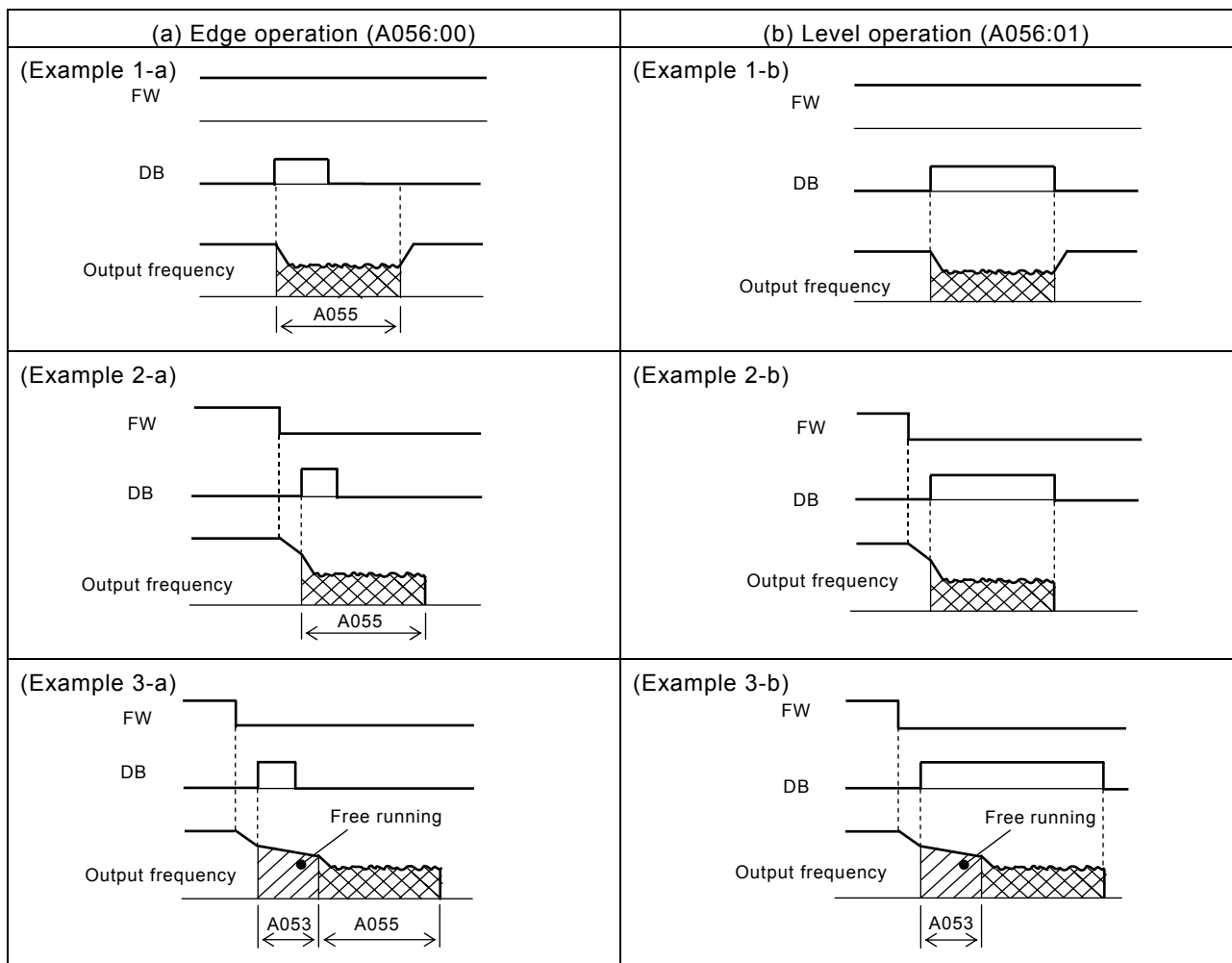
Frequency limiter

This function can set a maximum and minimum limit of the output frequency.

Even if a frequency command exceeds the maximum and minimum limiter

the inverter will ignore this value and stop at the values set.

Set first maximum limiter on setting.

Be sure that the maximum limiter (A061/A261-A562) > minimum limiter (A062/A262-A562).

The maximum and minimum limiter will not operate if 0Hz is set.

This function is not avalable under third control function.

Set item	Function code	Setting limit	Contents
Frequency max. limiter	A061/A261 -A561	0.00, frequency min. limiter - max. limiter frequency	Unit : Hz Setting max. of output frequency
Frequency min. limiter	A062/A262 -A562	0.00, starting frequency - max. limiter frequency	Unit : Hz Setting min. of output frequency

(1) In use O-L, OI-L case
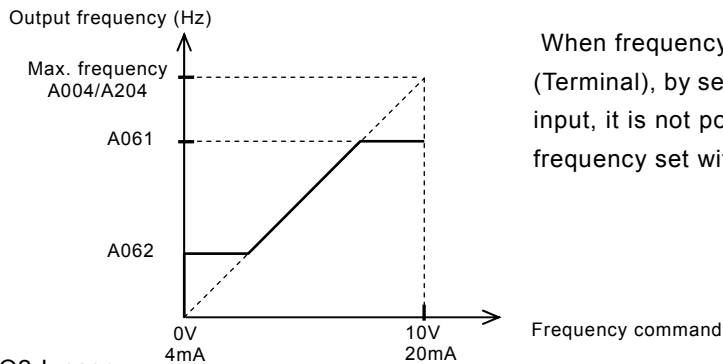
When frequency command is control terminal (Terminal), by setting Min. limiter, even if 0V is input, it is not possible to output less than the frequency set with Min. limiter.

(2) In use O2-L case
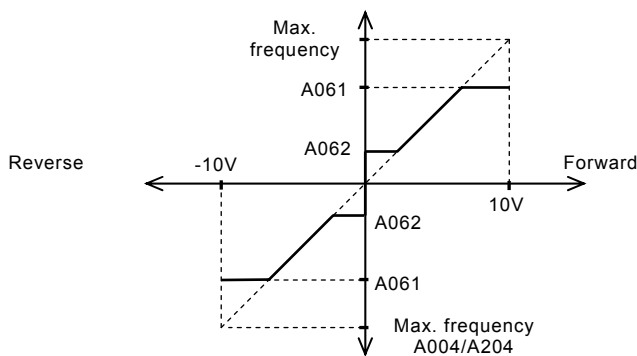
When using the minimum frequency limiter and 0v is inputted into O2 terminal, A062 applies to both forward and reverse directions.

(a) When operation command is control terminal (Terminal)(A002:01)

Terminal	Revolution when O2 is 0V
FW(ON)	A062 on forward side
RV(ON)	A062 on reverse side

(b) When operation command is operator (A002:02)

F004	Revolution when O2 is 0V
00	A062 on forward side
01	A062 on reverse side

Frequency jump function

Frequency jump can be used to avoid resonance points on machinery.

Frequency jump is to jump the frquency command and avoid usual operation within the limit of the jump frequency.

Output frequency changes continuously according to adjustable time.

It is possible three different points are set for the jump frequency.

> **Relation code**
> A063:Jump frequency1
> A064:Jump frequency band1
> A065:Jump frequency2
> A066:Jump frequency band2
> A067:Jump frequency 3
> A068:Jump frequency band3

Set item	Function code	Setting limit	Contents
Jump frequency 1/2/3	A063/A065/A067	0.00-1500.0	Unit: Hz Set the frequency fj of center to jump.
Jump Width 1/2/3	A064/A066/A068	0.00-100.00	Unit:Hz Set 1/2 value of frequency band to jump
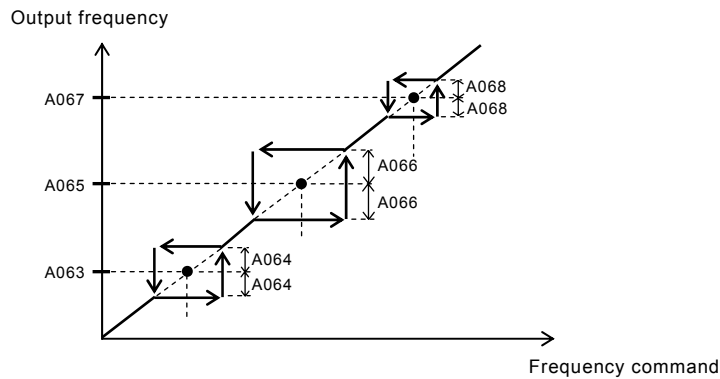
Acceleration stop function

When the inertial moment of a load is high, this is the function to wait until the slip of the motor on starting becomes smaller.

Use when the overcurrent trip occurs on starting.

> **Relation code**
> A069:Acceleration stop frequency
> A070:Acceleration stop time

Set item	Function code	Data	Contents
Acceleration stop frequency	A069	0.00-1500.0	Unit: Hz Set the frequency to be held.
Acceleration stop time	A070	0.0-60.0	Unit: second Set the time to hold the frequency.
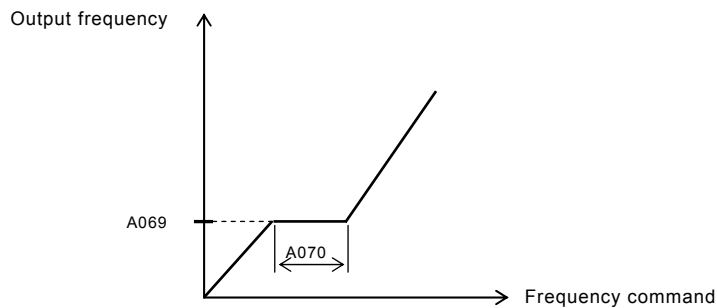
Two-stage acceleration and deceleration function (2CH)

By setting this function, it is possible to change the rate of acceleration and deceleration.

As methods to change the rate of acceleration and deceleration, you can select the method of changing by intelligent input terminal and the method of automatic changing by optional frequency.

In case of changing by intelligent input terminal, assign 09(2CH) to an Intelligent input terminal.

```
┌──────── Relation code ────────┐
│ F002/F202-F502: 1st/2nd-5th acceleration 1
│ F003/F203-F503: 1st/2nd-5th deceleration time 1
│ A092/A292-A592: 1st/2nd-5th acceleration time 2
│ A093/A293-A593: 1st/2nd-5th deceleration time 2
│ A094/A294-A594: 1st/2nd-5th two-stage
│            acceleration and deceleration selection
│ A095/A295-A595: 1st/2nd-5th two-stage
│            acceleration frequency
│ A096/A296-A596: 1st/2nd-5th two-stage
│            deceleration frequency
└───────────────────────────────┘
```

Set item	Function code	Data	Contents
Acceleration time 2	A092/A292 -A592	0.01-3600.	Unit : second (Example 1,2)
Deceleration time 2	A093/A293 -A593	0.01-3600.	Unit : second (Example 1,2)
Two-stage acceleration and deceleration selection	A094/A294 -A594	00	Changing by intelligent input terminal 09 (2CH) (Example 1)
		01	Changing by two-stage acceleration and deceleration frequency (A095/A295, A096/A296) (Example 2)
Two-stage acceleration frequency	A095/A295 -A595	0.00-1500.0	Unit: Hz It is valid when two-stage acceleration and deceleration selection (A094/A294) is 01. (Example 2)
Two-stage deceleration frequency	A096/A296 -A596	0.00-1500.0	Unit: Hz It is valid when two-stage acceleration and deceleration selection (A094/A294) is 01. (Example 2)

(Example 1) In to set A094/A294 to 00 case

(Example 2) In to set A094/A294 to 01 case
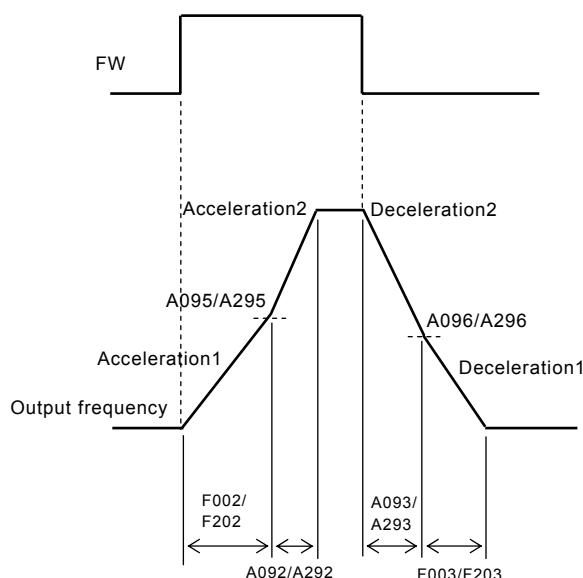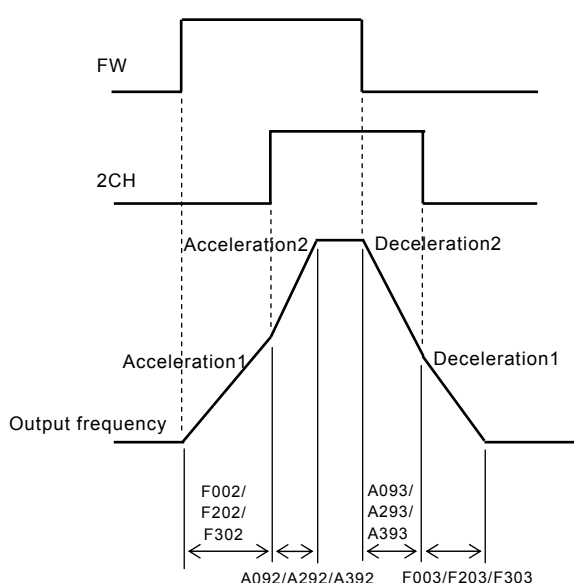
Acceleration and deceleration pattern
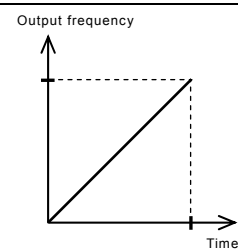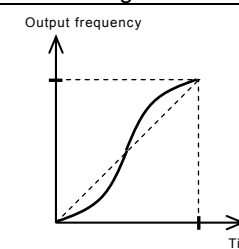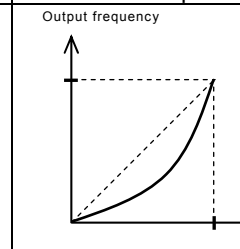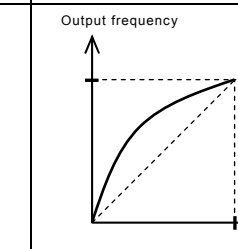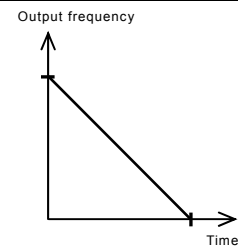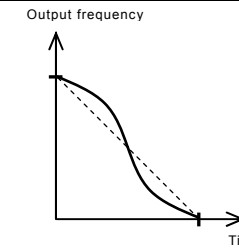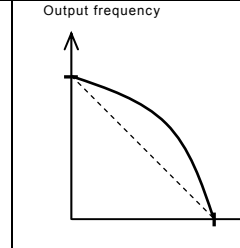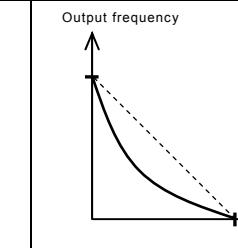
(1) Selection of pattern

Pattern of acceleration and deceleration speed is possible to set up corresponding to each system.

Select the pattern of acceleration and deceleration with A097 and A098.

┌─── Relation code ───┐
A097: Acceleration pattern selection
A098: Deceleration pattern selection
A131: Acceleration curve constant
A132: Deceleration curve constant

Set value	00	01	02	03
Curve	Line	Sigmoid	U-shape	Reverse U-shape
A097 (Accel-eration)				
A098 (Decel-eration)				
Contents	Accelerate and decelerate in line until output frequency set value.	Collapsing the cargo such as the going up and down machine, conveyor it uses it for prevention.	Cutting the tension control, rolled book such as the volume collector machine it uses it for prevention.	

It is possible to set the pattern of both acceleration, deceleration.

(2) The curve constant (the swelling degree)

It makes the rough sketch reference and please decide the swelling degree.
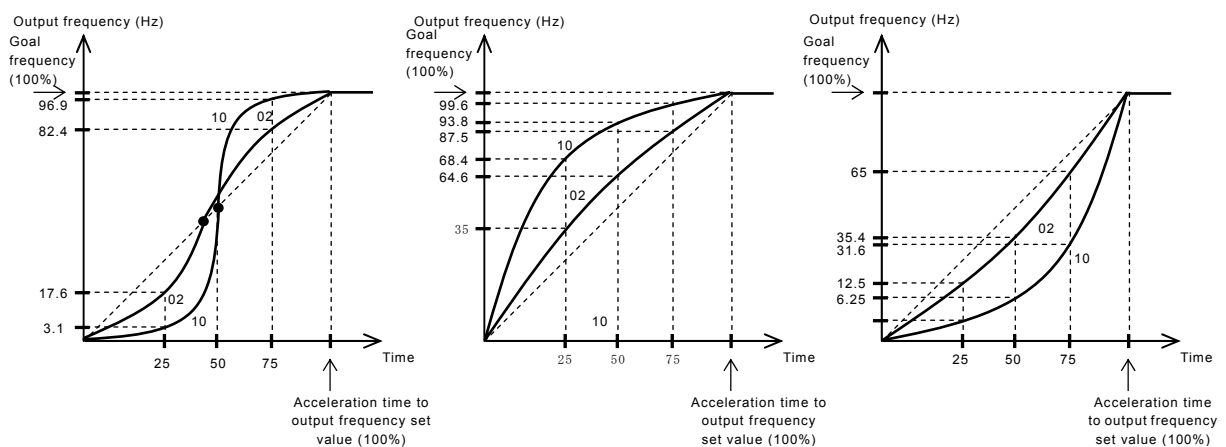
There is the range which the midway adjustable-speed time becomes fast in the S character pattern.

When An intelligent input terminal is allocated to LAD cancel (LAC) and the terminal is ON ,output frequency is immediately controlled by Setup frequency.

4- 33

Instantaneous power failure / under-voltage

Instantaneous stop and start

(1) You can select whether the inverter trips or retries (restart) when an instantaneous power failure/under-voltage occurs. When retry function is selected with b001, and an instantaneous stop/under-voltage trip occurs restart is tried 16 times and a trip will occur after 17 times.

And when retry function is selected, and an over-current or an over-voltage occurs, restart is tried 3 times and a trip will occur on the forth time. When an instantaneous power failure/under-voltage occurs, you can select execution of trip with b004. To select a retry function with b001, set the following retry mode correspondent to each system.

> **Relation code**
> b001 :Retry selection
> b002 :Allowable under-voltage power failure time
> b003 :Retry delay time
> b004 :Instantaneous power failure under-voltage trip during stop
> b005 :Instantaneous power failure undervoltage retry time selection
> b007 :frequency setting to match
> C021-C025 :Intelligent output terminal
> C026 :Alarm relay output

Set item	Function code	Data	Description
Retry selection (Note 3)	b001	00	Trip.
		01	Restart from 0Hz on retry.
		02	Start equaling frequency on retry. (Example 1)
		03	Start f-equaling and stop decelerating on retry. After stop, start trip. (Note 1)
		04	
Allowable under-voltage power failure time	b002	0.3-1.0	Units: second. If the instantaneous power failure time is shorter than the set time, a restart will occur. (Example 1) If the instantaneous stop time is longer than set time, trip. (Example 2)
Retry wait time	b003	0.3-100.	Units: second. Delay before motor restart time.
Instantaneous power failure/under-voltage trip during stop (Note 2)	b004	00	Invalid. Trip isn't caused and alarm isn't output.
		01	Valid. Trip is cause and alarm is output.
		02	Invalid. Trip isn't caused and alarm isn't output during stop and deceleration by stop command.
Instantaneous power failure/under-voltage retry time selection	b005	00	Restart to 16 times on instantaneous stop under-voltage.
		01	Restart freely on instantaneous stop under-voltage.
Frequency setting to match	b007	0.00-150 0.0	Units: Hz. When the frequency of the motor during free-run is less than this set frequency, restart with 0Hz is caused. (Example 3,4)

(Note 1) When trip of the over voltage or over current etc. occurs in the deceleration midway an instantaneous power failure error (E16) is displayed and operates free-run. In this case make the deceleration time of long

(Note 2) When using control power supply terminal R0-T0 and connecting DC voltage (P-N) to R0-T0, an under-voltage may be detected at power off and give trip signal. If this may cause any problem to your system, set data in 00 or 02.

F-equaling start: The inverter reads the motor RPM and direction and restarts the inverter to match these readings. Retry function (b001: 02): The timing chart in case of selection is following.

t0 :Instantaneous stop power failure
t1 :Allowable under-voltage power failure time(b002)
t2 :Retry wait time(b003)

(Example 1)
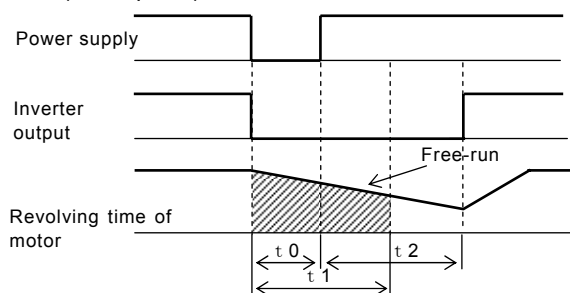
(Example 2)

After wait for t2 seconds according to t0 < t1, restart.
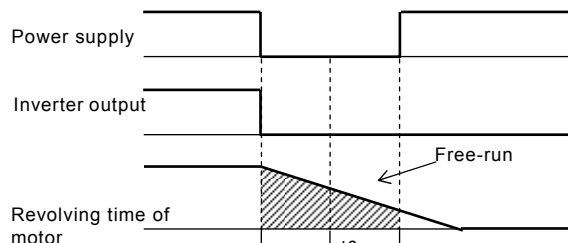
Trip according to t0 > t1.

(Example 3) Motor frequency (revolution time) >b007

Power supply

Inverter output

Motor frequency (revolution time)

Free-run

b007

F-equaling start

0

t0 | t2
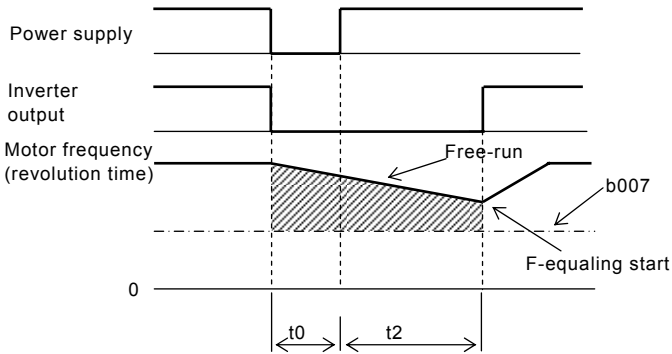
(Example 4) Motor frequency (revolution time) <b007

Power supply

Inverter output

Motor frequency (revolution time)

Free-run

b007

0

t0 | t2

0Hz start
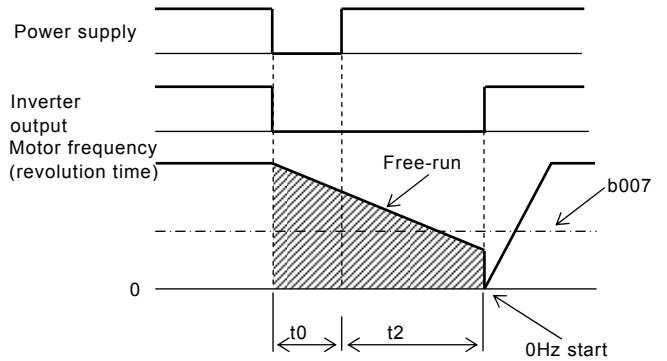
(2) Instantaneous power failure during stop alarm output during under-voltage

Select yes/no of alarm output when instantaneous power failure or under-voltage occurs with b004.

Alarm outputs while control power of inverter remains.

・Alarm output at an instantaneous power failure and under-voltage during standstill. Standard (Example 5-7).
Alarm signal performance when connecting DC voltage (P-N) to R0-T0 terminal. (Example 8-10).

(example 5) b004:00   inverter : stand still   inverter : run

(example 6) b004:01   inverter : stand still   inverter : run

(example 7) b004:02   inverter : stand still   inverter : run

(example 8) b004:00   inverter : stand still   inverter : run

(example 9) b004:01   inverter : stand still   inverter : run

under-voltage

(example 10) b004:02   inverter : stand still   inverter : run

power supply ON/OFF
running command ON/OFF
inverter output
AL ON/OFF
IP ON/OFF

(3)It is possible to use an output by assigning the signal (IP: 08) during instantaneous stop, by setting (UV: 09) during under-voltage to an intelligent output terminal 11-15(C021-C025) or alarm relay output terminal (C026).

(Note 3) It displays as follows during implementing frequency matching.
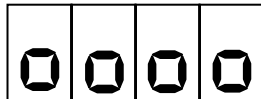
(4)

Open phase protection function selection

This is the function to warn when the inverter input supply opens.

Function code	Data	Description
b006	00	Invalid Don't trip when the input supply opens..
	01	Valid Trip when the input supply opens..

<div>
Relation code

b006:Open phase selection
</div>

When an open phase occurs, there is a danger that the inverter could produce one of the following states;

(1) Ripple current of main capacitor increases, life of main capacitor shortens remarkably.

(2) In case of load, there is danger that the capacitors or thyristors inside the inverter could be damaged.

(3) There is a risk that the in-rush resistor to limit the current inside the inverter may burn out.

Electronic thermal function

Set the Inverter according to motor rated current to protect the motor from overloading, overheating and damage.
A warning signal is outputted before tripping on electronic thermal Protection.

<div>
Relation code

b012/b212-b512:1st/2nd-5th electric thermal level
b013/b213-b513:1st/2nd-5th electric thermal characteristic selection
b015/b017/b019:free electric thermal frequency 1/2/3
b215-b515/b217-b517/b219-b519:
    2nd-5th electric thermal frequency 1/2/3
b016/b018/b020:free thermal current 1/2/3
b216-b516/b218-b518/b220-b520:
    2nd-5th electric thermal current 1/2/3
C021-C025:Intelligent output terminal
C026:Alarm relay output terminal
C061:Thermal warning level
</div>

(1) Electronic thermal level

Function code	Setting range	Description
b012/b212 -b512	Rated Current x 0.2 to Rated Current x 1.2	Units:A

(Example) SJH300-16LF

  Motor current: 46A

  Setting range: 9.2 to 55.2A

When electronic thermal level b012=46A,

time limit characteristic is right diagram.
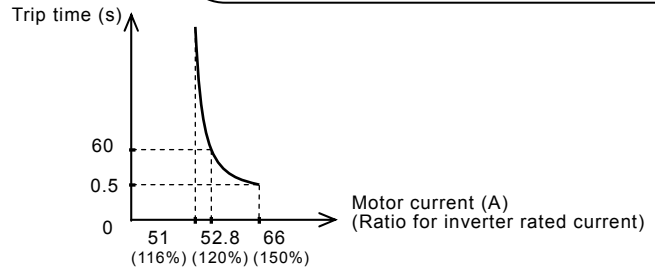
(2) Electronic thermal characteristic

Frequency characteristic is added up to set value of b012.

Function code	Deta	Electronic thermal characteristic
b013/b213 -b513	01	Constant torque characteristic
	02	Free setting

When output frequency of general motor decreases, cooling function of self-cooled fan will fall.

Reduced torque characteristic is calculated according to heat of an HITACHI general motor.

(a) Reduced torque charcteristic

To add to the time limit characteristic set with the reduced time rate b012/b212/b312 by each frequency.
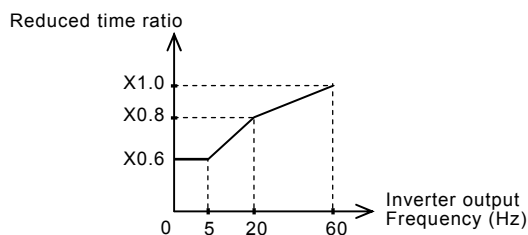
(Example) sb012 = 46(A), when output frequency = 20Hz
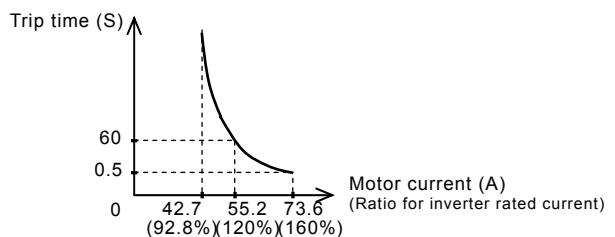
(b) Constant torque characteristic

Set this in to use constant torque motor case.
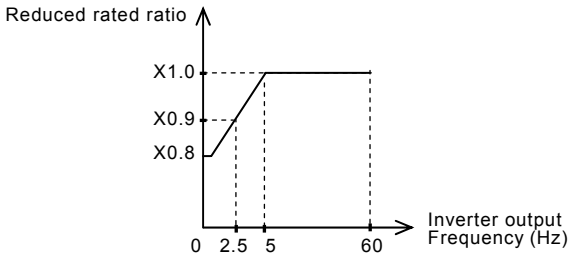
(Example) b012 = 46(A), when output frequency=2.5Hz.
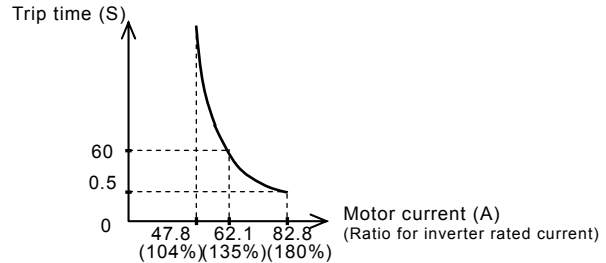
(3) Free/thermal characteristic

It is possible to set the electronic thermal characteristic freely according to the load in order to protect the motor and the Inverter.

Setting range is shown as follows;

Set item	Function code	Set range	Description
1st -5th Free electronic thermal frequency 1/2/3	b015/b017/b019 b215-b515/b217-b517/b219-b519	0 to 1500	Units : Hz
1st -5th Free electronic thermal current 1/2/3	b016/b018/b020 b216-b516/b218-b518/b220-b520	0.0 0.1 to 999.9	disable Units : A
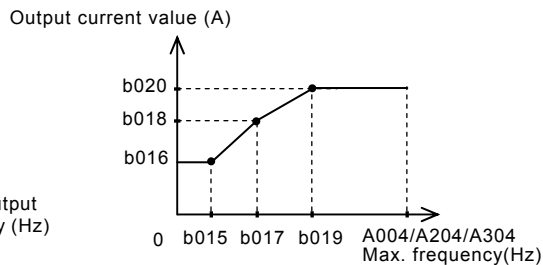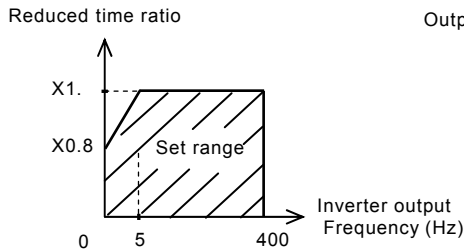
(Example) b012=44(A), output frequency=b017
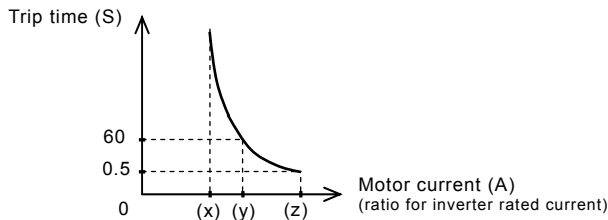
(x):b018x116%
(y):b018x120%
(z):b018x150%

(3) Thermal warning

A warning signal is outputted before overheat protection by the electronic thermal protection occurs.

Warning level is set with C061.

Assign 13(THM) to an intelligent output terminal (C021-C025) or the alarm relay output (C026).

Function code	Data	Description
C061	0.	Themal warning is noneffectiv.
	1.-100.	Units : %

Overload restriction/Overload advance notice

(1) Overload restriction

The Inverter monitors the motor current on acceleration and constant speed, When the inverter reaches the overload restriction level, the Inverter will reduce the output frequency automatically to restrict the overload.This function prevents an over-current trip by inertia during acceleration or radical changes in load at constant speed.

Two kinds of overload restriction function are set with b021, b022, b023 and b024, b025, b026. To change b021, b022, b023 and b024, b025, b026, assign 39(OLR) to an intelligent input terminal. The current value this function operates at is set in overload restriction level.

The overload restriction constant is the time to decelerate to 0Hz from max frequency.

b021, b022, b023 and b024, b025, b026 is changed with OLR.

As this function operates, the acceleration time is longer than setting time.

If the overload restriction constant is set too short, in spite of accelerating, an over-voltage trip is caused with regenerative enegy from the motor on automatic deceleration by this function.

When this function operates in the midst of accelerating, the frequency will not reach the goal frequency, the Inverter will adjust in the following way.

Make acceleration time longer.
Raise torque boost.
Raise overload restriction level.

Relation code

b021/b221-b521: 1st-5th
    Overload restriction selection
b022: 1st-5th
    Overload restriction level
b023: 1st-5th
    Overload restriction constant
C001-C008: Intelligent input
C021-C025: Intelligent output
C026:Alarm relay output setting
C040:Overload advance notice signal
    output mode
C041: Overload notices level

Set item	Function code	Data	Description
Overload restriction Selection.	b021/b221 -b521	00	Invalid
		01	Acceleration/valid on constant speed.
		02	Valid on constant speed.
Overload restriction Level.	b022/b222 -b522	Rated current x 0.5 to Rated current x 2.0	Units :A Current value overload restriction operates.
Overload restriction Constant.	b023/b223 -b523	0.1 to 30.0	Units :second Deceleration time when overload restriction Operates.
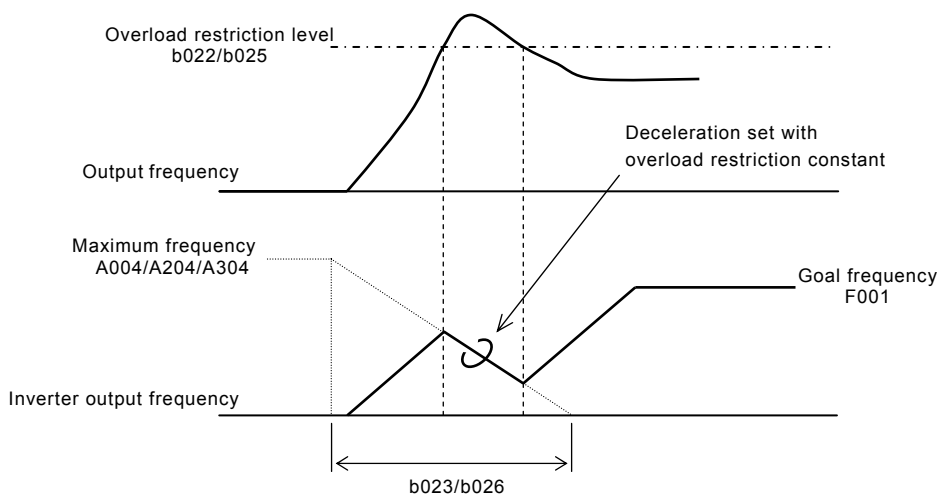
(2) Overload advance notice

 When the load is high, it is possible to adjust the load again by outputting an overload advance notice.

 It is used to prevent damage to the machine from too much load, i.e. baggage on a conveyor, the Inverter overload protection will operate.

 Assign 03(OL) or 26(OL2) to an intelligent output terminal 11 - 15 or the alarm relay output terminal. (Two kinds of overload advance notice signals are possible output.)

Set item	Function code	Data	Description
Overload advance notice signal output mode selection	C040	00	On acceleration/deceleration, constant speed, this is valid.
		01	On constant speed only, this is valid.
Overload advance notice level	C041/C241 -C541	0.0	Overload advance notice is non-effective.
		0.1 to Rated current x 2	Units: A As load reaches overload advance notice level, OL signal is output.
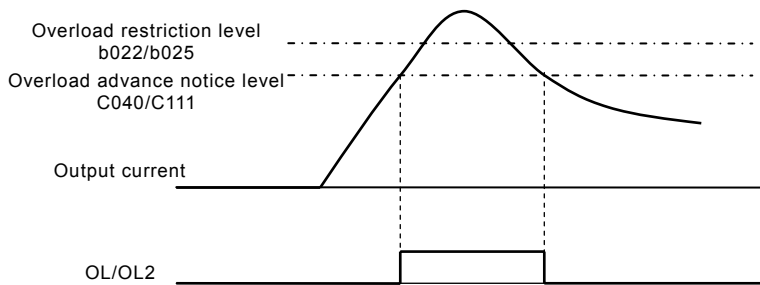
Start frequency

This frequency is the value the operator must set before the Inverter will give an output.

Mainly used when an operator adjusts the start torque.

By setting the start frequency higher, direct starting is caused and the starting current increases. Therefore an overload is within the restriction range and the inverter has a tendency to trip on over-current protection.

Function code	Set range	Description
b082	0.10 to 50.00	Units: Hz
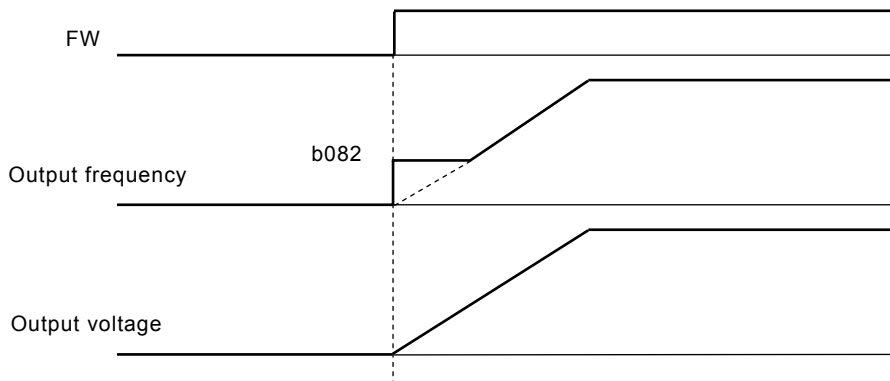
Reduced voltage start selection

This function is to raise the voltage slowly on motor starting.

The lower this value the more torque is available on starting..

However, by making this value lower, the inverter has a tendency of tripping on over-current protection, because of almost direct starting.

Function code	Data	Time to take for reduced voltage starting
b036	00	No reduced voltage start
	01	Short (about 6ms)
	↕	↕
	06	Long (about 36ms)
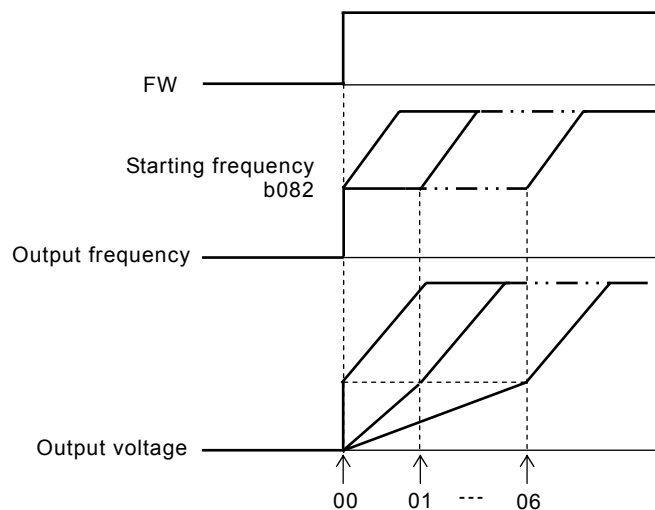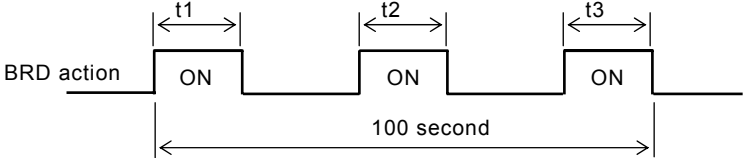
BRD (dynamic braking) function

This function only operates with the SJh300 - 16LF and lower, as they have
the built-in BRD.

This function is to consume regenerative energy from the motor as heat by the
use of an external resistor.

Regeneration occurs when the motor is decelerated to quickly and the motor turns into a generator and
voltage flows back into the Inverter.

To use the BRD function, set following condition.

Set item	Function code	Data	Description
BRD usage Ratio	b090	0.0	BRD don't operate.
		0.1-100.0	The usage ratio of BRD is set by 0.1% unit. When inverter exceeds the usage ratio, trip. BRD action — t1 ON, t2 ON, t3 ON — 100 second Usage ratio (%) = $\dfrac{(t1+t2+t3)}{100\ second} \times 100$
Selection of BRD	b095	00	BRD don't operate.
		01	During run: valid (BRD operates.) During stop: invalid (BRD doesn't operate.)
		02	During run, stop, valid (BRD operates.)
BRD ON Level	b096	(Note 1) 330-380	Units: V In case of 200V class inverter, setting is valid.
		(Note 1) 660-760	Units: V In case of 400V class inverter, setting is valid.

(Note 1) BRD ON level is the voltage setting of the DC (direct current) voltage of the inverter.

Cooling fan operating selection

You can select whether the fan operates continuously or operates only when the
inverter is in the running operation.

Relation code

b092:Cooling fan

operation selection

Function code	Data	Description
b092	00	Always run
	01	Only during run However, inverter operates for five minutes after power ON, and for five minutes after inverter operation stops.

BRD (dynamic braking) function

This function only operates with the SJH300 - 16LF/HF and lower, as they have
the built-in BRD.

This function is to consume regenerative energy from the motor as heat by the
use of an external resistor.

Regeneration occurs when the motor is decelerated to quickly and the motor turns into a generator and voltage flows back into the Inverter.

To use the BRD function, set following condition.

Set item	Function code	Data	Description
BRD usage Ratio	b090	0.0	BRD don't operate.
		0.1-100.0	The usage ratio of BRD is set by 0.1% unit. When inverter exceeds the usage ratio, trip. BRD action: t1 ON, t2 ON, t3 ON within 100 second Usage ratio (%) = $\dfrac{(t1+t2+t3)}{100\ \text{second}}$ **X100**
Selection of BRD	b095	00	BRD don't operate.
		01	During run: valid (BRD operates.) During stop: invalid (BRD doesn't operate.)
		02	During run, stop, valid (BRD operates.)
BRD ON Level	b096	(Note 1) 330-380	Units: V In case of 200V class inverter, setting is valid.
		(Note 1) 660-760	Units: V In case of 400V class inverter, setting is valid.

(Note 1) BRD ON level is the voltage setting of the DC (direct current) voltage of the inverter.

Cooling fan operating selection

You can select whether the fan operates continuously or operates only when the inverter is in the running operation.

> Relation code
> b092:Cooling fan
> operation selection

Function code	Data	Description
b092	00	Always run
	01	Only during run However, inverter operates for five minutes after power ON, and for five minutes after inverter operation stops.

Intelligent input terminal setting

It is possible to operate functions by assigning those functions to the intelligent input terminals 1-8 (C001-C008).

The intelligent input terminals 1-8 can be selected individually whether the contact input specification is either a NO or a NC contact.

Two or more intelligent input terminals can't be assigned to be the same function.

If an intelligent input is assigned a function which is already assigned to another terminal it will automatically be restored back to the setting before.

```
Relation code
C001-C008: Intelligent input terminal
```

Function Code	Data	Description	Reference item	Page
C001-C008	01	RV: Reverse command	Operation command selection	4-18
	02	CF1:Multi-speed 1 (binary operation)	Multi-speed operation function	4-44
	03	CF2:Multi-speed 2 (binary operation)		
	04	CF3:Multi-speed 3 (binary operation)		
	05	CF4:Multi-speed 4 (binary operation)		
	07	DB: Direct current braking	DC braking(outside DC braking)	4-29
	09	2CH:Two-stage adjustable-speed	Two-stage adjustable-speed function	4-33
	11	FRS: Free-run stop	Free-run stop	4-48
	12	EXT: External trip	External trip	4-51
	13	USP: Unattended start protection	Unattended start protection function	4-50
	15	SFT: Software lock (control terminal)	Software lock	4-47
	16	AT: analog input voltage/current select	Analog external input	4-21
	18	RS: Reset inverter	Reset inverter	4-49
	20	STA:3 wire start	3 wire input function	4-51
	21	STP:3 wire stop		
	22	F/R:3 wire direction		
	27	UP: Remote control UP function	UP/DOWN function	4-50
	28	DWN: Remote control DOWN function		
	29	UDC: Remote control data clear		
	31	OPE: Force operation ope	Force operation function	4-47
	32-38	SF1-7:Multi-speed 1-7 (bit run)	Multi-speed operation function	4-47
	50	SET0: Control 0 bit	Motor control function switching	4-46
	51	SET1: Control 1 bit		
	52	SET2: Control 2 bit		
	no	NO: No assign	-	-

Input terminal a/b (NO/NC) selection

It is possible to set a contact input or b contact input to
intelligent input terminals 1-8 and FW terminals individually.

Set item	Function code	Data	Description
Intelligent input 1-8 a/b(NO/NC)selection	C011-C018	00	a contact(NO)
		01	b contact(NC)
Input FW a/b(NO/NC)selection	C019	00	a contact(NO)
		01	b contact(NC)

a contact: "ON" with Close, "OFF" with Open

b contact: "ON" with Open, "OFF" with Close

RS terminal can set only a contact.

Multi-speed operation function (CF1-CF4,SF1-SF7)

It is possible to set multiple operation speeds and switch between the
speeds with the terminals.

Multi-speed operation can be selected by binary operation(max. 16
speeds) with 4 terminals or by bit operation (max. 6 speeds) with 5
terminals.

Set item	Functin code	Set value	Description
Multi-speed selection	A019	00	Change to binary operation 16 speed.
		01	Change to bit operation 5 speed
Multi-speed 0-15	A020/A220-A520, A021-A035	0.00, start frequency-max. frequency	Units:Hz

(1) Binary operation

It is possible to set multi-speed 0 to 15 by selecting 02 to 05 (CF1 to CF4) on the intelligent input terminals.

Set frequency setting for speed 1 to 15 with A021-A035.

Set 0 speed with A020/A220-A520 or F001 when frequency command is operator.

Or when frequency command is control terminal (Terminal), set with O, OI, O2 terminal.

Multi-speed	CF4	CF3	CF2	CF1
0 speed	OFF	OFF	OFF	OFF
1 speed	OFF	OFF	OFF	ON
2 speed	OFF	OFF	ON	OFF
3 speed	OFF	OFF	ON	ON
4 speed	OFF	ON	OFF	OFF
5 speed	OFF	ON	OFF	ON
6 speed	OFF	ON	ON	OFF
7 speed	OFF	ON	ON	ON
8 speed	ON	OFF	OFF	OFF
9 speed	ON	OFF	OFF	ON
10 speed	ON	OFF	ON	OFF
11 speed	ON	OFF	ON	ON
12 speed	ON	ON	OFF	OFF
13 speed	ON	ON	OFF	ON
14 speed	ON	ON	ON	OFF
15 speed	ON	ON	ON	ON

Frequency command from operator or analog external input terminal.
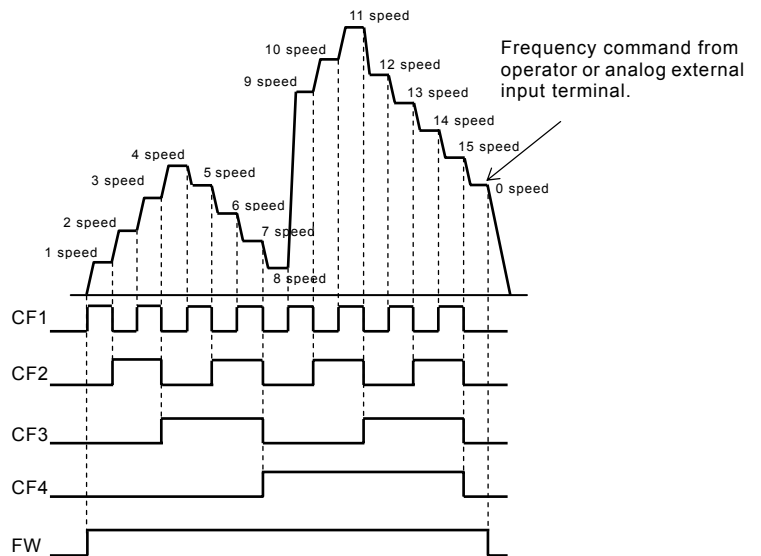
(2) Bit operation

It is possible to set multi-speed 1 to 5 by assigning 32 to 38 (SF1-SF7) to the intelligent input terminals.

Set frequency SF1-SF7 to A021-A027.

Multi-speed	SF7	SF6	SF5	SF4	SF3	SF2	SF1
0 speed	OFF	OFF	OFF	OFF	OFF	OFF	OFF
1 speed	✕	✕	×	×	×	×	ON
2 speed	✕	✕	×	×	×	ON	OFF
3 speed	✕	✕	×	×	ON	OFF	OFF
4 speed	✕	✕	×	ON	OFF	OFF	OFF
5 speed	✕	✕	ON	OFF	OFF	OFF	OFF
6 speed	✕	ON	OFF	OFF	OFF	OFF	OFF
7 speed	ON	OFF	OFF	OFF	OFF	OFF	OFF

When each terminal turns ON simultaneously, the lower number has priority.

In order for the inverter to operate both the frequency and the RUN operation (FW,RV) must be applied.
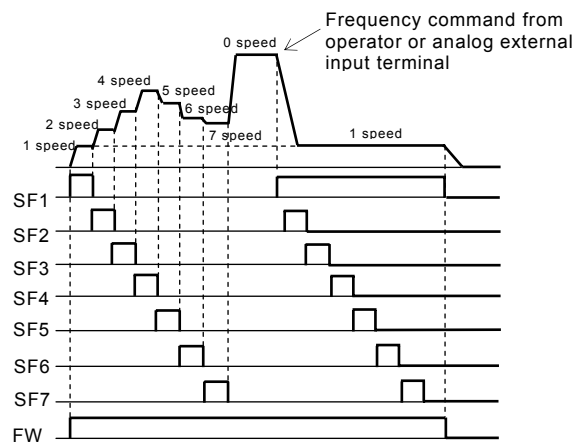
Second/Fifth control function (SET0,SET1, SET2)

This control function is used when the Inverter is connected to two different types of motors. By assigning 50-52(SET0,SET1,SET2) to an intelligent input terminal and turning SET0-SET2 terminal ON/OFF you can switch between three different Inverter set-ups.

Select 1st - 5th control function while the Inverter is in the STOP condition.

The functions which can change with SET terminal

F002/F202-F502:1st / 2nd - 5th acceleration time

F003/F203-F503:1st / 2nd - 5th deceleration time

A003/A203-F503:1st / 2nd - 5th base frequency

A004/A204-A504:1st / 2nd - 5th max. frequency

A020/A220-F520:1st / 2nd - 5th multi-speed 0 setting

A042/A242-A542:1st / 2nd - 5th manual torque boost

A043/A243-A543:1st / 2nd - 5th manual torque boost point

A044/A244-A544:1st / 2nd - 5th control system

A061/A261-A561:1st / 2nd - 5th frequency upper limiter

A062/A262-A562:1st / 2nd - 5th frequency lower limiter

A092/A292-A592:1st / 2nd - 5th acceleration time 2

A093/A293-A593:1st / 2nd - 5th deceleration time 2

A094/A294-A594:1st / 2nd - 5th two-stage adjustable speed selection

A095/A295-A595:1st / 2nd - 5th two-stage acceleration frequency

A096/A296-A596:1st / 2nd - 5th two-stage deceleration frequency

b012/b212-A512:1st / 2nd - 5th electronic thermal level

b013/b213-A513:1st / 2nd - 5th electronic thermal characteristic selection

b015-b020:1st free electronic thermal

b215-b220:2nd free electronic thermal

b315-b320:3rd free electronic thermal

b415-b420:4th free electronic thermal

b515-b520:5th free electronic thermal

b021/b221-b521:1st / 2nd - 5th overload restriction

b022/b222-b522:1st / 2nd - 5th overload restriction level

b023/b223-b523:1st / 2nd - 5th overload restriction constant

c041/c241-c541:1st / 2nd - 5th overload restriction notice level

H003/H203-H503:1st / 2nd - 5th motor capacity selection

H004/H204-H504:1st / 2nd - 5th motor pole selection

H006/H206-H506:1st / 2nd - 5th stabilized constant
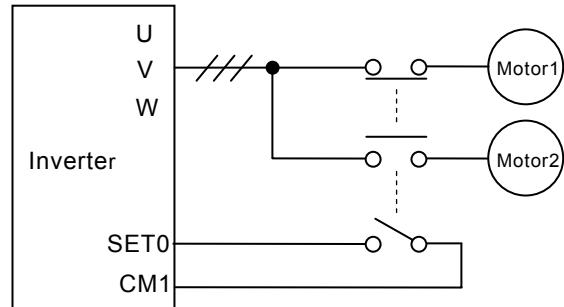
Motor control	SET2	SET1	SET0
1	OFF	OFF	OFF
2	OFF	OFF	ON
3	OFF	ON	OFF
4	OFF	ON	ON
5	ON	OFF	OFF

Display during setting isn't differentiated between the 1st - 5th control function . So confirm it in the state of ON/OFF of termnal. Even if 1st - 5th control is changed during run, it will not be active until the inverter is stopped.

Software lock mode selection(SFT)

This function is used to prevent changing data by mistake.

When you want to use an intellignent input terminal, assign 15(SFT).

Below is the software lock code selection.

Relation code

b031: Software lock mode selection

C001-C008: Intelligent input terminal

Function code	Data	SFT terminal	Description
b031	00	ON/OFF	Write disable except for b031/write enable
	01	ON/OFF	Write disable except for b031,F001,A020,A220-A520 A021-A035,A038 / write enable
	02	-	Write disable except for b031
	03	-	Write disable except for b031,F001,A020,A220-A520 A021-A035,A038
	10	-	Write disable except for change mode during running (code list reference)

Force operation ope function(OPE)

This function is used to operate from the operator forcibly by on/off of an intelligent terminal when frequency and operation command is selected other than the operator.

Relation code

A002: Operation command selection

C001-C008: Intelligent input terminal

Becoming the operation from the frequency and operation command that was selected by A001 and A002 if the signal is off, and becoming the frequency and operation command from an operator forcibly if the signal is on when the compulsion operation function is selected by an intelligent input selection.

When changed the operation command while driving, operation command is canceled and become stoppage at first.

Operation command from each command input the operation command once again as the stoppage at first for driving once again.

Set item	Function cord	Setting value	Contents
Frequency setting selection	A001	01	Terminal
		02	Operator
		03	RS485
		04	Option 1
		05	Option 2
Operation command selection	A002	01	Terminal
		02	Operator
		03	RS485
		04	Option 1
		05	Option 2
Intelligent input selection	C001-C008	31	OPE : Compulsion operation

Free-run stop (FRS)

By operating the free-run stop (FRS) function, the inverter output is cut off.

The motor wills free wheel under its own momentum.

This function is used when the motor is to be stopped by the use of

a brake, like an electromagnetic brake.

If you stop the motor with a machine brake while the inverter is

still outputting to the motor an over-current trip may occur.

Assign 11(FRS) to an intelligent input terminal.

This free-run stop function will operate when the FRS terminal is ON.

If you turn FRS terminal OFF the inverter will restart after the retry wait time b003 passes.

However when the operation command selection A002 is set to control terminal (01), the inverter restarts during free-running.

This function will only operate when the FW terminal is ON.

On restart it is possible to select 0Hz start or matching frequency start as output methods with the free-run stop selection b088. (Example 1), (Example 2)

When you set the frequency setting to match (b007) and the frequency detected is under this setting when the free×run stop is released, the inverter is restarted from 0Hz.

The setting of this function is valid for selection b091 on stopping.

```
┌──────────── Relation code ────────────┐
│ b088: Free-run stop selection          │
│ b003: Retry wait time                  │
│ b007: Frequency setting to match       │
│ b091: Stop mode selection              │
│ C001-C008: Intelligent input terminal  │
└────────────────────────────────────────┘
```

Set item	Function code	Data	Description
Free-run stop selection	b088	00	0Hz start (Example 1)
		01	Equaling frequency start (Example 2)
Retry wait time	b003	0.3-100.	Units: second Time until restart after FRS terminal is OFF. (This is also used for Instantaneous restart.)
Frequency setting to match	b007	0.00-1500.	Units: Hz (instantaneous stop, reference to item of insufficiency) This sets the level to match frequency. (Refer to item of instantaneous stop and restart.)

(Example 1) 0Hz start

(Example 2) Equaling start
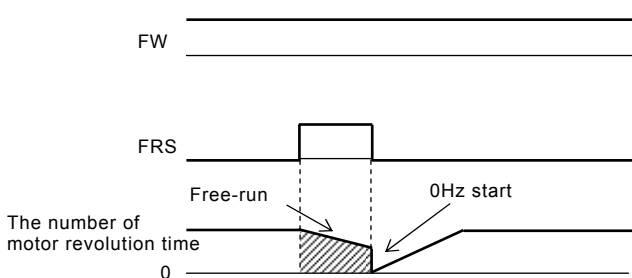
Start 0Hz regardless of the motor speed.
On 0Hz start, the retry wait time is disregarded.
When 0Hz start is used and the motor speed is still high there is the possibility of over-current trips.
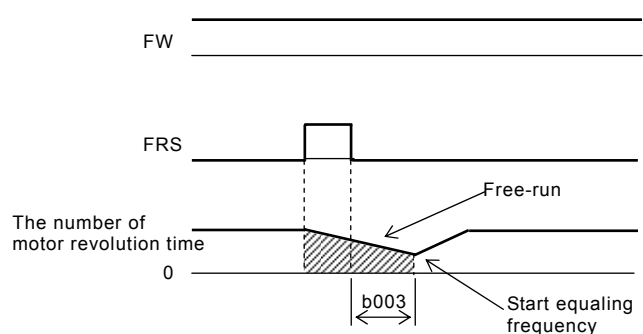
After FRS terminal is switched OFF, the Inverter reads the frequency of the motor and when it reaches the value in b007 the Inverter will begin to RUN again.
On frequency matching start if an over-current trip occurs, try extending the retry time.

Reset (RS)

This function resets the inverter when a protective trip has occurred.
The method of reset is to either push the STOP/RESET key on the
digital operator or to switch the RS terminal ON.
To reset the inverter with the control terminal, assign 18(RS) to an
intelligent input terminal.
Reset frequency matching selection C103 selects whether the
 inverter restarts at 0Hz or the inverter matches the output frequency after the reset operation is complete.
Reset selection C102 selects when the alarm signal is cancelled and whether it is valid or invalid in normal
operation.
The RS terminal is valid only when the contact is set to NO.

Relation code
b003: Retry waiting time
b007: Frequency setting to match
C102: Reset selection
C103: Reset frequency matching
      selection
C001-C008: Intelligent input terminal

Set item	Function code	Data	Description
Retry waiting time	b003	0.3-100.	Units:seconds (Reference to items of instantaneous power failure or under-voltage) After reset, time until restart is tried.
Frequency setting to match	b007	0.00-1500.	Units:Hz (Reference to items of instantaneous stop/ under-voltage)
Reset selection	C102	00	On ON signal, trip cancel (Example 1) On normal, this is valid (output cuts off).
		01	On OFF signal, trip cancel (Example 2) On normal, valid (output cuts off)
		02	On ON signal, trip cancel (Example 1) On normal, this is invalid. (only trip cancel)
Reset frequency matching selection	C103	00	0Hz start
		01	Frequency matching start. (Example 3)

(Example 1)

RS

Alarm

(Example 2)

RS

Alarm
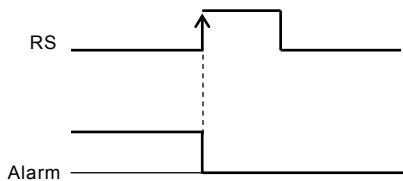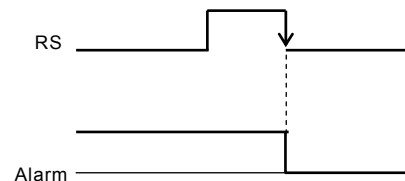
(Example 3) When 01 (frequency matching) is selected with reset frequency matching selection C103,
it is also possible to operate frequency start on power ON again. And retry waiting time is
disregarded at the time of the setting C103:00 (0Hz start).

Power supply

FW

Free-run

Frequency matching

Number of motor
revolution time
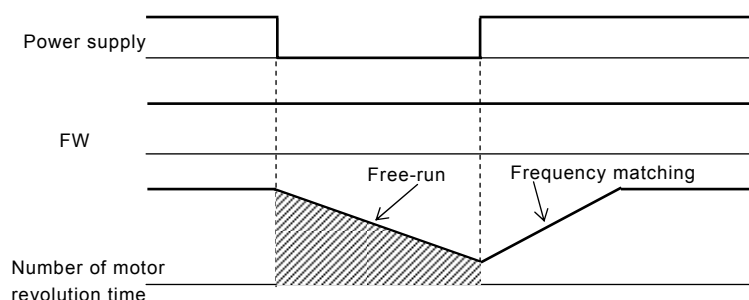
Unattended start protection (USP)

Relation code

C001-C008: Intelligent input terminal

The USP function is designed as a fail safe to prevent accidental starting of the Inverter if the RUN signal is ON when the power is restored to the Inverter.

When this function worked E13 is displayed. Either resetting the Inverter or turning the RUN signal OFF can clear the trip

This function is able to disarm when the operation command is turned off. (Example 1)

If the trip is cancelled while the RUN signal is still ON then the inverter will restart automatically. (Example 2)

When the operation command is turned on after the power supply input, the inverter drives normal. (Example 3)

Assign 13(USP) to an intelligent input terminal. Unattended start protection is shown as follows;
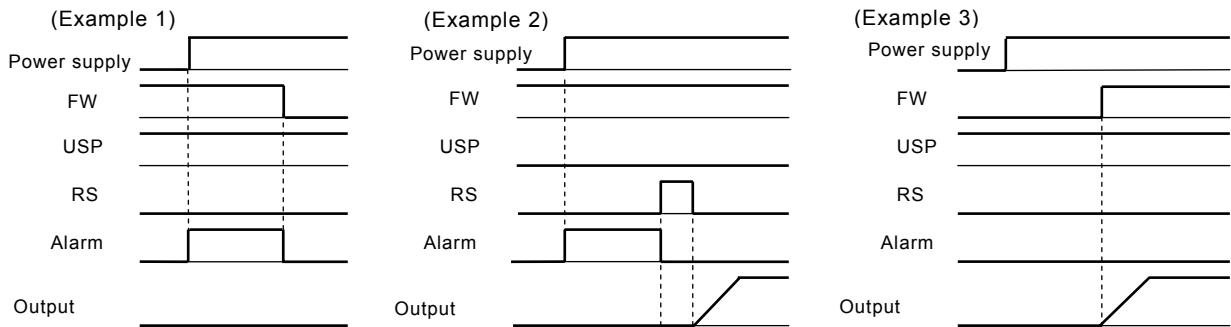
UP/DOWN selection(UP,DWN)

Relation code

C101: UP/DOWN memory selection

C001-C008: Intelligent input terminal

The Inverter output frequency can be changed with the UP and DWN intelligent input terminals.

Assign 27(UP) and 28(DWN) to two of the intelligent input terminals 1-5.

This function is valid only when the frequency command selection A001 is set to 01 or 02. However, when 01 (control terminal) is set, this can only be used for multi-speed operation.

This function will not operate when the external analog frequency command or the jogging operation is used.

Acceleration time operates according to F002, F003/F202-F502, F203-F503 when UP/DWN terminal is ON.

To change 1st /2nd -5th control, assign 50(SET0)/51(SET1)/52(SET2) to an intelligent input terminal, change with SET0/SET2 terminal.

It is possible for the Inverter to retain the frequency setting value from the UP/DWN terminals. Parameter C101 switches the memory ON or OFF. It is also possible to clear the memory and return to the original set frequency.

Assign 29(UDC) to an intelligent input terminal and switch it on to clear the memory.

Function code	Data	Description
C101	00	This will not memorize the frequency command adjusted with UP/DWN. When power is turned ON again, set value is returned to the value before it was adjusted with UP/DWN.
	01	This memorizes the frequency command adjusted with UP/DWN. When power is turned ON again, set value is kept the value after it was adjusted with UP/DWN.

Inverter doesn't accelerate and decelerate, if UP, DWN terminal is turned ON simultaneously.
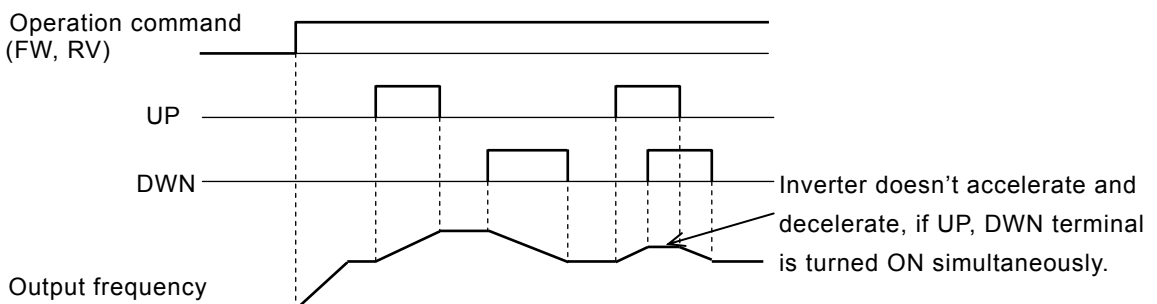
External trip (EXT)

This function can be used to force the Inverter into a trip situation which is Switched by an external input, i.e. PLC or relay contact.

When the EXT terminal is switched ON, the inverter trips on an E12 error and the outputis switched OFF.

Assign 12(EXT) to an intelligent input terminal.

The trip will not be canceled when the terminal is turned OFF.

To cancel the trip, the reset signal must be applied or the Inverter switched OFF and ON again at the supply.
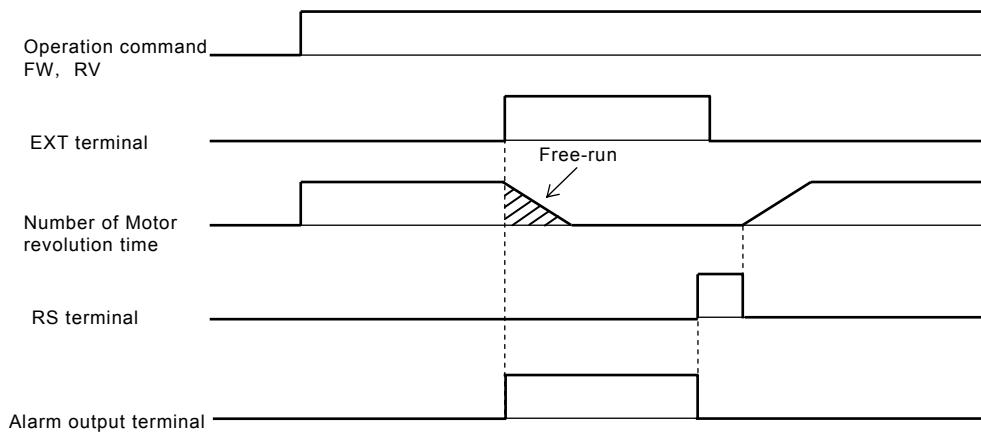
3 Wire input function(STA,STP,F/R)

This function is used when a momentary push start/stop control is required.

> Relation code
>
> C001-C008: Intelligent input terminal

Set the operation command selection A002 to control terminal (01).

Assign 20 (STA), 21 (STP) and 22 (F/R) to three of the intelligent input terminals, and the operation becomes possible as follows. When the terminal is assigned STP terminal, FW terminal and also RV terminal become invalid. If all three inputs are not assigned this function will not operate.

The FW terminal and RV terminal become redundant when the 3 wire control is assigned to the intelligent input terminals. Output from the 3 wire control terminal is as follows;
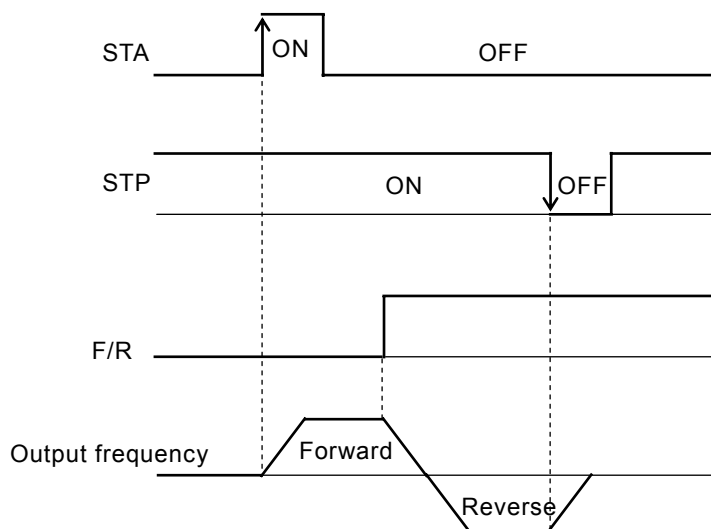
Intelligent output terminal setting

Any of the following functions can be assigned to the intelligent output terminals (11 - 15) or the alarm relay.

Both intelligent output terminals 11 - 15 and the alarm relay are all relay outputs.

All three output relays can be selected to be either NO or NC (a or b).

```
┌─── Relation code ───────────────┐
│                                 │
│ C021-C028 : Intelligent output terminal │
│ C026      :Alarm relay output terminal │
│                setting          │
└─────────────────────────────────┘
```

Data	Description	Reference item	Page
00	RUN: Signal during run	Signal during run	4-53
01	FA1: Constant speed arrival signal	Frequency arrival signal	4-54
02	FA2: Over setting frequency		
03	OL: Overload advance notice signal	Overload limit	4-39
05	AL: Alarm signal	Protection function	-
06	FA3: Arrival signal for only setting frequency	Frequency arrival signal	4-54
08	IP: Instantaneous stop signal	Instantaneous power failure/ under-voltage	4-35
09	UV: Under voltage signal		
11	RNT: RUN time over	RUN time over	4-55
12	ONT: ON time over	Power ON time over	4-55
13	THM: Thermal caution	Electric thermal function	4-37

Intelligent output terminal a/b (NO/NC) selection

```
┌─── Relation code ─────────────────────┐
│                                       │
│ C031-C035: Intelligent output 11-15a/b (NO/NC) │
│                selection              │
│ C036: Alarm relay output a/b (NO/NC) selection │
└───────────────────────────────────────┘
```

This sets the intelligent output terminal 11-15 and alarm relay output terminal contact condition to either NO or NC, (a or b).

Each output is changeable individually.

Both intelligent output terminals 11-15 and the alarm relay are all relay outputs.

Set item	Function code	Data	Description
Intelligent output 11-15 a/b(NO/NC) selection	C031-C035	00	a contact(NO)
		01	b contact(NC)
Alarm relay output a/b(NO/NC)selection	C036	00	a contact(NO)
		01	b contact(NC)

a contact: Close with {ON}, open with {OFF}.

b contact: Open with {ON}, close with {OFF}.

(1) Specification of the intelligent output terminals 11 - 15

Specification of the intelligent output terminals 11 - 15 is as follows;
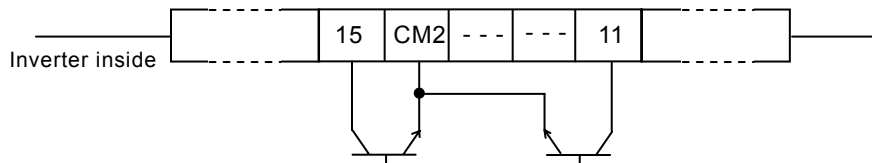
C031× C035 Set value	Power supply	Output description
00 (a contact)	On	ON
		OFF
	Off	-
01 (b contact)	On	ON
		OFF
	Off	-

Electric characteristic
Between each terminal and CM2 Under 4V (Voltage depression while signal is turned on) Permission Max. Voltage DC27V Permission Max. Current 50mA

(2) Specification of the alarm relay output terminal

The specifications of the alarm relay output terminal is a changeover contact. Action is as follows.

Inverter inside | ALO | AL1 | AL2 |
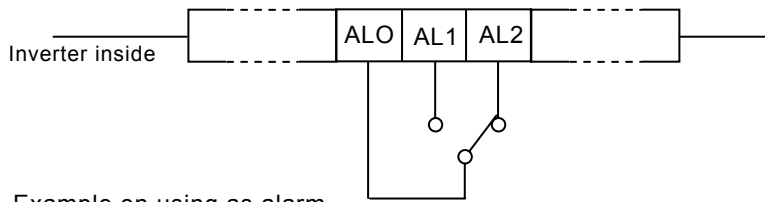
Example on using as alarm

C036 Set value	Power source	State of inverter	State of output terminal	
			AL1-AL0	AL2-AL0
00 (a contact)	On	On abnormal	Close	Open
		On normal	Open	Close
	Off	-	Open	Close
01 (b contact)	On	On abnormal	Open	Close
		On normal	Close	Open
	Off	-	Open	Close

Contact Specification		Resistor load	Inductor load
AL1-AL0	Maximum	AC250V, 2A DC30V, 8A	AC250V, 0.2A DC30V, 0.6A
	Minimum	AC100V, 10mA DC5V, 100mA	
AL2-AL0	Maximum	AC250V, 1A DC30V, 1A	AC250V, 0.2A DC30V, 0.2A
	Minimum	AC100V, 10mA DC5V, 100mA	

Signal during run (RUN)

This function is to provide an output signal when the Inverter is in a running condition.

Assign 00(RUN: signal during run) to an intelligent output terminal 11 - 15 or the alarm relay output terminal.

The signal is still outputted when the dc braking operates.

Operation is as follows;

```
Relation code
C021-C025: Intelligent output terminal
```

Output frequency

RUN
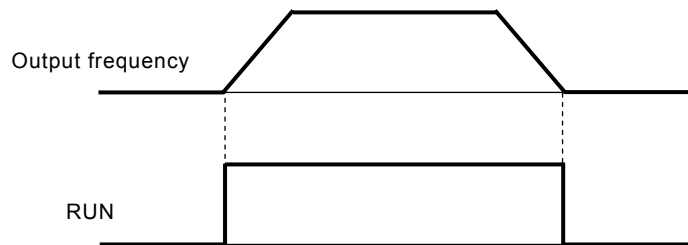
Frequency arrival signal (FA1, FA2, FA3)

When the output frequency arrives at the set frequency, an arrival signal is outputted.

Assign 01(FA1:constant speed arrival signal), 02(FA2:over setting frequency), 06(FA3: only setting frequency) to an intelligent output terminal 11-15 or the alarm relay output terminal.

Hysteresis frequency arrival signal is the following.

When ON: ON with   5 (Hz)

When OFF: OFF with 15 (Hz)

However in to set 06(FA3) case when inverter accelerate.

When ON: 5 (Hz)

When OFF: 15 (Hz)

When inverter decelerates

When ON: 5 (Hz)

When OFF: 15 (Hz)

> ── Relation code ──
> C021-C025: Intelligent output terminal
> C042: Acceleration arrival frequency
> C043: Deceleration arrival frequency

Set item	Function code	Data (Hz)	Description
Acceleration arrival frequency 2	C042	0.0	Arrival signal at acceleration is OFF.
		0.01-1500.	Arrival signal at acceleration is ON.
Deceleration arrival frequency 2	C043	0.0	Arrival signal at deceleration is OFF.
		0.01-1500.	Arrival signal at deceleration is ON.

(1) Output on constant speed arrival (01:FA1)

When the inverter arrives at the set frequency with frequency setting (F001, A020,A220-A520) or multi-speed (A021-A035), the output relay is switched.

Setting frequency $\begin{cases} F_{on}: & 5 \text{ (Hz)} \\ F_{off}: & 10\text{(Hz)} \end{cases}$
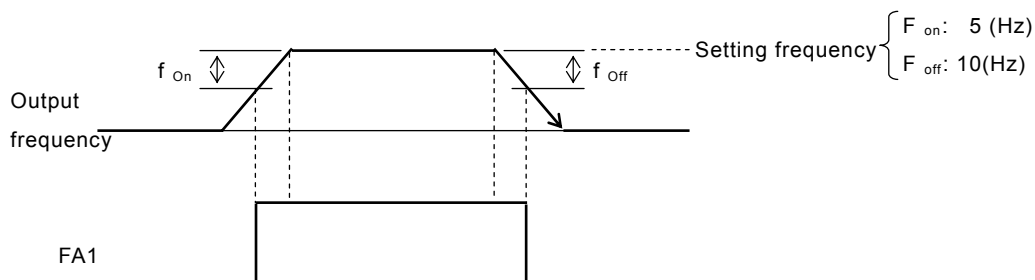
(2) Output over setting frequency (02:FA2)

When the output is over the arrival frequency set in C042, C043 on adjustable speed time, the output relay is switched.

f_{On} : 5 (Hz)

f_{Off} : 15 (Hz)
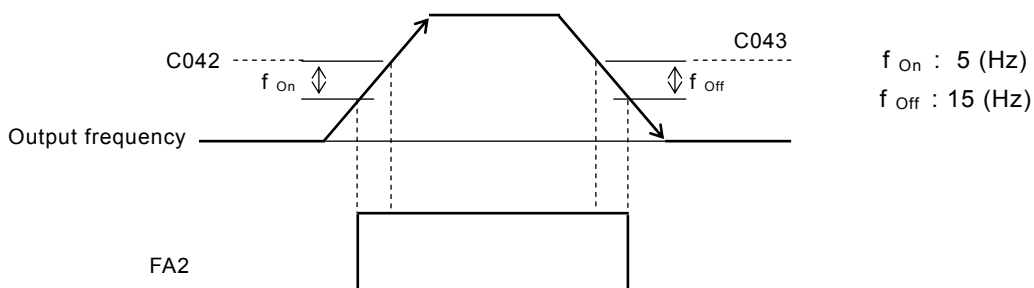
(3) Output setting frequency (06:FA3)

The signal is switched only when the output frequency matches the arrival frequency set in C042, C043 on adjustable speed time.

f_{On} : 5 (Hz)

f_{Off} : 15 (Hz)
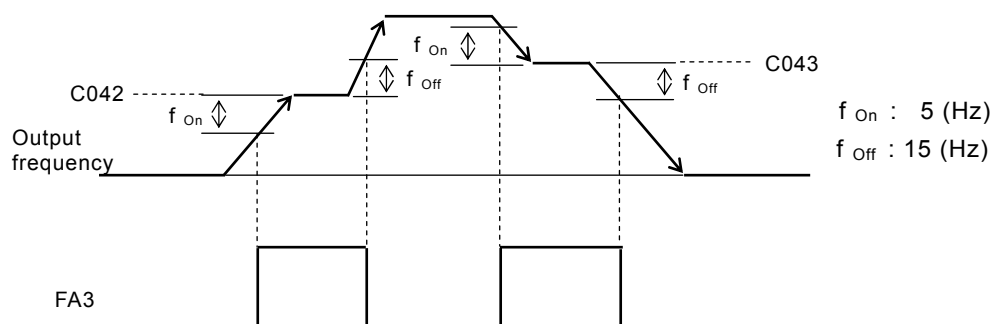
RUN time / power ON time over (RNT/ONT)

When the accumulated operation time reaches or is over the setting time in b034, RUN time/power ON time over (RNT/ONT) output is switched.

```
┌──── Relation code ────
│ b034: Warning time level
│ C021-C025: Intelligent output terminal
│ C026: Alarm relay output terminal
│ d016: Accumulation time monitor during RUN
│ d017: Power ON time monitor
```

Function code	Data	Description
b034	0.	Don't operate.
	1.-9999.	Set by 10-hour unit.
	1000-6553	Set by 100 hours unit. (100000×655300 hours)

(1) Run time over (RNT)

Assign 11(RNT) to an intelligent output terminal 11 - 15 (C021 - C025) or the alarm relay output terminal (C026).

Set ON time level with b034.

(2) Power ON time over (ONT)

Assign 12(ONT) to an intelligent output terminal 11 - 15 (C021 - C025) or the alarm output terminal, (C026).

Set ON time level with b034.

Alarm code output (AC0 – AC3)

This is the function that inverter outputs trip factor as signal.

When 01(3bit) or 02(4bit) is selected in alarm code selection,

intelligent output terminal , 11-13 or 11-14 compulsorily is outputted in alarm code.

Alarm code output is the following below.

Relation code	
C021 - C025	: Intelligent output selection
C062	: Alarm code selection

Intelligent output terminal				In 4bit code selection		In 3bit code selection	
14	13	12	11	Factor code	Contents of trip	Factor code	Contents of trip
AC3	AC2	AC1	AC0				
0	0	0	0	Normal	Normal	Normal	Normal
0	0	0	1	E01–E03, E04	Over current protection	E01–E03, E04	Over current protection
0	0	1	0	E05	Overload protection	E05	Overload protection
0	0	1	1	E07,E15	Over voltage Power source over voltage protection	E07,E15	Over voltage Power source over Voltage protection
0	1	0	0	E09	Lack voltage protection	E09	Lack voltage protection
0	1	0	1	E16	Instantaneous power× failure protection	E16	Instantaneous power failure protection
0	1	1	0	E30	IGBT error	E30	IGBT error
0	1	1	1	E06	Braking resister overload protection	–	–
1	0	0	0	E08,E11, E23	EEPROM error, CPU error, GA error	–	–
1	0	0	1	E10	CT error	–	–
1	0	1	0	E12,E13, E35,E36	External trip, USP error, thermistor error, brake abnormal	–	–
1	0	1	1	E14	Ground fault protection	–	–
1	1	0	0	–	–	–	–
1	1	0	1	E21	Power module temperature	–	–
1	1	1	0	E24	Phase failure protection	–	–
1	1	1	1	E50 – E79	RS485,option 1,2 error 0 – 9	–	–

Set item	Function code	Setting range	contents
Alarm code selection	C062	00	Invalid
		01	3bit code
		02	4bit code

FM terminal

The FM control terminal can monitor the output frequency and output current.

FM terminal is a PWM (Pulse Width Modulation) output.

Relation code

C027: FM selection

b081: FM adjustment

(1) FM selection

Select a signal to output from the following options.

When 03(digital frequency) is set a digital frequency counter meter is required.

Use an analog meter for all other output signals.

Function code	Data	Description	Full scale value
C027	00	Output frequency (Example 1)	0-Max. frequency(Hz)
	01	Output current (Example 1)	0-200%
	03	Digital output frequency (Example 2)	0-Max. frequency(Hz)
	04	Output voltage (Example 1)	0-100%
	05	Input electric power (Example 1)	0-200%
	06	Thermal load ratio (Example 1)	0-100%
	07	LAD frequency (Example 1)	0-Max. frequency(Hz)

(Example 1) Set value:00, 01, 04, 05, 06, 07

(Example 2) Set value: 03
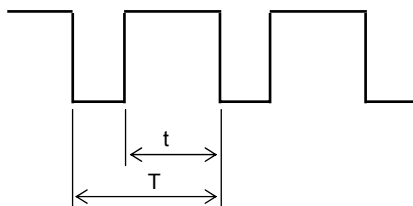
Period T: constant (6.4m)
Duty t/T : change
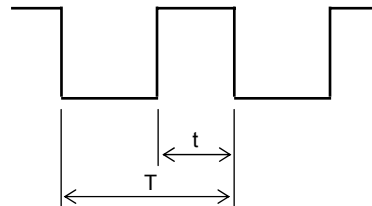
Period T: change
Duty t/T : 50%fixed

(2) FM adjustment

This function is used to calibrate a meter connected to the FM terminal.

Function code	Set range	Description
b081	0.-255.	Change one by one.

(Calibration methods)

(1) Connect meter to FM-CM1.

(2) Adjust b081 so that the meter is reading the same as the output frequency on your scale.

(Example) When output frequency is 60Hz, change value of b081 so that meter is 60Hz.

AM terminal, AMI terminal

The AM terminal and the AMI terminal can monitor the output frequency or the output current.

The AM terminal has an analog output of 0-10V.

The AMI terminal has an analog output of 4-20mA.

<table>
<tr><td colspan="2">Relation code</td></tr>
<tr><td>b080: AM adjustment</td></tr>
<tr><td>C028: AM selection</td></tr>
<tr><td>C029: AMI selection</td></tr>
<tr><td>C086: AM offset adjustment</td></tr>
<tr><td>C087: AMI adjustment</td></tr>
<tr><td>C088: AMI offset adjustment</td></tr>
</table>

(1) AM, AMI selection

　　Select a signal to output from the following options;

Set item	Function code	Data	Contents	Full scale value
AM selection/ AMI selection	C028/C029	00	Output frequency	0-Max. frequency(Hz)
		01	Output current	0-200%
		04	Output voltage	0-100%
		05	Output electric power	0-200%
		06	Thermal load ratio	0-100%
		07	LAD frequency	0-Max. frequency(Hz)

(2) AM adjustment, AMI adjustment

　　This function is used to calibrate a meter connected to the AM and AMI terminal.

Set item	Function code	Data	Description
AM adjustment	b080	0.-255.	After offset adjustment with C086, adjust according to memory.
AM offset Adjustment	C086	0.0-10.0	Units: V
AMI adjustment	C087	0.-255.	After offset adjustment with C088, adjust according to memory.
AMI offset adjustment	C088	0.0-20.0	Units: mA

External thermistor

Temperature protection of the external machine is possible by the use of a Thermistor fitted to your motor.

Wire the thermistor between control terminals TH and CM1.

Set the following function according to the thermistor specification.

<table>
<tr><td colspan="2">Relation code</td></tr>
<tr><td>b098: Thermistor selection</td></tr>
<tr><td>b099: Thermistor error level</td></tr>
<tr><td>C085: Thermistor adjustment</td></tr>
</table>

Set item	Function code	Set value	Contents
Thermistor selection	b098	00	Invalid (No temperature protection by external thermistor)
		01	Valid normal temperature/factor resistance element (For PTC)
		02	Valid (For NTC)
Thermistor error level	b099	0.-9999.	Units: OHM Set the resistance value of temperature for trip according to thermistor methods.
Thermistor adjustment	C085	0.0-1000.	Use this as gain adjustment.

Initialization setting

It is possible at any time to reinitialize the Inverter parameters back to their factory default. The trip history can also be cleared at any time, however, if problems occur it will be difficult to fault find without the trip history for reference.

Initialization details are as follows;

<table>
<tr><td>Relation code</td></tr>
<tr><td>b084: Initialization selection</td></tr>
<tr><td>b085: Initial data selection</td></tr>
</table>

Set item	Function mode	Data	Description
Initialization selection	b084	00	This clears only trip history.
		01	This only initializes setting value. Setting value becomes the state on factory forwarding.
		02	This clears trip history and initializes setting.
Initial data selection	b085	00	Initializing setting for Japan.
		01	Initializing setting for Europe
		02	Initializing setting for America.

(Initialization methods)

After setting the above parameters, initialize as follows;
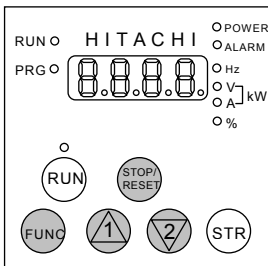
(1) Hold down the FUNC, UP and DOWN key and then press the STR key. When the display starts to flash and rotate release all the keys.
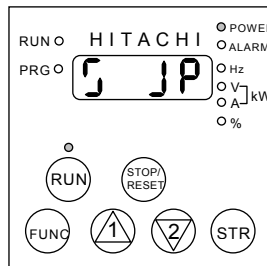
(2) During initializing
Above display is for Japan.
Other displays are below.
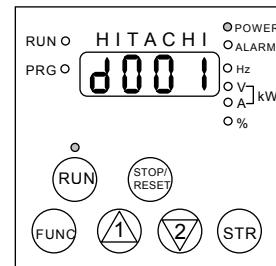
(3) When "d001" is displayed in the monitor, initialization is complete.

During initializing for Europe.

During initializing for America.

During initializing of trip history.
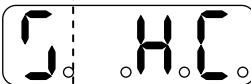
The display revolves on the left.

Display selection

This function can be used to limit what the digital operator can display.

Set item	Function code	Data	Description
Display selection	b037	00	All display
		01	Function individual display (Display, no display by item set)(Example 1)

(Example 1) When the Display selection (b037) is set to 01, only the programmed parameters are displayed.

No	Function to restrict display	Data	Code to be restricted display.	Note
1	A001	01	A005,A006,A011-A016,A101-A105, A111-A114,C081-C083,C121-C123	O,OI,O2 terminal function
2	A002	01,03,04,05	b087	Stop key function
3	A019	00	A028-A035	Multi-speed function
	C001×C008	02,03,04,05		
4	A044,A244-A544	02	b100-b113	Control methods
5	A051	01	A052-A059	DC braking
6	A094	01	A095-A096	2 stage adjustable
7	A294-A594	01	A295-A596,A296-A596	2nd 2 stage adjustable
8	b013,b213,b513	02	b015-b020	Electric thermal characteristic
9	b021,b221	01,02	b022,b023,b222-b522,b223-b523	Overload restriction
10	b095	01,02	b090,b096	BRD function
11	C001-C008	50,51,52	F202-F502,F203-F503,A203-A503, A204-A504,A220-A520,A242-A542, A243-A543,A244-A544,A261-A561, A262-A562,A292-A592,A293-A593, A294-A594,A295-A595,A296-A596, b212-b512,b213-b513,b215-b515, b216-b516,b217-b517,b218-b518, b219-b519,b220-b520,b221-b521, C241-C541,H203-H503,H204-H504 H206-H506	2nd-5th control
12		11	b088	Free-run stop
13		18	C102	Reset
14		27,28,29	C101	UP/DWN
15	A004	00,01	A042-A043,A242-A542,A243-A543	Torque boost function
16	A244-A544	00,01	A241×A243	Torque boost function
17	A097	01,02,03	A131	Acceleration pattern constant
18	A098	01,02,03	A132	Deceleration pattern constant
19	B098	01,02	B099,C085	Thermistor function
20	C021-C025,C026	02,06	C042,C043	Frequency arrival signal
21		03	C040,C041	Overload advance notice
22		24,25	C045,C046	Frequency arrival signal

Motor constant

Set each constant according to the motor you use.

In case of using several motors in parallel, set the constant values that are closest to the total capacity of the belonging motor.

Reduced torque or instability may occur while using auto torque boost function if these settings are incorrect.

Stabilized factor

When the motor is hunting or unstable, this function can be adjusted to help stabilize the motor.

When the motor is unstable, check the allowable motor selection (H003/H203) and motor pole selection (H004/H204-H504) with your motor. If their code data is different from your motor specification, set the right data. When R1 of usage motor is less than R1 of regular motor, raise the set value of H006/H206-H506 gradually. When you operate greater motor than rated capacity of inverter, lower the set value of H006/H206-H506.

The following two functions can also assist to reduce hunting or rattling of a motor.

 (1) Lower the carrier frequency (b083).

 (2) Lower the output voltage gain (A045).

Set item	Function code	Data	Description
Output gain	A045	20.-100.	Units :% Lower this when hunting occurs.
Carrier frequency	b083	0.5-10.0	Units :kHz Lower this when hunting occurs.
Stabilized factor	H006/H206	0.-255.	Raise or lower when hunting occurs.

Operation selection on option error

When an add×in option is the cause of a protective trip this function can be used to switch the trip facility off and allow the Inverter to carry on in it's operation.

Set item	Function code	Data	Description
Operation selection on optional error	P001/P002	00	TRP: inverter trip and output alarm when option error occurs.
		01	RUN: inverter ignores this and continues operation when option error occurs.

Communication function

Serial communication is possible from the Inverter to any external equipment using RS485 protocol. This function is built-in as standard and is controlled by the TM2 control terminals.

Relation code

A001: Frequency selection
A002: Operation command
    selection
C070: Data command
C071: Communication
    transmission speed
C072: Communication code
C073: Communication bit
C074: Communication parity
C075: Communication stop bit
C078: Communication waiting time

(1) Communication specification

Item	Specification	Notes
Transmission speed	2400/4800/9600/19200 bps	Selection with operator
Communication methods	Half duplex communication methods	
Synchronizing methods	Direct current transmission	
Transmission code	ASCII code	
Transmission methods	Transmission from lower bit	
Communication interface	RS485	
Data bit	7/8 bit	Selection with Operator
Parity	No parity/even/odd	Selection with Operator
Stop bit	1/2 bit	Selection with Operator
Start methods	One-way start form by command of host side	
Waiting time	10-1000[ms]	Setting with operator
Connect form	1:N (N = Maximum 32)	Station number is selected with operator.
Error check	Overrun / Fleming / BCC / Vertical / Horizontal parity	

<RS485 port specification and connection>

Use TM2 of control terminal PCB for RS485 communication function.

Control terminal

Control terminal PCB

SP SN RP SN
TM2
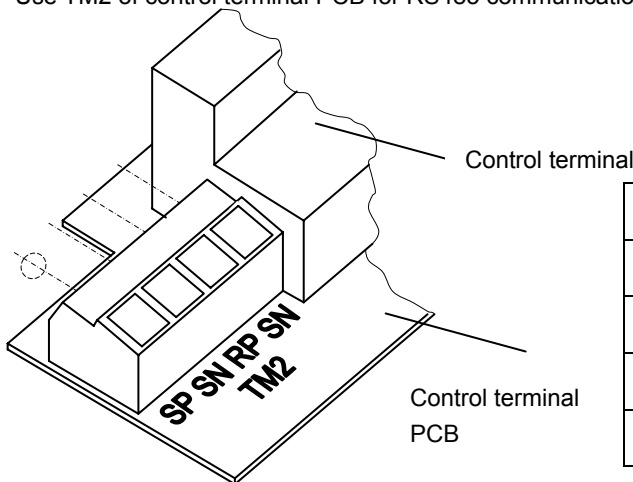
Abbreviation name	Description
S P	Transmission and Reception + side
S N	Transmission and reception - side
R P	Terminal resistance valid terminal
S N	Terminal resistance valid terminal

Connect each inverter in parallel as shown below. It is necessary to short terminals RP and SN on the last inverter in the link (even if communication is to only one inverter the link should still be made).

By shorting between RP and SN, the terminal resistance is increased and controls the reflection of the signal.
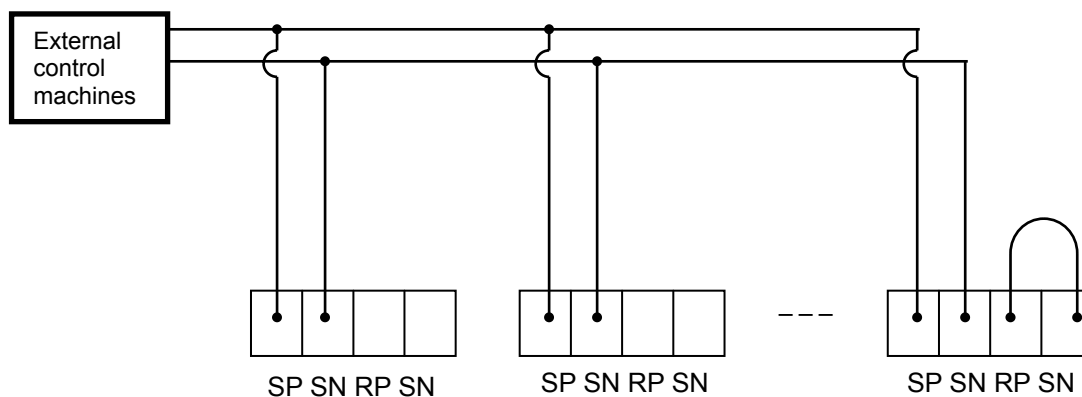
(2) Setting

The following settings are required to operate RS485 communication.

Set item	Function code	Set value	Description
Data command	C070	02	Operator
		03	RS485
		04	Option 1
		05	Option 2
Communicating transmission speed	C071	02	Loop-back test
		03	2400 bps
		04	4800 bps
		05	9600 bps
		06	19200 bps
Communication code	C072	1 to32	This assigns the station number of the inverter. This is used when you control more than one simultaneously.
Communication bit	C073	7	7 bit
		8	8 bit
Communication parity	C074	00	No parity
		01	Even parity
		02	Odd parity
Communication bit	C075	1	1 bit
		2	2 bit
Communication waiting time	C078	0 to 1000	Units: ms Refer to it. (3)

(3) Communication protocol

The method of the communication protocol is shown below in the time diagram.
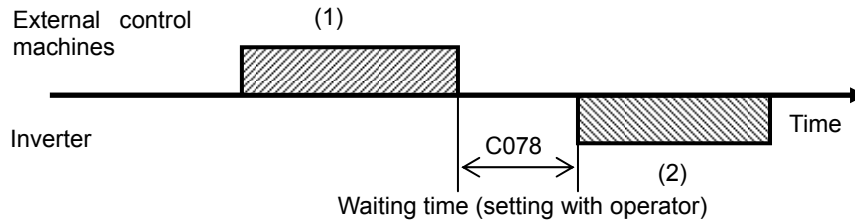
The following is indicated.

(1): Frame transmitted from external control machines to the inverter

(2): Frame replied from inverter to the external control machines

Frame (2) from the inverter is a reply to frame (1) from the external control machine, the active output is not operated.

The commands are shown below;

Command list

Command	Command description	Advisability of all code	Notes
00	Forward / backward / stop command	○	
01	Setting of frequency command	○	
02	Setting of intelligent terminal state	○	
03	Collective reading of monitor data	×	
04	Reading of inverter state	×	
05	Reading of trip history	×	
06	Reading of 1 setting item	×	
07	Setting of 1 set item	○	
08	Returning of each set value to initial value	○	This doesn't operate unless b084 is set to (01 or 02). (Clear of the trip origin)
09	This checks whether set value can be Conserved to EEPROM or not.	×	
0A	This conserves set value to EEPROM	○	
0B	Recalculation of internal constant.	○	

Explanation of each command is the following.

(i) 00 command : This controls the forward, backward and stop command. (Set up A002 in 03 in the case that this command is used.)

Transmission frame

Frame format

STX	Code	Command	Data	BCC	CR

	Explanation	Data size	Value
STX	Control code (Start of TeXt)	1 byte	STX (0x02)
Code	Station number of inverter	2 byte	01-32, and FF(broadcast)
Command	Transmission command	2 byte	00
Data	Transmission data	1 byte	(Note1) Reference
BCC	Bloc check code	2 byte	Exclusive OR of Code, Command and Data
CR	Control code (Carriage Return)	1 byte	CR (0x0D)

Data	Description	Note
0	Stop command	
1	Forward command	
2	Reverse command	

(Note 1)

(Example) when you transmit forward command to code 01

(STX)|01|00|1|(BCC)|(CR) ⎯⎯ASCIIconverter⎯⎯→ 02|30 31|30 30|31|33 30|0D

Reply frame

On normal reply: (4) - (i) Reference

On abnormal reply: (4) - (ii) Reference

(ii) 01 command: This is to set frequency command. (Set up A001 in 03 in the case that this command is used.)

Transmission frame

Frame format

STX	Code	Command	Data	BCC	CR

	Explanation	Data size	Value
STX	Control code (Start of TeXt)	1 byte	STX (0x02)
Code	Station number of inverter	2 byte	01-32, and FF (broadcast)
Command	Transmission command	2 byte	01
Data	Transmission data (tenth ASCII code)	6 byte	(Note2) Reference
BCC	Block check code	2 byte	Exclusive OR of Code, Command and Data
CR	Control code (Carriage Return)	1 byte	CR (0x0D)

(Note 2) when you set code 01 for 5Hz

(STX)|01|01|000500|(BCC)|(CR)

⎯⎯ASCII conversion⎯⎯→ 02|30 31|30 31|30 30 30 35 30 30|30 35|0D

(Note) The data is 100 times as big as set value.

(Example) 5(Hz) → 500 → 000500 ⎯⎯ASCII conversion⎯⎯→ 30 30 30 35 30 30

Reply frame

On normal reply: (4) - (i) Reference

On abnormal reply: (4) - (ii) Reference

(iii) 02 command: This sets the state of the intelligent terminals.

Transmission frame

Frame format

STX	Code	Command	Data	BCC	CR

	Explanation	Data size	Value
STX	Control code (Start of TeXt)	1 byte	STX (0x02)
Code	Station number of inverter	2 byte	01-32, and FF (broadcast)
Command	Transmission command	2 byte	02
Data	Transmission data	16 byte	(Note3) reference
BCC	Block check code	2 byte	Exclusive OR of Code, Command and Data (5) Reference
CR	Control code(Carriage Return)	1 byte	CR (0x0D)

(Note 3) Data (sixteenth) of intelligent terminal and contents

(the details refer to intelligent input terminal function.)

Data (Hex)	Description	Data (Hex)	Description
0000000000000001	FW: forward command	0000000004000000	-
0000000000000002	RV: reverse command	0000000008000000	UP: remote operation Accelerating speed
0000000000000004	CF1: multi-speed1(binary operation)	0000000010000000	DWN: remote operation Decelerate speed
0000000000000008	CF2: multi-speed2(binary operation)	0000000020000000	UDC: remote operation data clear
0000000000000010	CF3: multi-speed3(binary operation)	0000000040000000	-
0000000000000020	CF4: multi-speed4(binary operation)	0000000080000000	OPE: Force operation ope
0000000000000040	-	0000000100000000	SF1: multi-speed(bit run)
0000000000000080	DB: external DC control	0000000200000000	SF2: multi-speed(bit run)
0000000000000100	-	0000000400000000	SF3: multi-speed(bit run)
0000000000000200	2CH: two stage adjustable speed	0000000800000000	SF4: multi-speed(bit run)
0000000000000400	-	0000001000000000	SF5: multi-speed(bit run)
0000000000000800	FRS: free-run stop	0000002000000000	SF6: multi-speed(bit run)
0000000000001000	EXP: external trip	0000004000000000	SF7: multi-speed(bit run)
0000000000002000	USP: unattended start protection	0000008000000000	OLR: overload restriction setting
0000000000004000	-	0000010000000000	-
0000000000008000	SFT: software lock (control terminal)	0000020000000000	-
0000000000010000	AT: analog input voltage/current select	0000040000000000	-
0000000000020000	-	0000080000000000	-
0000000000040000	RS: reset	0000100000000000	-
0000000000080000	-	0000200000000000	-
0000000000100000	STA: 3 wire start	0000400000000000	LAC: LAD cancel
0000000000200000	STP: 3 wire holding	0000800000000000	-
0000000000400000	F/R: 3 wire forward	0001000000000000	-
0000000000800000	-	0004000000000000	SET0: 0bit control
0000000001000000	-	0008000000000000	SET1: 1bit control
0000000002000000	-	0010000000000000	SET2: 2bit control

(Example) When you make (forward), (multi-speed1) and (multi-speed2) active on inverter setting of

code 01, the calculation of data is

0x0000000000000001+0x0000000000000004+0x0000000000000008 = 0x000000000000000D

so transmission frame is

(STX)|01|02|000000000000000D|(BCC)|(CR)

Reply frame

On normal reply: Refer to (4) - (i).

On abnormal reply: Refer to (4) - (ii).

(iv) 03 command: This reads monitor data collectively.

Transmission frame

Frame format

STX	Code	Command	BCC	CR

Replay frame

	Explanation	Data size	Value
STX	Control code(Start of TeXt)	1 byte	STX (0x02)
Code	Station number of inverter	2 byte	01-32
Command	Transmission command	2 byte	03
BCC	Block check code	2 byte	Exclusive OR of Code, Command and Data (5) Reference
CR	Control code (Carriage Return)	1 byte	CR (0x0D)

Frame format

STX	Code	Data	BCC	CR

	Explanation	Data size	Value
STX	Control code (Start of TeXt)	1 byte	STX (0x02)
Code	Station number of inverter	2 byte	01-32
Data	Data	104 byte	(Note 4) reference
BCC	Block check code	2 byte	Exclusive OR of Code, Command and Data (5) Reference
CR	Control code (Carriage Return)	1 byte	CR (0x0D)

(Note 4) Each monitor value

Monitor item	Units	Competitive rate	Data size	Explanation	
Output frequency	Hz	x100	8 byte	Tenth ASCII code	Upper bite-----------lower bite
Output current	A	x10	8 byte	Tenth ASCII code	
Revolution direction	-	-	8 byte	0: stop, 1: forward, 2:backward	
-	-	-	8 byte	Invalid	
Intelligent input monitor	-	-	8 byte	*5) reference	
Intelligent output monitor	-	-	8 byte	*6) reference	
Frequency converting monitor	-	x100	8 byte	Tenth ASCII code	
Output torque monitor	%	x1	8 byte	Tenth ASCII code	
Output voltage monitor	V	x10	8 byte	Tenth ASCII code	
Electric power monitor	kW	x10	8 byte	Tenth ASCII code	
-	-	-	8 byte	(00000000) padding data	
RUN time monitor	h	x1	8 byte	Tenth ASCII code	
ON time monitor	h	x1	8 byte	Tenth ASCII code	

(Note 5) Intelligent input terminal monitor   (Note 6) Intelligent output terminal monitor

Item	Data
FW (Forward terminal)	00000001
1 (1st terminal)	00000002
2 (2nd terminal)	00000004
3 (3rd terminal)	00000008
4 (4th terminal)	00000010
5 (5th terminal)	00000020
6 (6th terminal)	00000040
7 (7th terminal)	00000080
8 (8th terminal)	00000100

Item	Data
AL (Alarm terminal)	00000001
11 (11th terminal)	00000002
12 (12th terminal)	00000004
13 (13th terminal)	00000008
14 (14th terminal)	00000010
15 (15th terminal)	00000020

(v) 04 command: This reads the state of the inverter.

Transmission frame

Frame format

STX	Code	Command	BCC	CR

	Explanation	Data size	Value
STX	Control code(Start of TeXt)	1 byte	STX (0x02)
Code	Station number of inverter	2 byte	01-32
Command	Transmission command	2 byte	04
BCC	Block check code	2 byte	Exclusive OR of Code, Command and Data (5) Reference
CR	Control code(Carriage Return)	1 byte	CR (0x0D)

Replay frame

Frame format

STX	Code	Data	BCC	CR

	Explanation	Data size	Value
STX	Control code(Start of TeXt)	1 byte	STX (0x02)
Code	Station number of inverter	2 byte	01-32
Data	Data on trip	8 byte	(Note7) reference
BCC	Block check code	2 byte	Exclusive OR of Code, Command and Data (5) Reference
CR	Control code(Carriage Return)	1 byte	CR (0x0D)

(Note 7) The data to indicate status contents of inverter is constructed from the following three factors
[A), B), C)].

Data	Status A	Status B	Status C	00 (reservation)

Inverter status A)

Code	Status
00	Initial status
01	Vdc on waiting settlement
02	On stopping
03	On running
04	On FRS
05	On JG
06	On DB
07	On reading frequency
08	On retrying
09	On UV
10	On TRIP
11	On waiting reset

Inverter status C)

Code	Status
00	---
01	Stop
02	Deceleration speed
03	Constant speed
04	Acceleration speed
05	Forward
06	Reverse
07	Reverse from forward
08	Forward from reverse
09	Forward start
10	Reverse start

Inverter status B)

Code	Status
00	On stopping
01	On running
02	On tripping

(vi) 05 command: This reads trip history data.

Transmission frame

Frame format

STX	Code	Command	BCC	CR

	Explanation	Data size	Value
STX	Control code(Start of TeXt)	1 byte	STX (0x02)
Code	Station number of inverter	2 byte	01-32
Command	Transmission command	2 byte	05
BCC	Block check code	2 byte	Exclusive OR of Code, Command and Data (5) Reference
CR	Control code(Carriage Return)	1 byte	CR (0x0D)

Replay frame

Frame format:

STX	Code	Data	BCC	CR

	Explanation	Data size	Value
STX	Control code(Start of TeXt)	1 byte	STX (0x02)
Code	Station number of inverter	2 byte	01-32
Data	Each monitor data on trip	440 byte	(Note 8) reference
BCC	Block check code	2 byte	Exclusive OR of Code, Command and Data (5) Reference
CR	Control code(Carriage Return)	1 byte	CR (0x0D)

(Note 8) The monitor data (trip history) on trip memorizes the last six errors with an accumulated count number (8byte).

Accumulated count number	Trip history 1	– – –	Trip history 6
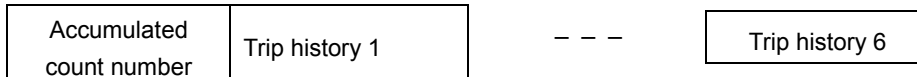
Monitor item	Units	Magnification	Data size	Notes	
Trip factor	-	-	8byte	Cord display	
Inverter status A)	-	-	8byte	04 command Note 7 reference	Upper
Inverter status B)	-	-	8byte		
Inverter status C)	-	-	8byte		
Output frequency	Hz	x10	8byte	Tenth ASCII code	
Accumulated RUN time	hour	x1	8byte	Tenth ASCII code	
Output current	A	x10	8byte	Tenth ASCII code	
Current voltage	V	x10	8byte	Tenth ASCII code	Lower
Power source ON time	hour	x 1	8byte	Tenth ASCII code	

(vii) 06 command: This reads 1 set item.

Transmission frame

Frame format

STX	Code	Command	Parameter	BCC	CR

	Explanation	Data size	Value
STX	Control code(Start of TeXt)	1 byte	STX (0x02)
Code	Station number of inverter	2 byte	01-32
Command	Transmission command	2 byte	06
Parameter	Parameter number of data	4 byte	(Note 9)
BCC	Block check code	2 byte	Exclusive OR of Code, Command and Data(5) Reference
CR	Control code(Carriage Return)	1 byte	CR (0x0D)

(Note 9) The range of parameter to get,

F002-, A001-, b001-, C001-, H003-, P001-   (F001 uses 01 command.)

Replay frame

Frame format

On normal reply

STX	Code	ACK	Data	BCC	CR

	Explanation	Data size	Value
STX	Control code(Start of TeXt)	1 byte	STX (0x02)
Code	Station number of inverter	2 byte	01-32
ACK	Control code(ACKnowledge)	1 byte	ACK (0x06)
Data	Data (tenth ASCII code)	8 byte	(Note 10)
BCC	Block check code	2 byte	Exclusive OR of Code, Command and Data(5) Reference
CR	Control code(Carriage Return)	1 byte	CR (0x0D)

(Note 10) When data is the selected item, this transmits and receives corresponding to station number.

The data of H003, H203 (motor capacity selection) is indicated following code data.

Code data	00	01	02	03	04	05	06	07	08	09	10
Internal, USA mode (b085 = 00, 02)	0.2kW	-	0.4	-	0.75	-	1.5	2.2	-	3.7	-
EU mode (b085 = 01)	0.2kW	0.37	-	0.55	0.75	1.1	1.5	2.2	3.0	-	4.0
Code data	11	12	13	14	15	16	17	18	19	20	21
Internal, USA mode (b085 = 00, 02)	5.5kW	7.5	11	15	18.5	22	30	37	45	55	75
EU mode (b085 = 01)	5.5kW	7.5	11	15	18.5	22	30	37	45	55	75

Refer to the function code list please.

On abnormal reply: (4) - (ii) Reference

(viii) 07 command: This sets 1 set item.

Transmission frame

Frame format

STX	Code	Command	Parameter	Data	BCC	CR

	Explanation	Data size	Value
STX	Control code(Start of TeXt)	1 byte	STX (0x02)
Code	Station number of inverter	2 byte	01-32, FF(broadcast)
Command	Transmission command	2 byte	07
Parameter	Parameter number of data	4 byte	(Note 9)
Data	Data of parameter (Tenth ASCII code)	8 byte	(Note 10)
BCC	Block check code	2 byte	Exclusive OR of Code, Command and Data (5) Reference
CR	Control code(Carriage Return)	1 byte	CR (0x0D)

Reply frame

On normal reply: (4) - (i) Reference

On abnormal reply: (4) - (ii) Reference

(ix) 08 command: This returns each set value to initial value.

This works in conjunction with initial selection (b084). If b084 is 00, the trip history is cleared.

Transmission frame

Frame format

STX	Code	Command	BCC	CR

	Explanation	Data size	Value
STX	Control code(Start of TeXt)	1 byte	STX (0x02)
Code	Station number of inverter	2 byte	01-32, FF(broadcast)
Command	Transmission command	2 byte	08
BCC	Block check code	2 byte	Exclusive OR of Code, Command and Data (5) Reference
CR	Control code(Carriage Return)	1 byte	CR (0x0D)

Replay frame

On normal reply: (4) - (i) Reference

On abnormal reply: (4) - (ii) Reference

(x) 09 command: This checks whether it is possible to store set value to EEPROM or not.

Transmission frame

Frame format

STX	Code	Command	BCC	CR

	Explanation	Data size	Value
STX	Control code(Start of TeXt)	1 byte	STX (0x02)
Code	Station number of inverter	2 byte	01-32
Command	Transmission command	2 byte	09
BCC	Block check code	2 byte	Exclusive OR of Code, Command and Data (5) Reference
CR	Control code(Carriage Return)	1 byte	CR (0x0D)

Transmission frame

Frame format

STX	Code	ACK	Data	BCC	CR

	Explanation	Data size	Value
STX	Control code(Start of TeXt)	1 byte	STX (0x02)
Code	Station number of inverter	2 byte	01-32
ACK	Control code(ACKnowledge)	1 byte	ACK (0x06)
Data	Data	2 byte	Allowance with 01
BCC	Block check code	2 byte	Exclusive OR of Code, Command and Data (5) Reference
CR	Control code(Carriage Return)	1 byte	CR (0x0D)

On normal reply: (4) - (ii) Reference

(xi) 0A command: This stores the set value to the EEPROM.

Transmission frame

Frame format

STX	Code	Command	BCC	CR

	Explanation	Data size	Value
STX	Control code(Start of TeXt)	1 byte	STX (0x02)
Code	Station number of inverter	2 byte	01-32
Command	Transmission command	2 byte	0A
BCC	Block check code	2 byte	Exclusive OR of Code, Command and Data (5) Reference
CR	Control code(Carriage Return)	1 byte	CR (0x0D)

Replay frame

On normal reply: (4) - (i) Reference

On abnormal reply: (4) - (ii) Reference

(xii) 0B command: This recalculates the internal motor constants.

This function is required when base frequency and parameter of H∗∗∗ is changed by RS485

Transmission frame

Frame format

STX	Code	Command	BCC	CR

	Explanation	Data size	Value
STX	Control code(Start of TeXt)	1 byte	STX (0x02)
Code	Station number of inverter	2 byte	01-32
Command	Transmission command	2 byte	0B
BCC	Block check code	2 byte	Exclusive OR of Code, Command and Data (5) Reference
CR	Control code(Carriage Return)	1 byte	CR (0x0D)

Reply frame

On normal reply: (4) - (i) Reference

On abnormal reply: (4) - (ii) Reference

(4) Acknowledge / Negative acknowledge response

(i) Acknowledge response

Reply frame

Frame format

STX	Code	ACK	BCC	CR

	Explanation	Data size	Value
STX	Control code(Start of TeXt)	1 byte	STX (0x02)
Code	Station number of inverter	2 byte	01-32
ACK	Control code(ACKnowledge)	1 byte	ACK(0x06)
BCC	Block check code	2 byte	Exclusive OR of Code, Command and Data (5) Reference
CR	Control code(Carriage Return)	1 byte	CR (0x0D)

(ii) Negative acknowledge response

Reply frame

Frame format

STX	Code	NAK	Error code	BCC	CR

	Explanation	Data size	Value
STX	Control code(Start of TeXt)	1 byte	STX (0x02)
Code	Station number of inverter	2 byte	01-32
NAK	Control code (Negative ACKnowledge)	1 byte	NAK(0x06)
Error code	Error contents of Communication	2 byte	(Note 11)
BCC	Block check code	2 byte	Exclusive OR of Code, Command and Data (5) Reference
CR	Control code (Carriage Return)	1 byte	CR (0x0D)

(Note 11) Error code list

Inverter doesn't reply on all code communication.

Error code	Contents
01H	Parity error
02H	Sum check error
03H	Framing error
04H	Overrun error
05H	Protocol error
06H	ASCII code error
07H	Reception buffer overrun error
08H	Reception time out error
-	-
-	-
11H	Error for abnormal command
12H	-
13H	Practice disapproval error
14H	-
15H	-
16H	Parameter abnormal error
17H	-

(6) Communication test mode

  The communication test mode checks the communication line of RS485.

 (The communication test mode procedure)

   (i) Please remove the wiring of terminal unit TM2 of the control terminal unit foundation, to do the loop back check.

   (ii) Please set up the following with the operator of the inverter.

      Please set up C071 (Communication transmission speed selection) to 02 (Loop Back Test).

   (iii) Shut the power supply of the inverter at first and please turn on the power supply once again.
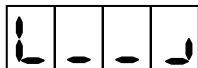
      The check is started.

   (iv) When the check ends the display is as follows.

      Normal:

      Abnormal:

   (v) Please push the reset button of the digital operator or copy unit. And, the setting of C071 is returned to the setting of

      an original request.

4.4 Protection function list

4.4.1 Protection function

Name	Description		Display of digital operator	Display of remote operator/ Copy unit ERR1***
Over-current protection	Motor is restricted and decelerates rapidly, excessive current is drawn through the inverter and there is a risk of damage. Current protection circuit operates and the inverter output is switched off.	At constant Speed	E 0 1	OC. Drive
		On deceleration speed	E 0 2	OC. Decel
		On acceleration speed	E 0 3	OC. Accel
		Other	E 0 4	Over. C
Overload protection (Note 1)	When the Inverter detects an overload in the motor, the internal electronic thermal overload operates and the inverter output is switched off.		E 0 5	Over. L
Braking resistor overload protection	When BRD exceeds the usage ratio of the regenerative braking resistor, the over-voltage circuit operates and the inverter output is switched off.		E 0 6	OL. BRD
Over-voltage protection	When regenerative energy from the motor exceeds the maximum level, the over-voltage circuit operates and the inverter output is switched off.		E 0 7	Over. V
EEPROM error (Note 2)	When EEPROM in the inverter is subject to radiated noise or unusual temperature rises, the inverter output is switched off.		E 0 8	EEPROM
Under-voltage	When the incoming voltage of inverter is low, the control circuit can't operate correctly. The under-voltage circuit operates and the inverter output is switched off.		E 0 9	Under. V
CT error	When an abnormality occurs to a CT (current detector) in the inverter, the inverter output is switched off.		E 1 0	CT
CPU error	When a mistaken action causes an error to the built-in CPU, the inverter output is switched off.		E 1 1	CPU
External trip	When a signal is given to the EXT intelligent input terminal, the inverter output is switched off. (on external trip function select)		E 1 2	EXTERNAL
USP error	This is the error displayed when the inverter power is restored while still in the RUN mode. (Valid when the USP function is selected)		E 1 3	USP
Ground fault protection	When power is turned ON, this detects ground faults between the inverter output and the motor.		E 1 4	GND. Flt
Incoming over-voltage protection	When the incoming voltage is higher than the specification value, this detects it for 60 seconds then the over-voltage circuit operates and the inverter output is switched off.		E 1 5	OV. SRC
Temporary power loss protection	When an instantaneous power failure occurs for more than 15ms, the inverter output is switched off. Once the instantaneous power failure wait time has elapsed and the power has not been restored it is regarded as a normal power failure. However, when the operation command is still ON with restart selection the inverter will restart. So please be careful of this.		E 1 6	Inst. P-F
Abnormal temperature	When main circuit temperature raises by stopping of cooling fan, the inverter output is switched off.		E 2 1	OH. FIN
Gate Array error	Communication error between CPU and gate array indicate		E 2 3	GA
Open-phase protection	When an open-phase on the input supply occurs the inverter output is switched off.		E 2 4	PH. Fail
IGBT error	When an instantaneous over-current is detected on the output the inverter output is switched off to protect the main devices.		E 3 0	IGBT
Thermistor error	When the Inverter detects a high resistance on the thermistor input from the motor the inverter output is switched off.		E 3 5	TH

Name	Description	Display of digital panel • digital operator	Display of remote operator/ Copy unit ERR1***
Option 1 error 0-9	These indicate the error of option 1. You can realize the details each instruction manual.	E60 - E69	OP1 0-9
Option 2 error 0-9	These indicate the error of option 2. You can realize the details by each instruction manual.	E70 - E79	OP2 0-9
During under-voltage waiting	When the incoming voltage of the inverter has dropped, the inverter output is switched off and the inverter waits.	- - - -	UV. WAIT
Communication error	When the incoming voltage of the operator has dropped, the inverter output is switched off and the inverter waits.	- - - -	UV. WAIT

(Note 1) After a trip occurs and 10 seconds pass, restart with reset operation.

(Note 2) When EEPROM error E08 occurs, confirm the setting data again.

(Note 3) Protection function list of optional board.

(Note 4) If the inverter doesn't run normally or the inverter trips, check the dip switch and/or rotary switch setting on optional board.

(1) Digital-input option board (SJ-DG)

Dip switch		Rotary switch	Setting frequency				Acceleration and deceleration time setting			Torque limit setting	Position setting
TYPE		CODE	Setting resolution								
Switch No.		Setting code	0.01Hz	0.1Hz	1Hz	Rate	0.01sec	0.1sec	1sec	1%	1pulse
1	2										
BIN (Binary input at OFF) / **BCD** (BCD input at ON)	**PAC** (One time input mode at OFF)	0	○								
		1		○							
		2			○						
		3				○					
		4								○	
		5									
		6									○
	DIV (Dividing input mode at ON)	0					○				
		1	○					○			
		2							○		
		3					○				
		4		○				○			
		5							○	○	○
		6					○				
		7			○			○			
		8							○		
		9					○				
		A				○		○			
		B							○		

4- 75

4.4.2 Trip monitor display

E07.2

(1) Factor of trip, explanation of display

E07.2

Display trip factor.
Please refer to 4. 4. 1.

Display the state of inverter on tripping.

60.00

(2) Output frequency on trip. (Hz)

0 : During reset.

1 : During stop.

2 : During deceleration.

4.00

3 : During constant speed.

4 : During acceleration.

(3) Output current on trip (A)

5 : The state operation command is set with frequency command.

398.0

6 : During start.

7 : During DB.

(4) DC Link Voltage on trip. (V)

8 : During overload restriction.

15.

(5) Accumulated time that the inverter has been running. (h)

18.

(6) Accumulated time that the inverter has been powered up. (h)

4.4.3 Warning Monitor display

Relation code

d090 : Warning Monitor

Warning messages will appear when the data set is contradicting to others.

Program lamp (PRG) turns ON during the warning (until the data is changed).

Below is the description of the warnings.

Warning	Codes	<, >	Basic code
꞉001/꞉201-501	frequency upper limiter A061/A261-A561	>	Maximum frequency A004/A204-A504
꞉002/꞉202-502	frequency lower limiter A062/A262-A562	>	
꞉004/꞉204-504	Base frequency A003/A203-A503 (Note 1)	>	
꞉005/꞉205-505	Output frequency F001, Multi stage speed 0 A020/A220-A520 (Note 2)	>	
꞉006/꞉206-506	Multi stage speed 1~15 A021~A035	>	
꞉012/꞉212-512	frequency lower limiter A062/A262-A562	>	frequency upper limiter A061/A261
꞉015/꞉215-515	Output frequency F001, Multi stage speed 0 A020/A220-A520 (Note 2)	>	
꞉016/꞉216-516	Multi stage speed 1~15 A021~A035	>	
꞉021/꞉221-521	frequency upper limiter A061/A261-A561	<	frequency lower limiter A062/A262
꞉025/꞉225-525	Output frequency F001, Multi stage speed 0 A020/A220-A520 (Note 2)	<	
꞉031/꞉231-531	frequency upper limiter A061/A261-A561	<	Starting frequency b082
꞉032/꞉232-532	frequency lower limiter A062/A262-A562	<	
꞉035/꞉235-535	Output frequency F001, Multi stage speed 0 A020/A220-A520 (Note 2)	<	
꞉036	Multi stage speed 1~15 A021~A035	<	
꞉085/꞉285	Output frequency F001, Multi stage speed 0 A020/A220-A520 (Note 2)	<>	Jump frequency 1/2/3 ±Jump width A063±A064 A065±A066 A067±A068 (Note 1)
꞉086	Multi stage speed 1~15 A021~A035	<>	
꞉ 091/꞉291	frequency upper limiter A061/A261-A561	>	Free v/f frequency 7 b112
꞉ 092/꞉292	frequency lower limiter A062/A262-A562	>	
꞉ 095/꞉295	Output frequency F001, Multi stage speed 0 A020/A220-A520	>	
꞉096	Multi stage speed 1~15 A021~A035	>	
꞉120	Free electronic thermal frequency 2, 3 b017, b019	<	Free electronic thermal frequency 1 b015
	Free electronic thermal frequency 1 b015	>	Free electronic thermal frequency 2 b017
	Free electronic thermal frequency 3 b019	<	
	Free electronic thermal frequency 1, 2 b015, b017	>	Free electronic thermal frequency 3 b019

Warning is cleared when the setting fulfils the above condition.

Data will be changed automatically to the basic code.

(Note 1) The jump frequency will be automatically re-written to the lowest jump frequency (= Jump frequency – jump width)

⚠ WARNING

- After a lapse of more than 10 minutes after turning off the input power supply, perform the maintenance and inspection.
  Otherwise, there is a danger of electric shock.

- Make sure that only qualified persons will perform maintenance, inspection and part replacement. (Before starting the work, remove metallic objects from your person (wristwatch, bracelet, etc.)
  (Be sure to use tools protected with insulation.)
  Otherwise, there is a danger of electric shock and/or injury.

5.1 Precautions for Maintenance/Inspection

5.1.1 Daily inspection
Every day before operation check the following;
    [1] Does the motor operate according to the settings?
    [2] Is there any trouble with the surroundings of the installation?
    [3] Is there any trouble with the cooling or ventilation system?
    [4] Is there any abnormal vibration or sound?
    [5] Are their any signs of over-current or discoloration?
    [6] Is their any unusual odor present?

Check the input voltage to the inverter by using a meter during running
    [1] Is the supply voltage constant?
    [2] Are all the phases of the supply balanced?

5.1.2 Cleaning
    Make sure that the inverter is not dirty when operating.
    Wipe clean with a soft cloth and synthetic detergent.

 (Note) Don't use solvents containing any of the following, acetone, benzene, toluene, alcohol etc. as they can cause melting of the inverter surface, peeling of paint.
        Never clean the display part of the digital operator with detergent or alcohol.

5.1.3 Regular inspection
 Inspections should be regularly carried out on the parts that can't be inspected while the inverter is running.

    [1] Is there any trouble with the cooling system? - - - Cleaning of air filter etc.
    [2] Check that all screw terminals and fixings are tight as they may loosen due to vibration or temperature change etc.
    [3] Is there any corrosion, damage to insulators?
    [4] Measurement of insulation resistance.
    [5] Check of cooling fan, smoothing capacitor, relay and exchange if necessary.

5.2 Daily inspection and regular inspection

Inspec-tion Parts	Inspection item	Inspection item	Inspection cycle Daily	Year 1	2	Inspection methods	Decision standard	Meter
Whole	Surroundings	Check temperature of surrounding, humidity, dust.	◯			Refer to 2.1 Installing.	Temperature range is between –10 and 40 degrees. No dew present and humidity is below 90%.	Thermometer, hygrometer, recorder
	Whole equipment	Is there abnormal vibration, abnormal sound?	◯			By watching, hearing.	No trouble.	
	Power voltage	Is main circuit voltage normal?	◯			Measurement of inverter terminal R, S, T phase voltage	Within alternating voltage allowable change.	Tester, digital multi-meter
Main circuit	Whole	(1)Megger check Between circuit terminal and earth terminal (2)Are all screws terminals tight? (3)Is there any sign of over-voltage? (4)cleaning		◯ ◯ ◯	◯	(1)After you remove connector J61 from inside the inverter Take out the wiring of input/output of inverter main circuit terminal and control terminal, measure beween parts shortened terminal R,S,T,U, V,W,P,PD,N,RB and earth terminal with megger. (2)Incremental clamping. (3)Watch.	(1)To be over 5M ohm. (2)(3) No abnormality .	DC500V class megger
	Connection conductor/ electric line	(1)Is there warp in conductor? (2)Is there any damage of coating of wires?		◯ ◯		(1)(2) By watching	(1)(2) No abnormality	
	Terminals	Is there any damage?		◯		By watching.	No abnormality.	
	Inverter parts Converter parts	Resistance check Between each Terminal.			◯	Take out connect of inverter, measure terminal between R,S,T and P,N, between U,V,W and P,N with tester x 1 ohm range.	Refer to check method of 5.5 inverter, converter parts.	Analog form tester
	Smoothing capacitor	(1)Is there any liquid? (2)Does relief valve come out? Is there any swell?	◯ ◯			(1),(2) By watching.	(1),(2) No abnormality	Capacity meter
	Relay	(1)Is there abnormal sound in operation? (2)Is there damage to the contacts?		◯ ◯		(1)By hearing (2)By watching	(1) No abnormality (2) No abnormality	
	Resistor	(1)Is there any crack, discoloration of resistance insulator. (2)Confirm existance of breaking of wire.		◯ ◯		(1)By watching.cementing resistance. Curl type resistance. Take out connection to other side, measure it with tester.	(1)No abnormality Error to be within 10% of Display resistance.	Tester, Digital multi-meter
Control circuit Protec-tion circuit	Operation check	(1)Confirm balance of each output phase voltage with inverter single operation. (2)Operate sequence protection moving test. And no abnormality.		◯ ◯		(1)Measure inverter output terminal U,V,W phase voltage. (2)Short or open protection circuit output of inverter.	(1)Phase voltage balance 200v/400v class is within 4V/8V. (2)On sequence, to operate abnormality.	Digital multi-meter, rectification type voltmeter
Cooling system	Cooling fan	(1)Is there abnormal vibration, abnormal sound? (2)Is there loosening of connecting parts?	◯	◯		(1)Revolve by hands in the state of tone-on idle. (2) By watching.	(1)Revolving smooth. (2)No abnormality.	
Display	Display	(1)Is the LED lamp illuninated? (2) Cleaning.	◯	◯		(1)Lamp indicates lamp on operator. (2) Cleaning with cloth.	(1)Confirm light.	
	Meter	Is direction value Normal?	◯	◯		Confirm indication value of board meter.	Satisfy normal value, control value.	Voltage meter, current meter
Motor	Whole	(1)Is there abnormal signal,abnormal sound? (2)Is there any abnor-mal odour?	◯ ◯			(1)By hearing, feeling, watching. (2)Abnormal odour from overheat, damage etc. Confirmation.	(1)(2) No abnormality.	
	Inslated resistance	(1)Megger check (terminal collection - earth terminal)			◯	Remove connection to U,V and W and disconnect motor wiring.	(1) To be over 5M ohm.	DC 500V Megger

(Note) Lifetime of the capacitors depends on the ambient temperature.

5.3 Megger test

When executing a megger test on the inverter remove all wires to R, S, T, PD, P, N, RB, U, V and W.

Do not use a megger or buzzer on the control circuit only use a digital multi-meter.

(Megger Voltage 500V DC)

Execute megger test of main circuit after the J61 connector has been removed. Short terminals of R, S, T, PD, P, N, RB, U, V and W.

After the megger test is complete, reconnect the J61 connector as before.
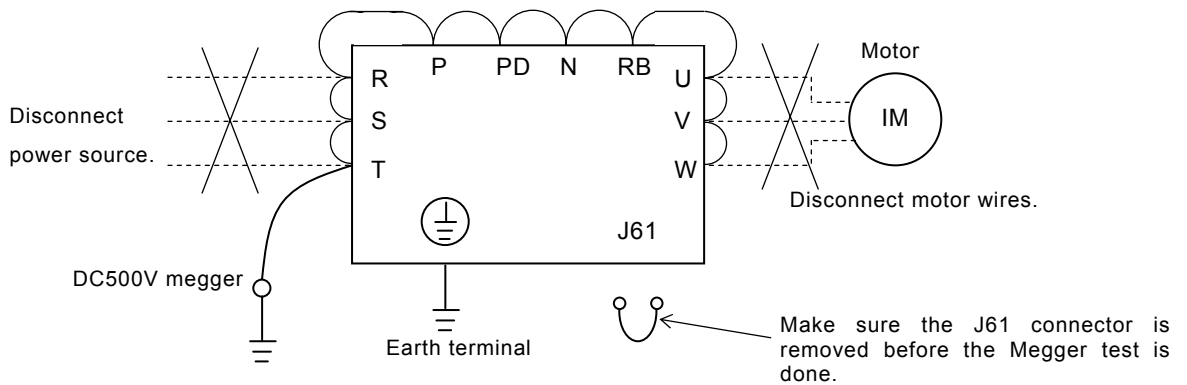
5.4 Withstand Voltage test

Never perform a withstand voltage test on the inverter.

The inverter main circuit uses semiconductors. Semiconductors can deteriorate when a withstand voltage test is performed.

5.5 The method to check Inverter, converter part

A test is possible to check quality.

(Preparation)

[1] Take out the power lines (R, S and T) connected to the inverter, the motor connection lines (U, V and W) and the regenerative control resistance (P and RB).

[2] Prepare tester. (Using range of 1 ohm resistance measure range.)

(How to check)

It is possible to check the quality of the charging state of the terminals R, S, T, U, V, W, RB, P and N of the inverter and the pole of the tester by measuring the charging state.
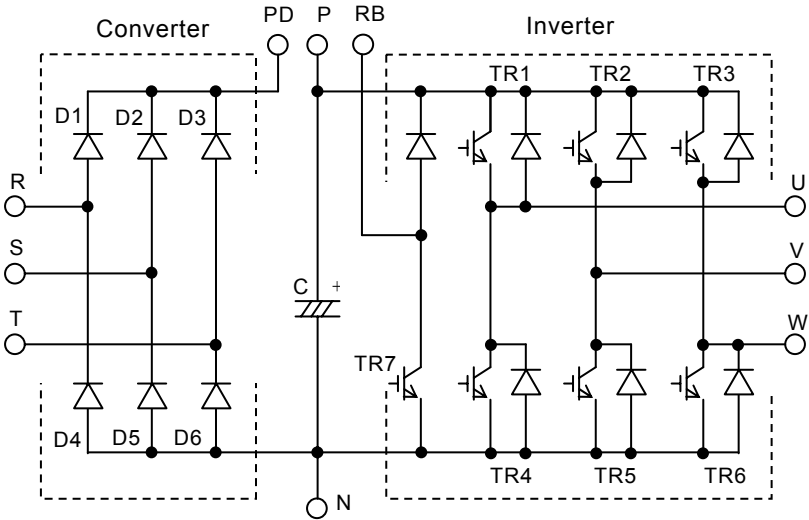
(Note 1) Before you measure the voltage between P and N with DC current range, confirm that the smoothing capacitor is discharged fully, execute checks.

(Note 2) Almost infinite value is indicated on no conducting.

With the effect of the smoothing capacitor, the inverter conducts instantly and an infinite value isn't indicated. Ohm-number 10 ohms is indicated on conducting.

The values indicated will not be exactly the same for each terminal, however they will be very close together. If there is a significant difference a problem may exist.

		Pole of tester		Measure value
		⊕ (Red)	⊖ (Black)	
Converter	D1	R	PD	No-conduct
		PD	R	Conduct
	D2	S	PD	No-conduct
		PD	S	Conduct
	D3	T	PD	No-conduct
		PD	T	Conduct
	D4	R	N	Conduct
		N	R	No-conduct
	D5	S	N	Conduct
		N	S	No-conduct
	D6	T	N	Conduct
		N	T	No-conduct
Inverter	TR1	U	P	No-conduct
		P	U	Conduct
	TR2	V	P	No-conduct
		P	V	Conduct
	TR3	W	P	No-conduct
		P	W	Conduct
	TR4	U	N	Conduct
		N	U	No-conduct
	TR5	V	N	Conduct
		N	V	No-conduct
	TR6	W	N	Conduct
		N	W	No-conduct
BR part	TR7	RB	P	No-conduct
		P	RB	Conduct
		RB	N	No-conduct
		N	RB	No-conduct

5.6 Capacitor Life Curve

Ambient air temperature (ºC)

12h/day operation

24h/day operation

Life time (year)
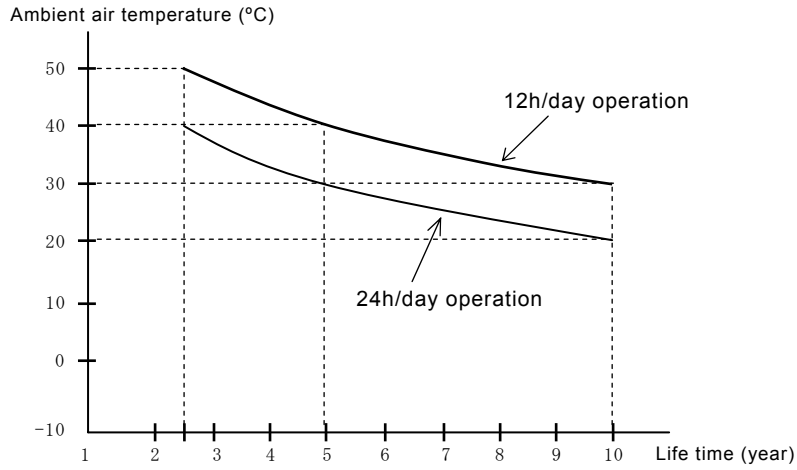
(Note 1)

Ambient air temperature means the surrounding temperature of the inverter. In case the inverter is installed in a cabinet, ambient air temperature is the temperature of the internal air of the cabinet.

(Note 2)

DC bus capacitors are recommended to be replaced every 5 years. And if the inverter is used in a worse condition, this recommended replacing period is reduced.

6.1 Standard specification list

(1) 200V class

Inverter Model	-	-	SJH300-2.5LF	SJH300-3.7LF	SJH300-5.5LF	SJH300-8LF	SJH300-11LF	SJH300-16LF	SJH300-22LF	-	-	-	-	-	-
Max. Applicadie Motor 4P (kW)	-	-	1.5	2.2	3.7	5.5	7.5	11	15	-	-	-	-	-	-
Rated input Alternating (kVA) 200V	-	-	2.5	3.6	5.7	8.3	11.0	15.9	22.1	-	-	-	-	-	-
240V	-	-	3.1	4.3	6.8	9.9	13.3	19.1	26.6	-	-	-	-	-	-
Rated input alternating voltage	Three-phase 200-240V(±10%)50Hz/60Hz														
Rated output voltage	Three-phase 200-240V (This corresponds to receiving voltage.)														
Rated output current (A)	-	-	7.5	10.5	16.5	24	32	46	64	-	-	-	-	-	-
Stat-ing Regenerative Control	BRD circuit built-in						Regenerative unit is required								
Stat-ing Minimum Resistance To be connected (OHM)	-	-	35	35	35	17	17	17	-	-	-	-	-	-	-

(2) 400V class

Inverter Model	-	-	SJH300-2.5HF	SJH300-3.7HF	SJH300-5.5HF	SJH300-8HF	SJH300-11HF	SJH300-16HF	SJH300-22HF	-	-	-	-	-	-
Max. Applicadie Motor 4P (kW)	-	-	1.5	2.2	3.7	5.5	7.5	11	15	-	-	-	-	-	-
Rated Input Alternating (kVA) 400V	-	-	2.6	3.6	5.9	8.3	11.0	15.9	22.1	-	-	-	-	-	-
480V	-	-	3.1	4.4	7.1	9.9	13.3	19.1	26.6	-	-	-	-	-	-
Rated input alternating voltage	Three-phase 380-480V (±10%) 50Hz/60Hz														
Rated output voltage	Three-phase 380-480V (This corresponds to receiving voltage.)														
Rated output current (A)	-	-	3.8	5.3	8.6	12	16	23	32	-	-	-	-	-	-
Start-ing Regenerative Control	BRD circuit built-in						Regenerative unit is required								
Start-ing Minimum Resistance To be connected (OHM)	-	-	100	100	70	70	50	50	-	-	-	-	-	-	-

(3) Common specification for 200V/400V class

Inverter Model	-	-	SJH300-2.5 LF/HF	SJH300-3.7 LF/HF	SJH300-5.5 LF/HF	SJH300-8 LF/HF	SJH300-11 LF/HF	SJH300-16 LF/HF	SJH300-22 LF/HF	-	-	-	-	-	-
Enclosures	IP20(NEMA1)														
Control system	Sine-wave modulation PWM system														
Output frequency range	0.1-1500Hz														
Frequency accuracy	Digital command ±0.01% for Max. frequency, analog frequency ±0.2%(25±10ºC)														
Frequency resolving power	Digital setting : 0.01Hz, Analog setting : Max. frequency/4000														
Voltage/frequency characteristic	V/f option variable, V/f control, (constant torque, reduced torque)														
Speed fluctuation	±0.5% (sensor-less vector control)														
Overload current rate	150% for 60 seconds, 200% for 0.5 second														
Acceleration/deceleration time	0.01-3600.0 seconds (straight or S-Curve on acceleration, deceleration is optional setting individually),														
DC Braking	On starting and decelerating by stop command, inverter operates under operation setting frequency. Or inverter operates with external input (Breaking power, time, frequency can be set.)														

Input

Frequency	Operator	Setting by ⊼ ⊽ key.
	Volume	DC 0 to 10V, -10 to +10V (input impedance 10k ohm), 4 to 20mA (input impedance 100 ohm)
	Extend Signal	Setting with RS485 communication
Run/Stop	Operator	Run/Stop
	Volume	Forward Run/Stop (1a connect), reverse command is impossible on assigning of terminal (selection of 1a, 1b is possible), input of 3 wires is possible.
	Extend Signal	Setting with RS485 communication
Intelligent input terminal		Use by selecting terminals from; Reverse command (RV), multi-speed1-4 (CF1-CF4), external dc braking (DB), 2nd acceleration (2CH), free-run stop (FRS), external trip (EXT), USP function (USP), software lock (SFT), analog input voltage / current / select (AT), reset inverter (RS), 3 wire run (STA), 3 wire keep (STP), 3 wire direction selection (F/R), remote control, up function (UP), remote control down function (DWN), remote control data clear (UDC), Compulsion operation(OPE) multi-speed bit 1-7(SF1-SF7), overload ristriction change (OLR), no assign (NO), 1st-5th control (SET0,SET1, SET2)
Thermistor input terminal		1 terminal

Output

Intelligent output terminal	Signal during run(RUN), Frequency arrival type 1 signal(FA1), Frequency arrival type 2 signal (FA2), Overload advance notice signal(OL), Alarm signal(AL), Arrival signal for only setting frequency(FA3), Instantaneous stop signal(IP), Under voltage signal(UV), Torque limit(TRQ), RUN time over(RNT), Thermal caution(THM), Arrival signal for over setting frequency2(FA4), Arrivalsignal for only setting frequency2(FA5), Overload advance notice signal2(OL2), Alarm cord0-3(AC0-AC3)
Intelligent monitor output terminal	Analog voltage output, analog current output, pulse line output

Display monitor	Output frequency, output current, frequency conversion value, trip history, input output terminal state, input electric power, output voltage, motor torque
Other function	V/f free setting (7points), Upper / lower frequency limitter, Frequency jump, Curve adjustable speed, Manual torque boost level / Braking point, Analog meter adjustment, Starting frequency, Electronic thermal free setting, External start/end (frequency/rate), Analog input selection, Trip retry, Reduced voltage start, Overload restriction, Restarting after an instantaneous power failure, Various kinds signal output, Initialization value setting, AVR function
Protection function	Over-current, over-voltage, under-voltage, electronic thermal level, abnormal trouble, ground fault current on starting, instantaneous stop, USP error, open-phase error, control resistor Overload, CT error, external trip, communication error

Usage surrounding

Frequency temperature/Preservation temperature/humidty	-10 to 50 ºC / -20 to 65 ºC / 20 to 90 % RH (installed with no dew conensation)
Vibration	5.9 m/s² (0.6G), 10-55Hz
Using place	Under 1,000m above sea level, indoors (installed away from corrosive gasses dust)

Paint color	Gray (Munsell 8.5YR 6.2/0.2)

Option

Options	Vector control with sensor
Digital input option	4 column BCD, 16bit binary

Other options	Operator with copy function, cable for operator, braking resistor, regenerative control unit, alternating reactor, D.C. reactor, EMC Mains filter, higher harmonic control unit, applied control installation

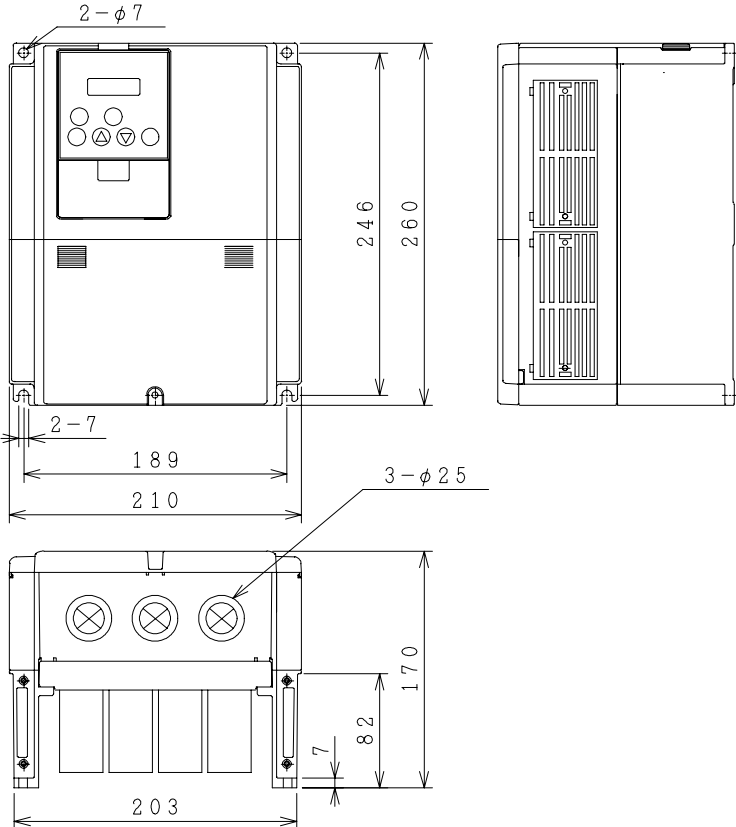| Schematic mass (kg) [200V class]	-	-	3.5	3.5	3.5	3.5	5	5	12	-	-	-	-	-	-
[400V class]	-	-	3.5	3.5	3.5	3.5	5	5	12	-	-	-	-	-	-

6.2 Dimension

SJH300-2.5-8LF

SJH300-2.5-8HF
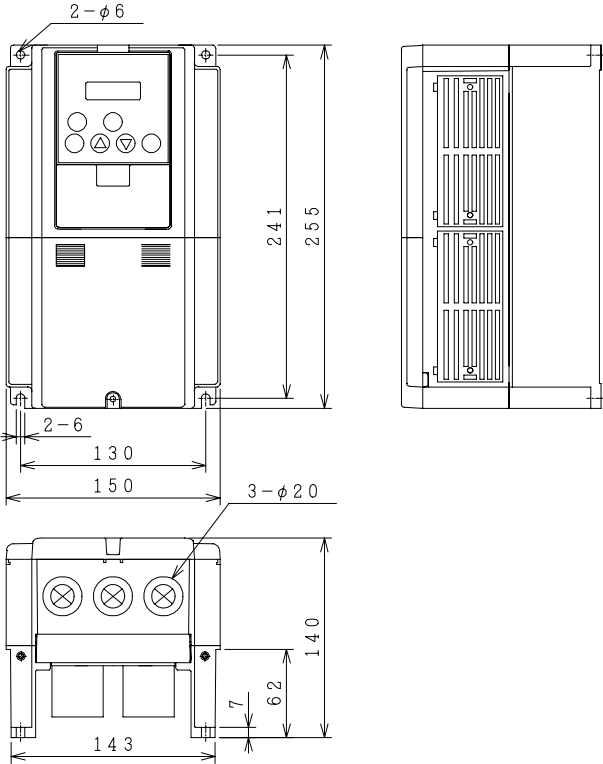
SJH300-11,16LF/HF

SJH300-22LF/HF