

LH1
SERIES

Basic Guide HITACHI LH1 Series Inverter

LH1



Introduction

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If you have any inquiry or problem,
Refer to Chapter 5 Troubleshooting
or
Contact to the Technical Inquiry Service
for Inverter.

When making a contact, inform the reference number on below.

NT9461 X

Introduction

Thank you for purchasing Hitachi LH1 Series Inverter. This is a user guide for basic handling and maintenance of Hitachi LH1 Series Inverter.

■ About the Basic Guide (this document)

The Basic Guide provides the minimum information necessary for handling the product. Please make sure to read this document.

■ Handling an optional products

If you use the inverter with optional products, also you should read the instruction enclosed in those products.

Cautions

■ Proper use of the inverter

Please read the Basic Guide, and optional products instruction before handling. Read carefully the Basic Guide, or optional product instruction before handling or performing maintenance of the product.

Before attempting installation, operation, maintenance, and inspection work, you should understand the knowledge of equipment, information of safety, precaution and how to use and service the inverter.

■ Cautions

No part of this document may be reproduced or reformed in any form without the publisher's permission.

The contents of the document are subject to change without prior notice.

If you lose the Basic Guide and need another one in printed form, you will be charged for resupply, so please keep it carefully.

You "CANNOT DO" what is not described in Basic Guide. We are not responsible for any impact from operations regardless of unexpected failure or accident due to the operation or handling of the product in a manner not specified in Basic Guide. We apologize in advance for any inconvenience this may cause.

If you find any unclear or incorrect description, missing description, or misplaced or missing pages, please takes time to inform Hitachi inverter technical service office.

Note that, the Basic Guide, and the instruction for each optional product enclosed, should be delivered to the end user of the inverter. And also make sure to be accessible any other guides or instruction to the end user.

Method of Inquiry and Product Warranty

Method of Inquiry about Product

- For an inquiry about product damage or faults or a question about the product, notify your supplier or Hitachi inverter technical service office.

Product Warranty

- The product LH1 Series inverter will be warranted by Hitachi Industrial Equipment (Nanjing) Co., Ltd. afterward "HINC", during the warranty period from your date of purchase only under proper usage of product.
- Furthermore, the warranty expressed here is covered only for the product delivered from HINC, and will not be responsible for others damage or loss of products like a motor or any equipment or systems damage caused by improper usage of the product. Minimize the consequence on equipment or system by applying safety design which is able to notify a hazard alarm to the user in case of malfunction or damage of the delivered product. The selection and application of delivered product must be done with sufficient margin on performance, as well as other equipment or system with sufficient redundancy design. Also, the compatibility of the product with the customer's intended use is not warranted, hence the validation test should be done by the customer by their responsibility before put in operation.
- In case of delivery a defective product, or encountered a defects on quality during a manufacturing process, HINC will repair or exchange with free of charge, only when the product is in warranty period (afterward, we call "warranty service").
- The product will be warranted for one year from your date of purchase. However, depending on case, sending technical assistance for repairing will be charged to the customer. Also, HINC will not be responsible of any readjustment or testing on site.
- After warranty service, the exchanged or repaired part will be warranted for 6 month from date of warranty service. HINC will be responsible for repair or exchange of defective part only for the exchanged or repaired part only during this warranty period.

- Inverter Model: It beginning with LH1- in specification label.
- Manufacturer Number(MFG No.): It shows in specification label.
- Date of purchase: Customer's purchased period.
- Inquiry contents:
 - Inform us the defective point and its condition.
 - Inform us the suspicious content and its detail.

- In order to receive warranty service, you should present the recipe issued by product supplier or any other document that permit to check the purchase date. However, any defects, damage, malfunction or any other failure caused by one of the following facts will not be covered by warranty service.
 - (1) Cannot confirm the purchase date.
 - (2) The damage or fault resulted from improper usage or inadequate handling of the product and not conforming usage described into the basic guide.
 - (3) Incorrect usage of product, inadequate setting of product and optional product, remodeling or inadequate repair and repair carried out by unqualified repair center.
 - (4) Deterioration and wear resulted from normal operation.
 - (5) Fault resulted from natural disaster, such as earthquake, fire disaster, lightning strike, pollution, salt pollution, or abnormal voltage or any others external factor.
 - (6) Shock, falling, or Vibration resulted during transportation or displacement after purchase.
 - (7) Damage or fault resulted from remodeling firmware by unqualified personal not belonging to HINC.
 - (8) Damage or fault resulted from customer's made programing function (EzSQ).
- By warranty service, might lose the data stored inside the product, as well as, customers made (EzSQ) program. Make sure to back up by own responsibility. However, in case of malfunction resulting from the circuit board of the storage devices, the backup will not be possible. It is recommended to keep a backup during the testing phase by using MOP or PC software ProDriveNext.

Liability Limitation

- Neither HINC, Affiliated company nor related dealer are liable to the written and unwritten public requirement including the common sense of the product or requirement in specific application.
- Even more, HINC, affiliated company or related dealer are not responsible of any incidental damage, special damage, direct loss, or indirect loss (even predictable or not) resulted on customer because of product defect.

Warranty Service

- The customer is able to receive a warranty service from product supplier or service station, if the product does not meet the function described on basic guide.
- Contact to your supplier or local Hitachi distributor or service station for fare-paying services.

Change on Product Specification

- We are sorry because any information described in Brochure, Basic Guide, or Technical Document would be modified without notice.

Precaution for Product Application

- The product should apply following the condition of use, handling method and precautions described in Basic Guide.
- The installed product should be confirmed previously by own that the product installation has done as intended in the customer system.
- When using Hitachi inverter consider on below
 - (1) Select inverter with sufficient capacity for rate current and performance.
 - (2) Safety design, for example, redundant system design.
 - (3) Equipment design where minimize hazard in case of inverter failure.
 - (4) For safety precautions, make a system configuration that alarms the hazard to user.
 - (5) Periodic maintenance of Hitachi inverter and customer's equipment.
- Hitachi inverter is designed and manufactured intentionally to be applied for general industrial equipment application. It is not intended to be used for the applications listed below therefore. In case inverter is used for these applications, it is out of warranty unless there is a special written agreement. Otherwise, the product will not be warranted.
 - (1) Special application such as aircraft, spacecraft, nuclear, electric power, passenger transportation, medical, submarine repeater, etc.
 - (2) For application such as elevator, amusement equipment, medical equipment which might have a big effect on human life and property.
- Even for above application, in case there is an agreement for the limitation of the purpose and quality, please contact to our sales office. Further study will be carried out to check whether inverter is applicable for that specific application or not.
- For applications that involve human life, or have risk of important loss, make sure to avoid a critical accident by installing a fail-safe device, protecting device, detecting device, alarm device, or spare device, etc.
- This inverter is only for three phase induction motor [IM] or three phase synchronous motor [SM(SMM)].
- For any other application make inquiries.

Supplement

- Refer to "Chapter 7 Specification" for short lifespan component.
- For optional product refer attached instruction.
- This warranty term will not restrict a legal right of customer who has purchased the product.
- Contact to the local supplier for warranty of purchased product sales in oversea.

Contact Information

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Chapter 1

Safety Instructions

1.1 Types of Warnings

In the Basic Manual, the severity levels of safety precautions and residual risks are classified as: "DANGER", "WARNING" and "CAUTION".

Display meanings







 DANGER
Indicates that incorrect handling may cause hazardous situations, which would most likely result in serious personal injury or death, and may result in major physical loss or damage.
 WARNING
Indicates that incorrect handling may cause hazardous situations, which may result in serious personal injury or death, and may result in major physical loss or damage.
 CAUTION
Indicates that incorrect handling may cause hazardous situations, which may result in moderate or slight personal injury or damage, and may result only physical loss or damage.

Even more, that "**CAUTION**" level description may lead to a serious risk depend on the circumstances. Be sure to follow the instruction because whichever contains important safety description.

1.2 Description of Safety Symbols

It describes annotation of the symbols in context. Be sure to follow and pay attention of content.

Symbols meaning


	Indicates a danger, warning or caution notice for fire, electric shock and high temperature while handling the product. Details are indicated in or near  by pictures or words.
	The drawing on the left indicates "a non-specific and general danger or caution".
	The drawing on the left indicates "a possible damage due to electric shock".
	Indicates "what you must not do" to prohibit the described acts in the operation of the product.
	Indicates "what you must do" according to the instructions in the operation of the product.

1.3 Cautions


Read carefully following safety instruction for handling.


1.3.1 Caution

 **DANGER**


 **Caution**

- Incorrect handling may result in personal death or severe injury, or may result in damage to the inverter, motor or the whole system.
- Be sure to read this Basic Manual and appended documents thoroughly before installing, wiring, operating, maintaining, inspecting or using the inverter.

 **Practice**


 **Caution**

- Many of the drawings in the Basic Guide show the inverter with covers and/or parts blocking your view as removed to illustrate the details.
- Do not operate the inverter in the status shown in those drawings. If you have removed the covers and/or parts, be sure to reinstall them in their original positions before starting operation, and follow all instructions when operating the inverter.


 **Practice**

1.3.2 Precautions for installation


 **WARNING**

 **Fire**


- **You run the risk of fire!**
- Do not place flammable materials near to the installed inverter.

 **Prohibited**


- Prevent foreign matter (e.g., cut pieces of wire, sputtering welding materials, iron chips, wire, and dust) from penetrating into the inverter.

 **Practice**


- Install the inverter on a non-flammable surface, such as, metal surface.
- Install the inverter in a well-ventilated indoor site not exposed to direct sunlight. Avoid places where the inverter is exposed to high temperature, high humidity, condensation, dust, explosive gases, corrosive gases, flammable gases, grinding fluid mist, or salt water.

 **Fall Injury**


- **You run the risk of injury due to the inverter falling**
- Do not hold its cover parts when carrying the inverter.

 **Prohibited**


- Install the inverter on a structure able to bear the weight specified in this Basic Guide.


 **Practice**

- Install the inverter on a vertical wall that is free of vibrations.


 **Injury**

- **You run the risk of injury!**
- Do not install and operate the inverter if it is damaged or its parts are missing.

 **Prohibited**


 **Failure**

- **You run the risk of failure of the inverter!**
- The inverter is precision equipment. Do not allow it to fall or be subject to high impacts.
- Also do not step on it, or place a heavy load on it.


 **Prohibited**


1.3.3 Precautions for Wiring

 **DANGER**


 **Electric shock Fire**


- **You run the risk of electric shock or fire!**
- Be sure to ground the inverter.
- Commit wiring work to a qualified electrician.
- Before wiring, make sure that the power supply is off.

 **Practice**


 **Electric shock Injury**


- **You run the risk of electric shock and injury!**
- Perform wiring only after installing the inverter.

 **Practice**


 **Failure**

- **You run the risk of failure of the inverter!**
- Do not pull the wire after wiring.


 **Prohibited**


 **Short circuit Ground**


- **You run the risk of short circuit and ground fault!**
- Do not remove rubber bushings from the wiring section. Otherwise, the edges of the wiring cover may damage the wire.

 **Prohibited**


⚠ WARNING



Injury
Fire


Prohibited


Practice


- **You run the risk of injury or fire!**
- Do not connect AC power supply to any of the output terminals (U, V, and W).
- Make sure that the voltage of AC power supply matches the rated voltage of your inverter.



Electric shock
Injury



Practice

- **You run the risk of electric shock and injury!**
- Before operating slide switch SW in the inverter, be sure to turn off the power supply.
- Since the inverter supports two modes of cooling-fan operation, the inverter power is not always off, even when the cooling fan is stopped. Therefore, be sure to confirm that the power supply is off and wait for 10 minutes(*1) or 15 minutes(*2) before wiring.

(*1)LH1-055H~LH1-300H
(*2)LH1-370H~LH1-1600H


Fire



Prohibited



Practice

- **You run the risk of fire!**
- Do not use a single-phase input.
- Do not connect a resistor directly to any of the DC terminals (PD, P, and N).
- Do not use the magnetic contactor installed on the primary and secondary sides of the inverter to stop its operation.
- Tighten each screw to the specified torque.
- No screws must be left loose.
- Connect an earth-leakage breaker to the power input circuit.
- Use only the power cables, earth-leakage breaker, and magnetic contactors that have the specified capacity (ratings).


1.3.4 Precautions to Run and Test Running


⚠ DANGER


Electric shock
Fire



Prohibited


- **You run the risk of electric shock or fire!**
- While power is supplied to the inverter, do not touch any internal part or terminal of the inverter. Also do not check signals, or connect or disconnect any wire or connector.
- While power is supplied to the inverter, do not touch any internal part of the inverter. Also do not insert a material such as a rod and etc..


Electric shock



Prohibited


- **You run the risk of electric shock!**
- Be sure to close the terminal block cover before turning on the inverter power. Do not open the terminal block cover while power is being supplied to the inverter or voltage remains inside.
- Do not operate switches with wet hands.


Injury
Fire



Prohibited


- **You run the risk of injury or fire!**
- While power is supplied to the inverter, do not touch the terminal of the inverter, even if it has stopped.



Injury
Damage


Prohibited

- **You run the risk of injury and damage to machine.**
- Do not select the retry mode for controlling an elevating or traveling device because free-running status occurs in retry mode.



Injury


Prohibited



Practice


- **You run the risk of injury!**
- If the retry mode has been selected, the inverter will restart suddenly after a break in the tripping status. Stay away from the machine controlled by the inverter when the inverter is under such circumstances. (Design the machine so that human safety can be ensured, even when the inverter restarts suddenly.)
- The [STOP] key on the operator keypad is effective only when its function is enabled by setting. Prepare an emergency stop switch separately.
- If an operation command has been input to the inverter before a short-term power failure, the inverter may restart operation after the power recovery. If such a restart may put persons in danger, design a control circuit that disables the inverter from restarting after power recovery.
- If an operation command has been input to the inverter before the inverter enters alarm status, the inverter will restart suddenly when the alarm status is reset. Before resetting the alarm status, make sure that no operation command has been input.

WARNING


 **Injury Damage**


- **You run the risk of injury and damage to machine.**
- The inverter easily allows you to control the speed of operating motor. Confirm the capacity and ratings of the motor or machine before operating.
- When you run the motor at a high frequency, check and confirm to each manufactures of a permitting revolution of the respective motor and machine.
- Check the rotate motor direction, abnormal sound, and vibrations while operating.

 **Practice**


 **Burn Injury**

- **You run the risk of burn injury.**
- Inverter heat sink will heat up during operation. Do not touch the heat sink.

 **Prohibited**


 **Injury**

- **You run the risk of injury!**
- Install an external brake system if needed.


 **Practice**


1.3.5 Precautions for Maintenance/Inspection

DANGER

 **Electric shock**

- **You run the risk of electric shock!**
- Before inspecting the inverter, be sure to turn off the power supply and wait for 10 minutes(*1) or 15 minutes(*2). (Before inspection, confirm that the Charge lamp on the inverter is off and the DC voltage between terminals P and N is 45 V or less.)

 **Practice**


 **Prohibited**

- Commit only a designated person to maintenance, inspection, and the replacement of parts. (Be sure to remove wristwatches and metal accessories, e.g., bracelets, before maintenance and inspection work and to use insulated tools for the work.)


(*1)LH1-055H~LH1-300H
(*2)LH1-370H~LH1-1600H

1.3.6 Precautions for disposal

DANGER

 **Injury Explosion**


- **You run the risk of injury and explosion!**
- For disposal of the inverter, outsource to a qualified industrial waste disposal contractor. Disposing of the inverter on your own may result in an explosion of the capacitor or produce poisonous gas.
- Contact us or your distributor for fixing the inverter.

 **Practice**


- A qualified waste disposer includes industrial waste collector/transporter and industrial waste disposal operator. Follow the act related to procedures stipulated in the waste management and public.
- cleansing for disposing of the inverter.

1.3.7 Other Cautions


DANGER

 **Electric shock Fire Injury**


- **You run the risk of electric shock, fire and injury!**
- Never modify the inverter.

 **Prohibited**

CAUTION

 **Life cycle**

- **You run the risk of significantly shortening the life cycle of a product!**
- Sterilizing and disinfecting a packaging wood materials use a means other than wood fumigation method. If the product is included in the fumigation treatment, electronic parts receive a critical damage from emitted gases or steams. Especially, halogen disinfectants (including fluorine, chlorine, bromine and iodine) can cause corrosion in the capacitor.

 **Practice**

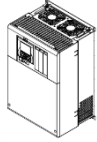
(Memo)

Chapter 2

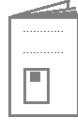
Installation and Wiring

2.1 Check the Inverter

Check the contents in the package, and confirm the inverter model with a specification label.



Inverter



Basic Guide
(This document)



Eye bolts for hanging the inverter
LH1-450HFC~LH1-750HFC

The model of the product is as follows:

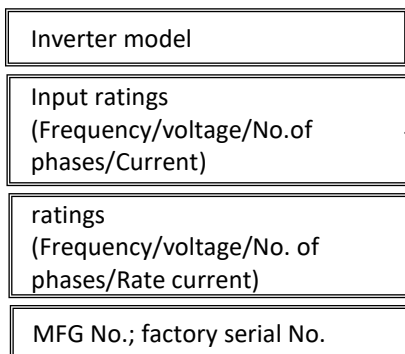
E.g.: 400V class input voltage for China

Applicable motor capacity is 7.5kW
rated current 17.0A



- (1) Series name LH1
- (2) Motor Capacity
075 means 0.75kW
- (3) Input power specification
H: three-phase 400V class
- (4) Panel
F: panel (MOP)equipped
- (5) Region (None): Japan;
C: China/Southeast Aisa

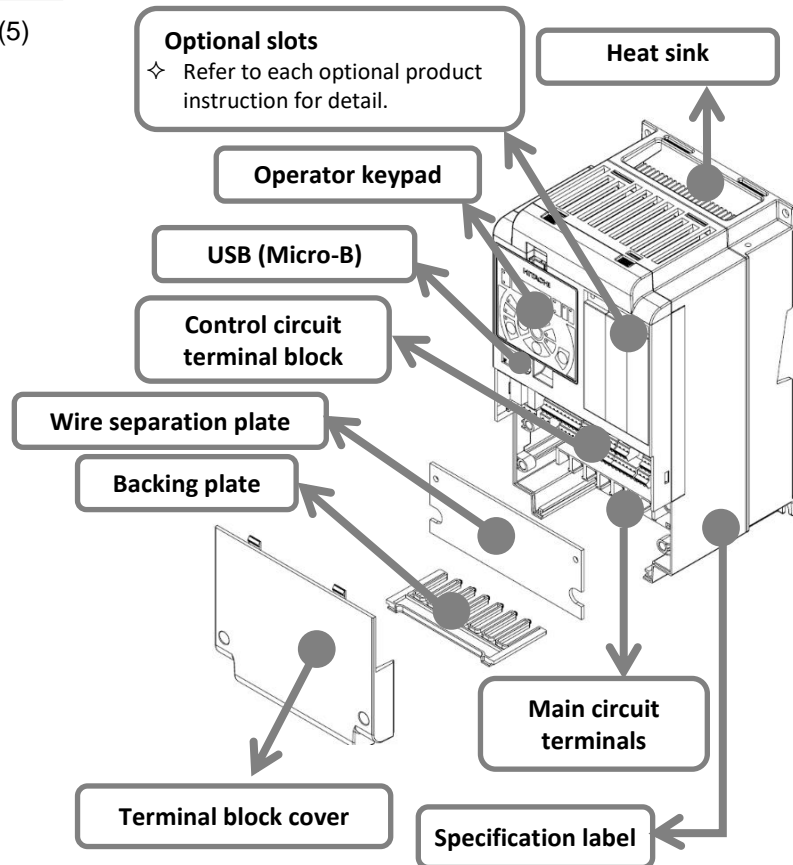
• Specification label example
Description example for LH1-075HFC
(*) means eigenvalues



HITACHI INVERTER		Ver. 2.02	
Model : LH1-075HFC			
Input/Entrée:	50Hz, 60Hz	380-460 V 3Ph	17.0 A
Output/Sortie:	0 -590Hz	380-460 V 3Ph	17.0 A
MFG No.	0117201303A00001	Date:	2001
Hitachi Industrial Equipment (Nanjing) Co., Ltd.		HINC	NE18470-127

- ◇ Configuration and description contents vary depending on the model.
Contact to your supplier or local Hitachi distributor or service station for more details.
- ◇ If the inverter is shipped incorporated with optional products, optional instruction will be enclosed.

◇ LH1-075HFC example illustration in below.



2.2 Install the Inverter



Transportation

- The inverter is made of plastics component. When carrying the inverter, handle it carefully to prevent damage to the parts.
- Do not carry the inverter by holding the front or terminal block cover. Doing so may cause the inverter to fall.
- Do not install and operate the inverter if it is damaged or its parts are missing.



Ambient temperature

- Avoid installing the inverter in a place where the ambient temperature goes above or below the allowable range defined by the standard inverter specification.

Ambient temperature:

-10 to 45°C

- Keep sufficient space around the inverter. Measure the temperature in a position about 5 cm distant from the bottom-center point of the inverter, and check that the measured temperature is within the allowable range. Operating the inverter at a temperature outside this range will shorten the inverter life (especially the capacitor life), resulting in damage to the inverter.



Do not install on a high temperature, high humidity or easily condensation area

- Avoid installing the inverter in a place where the relative humidity goes above or below the range (20% to 90% RH), as defined by the standard inverter specification. Avoid a place where the inverter is subject to condensation.
- Condensation inside the inverter will result in short circuits, which may cause damage to the inverter. Also avoid places where the inverter is exposed to direct sunlight.

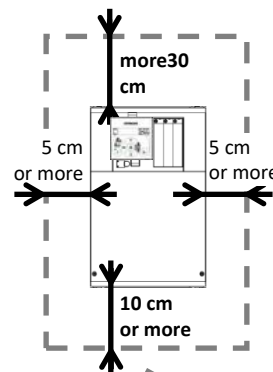


Install inverter on nonflammable (e.g. metal) surface.

- The inverter will reach a high temperature (up to about 150°C) during operation. Install the inverter on a vertical wall surface made of nonflammable material (e.g., metal) to avoid the risk of fire.
- In particular, keep sufficient distance between the inverter and other heat sources (e.g., braking resistors and reactors) if they are installed in the vicinity.

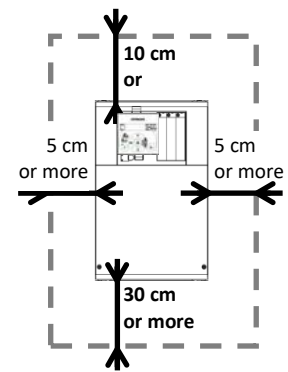
For

LH1-055H~LH1-750H

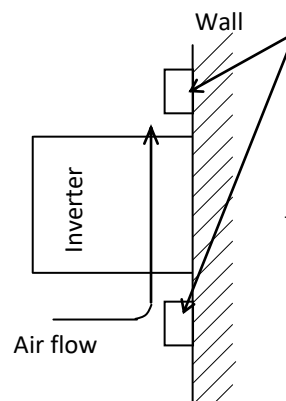


For

LH1-900H~LH1-1600H



- ◇ In order to replace life cycle parts on following models require a clearance of 22cm or more:
 - LH1-185H~LH1-300H
- ◇ In order to replace life cycle parts on following models is required to remove the installed units:
 - LH1-055H~LH1-150H



- Keep enough clearance between the inverter and the above and below wiring ducts to prevent cooling air ventilation from obstructing.

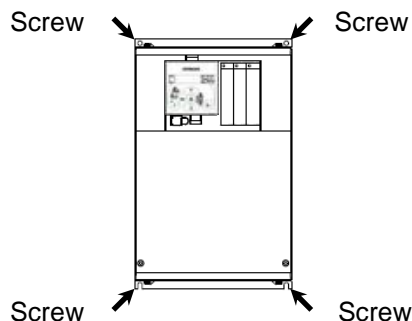
- ◇ For dimension drawing of inverter see chapter 2.3.

⚠ Installation environment

- Avoid installing the inverter in a place where the inverter is subject to dust, corrosive gases, explosive gases, flammable gases, grinding fluid mist, or salt water.
- Foreign particles entering the inverter will cause of failure. If you use the inverter in a considerably dusty environment, install the inverter inside a totally enclosed panel.

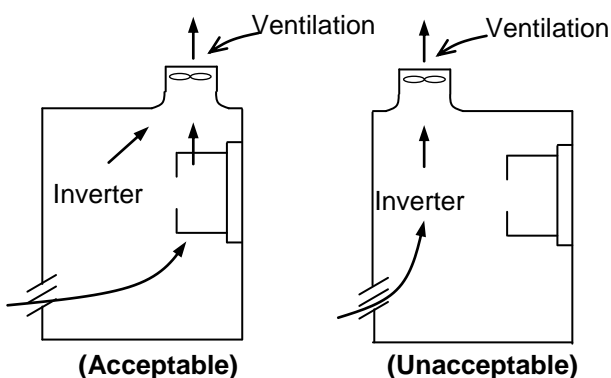
⚠ Installation method and position

- Install the inverter vertically and securely with screws or bolts on a surface that is free from vibrations and that can bear the inverter weight.
- If the inverter is not installed properly, its cooling performance may be degraded and tripping or inverter damage may result.



⚠ Mounting in an enclosure

- When mounting multiple inverters in an enclosure with a ventilation fan, carefully design the layout of the ventilation fan, air intake port, and inverters. An inappropriate layout will reduce the inverter-cooling effect and raise the ambient temperature. Plan the layout properly so that the inverter ambient temperature will remain within the range specified in the specification table.



Position of ventilation fan

- ◇ When the inverter is installed below ventilation fan, the incoming dust may adhere to the inverter. Place in a position to avoid this falling dust.

⚠ Reduction of enclosure size

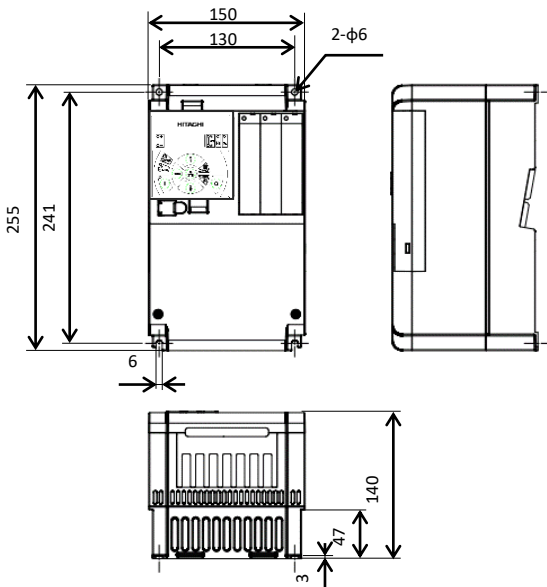
- External heat sink installation may reduce internal heat emission and reduce the enclosure size.
External heat sink mounting for the inverter
LH1-055H
 - requires an optional metal fitting.
 - Other models than above can be installed with the originally attached metal fitting. To mount the inverter for external heat sink, cut out the enclosure panel according to the specified cutting dimensions.
- The cooling section (including the heat sink) positioned outside the enclosure has a cooling fan. Therefore, do not place the enclosure in any environment where it is exposed to water drops, oil mist, or dust.
- The heat sink part reaches a high temperature. Install a protection cover as needed.

2.3 Dimension Drawing

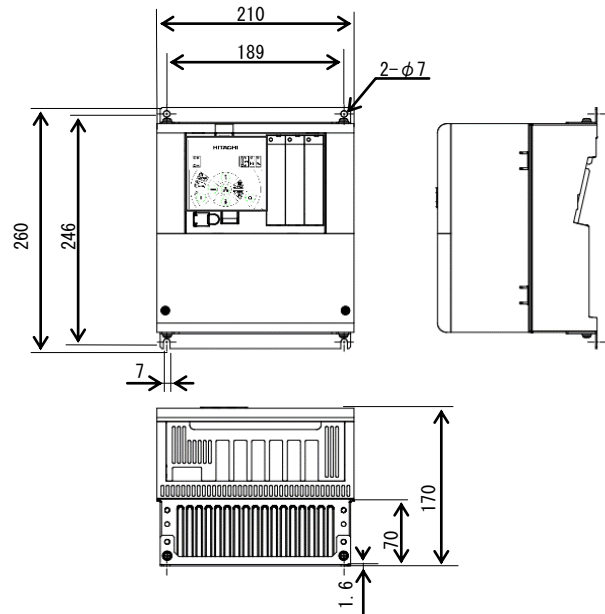
✧ If you add optional parts to the inverter, some extra space is required in the direction of the depth of the inverter depending on the wiring layout. Keep a clearance of 50 mm or more. For details, refer to the instruction manual for each optional product.

(Eg.) See "Chapter 7 Specifications" for details.

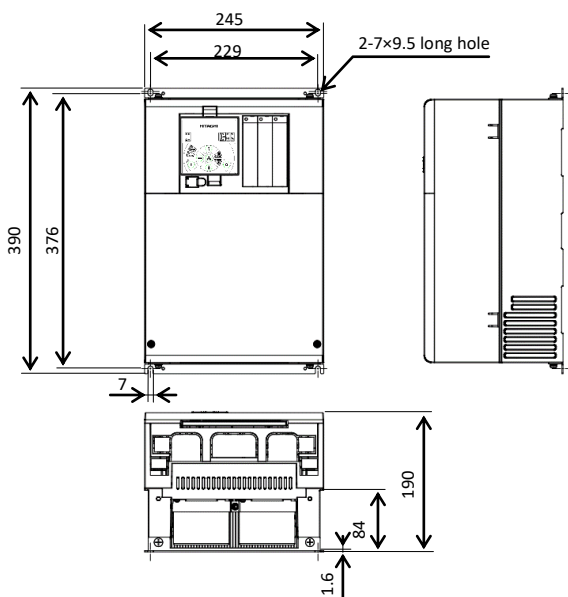
Model(LH1-***H)			
400V Class : 055H			
Dimension	W(mm)	H(mm)	D(mm)
	150	255	140



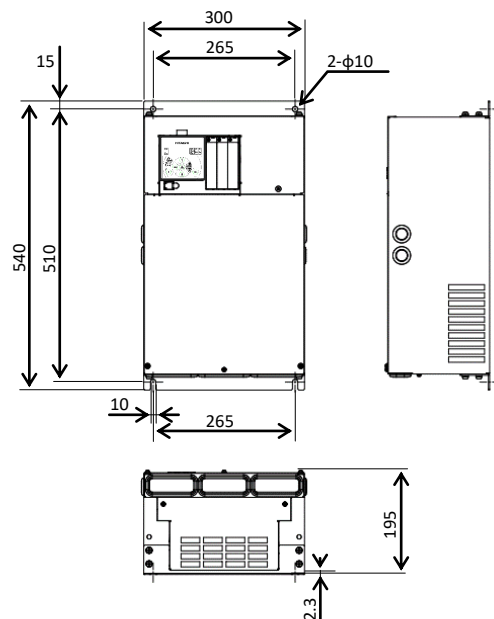
Model (LH1-***H)			
400V Class : 075H/110H/150H			
Dimension	W(mm)	H(mm)	D(mm)
	210	260	170



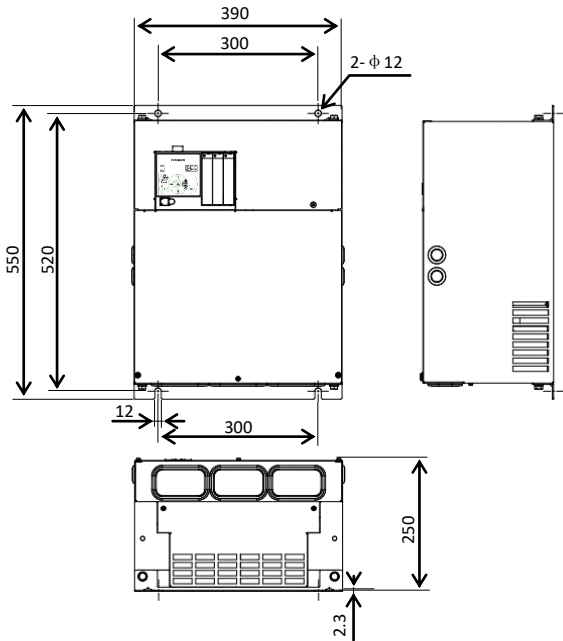
Model (LH1-***H)			
400V Class : 185H/220H/300H			
Dimension	W(mm)	H(mm)	D(mm)
	245	390	190



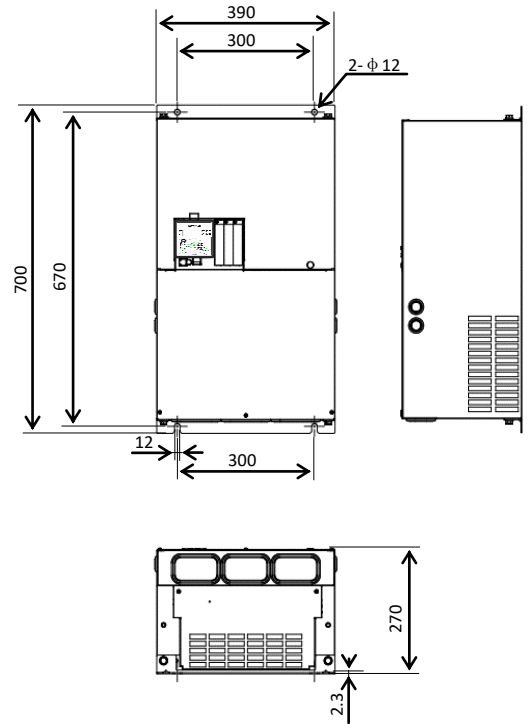
Model (LH1-***H)			
400V Class : 370H			
Dimension	W(mm)	H(mm)	D(mm)
	300	540	195



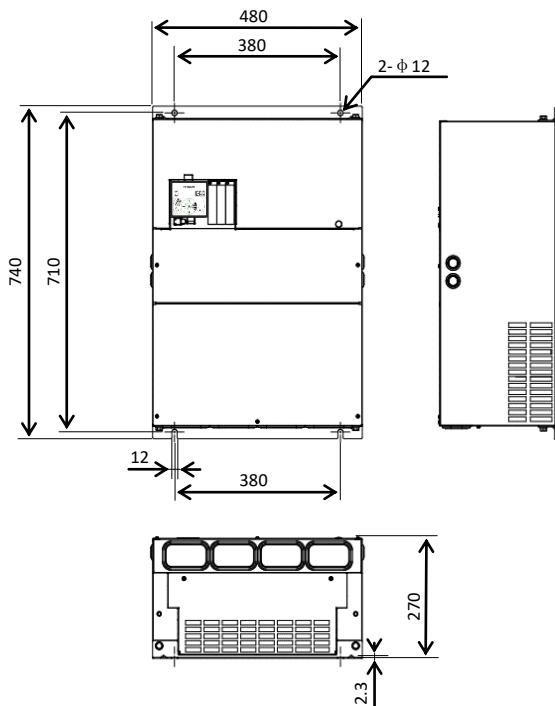
Model (LH1-***H)			
400V Class : 450H/550H/750H			
Dimension	W(mm)	H(mm)	D(mm)
	390	550	250



Model (LH1-***H/****H)			
400V Class : 900H/1100H			
Dimension	W(mm)	H(mm)	D(mm)
	390	700	270



Model (LH1-****H)			
400V Class :1320H/1600H			
Dimension	W(mm)	H(mm)	D(mm)
	480	740	270



2.4 Inverter Wiring

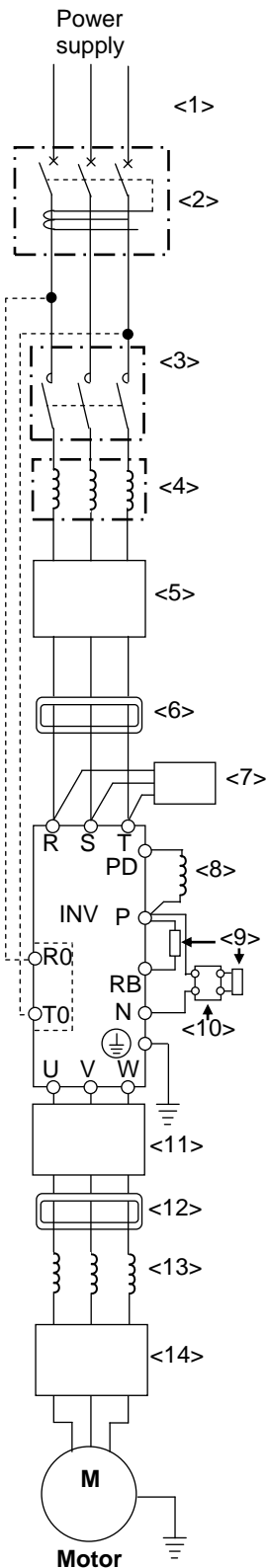
Applicable peripheral equipment



Notes:

- The description of peripheral equipment is for Hitachi 3-phase, 4-pole squirrel-cage motor.
- Select breakers with proper interrupting capacity. (Use inverter-ready breakers)
- Use earth-leakage circuit breakers (ELB or MCB) to ensure safety.
- Use copper electric wire (HIV cable) with allowable temperature rating 75°C or more.
- If the power line exceeds 20 m, use cable with major wire size for the power line.
- Tighten each terminal screw with the specified tightening torque.
Loose terminal screws may cause short circuits and fire.
Excessive tightening torque may cause damage to the terminal block or inverter body.
- When selecting a rated sensitivity current for earth-leakage circuit breaker, use a separated breaker considering a total cable length of between Inverter–Power supply and Inverter–Motor distance. Do not use a high-speed type of earth-leakage circuit breaker. Use a delayed-type circuit breaker, because the high-speed type may malfunction.
- When using a CV cable for wiring through a metal conduit, the average current leakage would be 30mA/km.
- When using a high relative dielectric constant cable such as IV cable, the leakage current is about eight times as high as the standard cable. Therefore, when using an IV cable, use ELCB with rated sensitivity current by eight times higher in the table below. If the total cable length exceeds 100 m, use a CV cable.
- Do not pull the power line cable after wiring. Doing so may cause screw loosening.

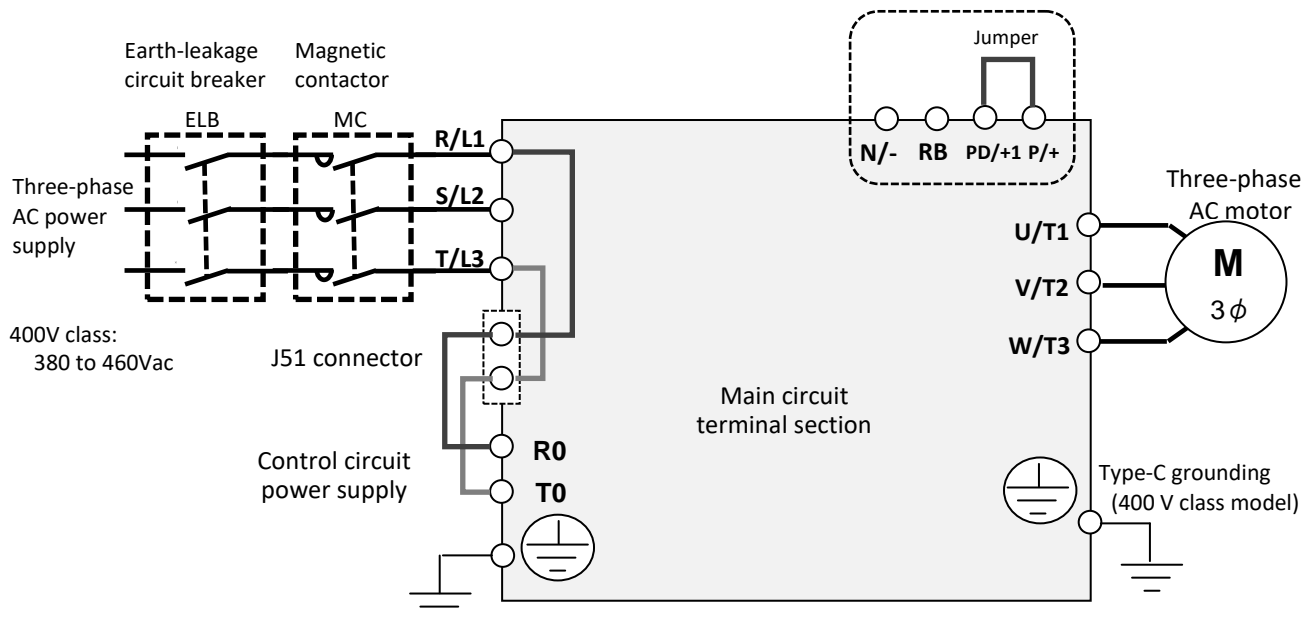
Total cable length	Sensitivity current (mA)
100 m or less	50
300 m or less	100



No.	Name	Function
<1>	Electric wire	See "Recommended cable gauges, wiring accessories, and crimp terminals" on Page 2-8.
<2>	Earth-leakage circuit breaker ELCB or MCCB	
<3>	Magnetic contactor MC	
<4>	Input AC reactor (For harmonic control, power supply voltage imbalance exceeds 3% or more, or when the power supply capacity is over 500 kVA or more, or when the power voltage may change rapidly. This reactor also improves the power factor.)	Use input reactor for harmonic wave control, or when power supply voltage imbalance exceeds 3% or more, or when the power supply capacity is over 500 kVA or more, or when the power voltage may change rapidly. This reactor also improves the power factor.
<5>	Noise filter for inverter	This noise filter reduces the conductive noise that is generated by the inverter and transmitted in cables. Connect this noise filter to the primary side (input side) of the inverter.
<6>	Radio noise filter (Zero-phase reactor)	The inverter may generate radio noise through power supply wiring during operation. Use this noise filter to reduce the radio noise (radiant noise).
<7>	Radio noise filter on the input side (Capacitor filter)	Use this noise filter to reduce the radiant noise radiated from input cables.
<8>	DC Choke	Use DC chokes to reduce the harmonic generated by the inverter.
<9>	Braking resistor	Use these devices to increase the braking torque of the inverter for operation in which the inverter turns the connected load on and off very frequently or decelerates the load running with a high moment of inertia.
<10>	Regenerative braking unit	
<11>	Noise filter on the output side	Connect this noise filter between the inverter and motor to reduce the radiant noise radiated from cables for the purpose of reducing the electromagnetic interference with radio and television reception and preventing malfunctions of measuring equipment and sensors.
<12>	Radio noise filter (Zero-phase reactor)	Use this noise filter to reduce the noise generated on the output side of the inverter. (This noise filter can be used on both the input and output sides.)
<13>	Output AC reactor For reducing vibrations and preventing thermal relay malfunction	Inverter driven motor may cause large vibrations compared to commercial power supply direct start motor. Connect Output AC reactor between inverter and motor to lessen the pulsation of motor. Also, connect output AC reactor, when the cable length between inverter and motor is longer (10 m or more), to prevent thermal relay malfunction due to the harmonic waves generated by switching operation of inverter. Note that the thermal relay can be replaced with a current sensor to avoid the malfunction.
<14>	LCR filter	Connect this noise filter between the inverter and motor to convert the inverter output into a sinusoidal waveform and to reduce the motor vibration, motor noise and the radiant noise radiated from cables. Surge voltage can be also controlled.

2.5 Wiring of the main circuit

Wire the main circuit of the inverter.
 The following illustration shows the power supply and wiring connections to a motor only.
 Open a terminal block cover to wire the terminal block in the main circuit.



Explanation of main circuit terminal block

Symbol	Terminal name	Description
R,S,T (L1,L2,L3)	Main power input	Connect to the AC power supply. Leave these terminals unconnected when using a regenerative converter (HS900A series) .
U,V,W (T1,T2,T3)	Inverter output	Connect a Three-phase motor.
PD,P (+1,+)	DC choke connection terminal	Remove the PD-P jumper from terminals, and connect the optional DC choke for power factor improvement.
P,RB (+,RB)	External chopper braking resistor connection terminal	Connect the optional external braking resistor. See “Chapter 7 Specifications” for built-in braking circuit inverter models.
P,N (+,-)	Regenerative braking unit connection terminal	Connect the optional regenerative braking unit.
⊕	Inverter ground terminal	This serves as a ground terminal for the inverter chassis to ground. Connect 400V class models to Type-C grounding.

- ◇ The screw size may vary depending on terminal. Refer to Page 2-8/2-9 for the size of the terminal screw for the power line cable while for other terminals, refer to the drawings of the wiring on Page 2-11 or later.
- ◇ The tables on Page 2-8/2-9 list the specifications of cables, crimp terminals, and terminal screw tightening torques for reference.

2.6 Recommended wire gauges, wiring accessories, and crimp terminals

■ 400V class

LH1 Model LH1-***H/****H	Power line Cable AWG(mm ²) R,S,T,U,V,W, P,PD,N	Grounding cable AWG(mm ²)	External braking resistor between P and RB AWG(mm ²)	Power line cable Terminal screw size	Crimp terminal	Tightening torque N·m
LH1-055H	12(3.3)	12(3.3)	12(3.3)	M4	5.5-4/5.5-4	1.4
LH1-075H	10(5.3)	10(5.3)	10(5.3)	M5	5.5-5/5.5-5	3.0
LH1-110H	8(8.4)	8(8.4)	8(8.4)	M5	8-5/8-5	3.0
LH1-150H	8(8.4)	8(8.4)	8(8.4)	M6	8-6/8-6	4.0
LH1-185H	8(8.4)	8(8.4)	8(8.4)	M6	8-6/8-6	4.0
LH1-220H	6(13.3)	8(8.4)	6(13.3)	M6	14-6/8-6	4.0
LH1-300H	4(21.2)	8(8.4)	4(21.2)	M6	22-6/8-6	4.0
LH1-370H	1(42.4)	6(13.3)	-	M6	60-6/14-6	6.0
LH1-450H	1(42.4)	6(13.3)	-	M8	60-8/14-8	15.0
LH1-550H	1/0(53.5)	6(13.3)	-	M8	60-8/14-8	6.0~10.0
LH1-750H	1/0-750H8-5na	4(21.2)	-	M8	60-8/22-8	6.0~10.0
LH1-900H	1/0-900H8-5na	4(21.2)	-	M10	60-10/22-8	6.0~10.0
LH1-1100H	2/0-1100H85na	3(26.7)	-	M10	70-10/38-8	6.0~10.0
LH1-1320H	3/0-1320H85na	1(42.4)	-	M10	80-10/60-8	19.6
LH1-1600H	25kcmil×2(85.0×2)	1(42.4)	-	M10	150-10/60-8	19.6

◇ The wire gauges in the above table shows the designed values based on HIV cable (with thermal resistance of 75°C).

Please use the round type crimp terminals (for the UL standard) suitable for the use electric wire when you connect the electric wire with the main circuit terminal block. Please put on pressure to the crimp terminals with a crimp tool that the crimp terminal maker recommends.

2.7 Applicable circuit breaker

■ 400V class

Model LH1-***H/****H	Applicable Motor (kW)	Applicable devices (Input Voltage 400 to 440V)							
		Without reactor (DCL or ALI)				With reactor (DCL or ALI)			
		Earth-leakage breaker(ELB)		Magnetic Contactor(MC)		Earth-leakage breaker(ELB)		Magnetic Contactor(MC)	
		Example model	Current Rate	AC-1	AC-3	Example model	Current Rate	AC-1	AC-3
LH1-055H	5.5	EXK50-C	20	HS8	HS20	EXK50-C	15	HS8	HS20
LH1-075H	7.5	EXK50-C	30	HS8	HS25	EXK50-C	20	HS8	HS20
LH1-110H	11	EXK50-C	40	HS20	HS35	EXK50-C	30	HS8	HS25
LH1-150H	15	EXK50-C	50	HS25	HS50	EXK50-C	40	HS20	HS35
LH1-185H	18.5	EXK100-C	75	HS35	HS50	EXK50-C	50	HS20	HS35
LH1-220H	22	EXK100-C	75	HS50	H65C	EXK60-C	60	HS35	HS50
LH1-300H	30	EXK100-C	100	HS50	H80C	EXK100-C	75	HS50	H65C
LH1-370H	37	RXK125-S	125	H80C	H100C	EXK100-C	100	HS50	H65C
LH1-450H	45	EXK225	150	H80C	H125C	RXK125-S	125	H65C	H80C
LH1-550H	55	EXK225	200	H100C	H125C	EXK225	150	H80C	H100C
LH1-750H	75	EX400	250	H150C	H200C	EXK225	200	H100C	H125C
LH1-900H	90	EX400	300	H200C	H250C	EXK225	225	H125C	H150C
LH1-1100H	110	EX400	400	H200C	H300C	EX400	300	H150C	H250C
LH1-1320H	132	EX600B	500	H250C	H300C	EX400	350	H200C	H250C
LH1-1600H	160	EX600B	600	H400C	H400C	EX400	400	H250C	H300C

- ◇ Device model name on above table shows example selection. The device selection should be made in base on rated current, short circuit current capability and accordance to the local electrical legislation.
- ◇ Applicable motor capacity is based on Hitachi 400Vac, 60Hz, 4 pole IE3 motor.
- ◇ Refer to the wire gauge table on chapter 2.6 for power line cable.
- ◇ Electrical endurance for AC-1 magnetic contactor is 500000 times, however, for emergency stop in motor operation will be only 25 times.
- ◇ Select AC-3 class magnetic contactor for inverter output for application which has an emergency stop or commercial power line operation.
- ◇ When selecting oversize inverter capacity compare to motor rating, select magnetic contactor according to the inverter capacity.

2.8 Chopper Braking Resistor

LH1 Series has a built-in chopper braking circuit in model below.
LH1-055H to LH1-450H

- By using an optional braking resistor, permit to use for high regeneration load application such as lift or high speed load.


- LH1 Series can offer when desired a built-in chopper braking circuit in models below.
LH1-550H~LH1-750H
- Using optional braking unit or regenerative unit, permit to use on high regenerative load application even for models without built-in chopper braking circuit.
- The table below shows an example selection of braking resistor to output 100% of braking torque for each motor rating on list.

■ 400V

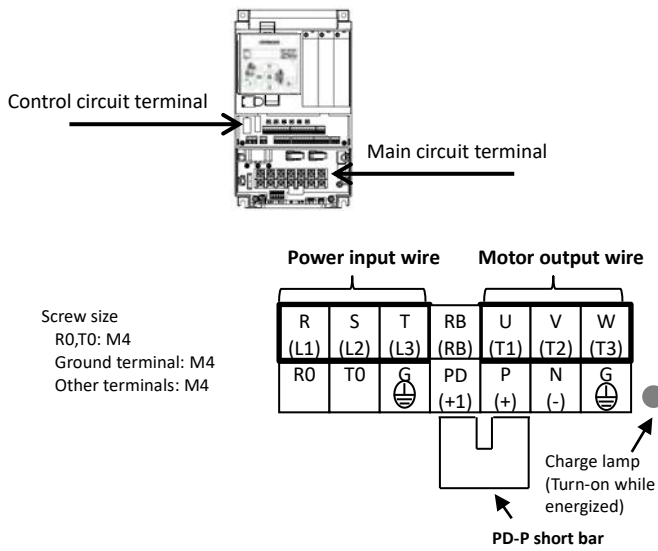
Model LH1-***H	Appli cable motor (kW)	Min. Resistor (Ω)	Resistor selection Ex. (Ω)	Braking Resistor			
				Model	Usage ratio (%)	Short period capacity (kW)	Rated capacity (kW)
055H	5.5	70	100	SRB300-1 ×2 series	7.5	5	0.6
075H	7.5	70	100	SRB300-1 ×2 series	7.5	5	0.6
110H	11	35	70	SRB400-1 ×2 series	7.5	7.2	0.8
150H	15	35	50	RB1 ×2 series ×2 parallel	10	10.4	1.6
185H	18.5	24	35	RB2 ×2 series ×2parallel	10	15.2	2.4
220H	22	24	35	RB2 ×2 series ×2parallel	10	15.2	2.4
300H	30	20	25	RB1 ×2 series ×4parallel	10	20.8	3.2
370H	37	15	17	RB3 ×2 series ×2parallel	10	30.8	4.8
450H	45	15	17	RB3 ×2 series ×2parallel	10	30.8	4.8
550H	55	10	10	CA-KB (10Ω5unit)	10	45	17
750H	75	10	10	CA-KB (10Ω5unit)	10	45	17

◇ When using RB2×2series×2parallel, will require in total 4 RB2 units.

2.9 Wiring

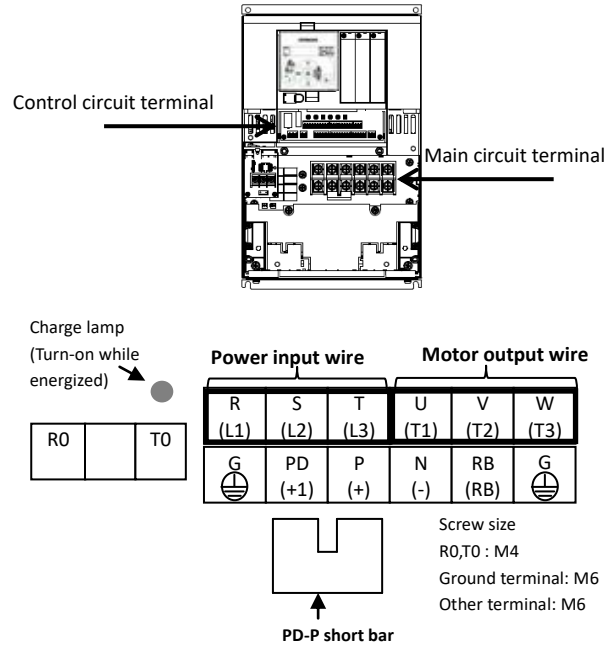
 When J51 connector is removed, charge lamp doesn't indicate R0-T0 status. Please make sure that power is off and care for safety. For own safety, make sure to power off before handling the inverter.

Model LH1- *H**
400V class: 055H

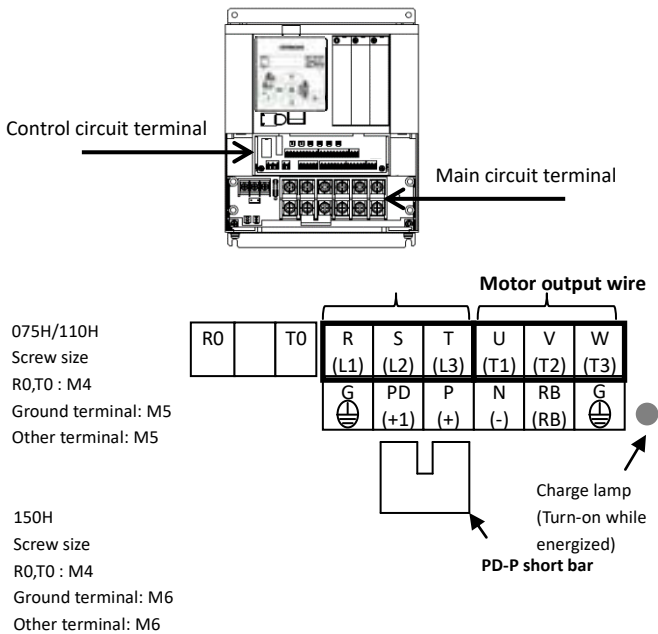


◇ Switch the short circuit connector to enable or disable the EMC filter.

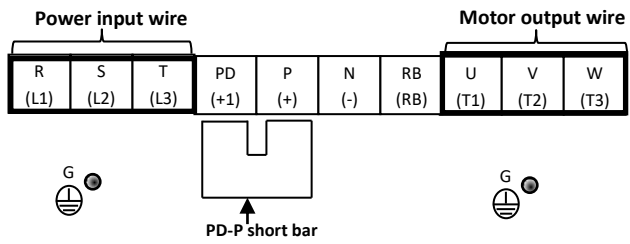
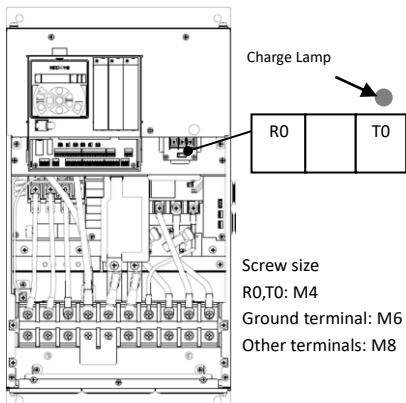
Model LH1- *H**
400V class: 185H,220H,300H



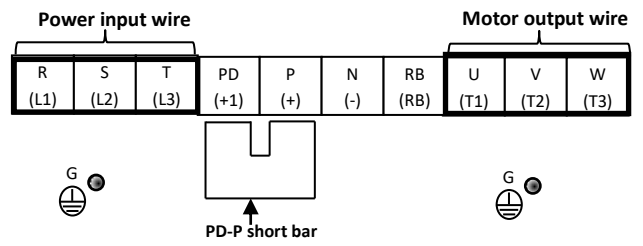
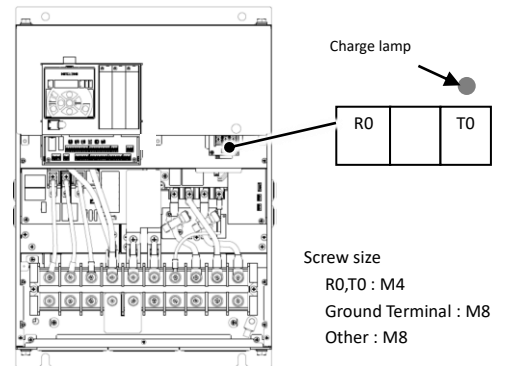
Model LH1- *H**
400V class: 075H,110H,150H



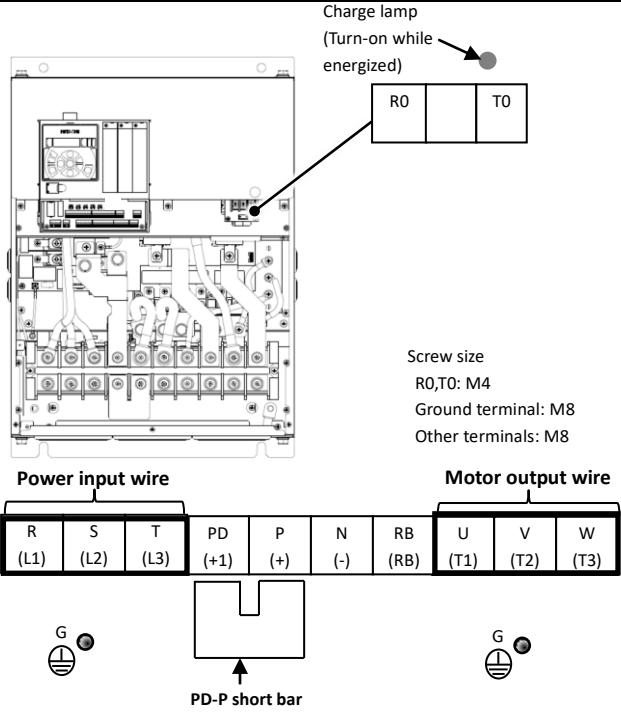
Model LH1- *H**
400V class: 370H



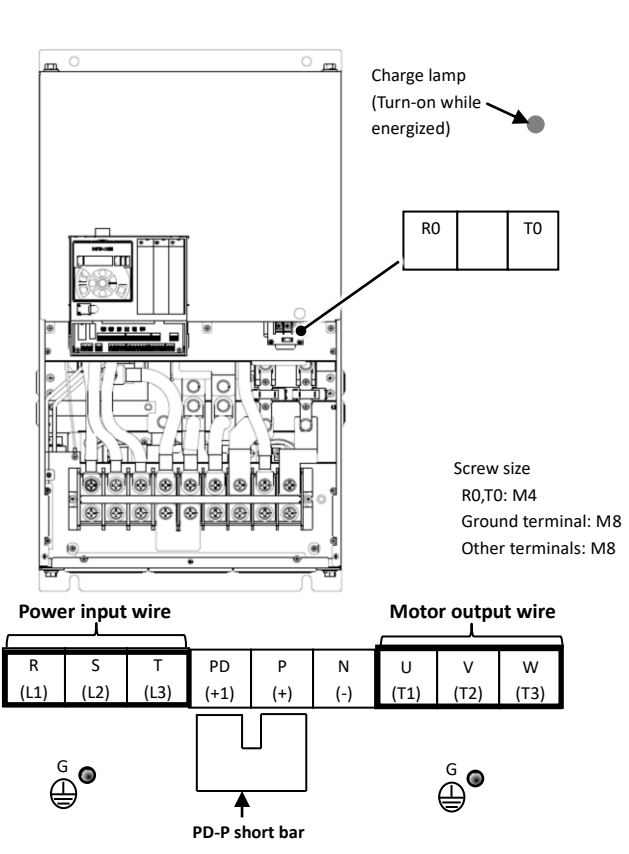
Model LH1- *H**
400V class: 450H



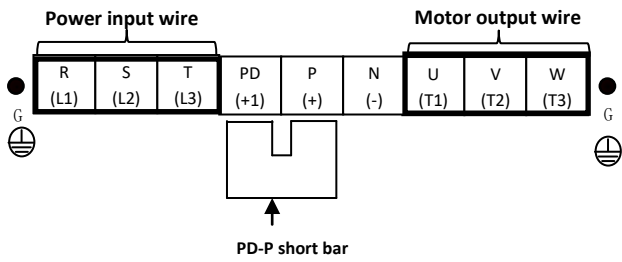
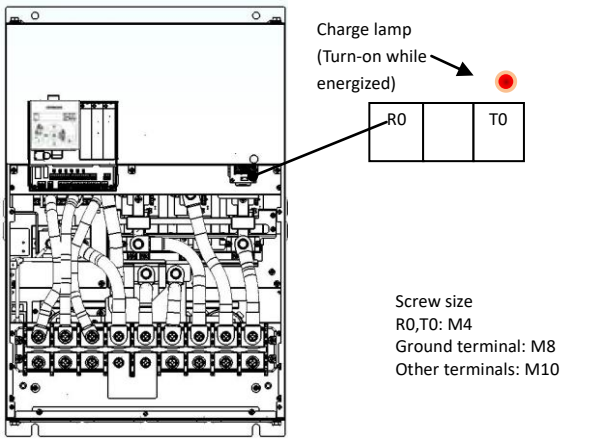
Model LH1- *H**
 400V class: 550H,750H



Model LH1- *H/****H**
 400V class: 900H,1100H

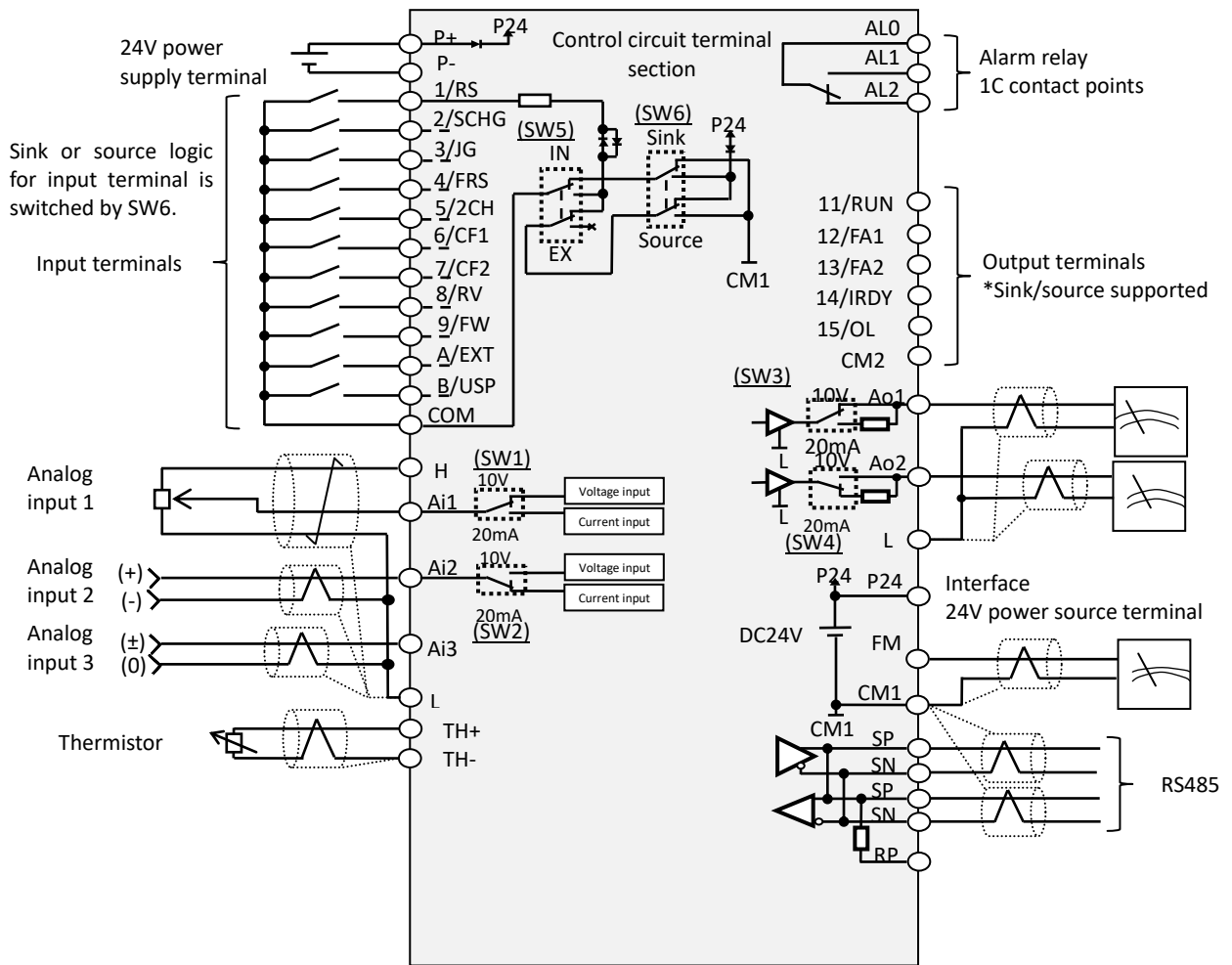


Model LH1- **H**
 400V class: 1320H,1600H



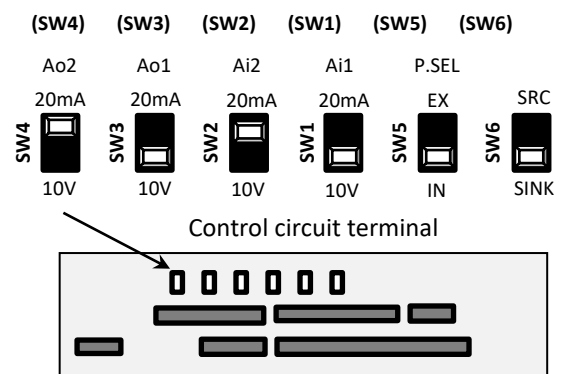
2.10 Wiring of the control circuit

◇ An example for sink logic.



Switch configuration

Label	Switch Name	Description
Ai1 (SW1)	Analog input 1 switch	It changes the input specification of Analog input 1 (Ai1 terminal). 10V: Voltage input is available. 20mA: Current input is available.
Ai2 (SW2)	Analog input 2 switch	It changes the input specification of Analog input 2 (Ai2 terminal). 10V: Voltage input is available. 20mA: Current input is available.
Ao1 (SW3)	Analog output 1 switch	It changes the output specification of Analog output 1 (Ao1 terminal). 10V: Voltage output is applied. 20mA: Current output is applied.
Ao2 (SW4)	Analog output 2 switch	It changes the output specification of Analog output 2 (Ao2 terminal). 10V: Voltage output is applied. 20mA: Current output is applied.
P.SEL (SW5)	Power supply input switch	It changes the power source for input terminals. IN: Internal power source. EX: External power source. (While setting EX, it requires an external power supply between input terminals and COM terminal)
SRC/SINK (SW6)	Input terminal Sink/Source logic switching	It changes the sink or source logic for input terminal. Is enabled when SW5 is in IN position. SINK: Switch to Sink logic. SRC: Switch to Source logic.

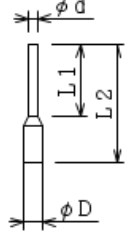


◇ Make sure to power-off previous to change any switches. Otherwise, may damage the inverter.

■ Recommended terminals for wiring

- The following ferrule terminals are recommended for signal cable for easy wiring and improved reliability of connectivity.
- The control circuit terminal adopts screw type wiring terminal blocks.

Ferrule terminal with sleeves

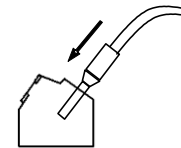
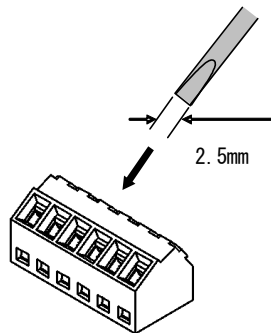
Power cable size mm ² (AWG)	Ferrule terminal Model*	L1 [mm]	L2 [mm]	φ d [mm]	φ D [mm]	
0.25 (24)	AI 0,25-8YE	4	12.5	0.8	2.0	
0.34 (22)	AI 0,34-8TQ	4	12.5	0.8	2.0	
0.5 (20)	AI 0,5-8WH	4	14	1.1	2.5	
0.75 (18)	AI 0,75-8GY	4	14	1.3	2.8	

*) Manufacturer: Phoenix Contact

Crimping tool: CRIMPFOX UD 6-4 or CRIMPFOX ZA 3

■ Wiring procedure

1. Open the insertion hole of the control circuit terminal block into the socket with a slotted screwdriver (with a wide of 2.5mm or less).
 2. Insert the wire or ferrule terminal into the wire insertion hole (round) while screwing up with a slotted screwdriver.
- Even for pulling out the wire from the socket with a slotted screwdriver (the insertion hole will be opened).

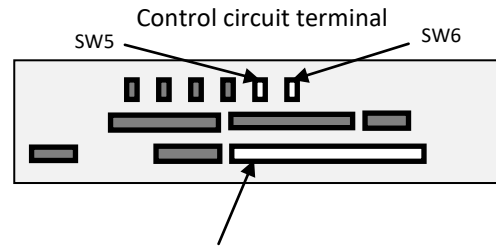


Insert the wire or ferrule terminal into the wire insertion hole while screwing up with a slotted screwdriver.

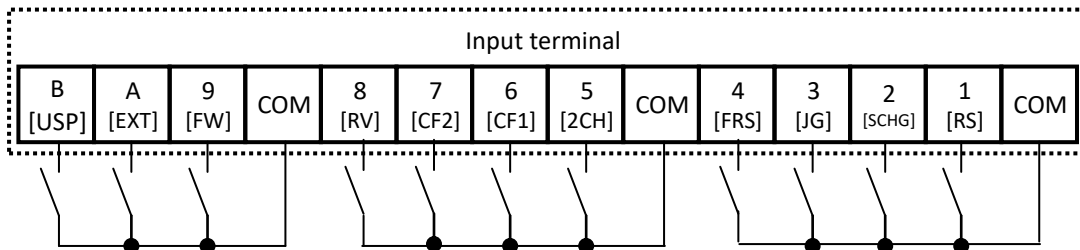
2.11 Control circuit wiring section

Input terminals

- All COMs have the same electric potential.
- Change SW5 to external power source (EX) to connect the power source between Input terminals 1 to 9, A or B, and COM.
- Sink or source logic of the input terminal is switched by SW6.



(Wiring example)



- [] it means factory default settings.

		Terminal label	Terminal name	Description	Electric characteristics
Intelligent input terminal	Contact	9, 8, 7, 6, 5, 4, 3, 2, 1	Input terminal	Terminal functions are selectable according to the parameter settings for each terminal. Switching SW6 to SRC or SINK allows you to select SINK or Source logic.	Voltage between each input and COM terminals • ON voltage Min.DC18V • OFF voltage Max.DC3V • Max. allowable voltage DC27V • Load current 5.6mA(at DC27V)
	Pulse	A	Pulse input-A	This is a terminal for pulse input. A and B terminals can be used also as an input terminal. Terminal functions are selectable according to the parameter settings for each terminal. The maximum input pulse rate is 32kpps.	Voltage between an input and COM terminals • ON voltage Min.DC18V • OFF voltage Max.DC3V • Max. allowable voltage DC27V • Load current 5.6mA(at DC27V) • Max input pulse rate 32kpps
		B	Pulse input-B		
	Common	COM	Input (common)	This is a common terminal for digital input terminals (1,2,3,4,5,6,7,8,9,A and B). Three COM terminals are available.	

Terminal's default function ([symbol: setting No.]

[RS:028]Reset

- Reset at every trip.

[SCHG:015]Command source change

- Change to the main speed command [AA101](OFF) or sub-speed command[AA102](ON).

[JG:029]Jogging

- Run at a frequency of [AG-20] upon receipt of the operation command by [JG]ON.

[FRS:032]Free-run stop

- [FRS]ON sets the motor in a free-run state.

[2CH:031]Two-step acceleration/deceleration

- [2CH]ON enables acceleration/deceleration time-2[AC124][AC126].

[EXT:033]External trip

- [EXT]ON issues Trip[Er012].

[FW:001]Forward rotation and [RV:002]Reverse rotation

Forward	Reverse	Description
OFF	OFF	No command
ON	OFF	Forward rotation command operation
OFF	ON	Reverse rotation command operation
ON	ON	No command (inconsistent logic)

[CF1:003]Multispeed-1 and [CF2:004]Multispeed-2 commands

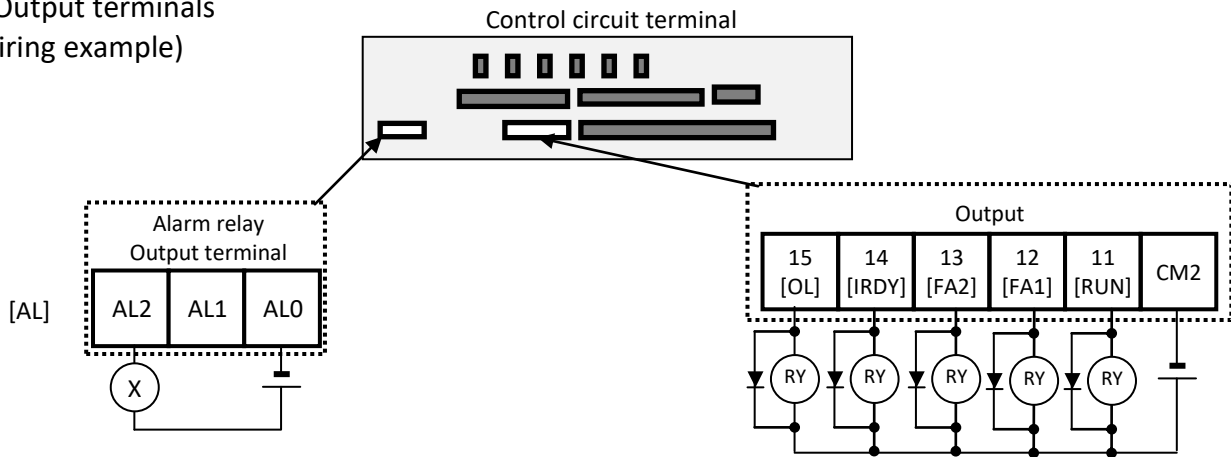
Multispeed-1 CF1	Multispeed-2 CF2	Description
OFF	OFF	The set frequency source is enabled.
ON	OFF	The frequency source of [Ab-11] is enabled.
OFF	ON	The frequency source of [Ab-12] is enabled.
ON	ON	The frequency source of [Ab-13] is enabled.

*) Setting CF3 and 4 allows you to set up to 16-speed.

[USP:034]Unattended start protection

- In a [USP]ON state, if an operation command has been input before the power supply is ON, Trip[Er013] is issued.

■ Output terminals
(Wiring example)



(X) : Equipment including lamps, relays and PLC
(RY) : Relays

• [] it means factory default settings.

			Terminal label	Terminal name	Description	Electric characteristics
Intelligent output terminals	Digital output	Open collector	15 14 13 12 11	Output terminal	Terminal functions are selectable according to the parameter settings for each terminal. This is available for both SINK and Source logics.	Open collector output Between each terminal and CM2 • Voltage drop when turned on: 4 V or less • Max. allowable voltage 27V • Max. allowable current 50mA
			CM2	Output (common)	This is a common terminal for output terminals 11 to 15.	
			AL0 AL1 AL2	1c relay terminal	Relays for C contact output	Maximum contact capacity AL1/AL0: • AC250V, 2A(resistance) • AC250V, 0.2A(inductive load) AL2/AL0: • AC250V, 1A(resistance) • AC250V, 0.2A(inductive load) Minimum contact capacity (common) • AC100V, 10mA • DC5V, 100mA

■ Terminal's default function

[RUN:001]Running signal

- Turns ON during operation (PWM output).

[FA1:002]Frequency-arrival signal

- Turns ON when the output frequency reaches the control frequency.

[FA1:003]Frequency-arrival signal 2

- Turns ON when the output frequency reaches the control frequency [CE-10] to [CE-13].

[IRDY:007]

- Turns ON when is ready for operation.

[OL:035]Overload notice advance signal

- Turns ON when the current exceeds the overload warning level.

[ZS:040]0Hz speed detection signal

- Turns ON when the inverter output frequency falls below the threshold frequency [CE-33].

[AL:017]Operation

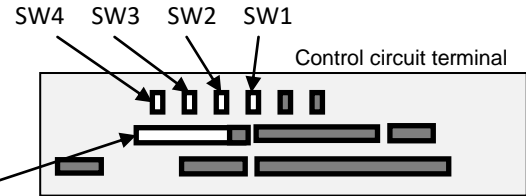
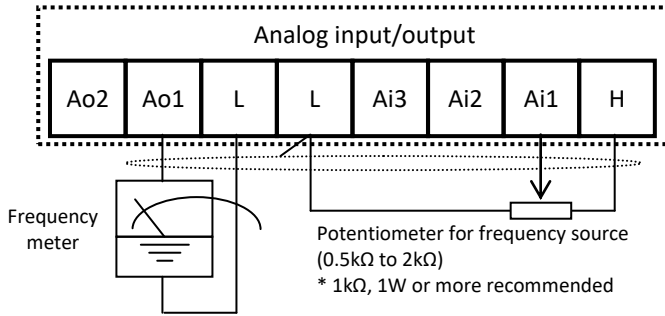
- In case of [CC-17]=00 (factory setting)

Power supply	Status	AL ₀ -AL ₁	AL ₀ -AL ₂
ON	Normal operation	Open	Closed
ON	Tripping	Closed	Open
OFF	—	Open	Closed

- In case of [CC-17]=01

Power supply	Status	AL ₀ -AL ₁	AL ₀ -AL ₂
ON	Normal operation	Closed	Open
ON	Tripping	Open	Closed
OFF	—	Open	Closed

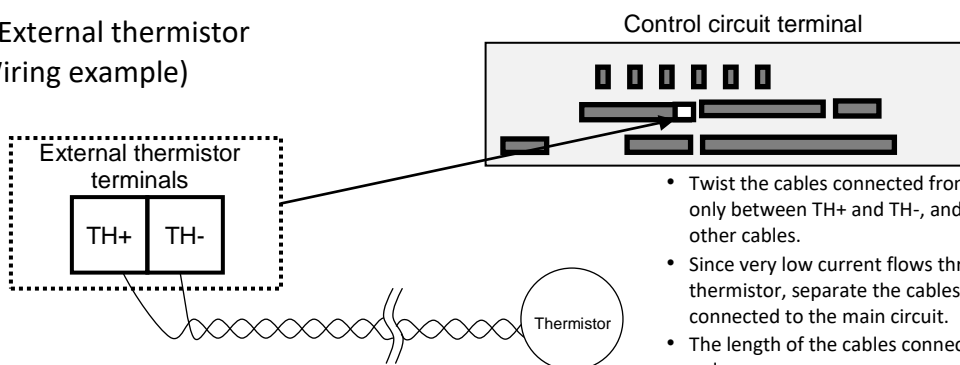
■ Analog input/output
(Wiring example)



- When variable resistor is connected on H-Ai1-L terminal, voltage input is given to inverter, Sw1 for analog input 1 (Ai1) is to be set on "voltage" side therefore.
- If a frequency meter connected in left example is current type (4 to 20mA), set SW3 for analog output 1 (Ao1) as current output.

	Terminal label	Terminal name	Description	Electric characteristics	
Voltage/current switchable analog input/output terminal	Power supply	L	COM for analog power supply	COM terminals for analog input terminals (Ai1,Ai2,Ai3) and analog output terminals (Ao1,Ao2). Two L terminals are available.	
		H	Speed setting power supply	DC10V power supply. Used for voltage input with analog input terminals (Ai1,Ai2,Ai3) using a variable resistor.	Max. allowable input current 20mA
	Analog input	Ai1	Analog input terminal 1 (Voltage/current selector SW1)	Either Ai1 or Ai2 can be used by switching the selector switch to DC0 to 10V voltage input or 0- to 20mA current input. Used as speed input and feedback input.	For voltage input: • Input impedance Approx.10kΩ • Allowable input voltage DC-0.3V to 12V
		Ai2	Analog input terminal 2 (Voltage/current selector SW2)		For current input: • Input impedance Approx.100Ω • Max. allowable input current 24mA
		Ai3	Analog input terminal 3	DC-10 to 10V voltage input is available. Used as speed input and feedback input.	Voltage input only: • Input impedance Approx.10kΩ • Allowable voltage input DC-12V to 12V
	Analog output	Ao1	Analog output terminal 1 (Voltage/current selector SW3)	Either Ao1 or Ao2 can be used as an output for inverter monitoring data by switching the selector switch to DC0 to 10V voltage output or 0 to 20mA current output.	For voltage output: • Max. allowable output current 2mA • Output voltage accuracy ±10% (Ambient temperature: 25±10 degrees C)
Ao2		Analog output terminal 2 (Voltage/current selector SW4)	For current input: • Allowable load impedance 250Ω or less • Output current accuracy ±20% (Ambient temperature: 25±10 degrees C)		

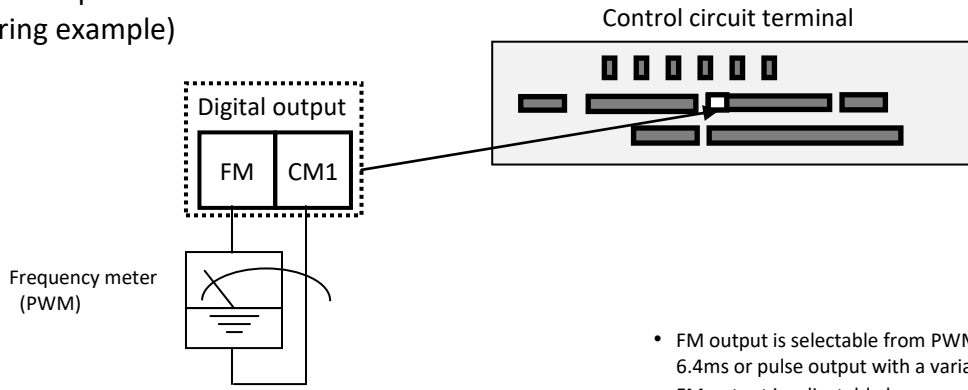
■ External thermistor
(Wiring example)



- Twist the cables connected from a thermistor to the TH terminal only between TH+ and TH-, and separate the twisted cables from other cables.
- Since very low current flows through the cables connected to the thermistor, separate the cables from those (power line cables) connected to the main circuit.
- The length of the cables connected to the thermistor must be 20 m or less.

	Terminal label	Terminal name	Description	Electric characteristics
Thermistor terminal	Analog input	TH+	External thermistor input	DC0 to 5V [Input circuit]
		TH-	Common terminal for external thermistor input	

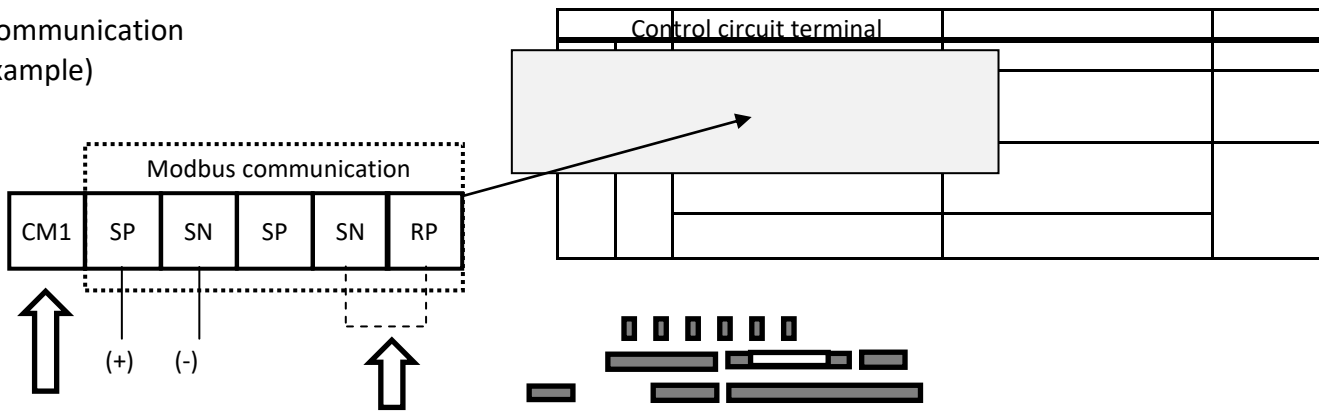
■ FM output terminals
(Wiring example)



- FM output is selectable from PWM output with a fixed cycle of 6.4ms or pulse output with a variable cycle.
- FM output is adjustable by parameter settings.

			Terminal label	Terminal name	Description	Electric characteristics
FM output terminal	FM output	Monitor output	FM	Digital monitor (voltage)	Digital monitor output is selectable from PWM output with 6.4ms cycle or pulse output with a variable duty cycle of approx. 50%.	Pulse train output DC0 to 10V <ul style="list-style-type: none"> • Max. allowable output current 1.2mA • Maximum frequency 3.60kHz
			CM1	COM for digital monitor	This is a common terminal for digital monitor. This is also used as 0V reference potential for P1.	

Serial communication
(Wiring example)



Connect CM1
Into the SG (signal ground) of
external devices,

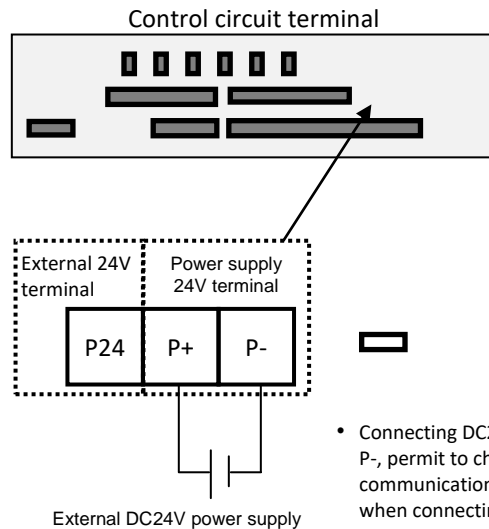
For enabling the termination
resistor, short-circuit between
RP and SN.

- SP and SN with the same name are internally connected, which are available for a plurality of wiring.
- For the use of Modbus communication, contact to your supplier or

	Terminal label	Terminal name	Description	Electric characteristics
RS485 communication	Serial communication	SP	SP terminal: RS-485 differential(+) signal	Termination resistor (120Ω) integrated Enabled: RP-SN shorted Disabled: RP-SN opened
		SN	SN terminal: RS-485 differential(-) signal	
		RP	RP terminal: Connect to SP through a termination resistor	
		CM1 (CM1)	CM1 terminal: Connect to the signal ground of external communication devices. There are two SP and two SN terminals, which are connected internally. The maximum baud rate is 115.2kbps.	

local Hitachi distributor or service station to obtain a more detailed description..

24V power supply input/output
(Wiring example)



- Connecting DC24V external power supply into the terminal P+ and P-, permit to change parameters and perform optional communication without the main power source. Is also allowable when connecting into the main power supply.

	Terminal label	Terminal name	Description	Electric characteristics	
24V power supply	Power input	P24	24V output power source terminal	This terminal supplies DC24V power for contact signals.	Max. output 100mA
		CM1	Reference terminal for 24V output	This serves as a 0V reference terminal for contact signal. This is used also as a common terminal for FM output.	
		P+	Terminal for external 24V input (24V)	Input external DC24V power supply to the inverter. 24V power supply input permit to change parameter settings and perform optional communication operations without control power supply.	Allowable input voltage DC24V±10% Max. allowable current 1A
		P-	Terminal for external 24V input (0V)		

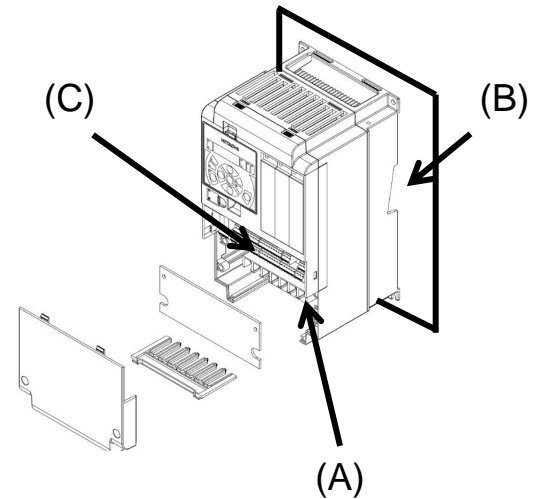
2.12 Residual risk

Parts subject to residual risk

Please check for any residual risk upon completion of the installation before power on.

Residual risk checklist No.

Target section	Name of part	DANGER	WARNING	CAUTION
(A)	Main circuit terminal block	8,10		
(B)	Heat sink	4		1
(C)	Input/output terminal block	11,13		
-	Unspecified parts	9,12,14		2,3,5,6,7



Residual risk checklist

No.	Operational phase	Work	Part	Residual risk	Details of harm or damage	Preventive measures	✓
1	Installation	Installation	(B)	CAUTION	Damage due to rough transportation.	Do not let the product fall. Do not apply force when handing the cover and operator keypad.	<input type="checkbox"/>
2	Installation	Installation	-	CAUTION	Shortened lifetime of parts due to the use in places where the product is exposed to direct sunlight or the temperature is not within the specified range.	Verify that the ambient temperature is within the specified range throughout the year by means of cooling or ventilation.	<input type="checkbox"/>
3	Installation	Installation	-	CAUTION	Short-circuit failure due to the use in places where the temperature is not within the specified range or condensation occurs.	Verify that the ambient temperature is within the specified range throughout the year by means of cooling or ventilation. Install the product in places where no condensation occurs.	<input type="checkbox"/>
4	Installation	Installation	(B)	DANGER	A cooling fan reaching a high temperature exceeding 150 °C causes a fire on a flammable wall.	Install the product on a non-flammable metal wall.	<input type="checkbox"/>
5	Installation	Installation	-	CAUTION	Damage to parts due to entry of dust and corrosive gases.	Install the product inside a totally enclosed panel.	<input type="checkbox"/>
6	Installation	Installation	-	CAUTION	Shortened lifetime of parts due to reduced cooling capability by placing the product horizontally.	Install the product vertically.	<input type="checkbox"/>
7	Installation	Installation	-	CAUTION	A cooling fan failed due to waterdrops or oil mist when the heat sink is positioned outside.	With the heat sink positioned outside, install the product in places free from waterdrops and oil mist.	<input type="checkbox"/>
8	Installation Maintenance	Wiring	(A)	DANGER	A fire is caused inside by an arc due to screws loosened by vibrations.	Regularly check the tightening of screws.	<input type="checkbox"/>
9	Installation Maintenance	Wiring	-	DANGER	A fire from flammable materials caused by an arc due to screws loosened by vibrations.	Regularly check the tightening of screws. Do not place flammable materials near the product.	<input type="checkbox"/>
10	Use Maintenance	Wiring Inspection	(A)	DANGER	Electric shock by touching a high voltage part with the cover removed.	Do not open the cover when the power is on. Wait for 10(*1)/15 (*2)minutes or more after the power is off, and then confirm that the voltage between P and N is significantly less than 45Vdc to start the work.	<input type="checkbox"/>
11	Use Maintenance	Wiring Inspection	(C)	DANGER	Electric shock by touching a high voltage part with a tool with the cover removed.	Do not open the cover when the power is on. Wait for 10(*1)/15 (*2) minutes or more after the power is off, and then confirm that the voltage between P and N is significantly less than 45Vdc to start the work.	<input type="checkbox"/>

◇ The installation, wiring and setting work must be conducted by qualified engineers.

◇ (*1)LH1-055H~LH1-300H

◇ (*2)LH1-370H~LH1-1600H

No.	Operational phase	Work	Part	Residual risk	Details of harm or damage	Preventive measures	✓
12 (a)	Installation	Wiring	-	DANGER	Motor insulation damage due to surge caused by long distance motor wiring.	When the motor wiring distance exceeds 20m or more, try to shorten the wiring. Use LCR filter or output AC reactor.	<input type="checkbox"/>
12 (b)	Installation	Wiring	-	DANGER	Motor damage due to insulation failure caused by motor voltage unmatched.	Use motor according to the inverter voltage class.	<input type="checkbox"/>
12 (c)	Installation	Wiring	-	DANGER	Motor damage due to unstable power supply, caused by power supply unbalance, low voltage or excessive voltage drop.	Confirm the inverter power supply voltage, feeding method and capacity.	<input type="checkbox"/>
12 (d)	Use Maintenance	Wiring Inspection	-	DANGER	Motor damage due to continue ran in open phase on motor output line.	Verify the motor output line that not being in open phase.	<input type="checkbox"/>
12 (e)	Use Maintenance	Setting	-	DANGER	Motor damage due high current on motor caused by inadequate parameter setting.	Set adequate value for related function parameter of motor electronic thermal level [bC-01] to [bC125]. Set adequate value for base frequency, motor rated current, control mode, motor constant, load rating, direct current output related parameters. (representative parameter) Motor related parameter: IM: [Hb102] to [Hb118] SM(PMM): [Hd102] to [Hd118] Control mode: [AA121] Load rating: [Ub-03] DC braking: [AF101] to [AF109]	<input type="checkbox"/>
13	Use	Operation	(C)	DANGER	The motor once stopped runs automatically.	If automatic restart after motor stop is set by a function, make sure to clearly describe that in the system.	<input type="checkbox"/>
14	General	General	-	DANGER	Damage or injury occurrence from a hidden risk.	Confirm that system is structured for fail safe considering a risk assessment.	<input type="checkbox"/>
15	General	General			Damage or injury occurrence by missing acquisition of information related to risk	Obtain the latest version of Basic guide to make those information available. Inform users appropriately.	<input type="checkbox"/>

- ✧ The installation, wiring and setting work must be conducted by qualified engineers.
- ✧ For using [SET] function of input terminal, similarly, set the related 2nd parameters settings.

(Memo)

Chapter 3

See “Chapter 4 Settings” for detailed operating instructions

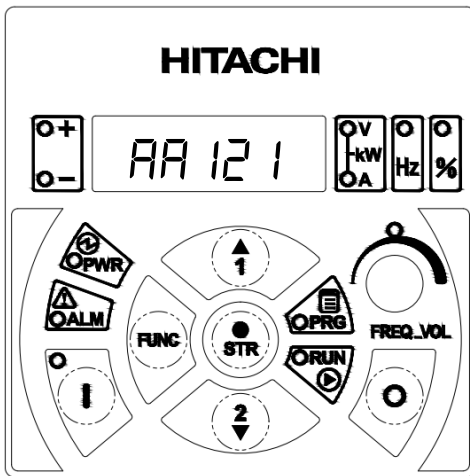
Operation Setting and Examples of I/O Adjustment

This chapter describes basic settings, frequency source required for operation, examples of run command source settings and examples of adjusted I/O terminals.

■ Basic settings 2

3.1 Set the motor data

- Set the parameters listed in the table below on the parameter setting screen according to the motor you use (e.g. induction motor and permanent-magnet motor).



■ Parameter

Induction motor (IM)

Parameter	Details	Setting data
[AA121]	Control pulse setting	00: V/f control constant torque characteristic, etc.
[Hb102]	Capacity selection	0.01 to 160.00 (kW)
[Hb103]	Motor poles setting	2 to 48 (poles)
[Hb104]	Base frequency	10.00 to 590.00 (Hz)
[Hb105]	Maximum frequency	10.00 to 590.00 (Hz)
[Hb106]	Rated voltage	1 to 1000 (V)
[Hb108]	Rated current	0.01 to 10000.00 (A)

Synchronous motor (permanent-magnet motor) (SM(PMM))

Parameter	Details	Setting data
[AA121]	Control pulse setting	11: SM(PMM) Sensorless vector control
[Hd102]	Capacity selection	0.01 to 160.00 (kW)
[Hd103]	Motor poles setting	2 to 48 (poles)
[Hd104]	Base frequency	10.00 to 590.00 (Hz)
[Hd105]	Maximum frequency	10.00 to 590.00 (Hz)
[Hd106]	Rated voltage	1 to 1000 (V)
[Hd108]	Rated current	0.01 to 10000.00 (A)

Note: Motor constant setting is required for driving SM.

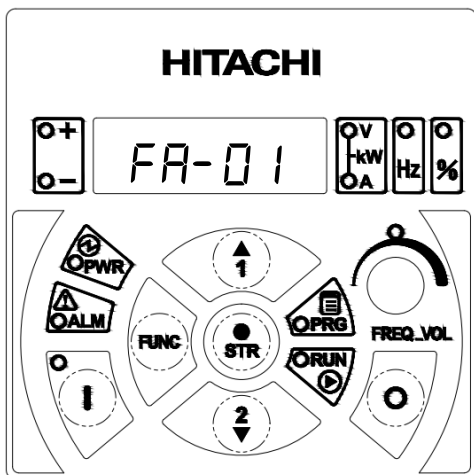
The frequency source and run command source are necessary to drive the motor.

■ Frequency source 1

3.2 Frequency setting from keypad

- Select [AA101] = 07 Frequency source from parameter setting screen.
- Changing frequency setting from each source
 - (1) [FA-01] for frequency setting from keypad or
 - (2) [Ab110] for frequency setting at multispeed profile.

Eg.) For [FA-01]



■ Frequency source

- Change the frequency source setting [Ab110] to "Multispeed-0 speed No.1" by using the up and down arrow keys.

■ Parameter

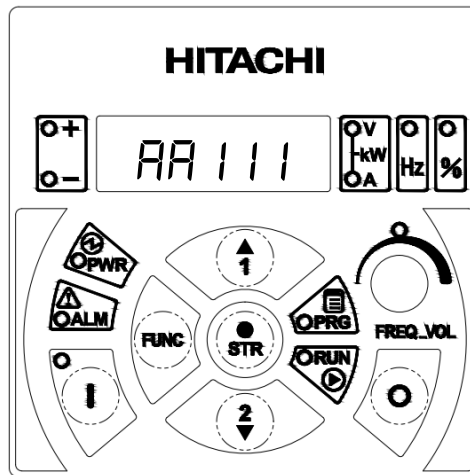
Parameter	Details	Setting data
[AA101]	Frequency source setting from keypad	07
[FA-01]*)	Main speed command	0.00Hz
[Ab110]*)	Multispeed-0 speed No. 1	0.00Hz

*) While [AA101] = 07, a change made in either [FA-01] or [Ab110] will be automatically reflected in the other. When no change can be made or is reflected in [FA-01], the operator keypad is not specified as a command source by the terminal function or [AA101].
You need to set the frequency value to a value other than 0.00.

■ Run command source 1

3.3 Run using the operator keypad

- Select [AA111] = 02 on the parameter setting screen to RUN from keypad.



■ Run/stop command

Press the RUN key and STOP key on the operator keypad to start and stop the inverter, respectively.

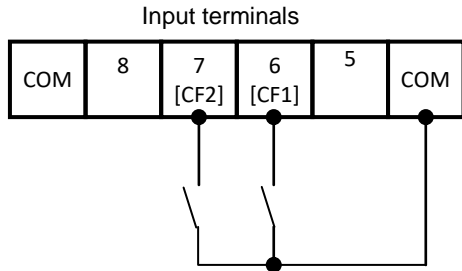
■ Parameter

Parameter	Details	Setting data
[AA111]	Run by pressing the RUN key of keypad.	02

■ Frequency source 2

3.4 Multispeed terminals command

- While multispeed command is off, the speed command will follow the parameter setting [AA101].
- To use multispeed 0, select [AA101] = 07 frequency source selection.



■ Frequency source

- Change the frequency command by turning ON/OFF from multispeed input terminals [CF1] and [CF2].

■ Parameter

Parameter	Details	Setting data
[AA101]	Frequency setting from keypad	07
[FA-01] *1)	Main speed source	0.00Hz
[Ab110] *1)	Multispeed 0 setting 1 st motor ([CF1]OFF/[CF2]OFF)	0.00Hz
[Ab-11] *2)	Multispeed 1 setting ([CF1]ON/[CF2]OFF)	0.00Hz
[Ab-12] *2)	Multispeed 2 setting ([CF1]OFF/[CF2]ON)	0.00Hz
[Ab-13] *2)	Multispeed 3 setting ([CF1]ON/[CF2]ON)	0.00Hz
[CA-06]	The terminal 6 for [CF1]	001
[CA-07]	The terminal 7 for [CF2]	002

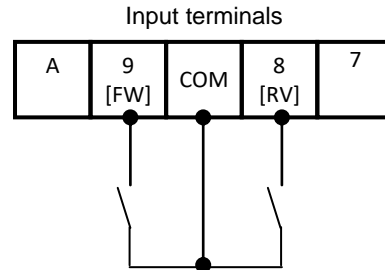
*1) While [AA101] = 07, a change made in either [FA-01] or [Ab110] will be automatically reflected in the other. When no change can be made or is reflected in [FA-01], the operator keypad is not specified as a command source by the terminal function or [AA101].

*2) Set the frequency value for multispeed selection.

■ Run command source 2

3.5 Operate using FW/RV terminal

- Select [AA111] = 00 [FW][RV] terminal from parameter setting screen.



■ Run/stop command

- Run or stop by turning either [FW] terminal or [RV] terminal ON/OFF.

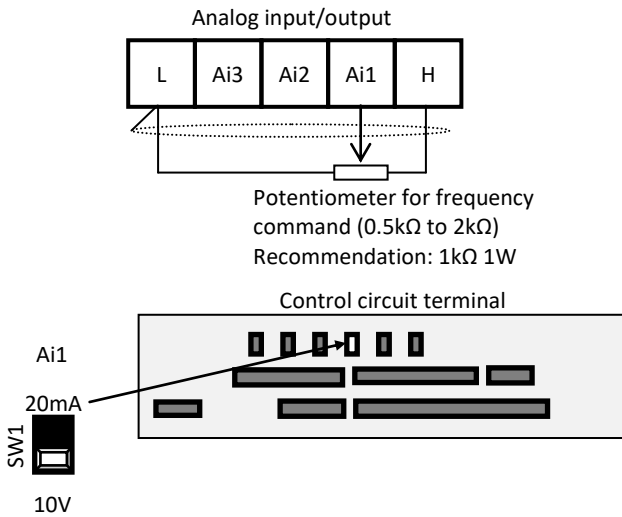
■ Parameter

Parameter	Details	Setting data
[AA111]	Run using FW/RV terminal	00
[CA-09]	The terminal 9 for [FW]	001
[CA-08]	The terminal 8 for [RV]	002

■ Frequency source 3

3.6 Potentiometer frequency command

- Select [AA101] = 01 Ai1 terminal input from parameter setting screen.
- * Select voltage input (0 to 10V) for Ai1 switch of control circuit board.



■ Frequency command

- Adjust the position of the knobs on the potentiometer to change the frequency command.

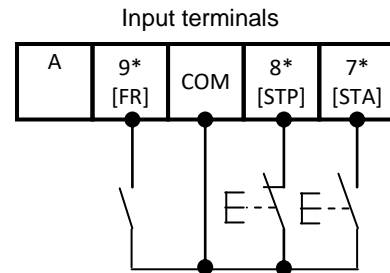
■ Parameter

Parameter	Details	Setting data
[AA101]	Set as frequency command for Ai1 input terminal.	01

■ Run command source 3

3.7 Operate using 3WIRE terminal

- Select [AA111] = 01 to 3WIRE function from parameter setting screen. In this section, 3WIRE functions are assigned into the input terminals.
- * Terminal 7[CA-07] = 016; terminal 8[CA-08] = 017; terminal 9[CA-09] = 018



■ Run/stop command

- To run turn ON [STA] terminal, and turn ON [STP] terminal to stop. Select the rotation direction with [FR] terminal.

■ Parameter

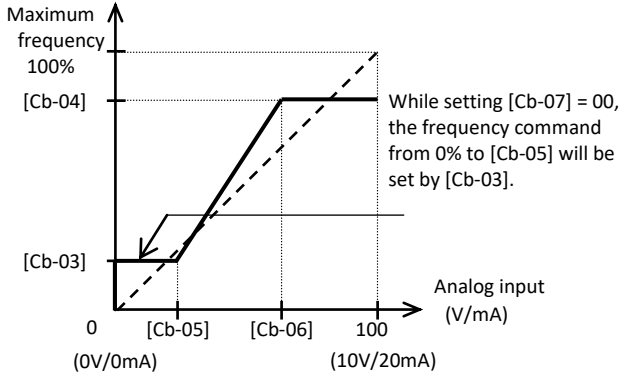
Parameter	Details	Setting data
[AA111]	Set the operation command for 3WIRE function.	01
[CA-09]	The terminal 9 is [FR].	018
[CA-08]	The terminal 8 is [STP].	017
[CA-07]	The terminal 7 is [STA].	016

Example for adjusting I/O terminals 1

3.8 Adjust the analog input (Ai1/Ai2)

E.g.) Adjust operation (E.g. for Ai1)

- Set the ratio to input to limit the operating range of the frequency command. (When selecting the frequency through terminal input)

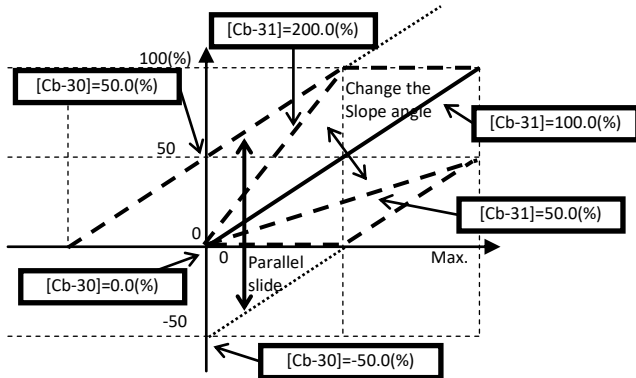


Parameter

Parameter		Details
Ai1	Ai2	
[Cb-03]	[Cb-13]	Set the frequency source ratio to the start ratio of the analog input.
[Cb-04]	[Cb-14]	Set the frequency source ratio to the end ratio of the analog input.
[Cb-05]	[Cb-15]	Set the start ratio of the analog input 0 to 10V/0 to 20mA.
[Cb-06]	[Cb-16]	Set the end ratio of the analog input 0 to 10V/0 to 20mA.

- Ai2 adjustment can be done in similar way to Ai1 by using Ai2 parameters in order to Ai1.

E.g.) Make a fine adjustment (E.g. for Ai1)



Parameter

Parameter		Details
Ai1	Ai2	
[Cb-30]	[Cb-32]	Adjust the zero-point reference line for voltage input 10V/current input 20mA and the maximum frequency.
[Cb-31]	[Cb-33]	Adjust the slope of the reference line for voltage input 10V/current input 20mA.

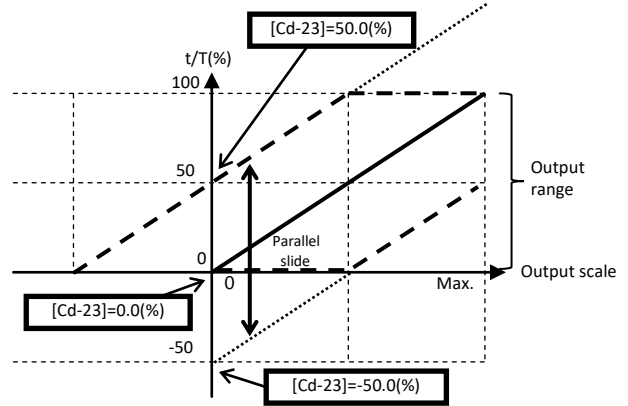
*) Use the switch on control circuit terminal board to change for voltage/current input.

Example for adjusting I/O terminals 2

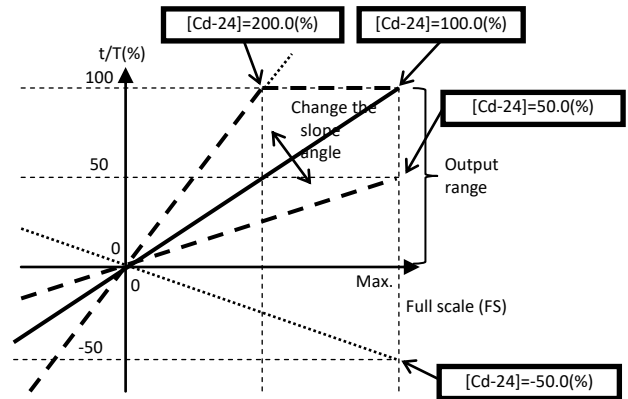
3.9 Adjust the analog output (Ao1/Ao2/FM)

E.g.) Adjust operation (E.g. for Ao1)

- Set a value equivalent to 0% output first.



- Then, adjust a value equivalent to 100% output.



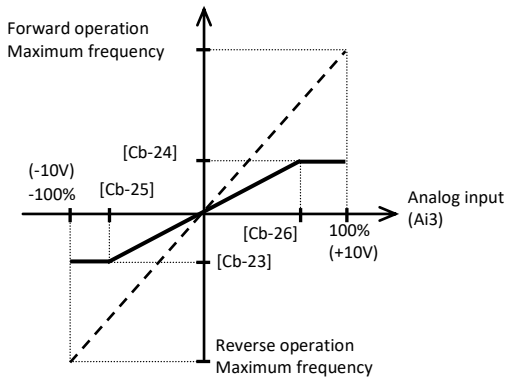
Parameter

Parameter			Details
Ao1	Ao2	FM	
[Cd-23]	[Cd-33]	-	Adjust the zero-point reference line for voltage output 10V/current output 20mA and data at 100%.
[Cd-24]	[Cd-34]	-	Adjust the slope for voltage output 10V/current output 20mA and data at 100%.
-	-	[Cd-13]	Adjust the zero-point reference line for 100% duty cycle output and data at 100%.
-	-	[Cd-14]	Adjust the slope for 100% duty cycle output and data at 100%.

■ Example for adjusting I/O terminals 3

3.10 Adjust the analog input (Ai3)

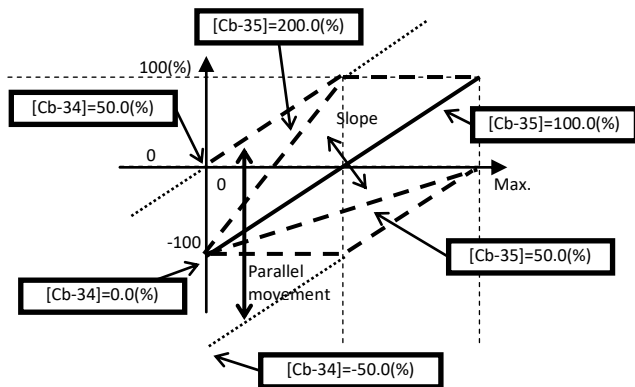
E.g.) Adjust operation (E.g. for Ai3)



■ Parameter

Parameter	Details
Ai3	
[Cb-23]	Set the frequency source ratio to the start ratio of the analog input.
[Cb-24]	Set the frequency source ratio to the end ratio of the analog input.
[Cb-25]	Set the start ratio of the analog input -10V to 10V.
[Cb-26]	Set the end ratio of the analog input -10V to 10V.

E.g.) Make a fine adjustment



■Parameter

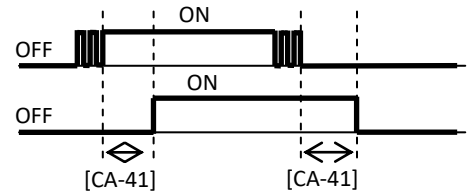
Parameter	Details
Ai3	
[Cb-34]	Adjust -10V on the reference line for -10V/10V and the frequency.
[Cb-35]	Adjust the slope of the reference line.

■ Example for adjusting I/O terminals 4

3.11 Prevent input terminal malfunction

- Set a response time for input terminal to prevent a malfunction due to noise input.

Operation of the input terminal 1
Operation of the internal functions



■ Parameter

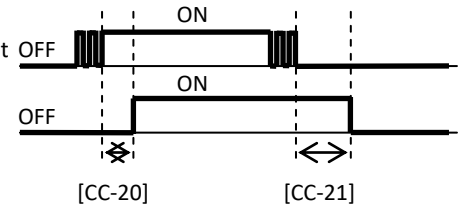
Input terminal	Response time	Input terminal	Response time
1	[CA-41]	7	[CA-47]
2	[CA-42]	8	[CA-48]
3	[CA-43]	9	[CA-49]
4	[CA-44]	A	[CA-50]
5	[CA-45]	B	[CA-51]
6	[CA-46]		

■ Example of adjusted I/O terminals 5

3.12 Stabilize an output terminal

- Set the delay time to stabilize an output terminal from a sensitive reaction of internal functions.

Selected output function
Operation of the output terminal 11



■Parameter

Output terminal	On-delay time	Off-delay time
11	[CC-20]	[CC-21]
12	[CC-22]	[CC-23]
13	[CC-24]	[CC-25]
14	[CC-26]	[CC-27]
15	[CC-28]	[CC-29]
16A-16C *1)	[CC-30]	[CC-31]
AL1-AL0/ AL2-AL0	[CC-32]	[CC-33]

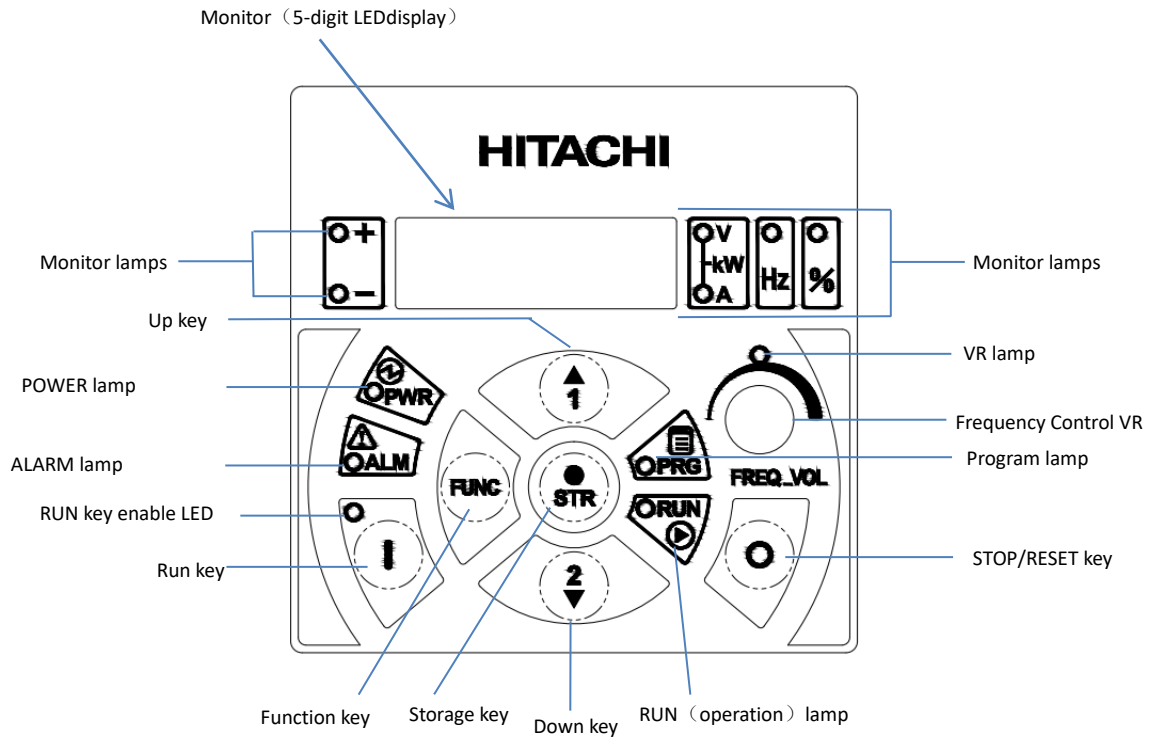
*1) LH1 Series do not have this terminal.

Chapter4 Settings

4.1 Keypad overview

4.1.1 Names and Functions of components

How to operate the digital operator



Name	Function
POWER lamp	Lights when the control circuit power is on.
ALARM lamp	Lights to indicate that the inverter has tripped.
RUN (operation) lamp	Lights to indicate that the inverter is operating.
VR lamp	Lights when the VR is effective.
program lamp	Lights when the monitor shows a value set for a function. This lamp starts blinking to indicate a warning (when the set value is invalid).
Monitor	Displays a frequency, output current, or set value.
Monitor lamps	indicates the type of value and units displayed on the monitor. Hz: frequency V: voltage A: current kW: electric power %: percentage +: positive value -: negative value
RUN key enable LED	Lights up when the inverter is ready to respond to the RUN key. (When this lamp is on, you can start the inverter with the RUN key on the digital operator.)
RUN key	Starts the inverter to run the motor.This key is effective only when the operating device is the digital operator. (To use this key,confirm that the operating device indicator lamp is on.)
STOP/RESET key	Decelerates and stops the motor or resets the inverter from alarm status.
Function key	Makes the inverter enter the monitor,function,or extended function mode.
Storage Key	Stores each set value.(Always press this key after changing a set value)
Up/Down Key	Switches the inverter operation mode(among monitor,function,and extended function modes) or increases or decreases the value set on the monitor for a function.

4.1.2 Code display system

The initial display on the monitor screen after power-on depends on the setting of function "UA-91". When the setting of function "UA-91"="dA-01"(factory setting),the monitor initially show 0.00 as the setting of "dA-01" . Pressing the FUNC key in this status changes The display to dA-01 .

Note: The display contents on the monitor depend on the setting of function "UA-10"(function code display restriction),"UA-91"(initial-screen selection),and"UA-30"(automatic setting of user parameters).

Item	Function code	Data	Description
Function code display restriction	UA-10	00	Full display
		01	Function-specific display
		02	user setting
		03	Data comparison diaplay
		04	Basic diaplay (factory setting)
Initial-screen selection (Initial display at power-on)	UA-91 (*1)	dA-01	Output frequency monitoring (factory setting)
		dA-02	Output current monitoring
		dA-03	Rotation direction monitoring
		dA-06	Scaled output frequency monitoring
		FA-01	Output frequency setting
Selection of automatic user-parameter settings	UA-30 (*1)	00	Disable (factory setting)
		01	Enable

(*1) Not displayed with the factory setting.

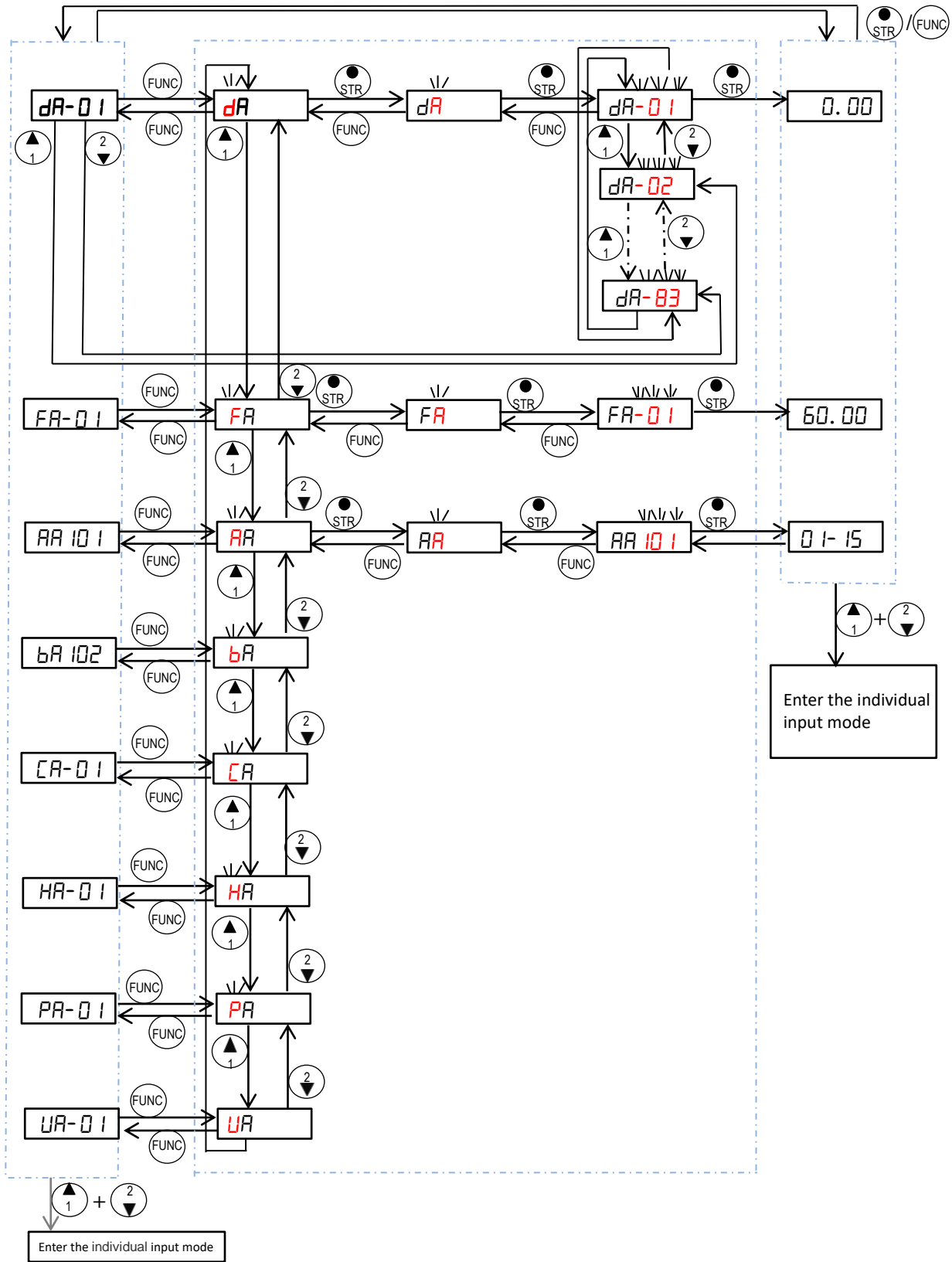
※The following procedure enables you to turn the monitor display back to dA-01 or 0.00

Hold down the FUNC key for 4 seconds or more.The monitor shows 0.00 .

During this status,press the FUNC key.The monitor will show dA-01 .

Note:The monitor shows 0.00 only when the motor driven by the inverter is stopped.While the motor is Running,the monitor shows an output frequency.

4.1.3 Transition of the monitored data on display



4.1.4 Procedure for directly specifying or selecting a code

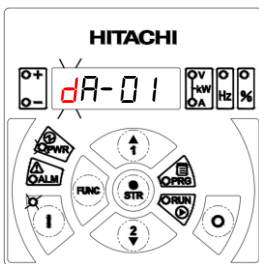
You can specify or select a code or data by entering each digit of the code or data instead of scrolling. The following shows an example of the procedure for changing the monitor mode code to extended function code.

① Display the monitor mode code.



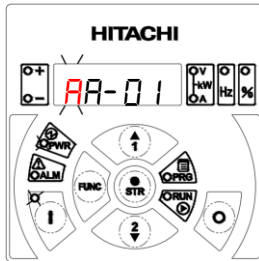
*3) **FUNC** \updownarrow Press the \updownarrow together.

② Change to the extended function mode.



Character "d" in the leftmost digit starts blinking.

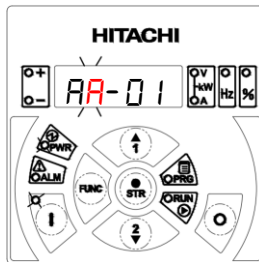
\downarrow Press the \uparrow twice.



Character "A" is blinking, Pressing the storage key determines the blinking character.

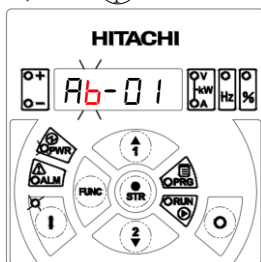
*2) **FUNC** \updownarrow Press the **STR** key (to determine character "A").

③ Change the fourth digit of the code.



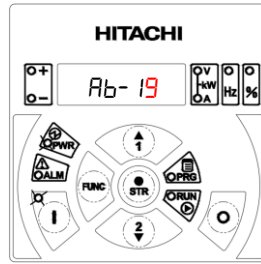
Character "A" is blinking.

\downarrow Press \uparrow once.



Character "b" in the fourth digit is blinking.

- Since the fourth digit need not be changed, press the [STR] key to determine the character "0".

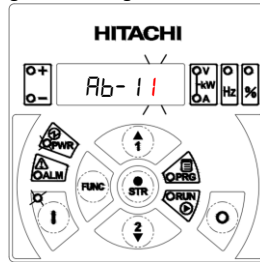


Character "9" in the first digit is blinking.

Press the **STR** key
(Character "9" is determined.)

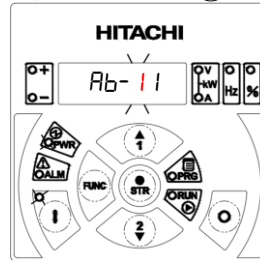
\uparrow Press the \uparrow eight times.

④ Change the first digit of the code "AA101".



Character "1" in the first digit is blinking.

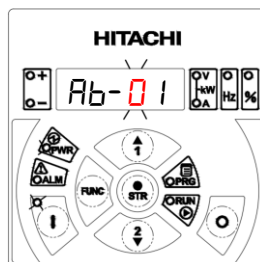
*2) **FUNC** \updownarrow Press the **STR** key



Character "1" in the second digit is blinking. Since the second digit need not be changed, press the [STR] key to determine the character "1".

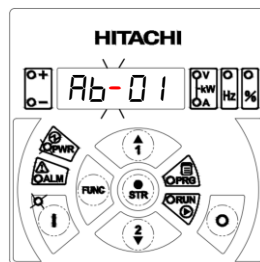
\uparrow Press the \uparrow once.

⑤ Change the second digit of the code "AA101".



*2) **FUNC** \downarrow Press the **STR** key

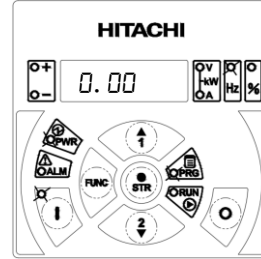
⑥ Change the third digit of the code "AA101".



"-" in the third digit is blinking.

- Since the third digit need not be changed, press the [STR] key to determine.

⑦ End the change of the extended function code.



Selection of code "Ab-19" is completed.

* If a code that is not defined in the code list or not intended for display is entered, the leftmost digit (fifth digit) (character "A" in this example) will start blinking again.

Press the **FUNC** key to display the data corresponding to the function code, change the data with the \uparrow and/or \downarrow key, and then press the **STR** key to store the changed data. (*4)

Note that you can also use the procedure (steps ① to ⑦) described here to change the data. (*3)(*4)

*1 This procedure can also be used on screens displaying a code other than "dA-01".

*2 If the **FUNC** key is pressed while a digit is blinking, the display will revert to the preceding status for entering the digit to the right of the blinking digit.

*3 If the **FUNC** key is pressed while the leftmost (fifth) digit is blinking, the characters having been entered to change the code will be cancelled and the display will revert to the original code shown before the \uparrow and \downarrow keys were pressed in step 1).

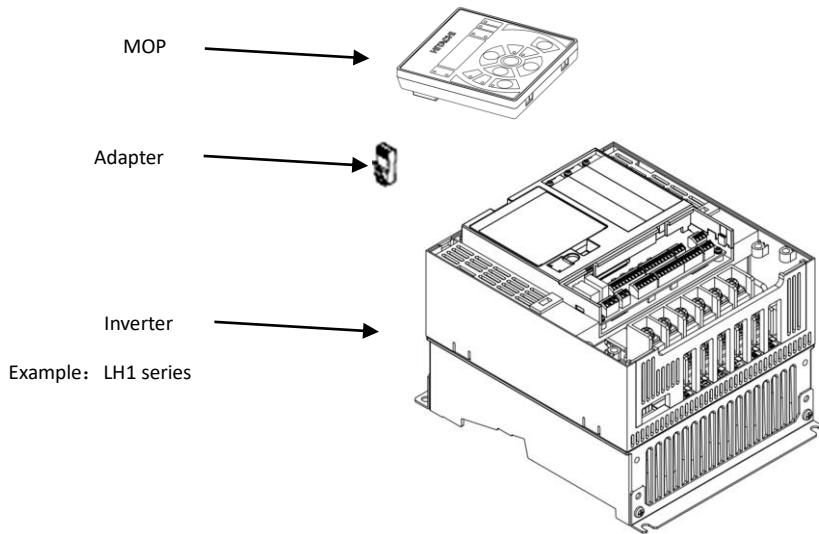
*4 When changing data, be sure to press the **STR** key.

4.1.5 Installation and Wiring

4.1.5.1 Installing the standard digital operator into the inverter

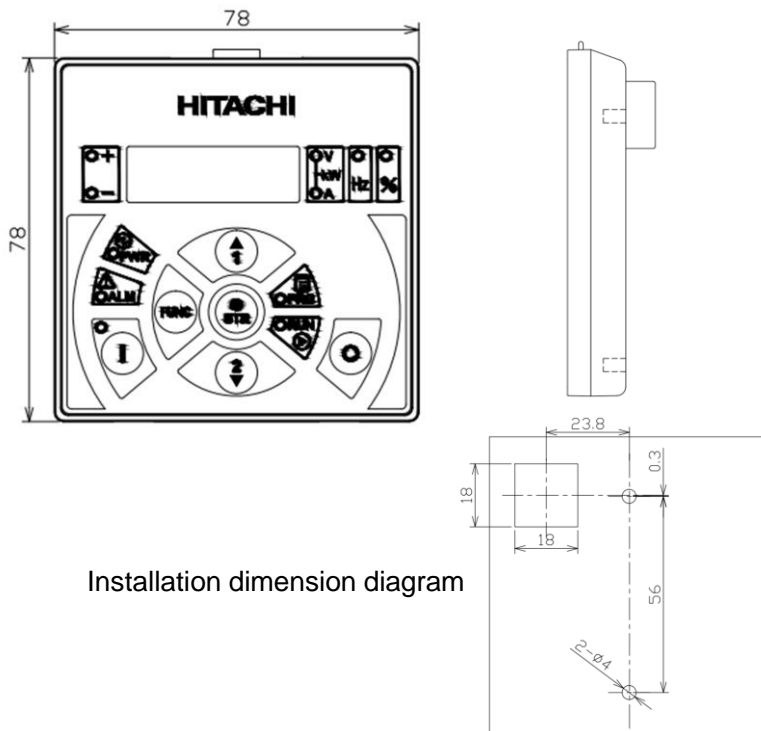
As shown below, vertically press the standard digital operator into the surface cover plate of inverter, until the sound is heard.

Power-on and Confirm that the LED is lighting up.



4.1.5.2 Installing the standard operator into the control cabinet

Installing it According to the following dimensions of the standard operator and Installation dimension diagram.

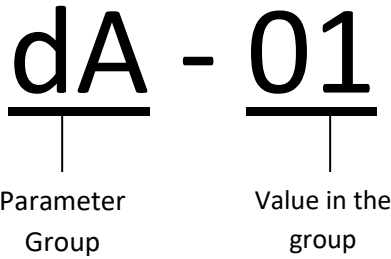


Note: When installing into the control cabinet, please use the communication cable that meets the following specifications.

- Linear communication cable above 10BASE-T category5 (CAT5) of UTP or STP.
- Within 3m. ※ UTP (Unshielded twist pair cable) STP (Shielded twist pair cable)

[dA-01] to [dA-41]

4.2 Monitor naming (Nomenclature)



4.3 Description of monitor functions

※For more details, please contact to your supplier or local Hitachi distributor or service station .

Monitor data list

■ Monitor mode (d code)

Code/Name	Range (unit)
dA-01 Output frequency monitor	0.00 to 590.00(Hz) <Actual frequency output>
dA-02 Output current monitor	0.00 to 655.35(A)
dA-03 Rotation direction monitor	F(forward)/r(reverse)/ d(0Hz output)/o(stop)
dA-04 Frequency reference monitor (after calculation) *2)	-590.00 to 590.00(Hz) <as target value>
dA-06 Output frequency scale conversion monitor	0.00 to 59000.00(Hz)
dA-08 Detect speed monitor	-590.00 to 590.00(Hz) <Encoder feedback required>
dA-12 Output frequency monitor (signed)	-590.00 to 590.00(Hz)
dA-14 Frequency upper limit monitor	0.00 to 590.00(Hz)
dA-15 Torque reference monitor (after calculation) *1)	-1000.0 to 1000.0(%) <Torque control mode required>
dA-16 Torque limit monitor	0.0 to 500.0(%)
dA-17 Output torque monitor *2)	-1000.0 to 1000.0(%)
dA-18 Output voltage monitor	0.0 to 800.0(V)
dA-20 Current position monitor	When [AA121]≠10 or [AA123]≠03 -536870912 to +536870911 (pls) Parameter setting other than above -2147483648 to +2147483647(pls)
dA-26 Pulse train position deviation monitor	-2147483647 to +2147483647(pls)
dA-28 Pulse count monitor	0 to 2147483647(pls)
dA-30 Input power monitor	0.00~655.35(kW)
dA-32 Accumulated input power monitor	0.0 to 1000000.0(kWh)
dA-34 Output power monitor	0.00~655.35(kW)
dA-36 Accumulated output power monitor	0.0 to 1000000.0 (kWh)
dA-38 Motor temperature monitor	-20.0 to 200.0(degree Celsius)
dA-40 DC bus voltage monitor	0.0 to 1000.0(V)
dA-41 BRD load rate monitor	0.00 to 100.00(%)

[dA-42] to [dA-83]

Code/Name	Range (unit)
dA-42 Electronic thermal load rating monitor (MTR)	0.00 to 100.00(%)
dA-43 Electronic thermal load rating monitor (CTL)	
dA-45 Safety STO monitor *3)	00(no input)/01(P-1A)/ 02(P-2A)/03(P-1b)/ 04(P-2b)/05(P-1C)/ 06(P-2C)/07(STO)
dA-46 Safety option hardware monitor *3)	0000 to FFFF
dA-47 Safety option function monitor *3)	00(no input)/ 01(STO)/ 02(SBC)/03(SS1)/04(SLS)/ 05(SDI)/06(SSM)
dA-50 Control terminal type	00(SH1-TM)/02(P1-TM2)/ 15(not connect)
dA-51 Input terminal monitor	 A B 9 8 7 6 5 4 3 2 1 Input B,A,9,8,7,6,5,4,3,2 & 1: OFF
dA-54 Output terminal monitor	 AL(-) 15 14 13 12 11 Output (-),14 : ON Output AL,15,13,12, 11 : OFF
dA-60 Analog input/output status monitor *4)	 Ao4 Ao3 Ai4 Ai3 Ao2 Ao1 Ai2 Ai1 Terminal Ao4,Ao3, Ai4, Ai3, Ao1,Ai2,Ai1 : Voltage Terminal Ao2 : Current
dA-61 Analog input [Ai1] monitor	0.00 to 100.00(%)
dA-62 Analog input [Ai2] monitor	
dA-63 Analog input [Ai3] monitor	-100.00 to 100.00(%)
dA-64 Analog input [Ai4] monitor	0.00 to 100.00(%)
dA-65 Analog input [Ai5] monitor	0.00 to 100.00(%)
dA-66 Analog input [Ai6] monitor	-100.00 to 100.00(%)
dA-70 Pulse train input monitor (internal)	-100.00 to 100.00(%)
dA-71 Pulse train input monitor (option)	-100.00 to 100.00(%)
dA-81 Option slot-1 status	00:(none)/01:(P1-EN)/ 02:(P1-ECT)/03:(P1-PN)/ 05:(P1-DN)/06:(P1-PB) / 07:(P1-CCL)/18:(P1-AG) 33:(P1-FB)(only dA-82) 48:(P1-FS)(only dA-83) *5)
dA-82 Option slot-2 status	
dA-83 Option slot-3 status	

*1) (After calculation) means that it is after calculation such as auxiliary speed or addition frequency and calculation such as torque bias.
 *2) dA-17 is invalid when the Control mode selection (AA121/AA221) setting is 00 to 06 (V/f control mode).
 *3) The parameter is about Safety function, is not suitable for LH1 series.
 *4) dA-60 is available also for the terminals of the option terminal board.
 *5) This option is not suitable for LH1 series.

[db-01] to [db-64]

Code/Name	Range (unit)
db-01 Program download monitor	00(Program is not installed)/ 01(Program is installed)
db-02 Program No. monitor	0000 to 9999
db-03 Program counter (Task-1)	1 to 1024
db-04 Program counter (Task-2)	
db-05 Program counter (Task-3)	
db-06 Program counter (Task-4)	
db-07 Program counter (Task-5)	
db-08 User monitor-0	-2147483647 to +2147483647
db-10 User monitor-1	
db-12 User monitor-2	
db-14 User monitor-3	
db-16 User monitor-4	0.00 to 100.00%
db-18 Analog output monitor YA0	
db-19 Analog output monitor YA1	
db-20 Analog output monitor YA2	
db-21 Analog output monitor YA3	
db-22 Analog output monitor YA4	
db-23 Analog output monitor YA5	

Code/Name	Range (unit)
db-30 PID1 feedback value 1 monitor	-100.00 to 100.00(%)
db-32 PID1 feedback value 2 monitor	(it also depends on [AH-04], [AH-05], [AH-06])
db-34 PID1 feedback value 3 monitor	
db-36 PID2 feedback value monitor	-100.00 to 100.00(%) (it also depends on [AJ-04], [AJ-05], [AJ-06])
db-38 PID3 feedback value monitor	-100.00 to 100.00(%) (it also depends on [AJ-24], [AJ-25], [AJ-26])
db-40 PID4 feedback value monitor	-100.00 to 100.00(%) (it also depends on [AJ-44], [AJ-45], [AJ-46])
db-42 PID1 target value monitor	-100.00 to 100.00(%) (it also depends on [AH-04], [AH-05], [AH-06])
db-44 PID1 feedback value monitor	
db-50 PID1 output monitor	-100.00 to +100.00(%)
db-51 PID1 deviation monitor	-200.00 to +200.00(%)
db-52 PID1 deviation 1 monitor	
db-53 PID1 deviation 2 monitor	
db-54 PID1 deviation 3 monitor	
db-55 PID2 output monitor	-100.00 to +100.00(%)
db-56 PID2 deviation monitor	-200.00 to +200.00(%)
db-57 PID3 output monitor	-100.00 to +100.00(%)
db-58 PID3 deviation monitor	-200.00 to +200.00(%)
db-59 PID4 output monitor	-100.00 to +100.00(%)
db-60 PID4 deviation monitor	-200.00 to +200.00(%)
db-61 Current PID P-Gain monitor	0.0 to 100.0
db-62 Current PID I-Gain monitor	0.0 to 3600.0(s)
db-63 Current PID D-Gain monitor	0.00 to 100.00(s)
db-64 PID feedforward monitor	0.00 to 100.00(%)

[dC-01] to [dE-50]

Code/Name	Range (unit)
dC-01 Inverter load type status	00(Very Low duty)/ 01(Low duty)/ 02(Normal duty)
dC-02 Rated current monitor	0.0 to 6553.5(A)
dC-07 Main speed input source monitor	01 to 34 *1)
dC-08 Sub speed input source monitor	00 to 06,08,25 to 33 *1)
dC-10 RUN command input source monitor	00([FW]/[RV] terminal)/ 01(3-wire)/ 02(Keypad's RUN key) 03(RS485)/04(Option1)/ 05(Option2)/06(Option3)
dC-15 Cooling fin temperature monitor	-20.0 to 200.0(°C)
dC-16 Life assessment monitor	LL to HH [L:Normal/H:Fatigued] [Left](FAN lifespan) [Right](board capacitor life span)
dC-20 Accumulated number of starts monitor	1 to 65535(cycles)
dC-21 Accumulated number of power-on times monitor	
dC-22 Accumulated RUN time monitor	1 to 1000000(hr)
dC-24 Accumulated power-on time monitor	
dC-26 Accumulated cooling-fan run time monitor	
dC-37 Icon 2 LIM monitor *2)	00(Other than below)/ 01(OC suppress)/ 02(OL restriction)/ 03(OV suppress)/ 04(TRQ Limit)/ 05(Freq Limit)/06(Min. Freq)
dC-38 Icon 2 ALT monitor *2)	00(Other than below) 01(OL notice) 02(Motor thermal notice) 03(Controller thermal notice) 04(Motor overheating notice)
dC-39 Icon 2 RETRY detail monitor *2)	00(Other than below) 01(Waiting for retry) 02(Waiting for restart)
dC-40 Icon 2 NRDY detail monitor *2)	00(Other than below) (Output terminal 007[IRDY]= ON, When the state is other than the following) 01(Trip occurrence) 02(Power supply error) 03(Resetting) 04(STO) *3) / 05(Standby) 06(Data Warning, etc) 07(EzSQ Sequence error) 08(Free run) / 09(Forced stop)
dC-45 IM/SM monitor	00 (IM selected)/ 01 (SM selected)
dC-50 Firmware ver. Monitor	00.00 to 99.99
dC-53 Firmware Gr. Monitor	00(Standard)

*1)00(disabled)/01(Ai1)/02(Ai2)/03 (Ai3)/04(Ai4)/05(Ai5)/06(Ai5)
07(Multi-speed 0)/08(auxiliary speed)/09 to 23(Multi-speed1 to 15)/
24(JG[AG-20])/25(RS485)/26(option-1)/27(option-2)/28(option-3)/
29(Pulse train input(internal))/30(Pulse train input(option))/31(EzSQ)
32(PID)/33(MOP-VR)/34(AHD retention speed)/

*2)This parameter is only effective when using the liquid crystal operator VOP(option).

*3) The parameter is about Safety function, is not suitable for LH1 series.

[dE-01] to [dE-50]

Code/Name	Range (unit)
dE-01 Trip Counter	0~65535 times
dE-11~20 Trip monitoring	Factor,frequency(±),current,voltage across P-N,INV status,LAD status, INV control mode, restriction status, sepecial status, running time,Power-on time
dE-31~40 Retry monitoring	Factor,frequency(±),current,voltage across P-N,INV status,LAD status, INV control mode, restriction status, sepecial status, running time,Power-on time
dE-50 warning monitor	Refer to the table below. For more information,contact to your supplier or local Hitachi distributor or service station.

No.	Judgment condition			MOP display
1	1st highest frequency	<	1st frequency upper limit limiter	102
2	1st highest frequency	<	1st frequency lower limit limiter	103
3	1st highest frequency	<	1st main speed command	106
4	1st highest frequency	<	1st auxiliary speed command	107
5	2nd highest frequency	<	2nd frequency upper limit limiter	202
6	2nd highest frequency	<	2nd frequency lower limit limiter	203
7	2nd highest frequency	<	2nd main speed command	206
8	2nd highest frequency	<	2nd auxiliary speed command	207

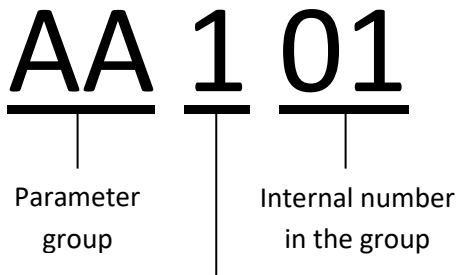
[FA-01] to [FA-40]

■ Variable mode monitor (F code)

* If a parameter that is being monitored by one of the [FA] parameters can be modified, it can directly be modified through that [FA] parameter.

Code/Name	Range (unit)
FA-01 Main speed reference setting or monitor	0.00 to 590.00(Hz)
FA-02 Sub-speed reference setting or monitor	-590.00 to 590.000(Hz) (at monitor) 0.00 to 590.00(Hz) (at setting)
FA-10 Acceleration time setting or monitor	0.00 to 3600.00(s)
FA-12 Deceleration time setting or monitor	
FA-15 Torque reference setting or monitor	-500.0 to 500.0(%)
FA-16 Torque bias setting or monitor	-500.0 to 500.0(%)
FA-20 Position reference setting or monitor	When [AA121]≠10 or [AA123]≠03 -268435455 to +268435455 (pls) Other than above. -1073741823 to +1073741823 (pls)
FA-30 PID1 set-point 1 setting or monitor	-100.00 to 100.00(%) (Adjustable with [AH-04][AH-05][AH-06])
FA-32 PID1 set-point 2 setting or monitor	
FA-34 PID1 set-point 3 setting or monitor	
FA-36 PID2 set-point setting or monitor	-100.00 to 100.00(%) (Adjustable with [AJ-04][AJ-05][AJ-06])
FA-38 PID3 set-point setting or monitor	-100.00 to 100.00(%) (Adjustable with [AJ-24][AJ-25][AJ-26])
FA-40 PID4 set-point setting or monitor	-100.00 to 100.00(%) (Adjustable with [AJ-44][AJ-45][AJ-46])

4.4 Parameter naming (Nomenclature)



- : Common for 1st and 2nd motor
- 1 : 1st motor enabled if function [SET] is OFF
- 2 : 2nd motor enabled if function [SET] is ON

※By default, 1st motor parameter is enabled in the case that 08:[SET] is not assigned in the Intelligent Input terminals [CA-01] to [CA-11].

Input terminal 024[SET] enable code example.

[SET]OFF	[SET]ON
[**.*] type	[**.*] type
[**1**] type	[**2**] type

(Example)

[SET]OFF	[SET]ON
[AH-01]	[AH-01]
[Ub-01]	[Ub-01]
.
[Hb102]	[Hb202]
[Ab110]	[Ab210]
[bA122]	[bA222]
.

※When using 2nd motor parameter setting by [SET] function of terminal, description as 1st motor setting in the following part is to be replaced with that of 2nd motor setting.

4.5 Parameter arrangement

Next is the parameter explanation, such as the parameter group and the internal group number line-up.

T classification numbers “-” and “1” are lined without distinction, except “2” which is lined-up after “-” and “1”.

Example) Regarding the order

[AA101]⇒[AA102]⇒[AA104]⇒[AA105]⇒...

⇒[AA123]⇒[AA201]⇒...⇒[AA223]⇒

[Ab-01]⇒[Ab-03]⇒[Ab110]⇒[Ab-11]⇒...

(Parameters order depends on the last 2 digit.)

⇒[Ab-25]⇒[Ab210]⇒

[AC-01]⇒...

(At first the parameters which middle character is “-” or “1” are shown, next the parameters which middle character is “2” are shown, then the group will change.)

※Depending on display restriction function, Parameters may not be displayed in order. Refer to [UA-10][UA-21][UA-22].

[AA101] to [AA106]

4.6 Parameter explanation



Working

- For the motor protection, the following parameters are necessary to be set.
- [Hb102] to [Hb108](If [IM])
- [Hd102] to [Hd108](If [SM/PMM])
- [bC110](Electronic thermal level setting, 1st-motor)

■ Parameter mode (A code)

Frequency reference selection

Code/Name	Range (unit)	Initial value
AA101 Main speed input source selection, 1st-motor	01 to 16 *1)	07(JPN)/01(EU)(USA)(ASIA)(CHN)
AA102 Sub speed input source selection, 1st-motor	00 to 16 *1)	00
AA104 Sub speed setting, 1st-motor	0.00 to 590.00(Hz)	0.00
AA105 Speed reference calculation symbol selection, 1st-motor	00(Disable)/01(Addition)/02(Subtraction)/03(Multiplication)	00

*1)00(Disable)/01(Terminal[Ai1])/02(Terminal[Ai2])/03(Terminal[Ai3])/04(Terminal[Ai4])/05(Terminal[Ai5])/06(Terminal[Ai6])/07(Parameter Setting)/08(RS485)/09(Option-1)/10(Option-2)/11(Option-3)/12(Pulse train input(internal))/13(Pulse train input(option))/14(Program function)/15(PID)/16(MOP VR)

- To change the frequency input reference, use [AA111]. Example: to set by [FA-01] -> [AA101]=07
To set by Analog(voltage) to set -> [AA101]=01(Ai1)
- To change between main and sub speed is possible with the math operator.
- If [AA105]=00, the Intelligent input terminal 015[SchG] can change the frequency reference input source between the main(OFF) and sub(ON) .
- Through the [AA105] selection, the operator for the main and sub speed frequency calculation is set.

Temporary frequency addition

Code/Name	Range (unit)	Initial value
AA106 Add frequency setting, 1st-motor	-590.00 to +590.00(Hz)	0.00

- When the input terminal 014[ADD] is ON the frequency set in [AA106] will be temporarily added to the frequency reference.

[AA111] to [AA115][bb-40]

RUN command selection

Code/Name	Range (unit)	Initial value
AA111 RUN command input source selection, 1st-motor	00([FW]/[RV] terminal) 01(3-wire) 02(Keypad's RUN-key) 03(RS485) 04(Option-1) 05(Option-2) 06(Option-3)	02(JPN)/ 00(EU) (USA) (ASIA) (CHN)

- Select in which way will be operated.
In case it does not work, please review it.

Keypad keys setting

Code/Name	Range (unit)	Initial value
AA-12 RUN-key command rotation direction	00(Forward)/ 01(Reverse)	00
AA-13 STOP-key enable	00(Disable)/01(Enable)/ 02(Enable at only trip reset)	01

- [AA-12] specifies in which direction (forward/reverse) will be the rotation after pressing the RUN key in the operation keypad.
- [AA-13] changes the behavior of the STOP key of keypad. When 01 (enable) (initial value) is set, the STOP key performs stop operation regardless of the run command selected in the run command selection, change it to 00(disabled). If the run command selectin [AA111] is set to 02(Keypad's RUN key), the STOP key on the Keypad is valid regardless of the [AA-13] setting.

RUN command direction restriction

Code/Name	Range (unit)	Initial value
AA114 RUN direction restriction,1st-motor	00(No restriction)/ 01(Only forward)/ 02(Only reverse)	00

- In the case of an incorrect RUN command, [AA114] setting prevents the output from unintended rotation.

Restart operation after decel/free-run STOP

Code/Name	Range (unit)	Initial value
AA115 STOP mode selection, 1st-motor	00(Deceleration stop)/ 01(Free-run stop)	00
bb-40 Restart mode after FRS release	00(Restart at 0Hz)/ 01(Restart with matching frequency)/ 02(Restart with active frequency matching)/ 03(Detect speed) *1)	00

*1) Requires encoder feedback to the P1-FB option or the input terminal function 103[PLA]/104[PLB] assigned [A]/[B] terminals.

- In [AA115] setting, deceleration stop or free-run stop can be selected when a stop command is executed.
- If input terminal 032[FRS] is active (ON), free-run stop is possible.
- With [bb-40], a restart with the release of the [FRS], or a restart operation that will be executed after the free-run-stop operation will be selected.
- If it selected free-run-stop (the torque will be lost), it can be configured to stop by inertia in case of the [E007] overvoltage error occurs during deceleration.

[AA121] to [AA223]

Control mode selection

Code/Name	Range (unit)	Initial value
AA121 Control mode selection, 1st-motor	00 ([V/f] Fixed torque characteristics (IM))/ 01 ([V/f] Reducing torque characteristics (IM))/ 02 ([V/f] Free V/f (IM))/ 03 ([V/f] Auto torque boost (IM))/ 04 ([V/f with encoder] Fixed torque characteristics (IM))/ 05 ([V/f with encoder] Reduced torque characteristics (IM))/ 06 ([V/f with encoder] Free V/f (IM))/ 07 ([V/f with encoder] Auto torque boost (IM))/ 08 (Sensorless vector control (SLV) (IM))/ 09 (0Hz-range sensorless vector control (0Hz-SLV) (IM)) / *1) 10 (Vector control with encoder (CLV)(IM)) /*1) 11(Synchronous start type sensorless vector control(SM/PMM))/ 12 (IVMS start type sensorless vector control (SM/PMM)) *1)	00

- Generally for a light duty control (such as fans or pumps) , the [V/f] control with fixed torque characteristics or the [V/f] control with reducing torque characteristics similar to the operation characteristics of fans and pumps is selected.
- For a magnet motor, select the sensorless vector control (SM/PMM).

*1) The setting (09/10/12) is not suitable for LH1 series.

Vector control with encoder mode

Code/Name	Range (unit)	Initial value
AA123 Vector control mode selection, 1st-motor	00(Speed/Torque control mode)/ 01(Pulse train position control)/ 02(Position control)/ 03(High-resolution position control)	00

- Torque control is effective only when the AA121 setting is 08 to 12 and the AA123 setting is 00.
- Pulse train position control is effective only when the AA121 setting is 10 and the AA123 setting is 01, And input terminal 073[STAT] is assigned and must be ON.
- Absolute position control is effective only when the AA121 setting is 10 and the AA123 setting is 02 or 03.
- For more information, contact to your supplier or local Hitachi distributor or service station.

2nd motor When Intelligent Input terminal 024[SET] is enabled.

Code/Name	Range (unit)	Initial value
AA201 Main speed input source selection, nd-motor		Same as AA101
AA202 Sub speed input source selection, 2nd-motor		Same as AA102
AA204 Sub speed setting, 2nd-motor		Same as AA104
AA205 Speed reference calculation symbol selection, 2nd-motor		Same as AA105
AA206 Add frequency setting, 2nd-motor		Same as AA106
AA211 RUN command input source selection, 2nd-motor		Same as AA111
AA214 RUN-direction restriction selection, 2nd-motor		Same as AA114
AA215 STOP mode selection, 2nd-motor		Same as AA115
AA221 Control mode selection 2nd-motor		Same as AA121
AA223 Vector control mode selection, 2nd-motor		Same as AA123

[Ab-01] to [Ab-25]

Frequency scale conversion monitor [dA-06]

Code/Name	Range (unit)	Initial value
Ab-01 Frequency conversion gain	0.01 to 100.00	1.00

- The visualized “Output frequency scale conversion monitor[dA-06]” is equal to the “Output frequency monitor[dA-01]” multiplied by the “Frequency conversion gain[Ab-01]”.

Multi-speed command

Code/Name	Range (unit)	Initial value
Ab-03 Multi-speed operation selection	00(Binary(16 speeds))/01(Bit(8 speeds))	00
Ab110 Multi-speed 0 setting, 1st-motor	0.00 to 590.00(Hz) *1)	0.00
Ab-11 Multi-speed 1 setting	0.00 to 590.00(Hz) *1)	0.00
Ab-12 Multi-speed 2 setting	0.00 to 590.00(Hz) *1)	0.00
Ab-13 Multi-speed 3 setting	0.00 to 590.00(Hz) *1)	0.00
Ab-14 Multi-speed 4 setting	0.00 to 590.00(Hz) *1)	0.00
Ab-15 Multi-speed 5 setting	0.00 to 590.00(Hz) *1)	0.00
Ab-16 Multi-speed 6 setting	0.00 to 590.00(Hz) *1)	0.00
Ab-17 Multi-speed 7 setting	0.00 to 590.00(Hz) *1)	0.00
Ab-18 Multi-speed 8 setting	0.00 to 590.00(Hz) *1)	0.00
Ab-19 Multi-speed 9 setting	0.00 to 590.00(Hz) *1)	0.00
Ab-20 Multi-speed 10 setting	0.00 to 590.00(Hz) *1)	0.00
Ab-21 Multi-speed 11 setting	0.00 to 590.00(Hz) *1)	0.00
Ab-22 Multi-speed 12 setting	0.00 to 590.00(Hz) *1)	0.00
Ab-23 Multi-speed 13 setting	0.00 to 590.00(Hz) *1)	0.00
Ab-24 Multi-speed 14 setting	0.00 to 590.00(Hz) *1)	0.00
Ab-25 Multi-speed 15 setting	0.00 to 590.00(Hz) *1)	0.00

*1) The actual setting range is limited to the maximum frequency setting ((Hb105/205) [Hd105/205]).

- For the 16 speeds selection, set [Ab-03]=00 for assigning the intelligent terminals 003[CF1] to 006[CF4] makes available the use of the speeds 0 to 15.

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

[Ab210][AC-01] to [AC-02]

- For the 8 speeds selection, set [Ab-03]=01 assigning the intelligent terminals 007[SF1] to 013[SF7] makes available the use of the speeds 0 to 7.

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

2nd motor When Intelligent Input terminal 024[SET] is enabled.

Code/Name	Range (unit)	Initial value
Ab210 Multi-speed 0 setting, 2nd-motor	Same as Ab110	

Input method for Accel/Decel time

Code/Name	Range (unit)	Initial value
AC-01 Acceleration/Deceleration time input source selection	00(Parameter setting)/01(Option-1)/02(Option-2)/03(Option-3)/04(Function EzSQ)	00

- [AC-01] changes the reference source for the Accel/Decel time command.

Individual Accel/Decel time for Multispeed

Code/Name	Range (unit)	Initial value
AC-02 Acceleration/Deceleration selection	00(Common setting)/01(Multi stage accel/decel)	00

- When [AC-02]=00, the Accel/Decel time settings [AC120][AC122] or [AC124][AC126] will be in effect.
- 2-stage Accel/Decel time change functions from [AC115] to [AC117] can be set.
- When [AC-02]=01, the Accel/Decel time [AC-30] to [AC-88] for each multispeed control (from speed 1 to 15) are enabled.
- Even if [AC-02]=01, while in Multspeed-0 command, Accel/Decel time setting [AC120] [AC122] or Accel/Decel time setting [AC124] [AC126] are enabled.
- [CA-64]/[CA-66] takes precedence during the input terminal 020[FUP]/021[FDN] function. And [AH-78] takes precedence during the PID soft start function.

[AC-03] to [AC117]

Acceleration/deceleration curve selection

Code/Name	Range (unit)	Initial value
AC-03 Acceleration curve selection	00(Linear)/ 01(S-curve)/ 02(U-curve)/	00
AC-04 Deceleration curve selection	03(Reverse U-curve)/ 04(Elevator S-curve)	00
AC-05 Acceleration curve constant setting	1 to 10	2
AC-06 Deceleration curve constant setting		2
AC-08 EL-S-curve ratio @start of acceleration	0 to 100(%) *1)	25
AC-09 EL-S-curve ratio @end of acceleration		25
AC-10 EL-S-curve ratio @start of deceleration		25
AC-11 EL-S-curve ratio @end of deceleration		25

*1) The setting range is limited so that AC-08+AC-09 ≤ 100.(%)
 For example, when AC-09=25%, the setting range of AC-08 is 0 to 75%
 AC-10 and AC-11 are the same as above.

- When [AC-03]/[AC-04] = 00 (Linear), the Accel/Decel time operation becomes linear toward the target value.
- When [AC-03]/[AC-04] = 01 (S-curve), the start and end of the Accel/Decel time operation is made loose and shockless operation is performed.
- When [AC-03]/[AC-04] = 02 (U-curve), at the start of the Accel/Decel time operation is made loose.
- When [AC-03]/[AC-04]=03(Reverse -U-curve), at the end of the Accel/Decel time operation is made loose.
- For S-curve, U-curve and Reverse U-curve, the curve degree of Accel/Decel time operation can be set with [AC-05]/[AC-06].
- When [AC-03]/[C-04] = 04 (EL-S-curve), at the start and end of the Accel/Decel time operation is made loose.
- For EL-S-curve shockless operation, the curve degree of Accel/Decel time operation can be adjusted with [AC-08] to [AC-11].

2-stage Accel/Decel time change

Code/Name	Range (unit)	Initial value
AC115 Accel/Decel change trigger, 1st-motor	00(Switching by [2CH] terminal)/ 01(Switching by setting)/ 02(Switching only when rotation is reversed)	00
AC116 Accel1 to Accel2 frequency transition point, 1st-motor	0.00 to 590.00(Hz)	0.00
AC117 Decel1 to Decel2 frequency transition point, 1st-motor		0.00

- Depending on the setting of [AC115], switching to Accel/Decel time 2 is selected from the following.
 "When the input terminal 031 [2CH] is turned ON",
 "When the set frequency [AC116]/[AC117] is reached",
 "When the operating frequency is switched between forward and reverse".
- Set the Accel/Decel time1 with [AC120] and [AC122], Accel/Decel time2 with [AC124] and [AC126].

[AC120] to [AC126]

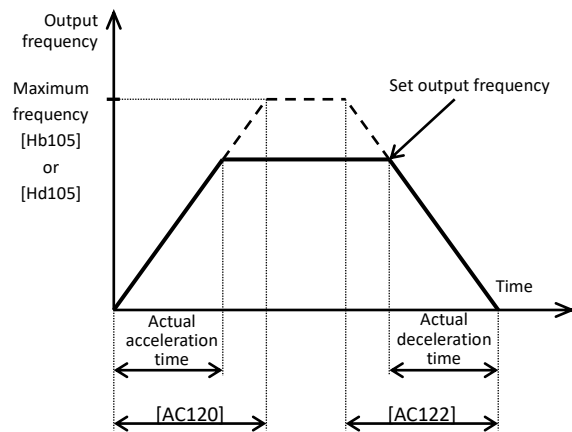
Acceleration/deceleration time setting

Code/Name	Range (unit)	Initial value
AC120 Acceleration time setting 1, 1st-motor	0.00 to 3600.00(s)	30.00
AC122 Deceleration time setting 1, 1st-motor		30.00
AC124 Acceleration time setting 2, 1st-motor		15.00
AC126 Deceleration time setting 2, 1st-motor		15.00

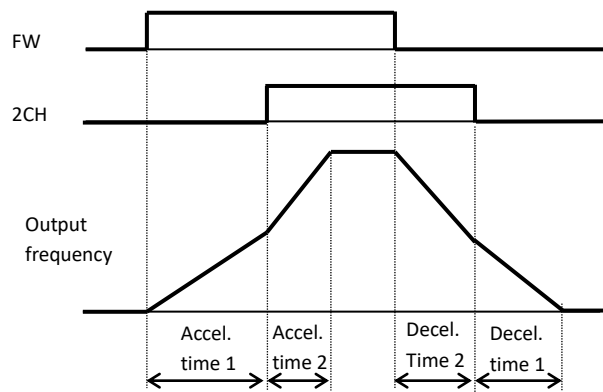
- Assign the Accel/Decel time that takes from 0Hz to reach the maximum frequency.
- In case that the 2-stage Accel/Decel time function is not meant to be used, the Acceleration time 1[AC120] and Deceleration time 1 [AC122] are used.
- The Accel/Decel time setting is from 0 Hz to the maximum frequency setting ([Hb105]/[Hd105]).

Ex) In the case of maximum frequency = 60Hz, Accel time = 30sec

At this case, if command=30Hz, it reaches 30Hz in 15sec.
 (Under conditions when Accel/Decel time does not pause or etc for other functions.)



- Example of using the 2-stage Accel/Decel time function is following.
 With [AC115] = 00

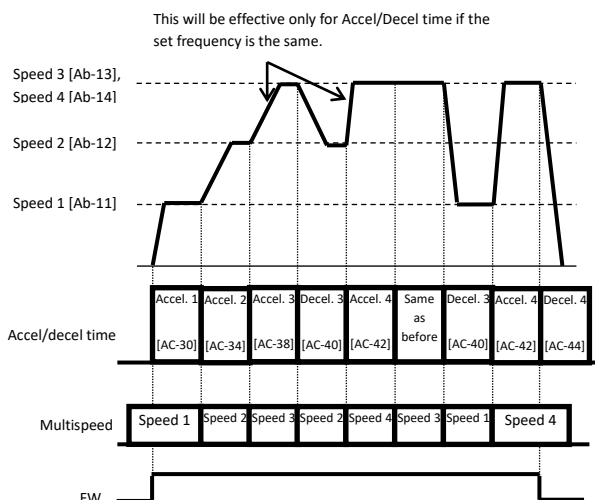


[AC-30] to [AC-88]

Individual Accel/Decel time for Multispeed

Code/Name	Range (unit)	Initial value
AC-30 Accel. time for Multi-speed 1	0.00 to 3600.00(s)	0.00
AC-32 Decel. time for Multi-speed 1		0.00
AC-34 Accel. time for Multi-speed 2		0.00
AC-36 Decel. time for Multi-speed 2		0.00
AC-38 Accel. time for Multi-speed 3		0.00
AC-40 Decel. time for Multi-speed 3		0.00
AC-42 Accel. time for Multi-speed 4		0.00
AC-44 Decel. time for Multi-speed 4		0.00
AC-46 Accel. time for Multi-speed 5		0.00
AC-48 Decel. time for Multi-speed 5		0.00
AC-50 Accel. time for Multi-speed 6		0.00
AC-52 Decel. time for Multi-speed 6		0.00
AC-54 Accel. time for Multi-speed 7		0.00
AC-56 Decel. time for Multi-speed 7		0.00
AC-58 Accel. time for Multi-speed 8		0.00
AC-60 Decel. time for Multi-speed 8		0.00
AC-62 Accel. time for Multi-speed 9		0.00
AC-64 Decel. time for Multi-speed 9		0.00
AC-66 Accel. time for Multi-speed 10		0.00
AC-68 Decel. time for Multi-speed 10		0.00
AC-70 Accel. time for Multi-speed 11	0.00	
AC-72 Decel. time for Multi-speed 11	0.00	
AC-74 Accel. time for Multi-speed 12	0.00	
AC-76 Decel. time for Multi-speed 12	0.00	
AC-78 Accel. time for Multi-speed 13	0.00	
AC-80 Decel. time for Multi-speed 13	0.00	
AC-82 Accel. time for Multi-speed 14	0.00	
AC-84 Decel. time for Multi-speed 14	0.00	
AC-86 Accel. time for Multi-speed 15	0.00	
AC-88 Decel. time for Multi-speed 15	0.00	

- Individual Accel/Decel times can be set for multispeed functions[Ab-11] to [Ab-25].



[AC215] to [AC226],[Ad-01] to [Ad-42]

2nd motor When Intelligent Input terminal 024[SET] is enabled.

Code/Name	Range (unit)	Initial value
AC215 Accel/Decel change trigger, 2nd-motor	Same as AC115	
AC216 Accel1 to Accel2 frequency transition point, 2nd-motor	Same as AC116	
AC217 Decel1 to Decel2 frequency transition point, 2nd-motor	Same as AC117	
AC220 Acceleration time 1, 2nd-motor	Same as AC120	
AC222 Deceleration time 1, 2nd-motor	Same as AC122	
AC224 Acceleration time 2, 2nd-motor	Same as AC124	
AC226 Deceleration time 2, 2nd-motor	Same as AC126	

Torque control function setting

Code/Name	Range (unit)	Initial value
Ad-01 Torque reference input source selection	01 to 13/15 *1)	07
Ad-02 Torque reference value setting	-500.0 to 500.0(%)	0.0
Ad-03 Polarity selection for torque reference	00(According to sign)/01(Depending on the operation direction)	00
Ad-04 Switching time of speed control to torque control	0 to 1000(ms)	100

- Operations setting of torque control.
- Torque control is enabled when input terminal 067[ATR] torque control enabled is turned ON when control mode AA 121 setting is set to 08 to 12 (sensorless vector control or vector control with sensor)
For more information, contact to your supplier or local Hitachi distributor or service station.

Torque bias setting

Code/Name	Range (unit)	Initial value
Ad-11 Torque bias input source selection	01 to 13 /15 *1)	00
Ad-12 Torque bias value setting	-500.0 to 500.0(%)	0.0
Ad-13 Torque bias polarity	00(According to sign)/01(Depend on the operation direction)	00
Ad-14 Enable terminal [TBS]	00(Disable)/01(Enable)	00

- For setting the torque bias.
- For more information, contact to your supplier or local Hitachi distributor or service station.

Speed limitation for torque control

Code/Name	Range (unit)	Initial value
Ad-40 Speed limit input source selection at torque control	01 to 13 *1)	07
Ad-41 Speed limit at torque control (at Forward rotation)	0.00 to 590.00(Hz) *2)	0.00
Ad-42 Speed limit at torque control (at Reverse rotation)		0.00

- The speed limit during the torque control can be set.
For more information, contact to your supplier or local Hitachi distributor or service station.
- *1)00(Disable)/01(Terminal[Ai1])/02(Terminal[Ai2])/03(Terminal[Ai3])/04(Terminal[Ai4])/05(Terminal[Ai5])/06(Terminal[Ai6])/07(Parameter Setting)/08(RS485)/09(Option-1)/10(Option-2)/11(Option-3)/12(Pulse train input(internal))/13(Pulse train input(option))/15(PID calc.)
- *2) The actual setting range is limited to the maximum frequency setting ([Hb105/205] [Hd105/205]).

[AE-01] to [AE-13]

Position control

Code/Name	Range (unit)	Initial value
AE-01 Electronic gear setting point selection	00(Feedback side)/01(Reference side)	00
AE-02 Electronic gear ratio numerator	1 to 10000	1
AE-03 Electronic gear ratio denominator	1 to 10000	1
AE-04 Positioning completed range setting	0 to 10000(pls)	5
AE-05 Positioning completed delay time setting	0.00 to 10.00(s)	0.00
AE-06 Position feedforward gain setting	0 to 655.35	0.00
AE-07 Position loop gain setting	0.00 to 100.00	0.50
AE-08 Position bias setting	-2048 to 2048(pls)	0

- Position control requires encoder feedback to the P1-FB option or the input terminal 103[PLA]/104[PLB] assigned to [A]/[B] terminals.
- See also input terminal 073[STAT],074[PUP],075[PDN] and output terminal 042[PDD], 043[POK] for position control.
For more information, contact to your supplier or local Hitachi distributor or service station.

Home search function setting

Code/Name	Range (unit)	Initial value
AE-10 Stop position selection of home search function	00(Parameter)/01(Option 1)/02(Option 2)/03(Option 3)/	00
AE-11 Stop position of home search function	0 to 4095	0
AE-12 Speed reference of home search function	0.00 to 120.00(Hz) *1)	0.00
AE-13 Direction of home search function	00(Forward)/01(Reverse)	00

*1) If the maximum frequency setting ([Hb105/205] [Hd105/205]) is less than 120 Hz, the maximum value of [AE-12] will be limited to it.

- Adjust the Home search function of the position control. This function is valid only when AA121=10 and AA123=00, 01. And also assign the input terminal 069[ORT] Home search function and 109[PLZ] Pulse train input Z. For more information, contact to your supplier or local Hitachi distributor or service station.

[AE-20] to [AE-61]

Absolute position control

Code/Name	Range (unit)	Initial value
AE-20 Position reference 0	When [AA121]≠10 or [AA121]≠03 -268435455 to +268435455 (pls) Parameter setting other than above. -1073741823 to +1073741823 (pls)	0
AE-22 Position reference 1		0
AE-24 Position reference 2		0
AE-26 Position reference 3		0
AE-28 Position reference 4		0
AE-30 Position reference 5		0
AE-32 Position reference 6		0
AE-34 Position reference 7		0
AE-36 Position reference 8		0
AE-38 Position reference 9		0
AE-40 Position reference 10		0
AE-42 Position reference 11		0
AE-44 Position reference 12		0
AE-46 Position reference 13		0
AE-48 Position reference 14		0
AE-50 Position reference 15	0	
AE-52 Position control range setting (forward)	When [AA121]≠10 or [AA123]≠03 0 to +268435455(pls) Other than above. 0 to +1073741823(pls)	268435455
AE-54 Position control range setting (reverse)	When [AA121]≠10 or [AA123]≠03 -268435455 to 0 (pls) Other than above. -1073741823 to 0 (pls)	-268435455
AE-56 Position control mode selection	00(Limited)/01(Not limited)	00

- Set the absolute position function.
- Absolute position reference 0 to 15 can be switched by the combination of input terminals 076[CP1] multistage position 1 to 079[CP4] multistage position 4. See also position control functions such as input terminal 082[FOT] Forward over travel, 083[ROT] Reverse over travel, 084[SPD] speed/position switching, 085[PSET] position data presetting and etc.
For more information, contact to your supplier or local Hitachi distributor or service station.

Teach-in function

Code/Name	Range (unit)	Initial value
AE-60 Teach-in function target selection	00 to 15(X00 to X15)	00

- Sets the teaching position for absolute position control.
- Use the input terminal 110[TCH] for teach-in function.
For more information, contact to your supplier or local Hitachi distributor or service station.

Enable position saving when power is cut off

Code/Name	Range (unit)	Initial value
AE-61 Save current position at power off	00(Disable)/01(Enable)	00

- When AE-61 is set to 01, the absolute position is automatically saved into the inverter at the power supply is cut-off.
For more information, contact to your supplier or local Hitachi distributor or service station

[AE-62] to [AE-73]

Pre-set position

Code/Name	Range (unit)	Initial value
AE-62 Pre-set position data	When [AA121]≠10 or [AA121]≠03 -268435455 to +268435455(pls) Other than above. -1073741823 to +107374182(pls)	0

- During absolute position control, turning on the input terminal 085[PSET] sets the current position to the value set in [AE-62] preset position data.

The current position monitor [dA-20] is also changed.
For more information, contact to your supplier or local Hitachi distributor or service station.

Positioning operation adjustment

Code/Name	Range (unit)	Initial value
AE-64 Deceleration stop distance calculation gain	50.00 to 200.00(%)	100.00
AE-65 Deceleration stop distance calculation bias	0.00 to 655.35(%)	0.00
AE-66 Speed limit in APR control	0.00 to 100.00(%)	1.00
AE-67 APR start speed	0.00 to 100.00(%)	0.20

*APR: Automatic Position Regulator

- Adjustment of control operation for positioning operation.

For more information, contact to your supplier or local Hitachi distributor or service station.

Homing (Return to reference position)

Code/Name	Range (unit)	Initial value
AE-70 Homing function selection	00(Low-speed)/ 01(High-Speed 1)/ 02(High-Speed 2)	00
AE-71 Direction of homing function	00(Forward)/ 01(Reverse)	00
AE-72 Low-speed homing speed setting	0.00 to 10.00(Hz)	0.00
AE-73 High-speed homing speed setting	0.00 to 590.00(Hz) *1)	0.00

*1) The actual setting range is limited to the maximum frequency setting ([Hb105/205] [Hd105/205]).

- Set the Homing function for absolute position mode.
- When using the homing function, assign the input terminal 080[ORL] Limit signal of homing function and 081[ORG] Start signal of homing function.

For more information, contact to your supplier or local Hitachi distributor or service station.

[AF101] to [AF109]

DC braking (DB) function

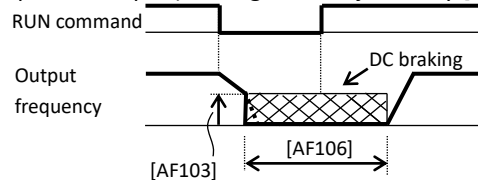
Code/Name	Range (unit)	Initial value
AF101 DC braking selection, 1st-motor	00(Disable)/01(Enable)/ 02(Frequency reference)	00
AF102 Braking type selection, 1st-motor	00(DC braking)/ 01(Speed servo-lock)/ 02(Position servo-lock)	00
AF103 DC braking frequency, 1st-motor	0.00 to 590.00(Hz)	0.50
AF104 DC braking delay time, 1st-motor	0.00 to 5.00(s)	0.00
AF105 DC braking force setting, 1st-motor *2)	0 to 100(%)	30
AF106 DC braking active time at stop, 1st-motor	0.00 to 60.00(s)	0.00
AF107 DC braking operation method selection, 1st-motor	00(Edge)/ 01(Level)	01
AF108 DC braking force at start, 1st-motor *2)	0 to 100(%)	30
AF109 DC braking active time at start, 1st-motor	0.00 to 60.00(s)	0.00

- DB function can be activated at start-up and stop state ([AF101]=01) or at setting frequency ([AF101]=02), selectively.

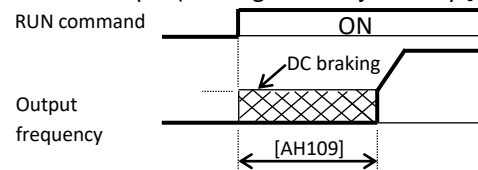
- DC braking can be also used if Intelligent input terminal 030[DB] is ON.

*2) Depending on the setting of Load type selection [Ub-03] and inverter capacity, an internal limit is applied to DC braking force.

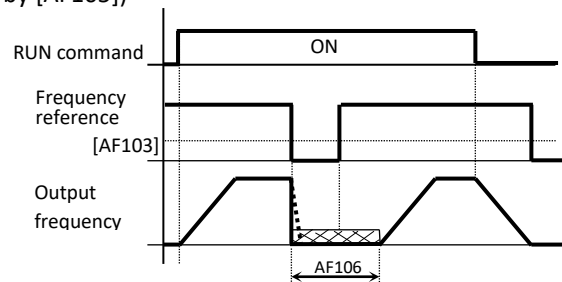
- Stop DB example (Braking force adjusted by [AF105])



- Start DB example (Braking force adjusted by [AF108])



- Frequency reference DB example (Braking force adjusted by [AF105])



- When the DC braking time is set as 0.00(s), DC braking is not operational.

[AF120] to [AF152]

Brake control function

Code/Name	Range (unit)	Initial value
AF120 Contactor control enable, 1st-motor	00(Disable)/ 01(Enable: primary side) 02(Enable: secondary side)	00
AF121 Run delay time, 1st-motor	0.00 to 2.00(s)	0.20
AF122 Contactor off delay time, 1st-motor	0.00 to 2.00(s)	0.10
AF123 Contactor response check time, 1st-motor	0.00 to 5.00(s)	0.10
AF130 Brake control enable, 1st-motor	00(Disable)/ 01(Brake control 1: Common)/ 02(Brake control 1: Separate)/ 03(Brake control 2)	00
AF131 Brake release wait time, 1st-motor(Forward)	0.00 to 5.00(s)	0.00
AF132 Brake wait time for accel., 1st-motor(Forward)	0.00 to 5.00(s)	0.00
AF133 Brake wait time for stopping, 1st-motor (Forward)	0.00 to 5.00(s)	0.00
AF134 Brake confirmation signal wait time, 1st-motor (Forward)	0.00 to 5.00(s)	0.00
AF135 Brake release frequency setting, 1st-motor (Forward)	0.00 to 590.00(Hz)	0.00
AF136 Brake release current setting, 1st-motor(Forward)	Inverter rated current ×(0.0 to 2.0)(A)	Inv rated current × 1.0(A)
AF137 Braking frequency, 1st-motor (Forward)	0.00 to 590.00(Hz)	0.00
AF138 Brake release wait time, 1st-motor (Reverse)	0.00 to 5.00(s)	0.00
AF139 Brake wait time for accel., 1st-motor (Reverse)	0.00 to 5.00(s)	0.00
AF140 Brake wait time for stopping, 1st-motor(Reverse)	0.00 to 5.00(s)	0.00
AF141 Brake confirmation signal wait time, 1st-motor(Reverse)	0.00 to 5.00(s)	0.00
AF142 Brake release frequency setting, 1st-motor (Reverse)	0.00 to 590.00(Hz)	0.00
AF143 Brake release current setting, 1st-motor(Reverse)	Inverter rated current ×(0.0 to 2.0)(A)	Inv rated current × 1.0(A)
AF144 Braking frequency, 1st-motor (Reverse)	0.00 to 590.00(Hz)	0.00
AF150 Brake open delay time, 1st-motor	0.00 to 2.00(s)	0.20
AF151 Brake close delay time, 1st-motor	0.00 to 2.00(s)	0.20
AF152 Brake response check time, 1st-motor	0.00 to 5.00(s)	0.10

[AF153] to [AF254]

Code/Name	Range (unit)	Initial value
AF153 Servo lock/ DC injection time at start, 1st-motor	0.00 to 10.00(s)	0.60
AF154 Servo lock/ DC injection time at stop, 1st-motor	0.00 to 10.00(s)	0.60

- Set brake control and contactor control.

In addition to these parameters, the brake control function uses the input terminal 037[BOK] Answer back from Brake and the output terminal 037[BRK] Brake release, 038[BER] Brake error. And the contactor control function uses the input terminal 107[COK] Contactor check signal and the output terminal 039[CON] Contactor control.

For more information, contact to your supplier or local Hitachi distributor or service station.

2nd motor When Intelligent Input terminal 024[SET] is enabled.

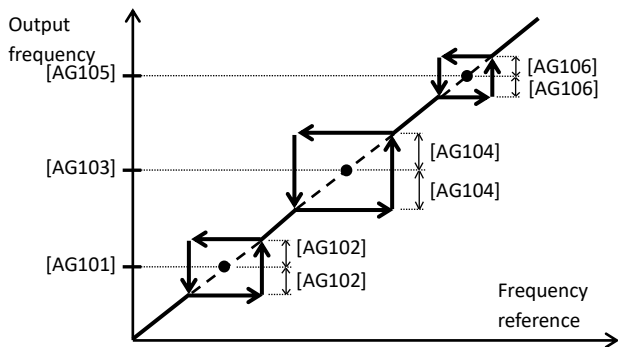
Code/Name	Range (unit)	Initial value
AF201 DC braking selection, 2nd-motor	Same as AF101	
AF202 Braking type selection, 2nd-motor	Same as AF102	
AF203 DC braking frequency, 2nd-motor	Same as AF103	
AF204 DC braking delay time, 2nd-motor	Same as AF104	
AF205 DC braking force setting, 2nd-motor	Same as AF105	
AF206 DC braking active time at stop, 2nd-motor	Same as AF106	
AF207 DC braking operation method selection, 2nd-motor	Same as AF107	
AF208 DC braking force at start, 2nd-motor	Same as AF108	
AF209 DC braking active time at start, 2nd-motor	Same as AF109	
AF220 Contactor control enable, 2nd-motor	Same as AF120	
AF221 Run delay time, 2nd-motor	Same as AF121	
AF222 Contactor off delay time, 2nd-motor	Same as AF122	
AF223 Contactor response check time, 2nd-motor	Same as AF123	
AF230 Brake control enable, 2nd-motor	Same as AF130	
AF231 Brake release wait time, 2nd-motor (Forward)	Same as AF131	
AF232 Brake wait time for accel., 2nd-motor (Forward)	Same as AF132	
AF233 Brake wait time for stopping, 2nd-motor (Forward)	Same as AF133	
AF234 Brake confirmation signal wait time, 2nd-motor(Forward)	Same as AF134	
AF235 Brake release frequency setting, 2nd-motor (Forward)	Same as AF135	
AF236 Brake release current setting, 2nd-motor (Forward)	Same as AF136	
AF237 Braking frequency, 2nd-motor (Forward)	Same as AF137	
AF238 Brake release wait time, 2nd-motor (Reverse)	Same as AF138	
AF239 Brake wait time for accel., 2nd-motor (Reverse)	Same as AF139	
AF240 Brake wait time for stopping, 2nd-motor(Reverse)	Same as AF140	
AF241 Brake confirmation signal wait time, 2nd-motor(Reverse)	Same as AF141	
AF242 Brake release frequency setting, 2nd-motor(Reverse)	Same as AF142	
AF243 Brake release current setting, 2nd-motor (Reverse)	Same as AF143	
AF244 Braking frequency, 2nd-motor (Reverse side)	Same as AF144	
AF250 Brake open delay time, 2nd-motor	Same as AF150	
AF251 Brake close delay time, 2nd-motor	Same as AF151	
AF252 Brake response check time, 2nd-motor	Same as AF152	
AF253 Servo lock/DC injection time at start, 2nd-motor	Same as AF153	
AF254 Servo lock/DC injection time at stop, 2nd-motor	Same as AF154	

[AG101] to [AG113]

Resonant frequency avoidance (Jump)

Code/Name	Range (unit)	Initial value
AG101 Jump frequency 1, 1st-motor	0.00 to 590.00(Hz)	0.00
AG102 Jump frequency width 1, 1st-motor	0.00 to 10.00(Hz)	0.00
AG103 Jump frequency 2, 1st-motor	0.00 to 590.00(Hz)	0.00
AG104 Jump frequency width 2, 1st-motor	0.00 to 10.00(Hz)	0.00
AG105 Jump frequency 3, 1st-motor	0.00 to 590.00(Hz)	0.00
AG106 Jump frequency width 3, 1st-motor	0.00 to 10.00(Hz)	0.00

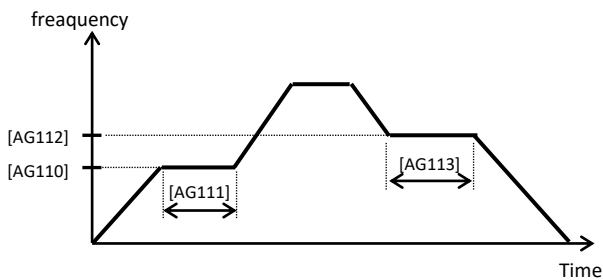
- Using above parameters prevents from the passing of the output frequency in a resonant point. Output frequency changes discontinuously.



Motor Accel/Decel time dwell (Hold)

Code/Name	Range (unit)	Initial value
AG110 Acceleration stop frequency setting, 1st-motor	0.00 to 590.00(Hz)	0.00
AG111 Acceleration stop time setting, 1st-motor	0.0 to 60.0(s)	0.0
AG112 Deceleration stop frequency setting, 1st-motor	0.00 to 590.00(Hz)	0.00
AG113 Deceleration stop time setting, 1st-motor	0.0 to 60.0(s)	0.0

- This dwell function will allow the inverter to stop the Accel/Decel time operation during the Accel/Decel operation stop time after the inverter output reaching as the settled by Accel/Decel time operation stop frequency, when the load has a large inertia.
- If the Intelligent input terminal 100[HLD] is in ON state, the acceleration and deceleration will be stopped (Hold activation).



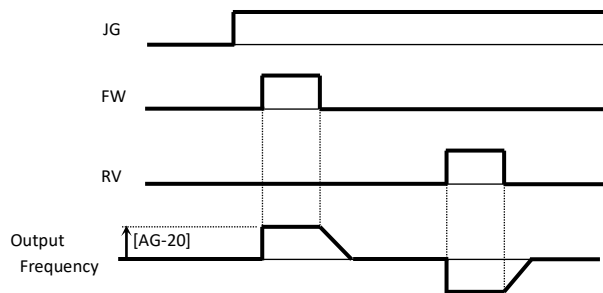
[AG-20] to [AG213]

Jogging function

Code/Name	Range (unit)	Initial value
AG-20 Jogging frequency	0.00 to 10.00(Hz)	6.00
AG-21 Jogging stop mode selection	00 (Free run at Jogging stop (Disable at run)) 01 (Deceleration stop at Jogging stop (Disable at run)) 02 (Dynamic brake at Jogging stop (Disable at run)) 03 (Free run at Jogging stop (Enable at run)) 04 (Deceleration stop at Jogging stop (Enable at run)) 05 (Dynamic brake at Jogging stop (Enable at run))	00

- The jogging frequency is outputted when Input terminal 029[JG] is active (ON) and the RUN command is given. The frequency and stop method can be set when the jogging motion performing.

- In the case [AG-21]=01



- 2nd motor** When Intelligent Input terminal 024[SET] is enabled.

Code/Name	Range (unit)	Initial value
AG201 Jump frequency 1, 2nd-motor	Same as AG101	
AG202 Jump frequency width 1, 2nd-motor	Same as AG102	
AG203 Jump frequency 2, 2nd-motor	Same as AG103	
AG204 Jump frequency width 2, 2nd-motor	Same as AG104	
AG205 Jump frequency 3, 2nd-motor	Same as AG105	
AG206 Jump frequency width 3, 2nd-motor	Same as AG106	
AG210 Acceleration stop frequency setting, 2nd-motor	Same as AG110	
AG211 Acceleration stop time setting 2nd-motor	Same as AG111	
AG212 Deceleration stop frequency setting, 2nd-motor	Same as AG112	
AG213 Deceleration stop time setting, 2nd-motor	Same as AG113	

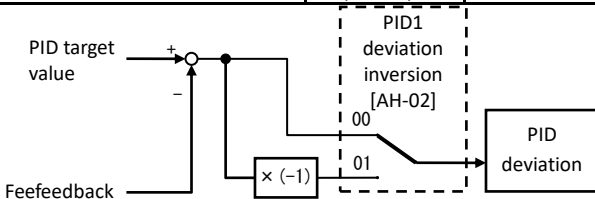
[AH-01] to [AH-06]

PID1 function

Code/Name	Range (unit)	Initial value
AH-01 PID1 enable	00(Disable)/ 01(Enable)/ 02(Enable (with inverted output))	00

- The PID1 function is enabled with the above parameter.
- If [AH-01]=01 when the PID output reaches negative value, the PID output is limited to 0.
- If [AH-01]=02 when the PID output reaches negative value, the PID output lets out an inverted output.
- When the PID output is negative, the motor will rotate in the contrary direction.
- If input terminal 041[PID] is ON, the PID control is disabled and the PID target value becomes the frequency reference.

Code/Name	Range (unit)	Initial value
AH-02 PID1 deviation inversion	00(Disable)/ 01(Enable)	00

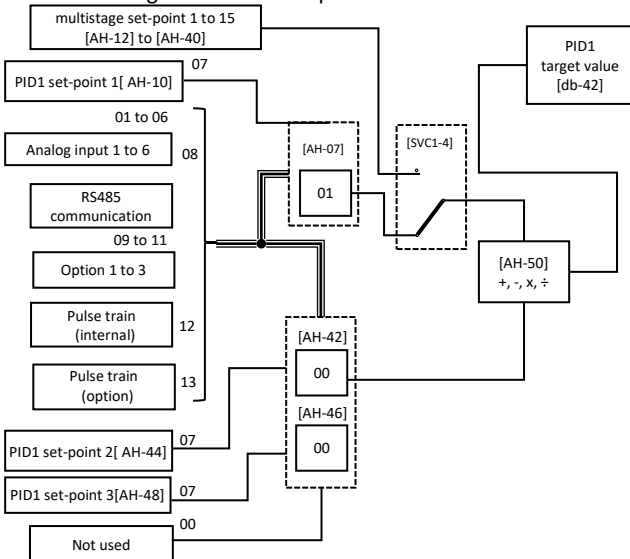


Code/Name	Range (unit)	Initial value
AH-03 Unit selection for PID1	Refer <unit table> of the end of this chapter.	01
AH-04 PID1 adjustment (0%)	-10000 to 10000	0
AH-05 PID1 adjustment (100%)	-10000 to 10000	10000
AH-06 PID1 Adjustment (decimal point position)	0 to 4	2

- The unit and display data related to the output of the PID control can be changed.
- PID1 is capable of 3 target value inputs and 3 feedback inputs, and various operations can be performed with [AH-50] and [AH-54].

■AH-50 = 01 to 04 (+, -, x, /)

Calculation targets are PID1 set-point 1



(selected with [AH-07] and [AH-10] to [AH-40]) and PID1 set-point 2 (selected with [AH-42]).

[AH-07] to [AH-50]

Code/Name	Range (unit)	Initial value
AH-07 PID1 set-point 1 input source selection	00 to 13 *2)	09
AH-10 PID1 set-point-1 setting	-100.00 to 100.00(%) *1)	0.00
AH-12 PID1 multistage set-point 1		0.00
AH-14 PID1 multistage set-point 2		0.00
AH-16 PID1 multistage set-point 3		0.00
AH-18 PID1 multistage set-point 4		0.00
AH-20 PID1 multistage set-point 5		0.00
AH-22 PID1 multistage set-point 6		0.00
AH-24 PID1 multistage set-point 7		0.00
AH-26 PID1 multistage set-point 8		0.00
AH-28 PID1 multistage set-point 9		0.00
AH-30 PID1 multistage set-point 10		0.00
AH-32 PID1 multistage set-point 11		0.00
AH-34 PID1 multistage set-point 12		0.00
AH-36 PID1 multistage set-point 13		0.00
AH-38 PID1 multistage set-point 14		0.00
AH-40 PID1 multistage set-point 15	0.00	
AH-42 PID1 set-point 2 input source selection	00 to 13 *2)	00
AH-44 PID1 set-point 2 setting	-100.00 to 100.00(%) *1)	0.00
AH-46 PID1 set-point 3 input source selection	00 to 13 *2)	0.00
AH-48 PID1 set-point 3 setting	-100.00 to 100.00(%) *1)	0.00
AH-50 PID1 set-point calculation symbol selection	01(Addition) 02(Subtraction) 03(Multiplication) 04(Division) 05(Minimum deviation) 06(Maximum deviation)	01

*1) Display range can be set by [AH-04], [AH-05] and [AH-06].

*2) 00(Not used)/01(Terminal[Ai1])/02(Terminal[Ai2])/03(Terminal[Ai3])/04(Terminal[Ai4])/05(Terminal[Ai5])/06(Terminal[Ai6])/07(Parametersetting)/08(RS485)/09(Option-1)/10(Option-2)/11(Option-3)/12(Pulse train input (internal))/13(Pulse train input (option))

- If Input terminal 051[SVC1] to 054[SVC4] are used, the PID1 set-point 1 can be changed for the Multistage.

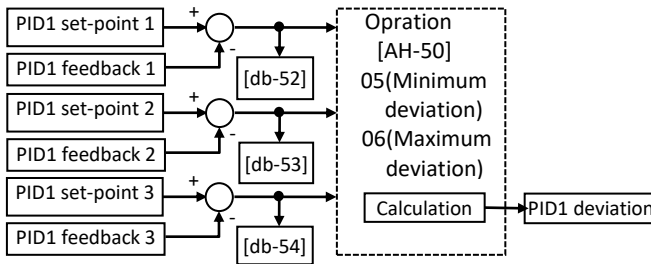
Multistage value	SVC4	SVC3	SVC2	SVC1
AH-10	OFF	OFF	OFF	OFF
AH-12	OFF	OFF	OFF	ON
AH-14	OFF	OFF	ON	OFF
AH-16	OFF	OFF	ON	ON
AH-18	OFF	ON	OFF	OFF
AH-20	OFF	ON	OFF	ON
AH-22	OFF	ON	ON	OFF
AH-24	OFF	ON	ON	ON
AH-26	ON	OFF	OFF	OFF
AH-28	ON	OFF	OFF	ON
AH-30	ON	OFF	ON	OFF
AH-32	ON	OFF	ON	ON
AH-34	ON	ON	OFF	OFF
AH-36	ON	ON	OFF	ON
AH-38	ON	ON	ON	OFF
AH-40	ON	ON	ON	ON

[AH-51] to [AH-54]

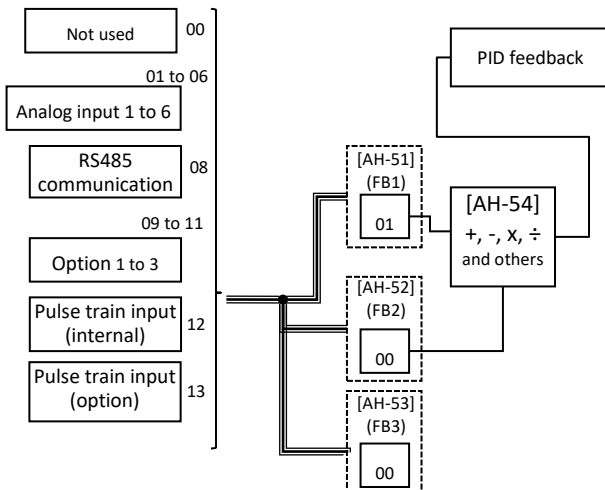
Code/Name	Range (unit)	Initial value
AH-51 PID1 feedback 1 input source selection	00 to 06/08 to 13 *1)	01
AH-52 PID1 feedback 2 input source selection		00
AH-53 PID1 feedback 3 input source selection		00
AH-54 PID1 feedback calculation symbol selection	01(Addition FB1+FB2)/ 02(Subtraction FB1-FB2)/ 03(Multiplication FB1×FB2)/ 04(Division FB1 / FB2)/ 05(Square Root FB1)/ 06(Square Root FB2)/ 07(Square Root(FB1-FB2))/ 08(Average of the three inputs) 09(Minimum of the three inputs) 10(Maximum of the three inputs)	01

*1)00(Not used)/01(Terminal[Ai1])/02(Terminal[Ai2])/03(Terminal[Ai3])/04(Terminal[Ai4])/05(Terminal[Ai5])/06(Terminal[Ai6])
08(RS485)/ 09(Option-1)/10(Option-2)/11(Option-3)/12(Pulse train input(internal))/13(Pulse train input(option))

■AH-50 = 05, 06 (minimum deviation, maximum deviation)
The maximum value or the minimum value of deviation 1 to 3 of PID1 is taken as PID1 deviation (at this time, [AH-54] becomes invalid).

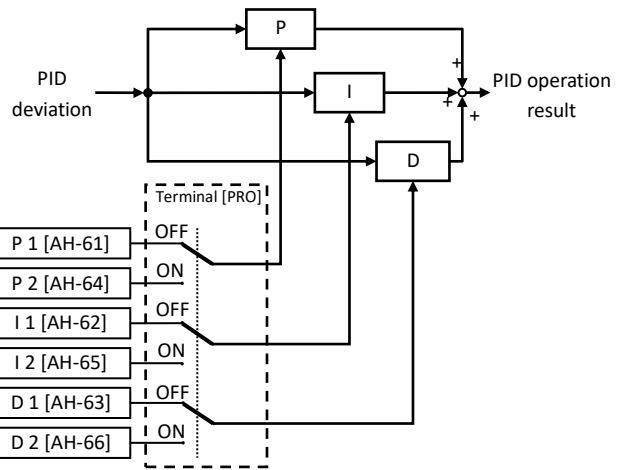


- PID feedback of PID1 by setting [AH-51] to [AH-54] is calculated.
- When 01 to 07 is selected in [AH-54], the operation target is [AH-51] PID1 feedback data 1 (FB1) and [AH-52] PID1 feedback data 2 (FB2). When 08 to 10 is selected in [AH-54], feedback data 1 ([AH-51] selection (FB1)) to 3 ([AH-53] selection (FB3)) are targeted.



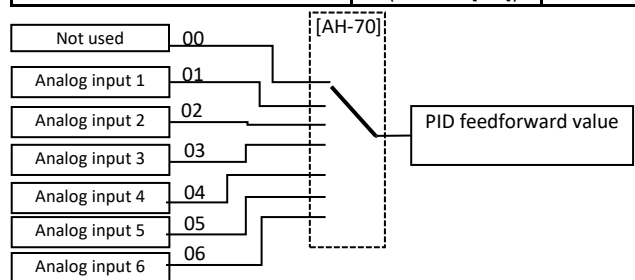
[AH-60] to [AH-70]

Code/Name	Range (unit)	Initial value
AH-60 PID1 gain change method selection	00(Using gain-1 only)/ 01([PRO] terminal)	00
AH-61 PID1 proportional gain 1	0.0 to 100.0	1.0
AH-62 PID1 integral time constant 1	0.0 to 3600.0(s)	1.0
AH-63 PID1 derivative gain 1	0.00 to 100.00(s)	0.00
AH-64 PID1 proportional gain 2	0.0 to 100.0	0.0
AH-65 PID1 integral time constant 2	0.0 to 3600.0(s)	0.0
AH-66 PID1 derivative gain 2	0.00 to 100.00(s)	0.00
AH-67 PID1 gain change time	0 to 10000(ms)	100



- If input terminal 042[PIDC] is active (ON), the value of the integral constant is cleared. If it is done while the inverter is in running, the driving condition may become unstable.
- The PID gain can be switched by turning on the input terminal 055 [PRO]. When OFF gain 1 is enabled. When ON gain 2 is enabled.

Code/Name	Range (unit)	Initial value
AH-70 PID1 feed-forward input source selection	00(Notused)/ 01(Terminal[Ai1])/02(Terminal[Ai2])/03(Terminal[Ai3])/04(Terminal[Ai4])/05(Terminal[Ai5])/06(Terminal[Ai6])	00

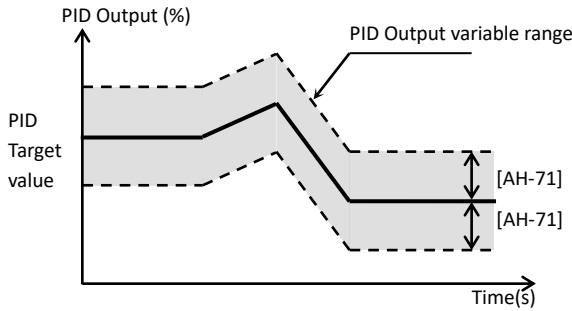


- The input source for PID feed forward control is selected by AH-70.

[AH-71] to [AH-74]

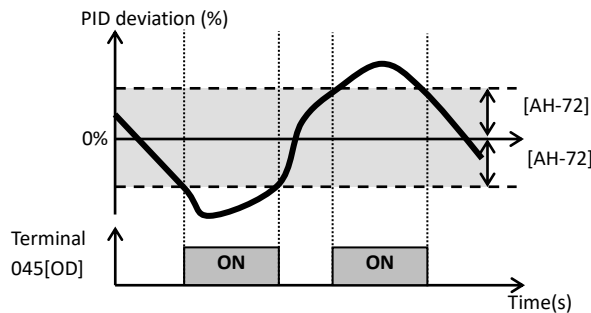
[AH-75] to [AH-92]

Code/Name	Range (unit)	Initial value
AH-71 PID1 output range	0.00 to 100.00(%)	0.00



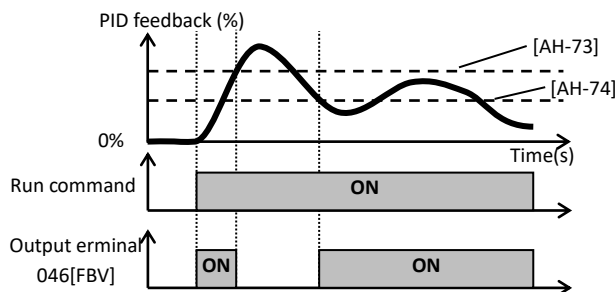
- [AH-71] Limits the output range of the PID. If [AH-71] = 0.00 the limit is disabled.

Code/Name	Range (unit)	Initial value
AH-72 PID1 over deviation level	0.00 to 100.00(%)	3.00



- When the PID deviation pass over the \pm [AH-72], the output terminal 045[OD] Deviation over for PID control is ON.

Code/Name	Range (unit)	Initial value
AH-73 Turn-off level for the PID1 feedback compare signal	0.00 to 100.00(%)	100.00
AH-74 Turn-on level for the PID1 feedback compare signal	0.00 to 100.00(%)	0.00

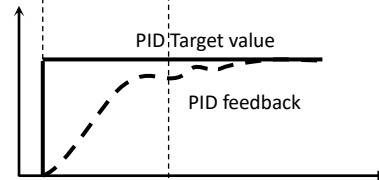
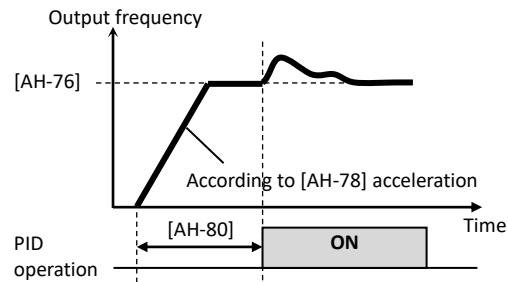


- When the PID feedback cross over the [AH-73] level, the output terminal 046[FBV] is OFF. If the PID feedback crosses under the [AH-74] level, 046[FBV] is turned on.

PID soft start function

Code/Name	Range (unit)	Initial value
AH-75 PID soft start function enable	00(Disable)/01(Enable)	00
AH-76 PID soft start target level	0.00 to 100.00(%)	100.00
AH-78 Acceleration time setting for PID soft start function	0.00 to 3600.00(s)	30.00
AH-80 PID soft start time	0.00 to 600.00(s)	0.00
AH-81 PID soft start error detection enable	00(Disable)/01(Enable: Error[E120])/02(Enable: Warning[SSE])	00
AH-82 PID soft start error detection level	0.00 to 100.00(%)	0.00

- In order to start the shockless PID, normal operation is performed with the base frequency \times [AH-76] as the target frequency from the start of operation to the set time of [AH-80].
- The acceleration time at soft start can be set with [AH-78].



- When an error is judged, the operation changes depending on the setting of [AH-81] PID soft start error detection enable.
 - If [AH-81] is 00, nothing is done.
 - If [AH-81] is 01, the abnormal state will trip with [E120] PID start error after the set time of [AH-80] has elapsed.
 - If [AH-81] is 02, the output terminal 093[SSE] PID soft start error signal turns ON after the abnormal state has passed for the [AH-80] setting time.
 - Output terminal 093[SSE] signal is turned ON while the inverter is in running.

[AH-85] to [AH-96]

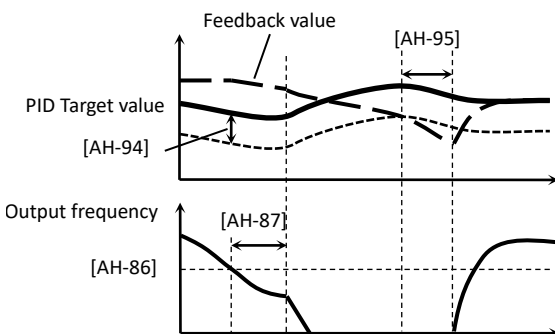
PID sleep function

Code/Name	Range (unit)	Initial value
AH-85 PID sleep trigger selection	00(Disable)/ 01(Low output)/ 02([SLEP] terminal)	00
AH-86 PID sleep start level	0.00 to 590.00(Hz)	0.00
AH-87 PID sleep active time	0.00 to 100.00(s)	0.00
AH-88 Enable set-point boost before PID sleep	00(Disable)/ 01(Enable)	00
AH-89 Set-point boost time before PID sleep	0.00 to 100.00(s)	0.00
AH-90 Set-point boost value before PID sleep	0.00 to 100.00(%)	0.00
AH-91 Minimum RUN time before PID sleep	0.00 to 100.00(s)	0.00
AH-92 Minimum active time of PID sleep	0.00 to 100.00(s)	0.00
AH-93 PID wake trigger selection	01(Deviation)/ 02(Low feedback)/ 03([WAKE] terminal)	01
AH-94 PID wake start level	0.00 to 100.00(%)	0.00
AH-95 PID wake start time	0.00 to 100.00(s)	0.00
AH-96 PID wake start deviation value	0.00 to 100.00(%)	0.00

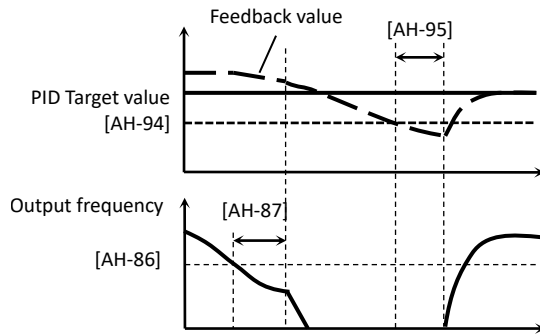
- The PID sleep function temporarily reduces the PID output, achieving an energy saving state.
- If [AH-88]"Enable set-point boost before PID sleep" is enable, during [AH-89] setting time before PID sleep, the [AH-90] boost amount is added to the PID target value to increase the feedback amount. As a result, it is possible to maintain sleep for a longer time.

• Operation example of the sleep function.

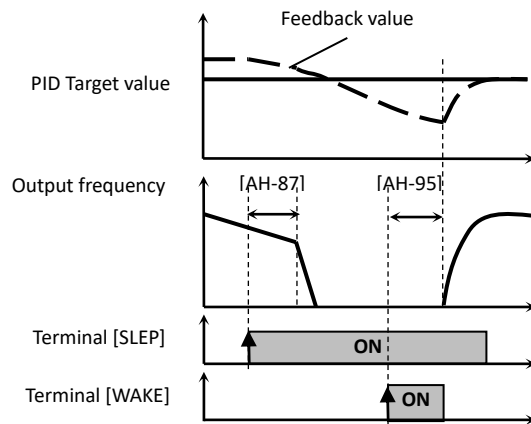
Example 1) [AH-85]=01(Low output)
[AH-93]=01(deviation)



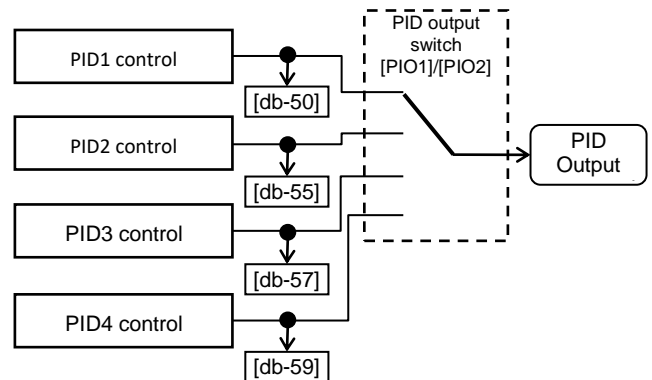
Example 2) [AH-85]=01(Low output)
[AH-93]=02(Low feedback)



Example 3) [AH-85]=02(output terminal 058[SLEP])
[AH-93]=03(output terminal 059[WAKE])



- There are 4 independent PID control blocks in LH1. By switching the input terminal 056[PIO1]/057[PIO2], PID1 to PID4 can be switched.



Combination of [PIO1]/[PIO2]

	057[PIO2]	056[PIO1]
PID1 is enabled	OFF	OFF
PID2 is enabled	OFF	ON
PID3 is enabled	ON	OFF
PID4 is enabled	ON	ON

[AJ-01] to [AJ-12]

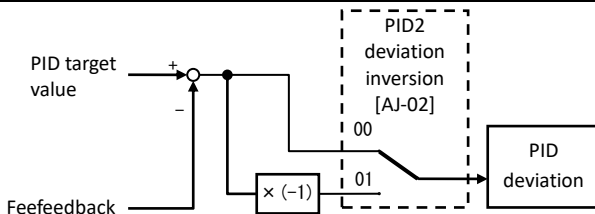
[AJ-13] to [AJ-19]

PID2 function

Code/Name	Range (unit)	Initial value
AJ-01 PID2 enable	00(Disable)/01(Enable)/02(Enable (with inverted output))	00

- The PID2 function is enabled with the above parameter.
- If [AJ-01]=01 when the PID output reaches a negative value, the PID output is limited to 0.
- If [AJ-01]=02 when the PID output reaches a negative value, the PID output lets out an inverted output.
- By turning on the input terminal 043[PID2], the PID2 output becomes 0.

Code/Name	Range (unit)	Initial value
AJ-02 PID2 deviation inversion	00(Disable)/01(Enable)	00



- PID2 deviation can be reversed.

Code/Name	Range (unit)	Initial value
AJ-03 PID2 unit selection	refer <unit table> of the end of this chapter.	01
AJ-04 PID2 scale adjustment (0%)	-10000 to 10000	0
AJ-05 PID2 scale adjustment (100%)	-10000 to 10000	10000
AJ-06 PID2 scale adjustment (decimal point position)	0 to 4	2

- The unit and display data related to the output of the PID control can be changed.

Code/Name	Range (unit)	Initial value
AJ-07 PID2 set-point input source selection	00 to 13, 15 *2)	07
AJ-10 PID2 set-point setting	-100.00 to 100.00(%) *1)	0.00

*1) Adjustable with [AJ-04] [AJ-05] [AJ-06]

- When PID2 target value input is selected, if the selected is the parameter setting, [AJ-10] gets enabled.

Code/Name	Range (unit)	Initial value
AJ-12 PID2 feedback input source selection	00 to 06/08 to 13 *2)	02

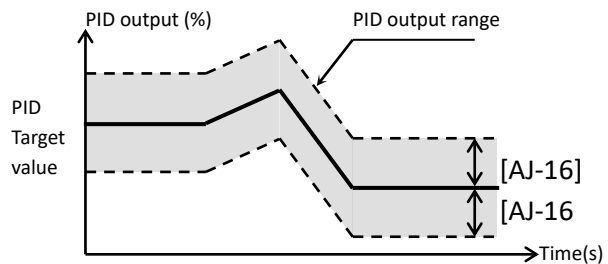
- Selects the PID2 feedback reference.

*2) 00(Not sed)/01(Terminal[Ai1])/02(Terminal[Ai2])/03(Terminal[Ai3])/04(Terminal[Ai4])/05(Terminal[Ai5])/06(Terminal[Ai6])/07(Parameter setting)/08(RS485)/09(Option-1)/10(Option-2)/11(Option-3)/12(Pulse train input (internal)/13(Pulse train input (option)/15(PID1 output)

Code/Name	Range (unit)	Initial value
AJ-13 PID2 proportional gain	0.0 to 100.0	1.0
AJ-14 PID2 integral time constant	0.0 to 3600.0(s)	1.0
AJ-15 PID2 derivative gain	0.00 to 100.00(s)	0.00

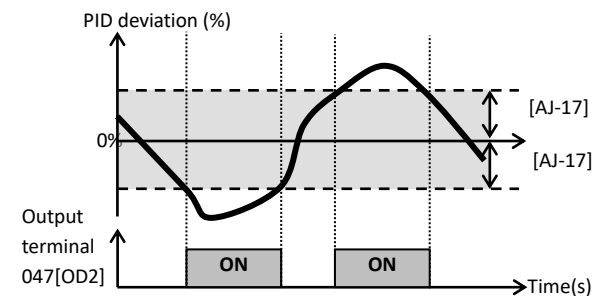
- The PID2 gains are set by the above parameters.
- If input terminal 044[PIDC2] is active (ON), the value of the integral constant is cleared. If it is done while the inverter is in running, the driving condition may become unstable.

Code/Name	Range (unit)	Initial value
AJ-16 PID2 output range	0.00 to 100.00(%)	0.00



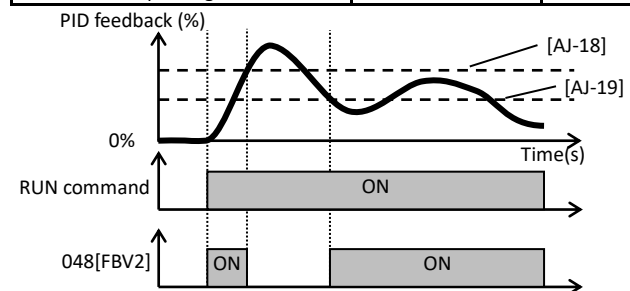
- [AJ-16] Limits the output range of the PID. If [AJ-16] =0.00 the limit is disabled.

Code/Name	Range (unit)	Initial value
AJ-17 PID2 over deviation level	0.00 to 100.00(%)	3.00



- When the PID deviation pass over ±[AJ-17], the output terminal 047[OD2] is activated.

Code/Name	Range (unit)	Initial value
AJ-18 Turn-off level for the PID2 feedback compare signal	0.00 to 100.00(%)	100.00
AJ-19 Turn-on level for the PID2 feedback compare signal	0.00 to 100.00(%)	0.00



- When the PID feedback cross over the [AJ-18] level, the output terminal 048[FBV2] is OFF. If the PID feedback crosses under the [AJ-19] level, 048[FBV2] is turned on.

[AJ-21] to [AJ-32]

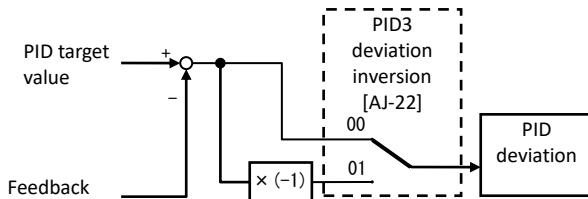
[AJ-33] to [AJ-39]

PID3 function

Code/Name	Range (unit)	Initial value
AJ-21 PID3 enable	00(Disable)/01(Enable)/02(Enable (with inverted output))	00

- The PID3 function is enabled with the above parameter.
- If [AJ-21]=01 when the PID output reaches a negative value, the PID output is limited to 0.
- If [AJ-21]=02 when the PID output reaches a negative value, the PID output lets out an inverted output.
- By turning on the input terminal 045[PID3], the PID3 output becomes 0.

Code/Name	Range (unit)	Initial value
AJ-22 PID3 deviation inversion	00(Disable)/01(Enable)	00



- PID3 deviation can be reversed.

Code/Name	Range (unit)	Initial value
AJ-23 PID3 unit selection	refer <unit table> of the end of this chapter.	01
AJ-24 PID3 scale adjustment (0%)	-10000 to 10000	0
AJ-25 PID3 scale adjustment (100%)	-10000 to 10000	10000
AJ-26 PID3 scale adjustment (decimal point position)	0 to 4	2

- You can switch the display data and the display unit involved in the output of the PID control by the calculation.

Code/Name	Range (unit)	Initial value
AJ-27 PID3 set-point input source selection	00 to 13 *1)	07
AJ-30 PID3 set-point setting	-100.00 to 100.00(%) *2)	0.00

*2) Adjustable with [AJ-24] [AJ-25] [AJ-26]

- When PID3 target value input is selected, if the selected is the parameter setting, [AJ-30] gets enabled.

Code/Name	Range (unit)	Initial value
AJ-32 PID3 feedback input source selection	00 to 06/08 to 13 *1)	01

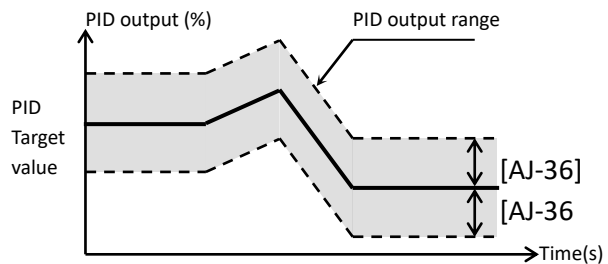
- Selects the PID3 feedback reference.

*1) 00(Not used)/01(Terminal[Ai1])/02(Terminal[Ai2])/03(Terminal[Ai3])/04(Terminal[Ai4])/05(Terminal[Ai5])/06(Terminal[Ai6])/07(Parameter setting)/08(RS485)/09(Option-1)/10(Option-2)/11(Option-3)/12(Pulse train input (internal))/13(Pulse train input (option))

Code/Name	Range (unit)	Initial value
AJ-33 PID3 proportional gain	0.0 to 100.0	1.0
AJ-34 PID3 integral time constant	0.0 to 3600.0(s)	1.0
AJ-35 PID3 derivative gain	0.00 to 100.00(s)	0.00

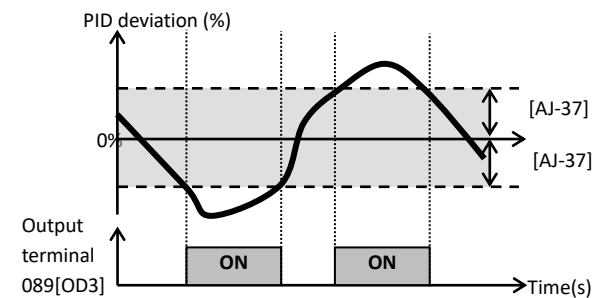
- The PID3 gains are set by the above parameters.
- If input terminal 046[PIDC3] is active (ON), the value of the integral constant is cleared. If it is done while the inverter is in running, the driving condition may become unstable.

Code/Name	Range (unit)	Initial value
AJ-36 PID3 output variable	0.00 to 100.00(%)	0.00



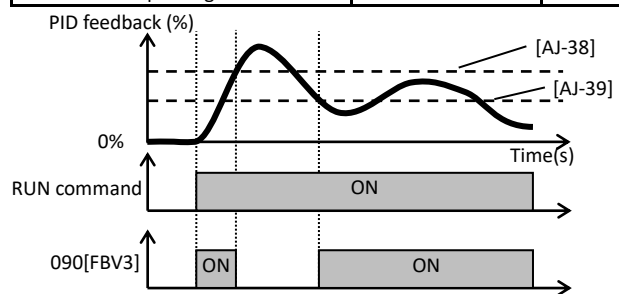
- [AJ-36] Limits the output range of the PID. If [AJ-36] =0.00 the limit is disabled.

Code/Name	Range (unit)	Initial value
AJ-37 PID3 over deviation level	0.00 to 100.00(%)	3.00



- When the PID deviation pass over ±[AJ-37], the output terminal 089[OD3] is activated.

Code/Name	Range (unit)	Initial value
AJ-38 Turn-off level for the PID3 feedback compare signal	0.00 to 100.00(%)	100.00
AJ-39 Turn-on level for the PID3 feedback compare signal	0.00 to 100.00(%)	0.00



- When the PID feedback cross over the [AJ-38] level, the output terminal 090[FBV3] is OFF. If the PID feedback crosses under the [AJ-39] level, 090[FBV3] is turned on.

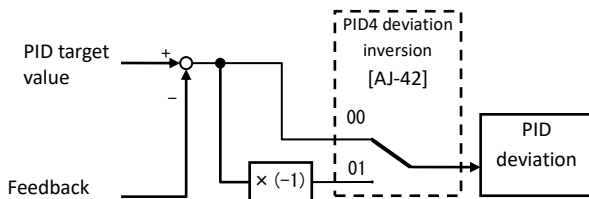
[AJ-41] to [AJ-52]

PID4 function

Code/Name	Range (unit)	Initial value
AJ-41 PID4 enable	00(Disable)/01(Enable)/02(Enable (with inverted output))	00

- The PID4 function is enabled with the above parameter.
- If [AJ-41]=01 when the PID output reaches a negative value, the PID output is limited to 0.
- If [AJ-41]=02 when the PID output reaches a negative value, the PID output lets out an inverted output.
- By turning on the 047[PID4] terminal, the PID4 output becomes 0.

Code/Name	Range (unit)	Initial value
AJ-42 PID4 deviation inversion	00(Disable)/01(Enable)	00



- PID4 deviation can be reversed.

Code/Name	Range (unit)	Initial value
AJ-43 PID4 unit selection	refer <unit table> of the end of this chapter.	01
AJ-44 PID4 scale adjustment (0%)	-10000 to 10000	0
AJ-45 PID4 scale adjustment (100%)	-10000 to 10000	10000
AJ-46 PID4 scale adjustment (decimal point position)	0 to 4	2

- You can switch the display data and the display unit involved in the output of the PID control by the calculation.

Code/Name	Range (unit)	Initial value
AJ-47 PID4 set-point input source selection	00 to 13 *1)	07
AJ-50 PID4 set-point setting	-100.00 to 100.00(%) *2)	0.00

*2) Adjustable with [AJ-44] [AJ-45] [AJ-46]

- When PID4 target value input is selected, if the selected is the parameter setting, [AJ-50] gets enabled.

Code/Name	Range (unit)	Initial value
AJ-52 PID4 feedback input source selection	00 to 06/08 to 13 *1)	01

- Selects the PID4 feedback reference.

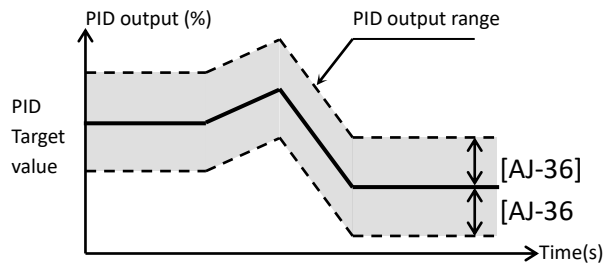
*1) 00(Not used)/01(Terminal[Ai1])/02(Terminal[Ai2])/03(Terminal[Ai3])/04(Terminal[Ai4])/05(Terminal[Ai5])/06(Terminal[Ai6])/07(Parameter setting)/08(RS485)/09(Option-1)/10(Option-2)/11(Option-3)/12(Pulse train input (internal))/13(Pulse train input (option))

[AJ-53] to [AJ-59]

Code/Name	Range (unit)	Initial value
AJ-53 PID4 proportional gain	0.0 to 100.0	1.0
AJ-54 PID4 integral time constant	0.0 to 3600.0(s)	1.0
AJ-55 PID4 derivative gain	0.00 to 100.00(s)	0.00

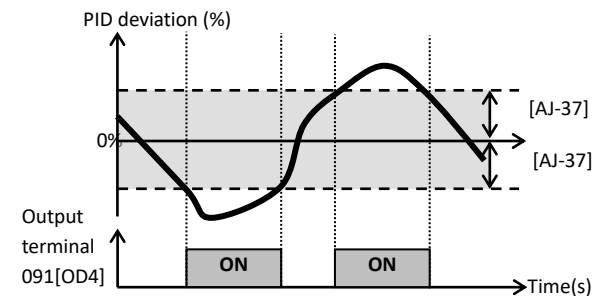
- The PID4 gains are set by the above parameters.
- If input terminal 048[PIDC4] is active (ON), the value of the integral constant is cleared. If it is done while the inverter is in running, the driving condition may become unstable.

Code/Name	Range (unit)	Initial value
AJ-56 PID4 output range	0.00 to 100.00(%)	0.00



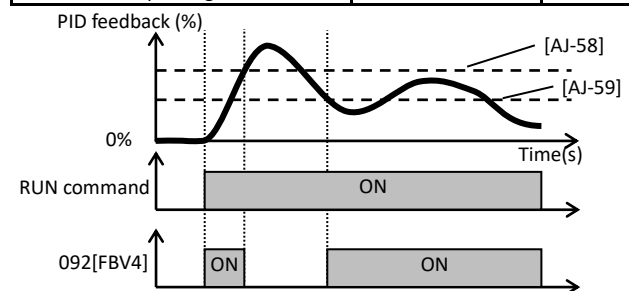
- [AJ-56] Limits the output range of the PID. If [AJ-56] =0.00 the limit is disabled.

Code/Name	Range (unit)	Initial value
AJ-57 PID4 over deviation level	0.00 to 100.00(%)	3.00



- When the PID deviation pass over ±[AJ-57], the output terminal function 091[OD4] is activated.

Code/Name	Range (unit)	Initial value
AJ-58 Turn-off level for the PID4 feedback compare signal	0.00 to 100.00(%)	100.00
AJ-59 Turn-on level for the PID4 feedback compare signal	0.00 to 100.00(%)	0.00



- When the PID feedback cross over the [AJ-58] level, the output terminal 092[FBV4] is OFF. If the PID feedback crosses under the [AJ-59] level, 092[FBV4] is turned on.

[bA101] to [bA116]

[bA120] to [bA128]

■ Parameter mode (b code)

Frequency limit

Code/Name	Range (unit)	Initial value
bA101 Upper frequency limit source selection, 1st-motor	00(Disable)/ 01(Terminal[Ai1])/02(Terminal[Ai2])/03(Terminal[Ai3])/04(Terminal[Ai4])/05(Terminal[Ai5])/06(Terminal[Ai6])/07(Parameter Setting)/08(RS485)/09(Option-1)/10(Option-2)/11(Option-3)/12(Pulse train input(internal))/13(Pulse train input(option))	00
bA102 Upper frequency limit, 1st-motor	0.00 to 590.00(Hz)	0.00
bA103 Lower frequency limit, 1st-motor	0.00 to 590.00(Hz)	0.00

• The upper and lower limits of the frequency reference are set by the above parameters.

Torque limit

Code/Name	Range (unit)	Initial value
bA110 Torque limit selection, 1st-motor	00(Disable)/01(Terminal[Ai1])/02(Terminal[Ai2])/03(Terminal[Ai3])/04(Terminal[Ai4])/05(Terminal[Ai5])/06(Terminal[Ai6])/07(Parameter Setting)/08(RS485)/09(Option1)/10(Option2)/11(Option3)	07
bA111 Torque limiting parameters mode selection, 1st-motor	00(4 quadrants)/01(Switch by [TRQ1]/[TRQ2] terminals)	00
bA112 Torque limit 1 (Forward drive), 1st-motor	0.0 to 500.0(%)	150.0(%)
bA113 Torque limit 2 (Reverse regenerative), 1st-motor	0.0 to 500.0(%)	150.0(%)
bA114 Torque limit 3 (Reverse drive), 1st-motor	0.0 to 500.0(%)	150.0(%)
bA115 Torque limit 4 (Forward regenerative), 1st-motor	0.0 to 500.0(%)	150.0(%)
bA116 Torque limit LADSTOP selection, 1st-motor	00(Disable)/01(Enable)	00

- The torque limit function is effective for vector control. (with sensor, sensorless, 0Hz range sensorless).
- If the input terminal 060[TL] torque limit enabled is not assigned, [bA110] is always enabled. When input terminal 060 [TL] is assigned and turned on, the torque limit function [bA110] becomes valid. When it is off, the torque limit value becomes the maximum value in the data setting range.
- When the torque is limited, the output terminal 022[TRQ] torque limiting signal is ON.

Overcurrent suppression function setting

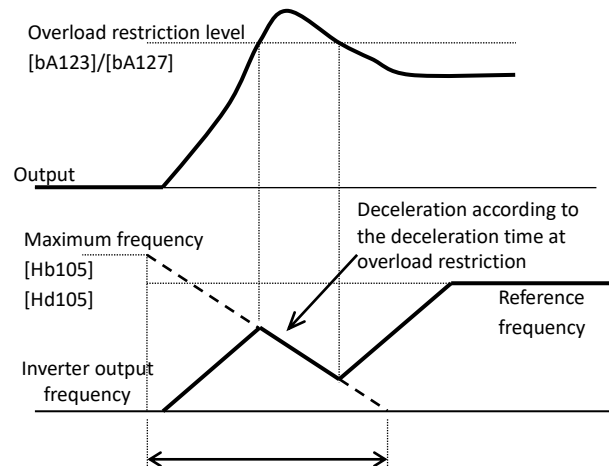
Code/Name	Range (unit)	Initial value
bA120 Overcurrent suppression enable, 1st-motor	00(Disable)/01(Enable)	00
bA121 Overcurrent suppression level, 1st-motor	Inverter rated Current ×(0.0 to 2.0)(A)	Inverter rated current×1.8

• Overcurrent can be suppressed, but in that case there is a possibility the motor become in a step-out state.

Overload restriction function setting

Code/Name	Range (unit)	Initial value
bA122 Overload restriction 1 mode selection, 1st-motor	00(Disable)/01(Enable during accel. and constant speed)/02(Constant speed only)/03(Enable during accel. and constant speed (accel. during regeneration))	01
bA123 Overload restriction 1 active level, 1st-motor	Inverter rated current ×(0.2 to 2.0)(A)	Inv rated current × 1.5(A)
bA124 Overload restriction 1 action time, 1st-motor	0.10 to 3600.00(s)	1.00
bA126 Overload restriction 2 mode selection, 1st-motor	00(Disable)/01(Enable during accel. and constant speed)/02(Constant speed only)/03(Enable during accel. and constant speed (accel. during regeneration))	01
bA127 Overload restriction 2 active level, 1st-motor	Inverter rated current ×(0.2 to 2.0)(A)	Inv rated current × 1.5(A)
bA128 Overload restriction 2 action time, 1st-motor	0.10 to 3600.00(s)	1.00

• When the current is increased over “Overload restriction level”, the overload restriction function reduces the current automatically by lowering the frequency.



• Using input terminal 038[OLR] state, the overload restriction 1(OFF) and overload restriction 2(ON) can be used.

[bA-30] to [bA145]

Deceleration / stop at power loss (Non-stop)

Code/Name	Range (unit)	Initial value
bA-30 Instantaneous power failure non-stop function, mode selection	00(Disable)/ 01(Deceleration-stop)/ 02 (Voltage controlled decel-stop(without recovery)) / 03 (Voltage controlled decel-stop (with recovery))	00
bA-31 Instantaneous power failure non-stop function, start voltage level	(400V class) 0.0 to 820.0(Vdc)	(400V class) 440.0
bA-32 Instantaneous power failure non-stop function, target voltage level	(400V class) 0.0 to 820.0(Vdc)	(400V class) 720.0
bA-34 Instantaneous power failure non-stop function, deceleration time	0.01 to 3600.00(s)	1.00
bA-36 Instantaneous power failure non-stop function, start frequency decrement	0.00 to 10.00(Hz)	0.00
bA-37 Instantaneous power failure non-stop function, DC bus voltage control P gain	0.00 to 5.00	0.20
bA-38 Instantaneous power failure non-stop function, DC bus voltage control I gain	0.00 to 150.00(s)	1.00

- If the DC bus voltage of the main circuit is lower than the level of [bA-31], the inverter decelerates to create a regenerative state.
- When [bA-30]=01, if the DC bus voltage drops under [bA-31], the current output frequency will be decreased by the amount set in the [bA-36] and then the inverter will decelerate according to the deceleration time [bA-34]. Once the DC bus voltage exceeds the [bA-32], the deceleration is temporally stopped.
- When [bA-30] = 02/03, at the time of DC bus voltage drop, PI control is performed to generate a regenerative state by deceleration and keep the DC bus voltage at the [bA-32] set value.
- During Instantaneous power failure non-stop deceleration, output terminal O23[IPS] turns ON.

Overvoltage suppression - deceleration

Code/Name	Range (unit)	Initial value
bA140 Overvoltage suppression enable setting, 1st-motor	00(Disable)/ 01(Constant DC bus voltage control(deceleration stop)) 02(Enable acceleration)/ 03(Enable acceleration (at constant speed and deceleration))	00
bA141 Overvoltage suppression active level, 1st-motor	(400V class) 660.0 to 800.0(Vdc)	(400V class) 760
bA142 Overvoltage suppression active time, 1st-motor	0.00 to 3600.00(s)	1.00
bA144 Constant DC bus voltage control P gain, 1st-motor	0.00 to 5.00	0.20
bA145 Constant DC bus voltage control I gain, 1st-motor	0.00 to 150.00(s)	1.00

- When [bA140] = 01, the inverter stops with the deceleration time extended so that the DC bus voltage do not cross over the [bA141] level.
- When [bA140] = 02, 03, the inverter accelerates once so that the DC bus voltage do not cross over [bA141] level.

[bA146] to [bA-63]

Overvoltage suppression - Over-excitation

Code/Name	Range (unit)	Initial value
bA146 Over-magnetization function selection, 1st-motor	00(Disable)/ 01(Always enable)/ 02(At deceleration only)/ 03(Operation at setting level)/ 04(Operation at setting level at deceleration only)	02
bA147 Over-magnetization function output filter time constant, 1st-motor	0.00 to 1.00(s)	0.30
bA148 Over-magnetization function voltage gain, 1st-motor	50 to 400(%)	100
bA149 Over-magnetization function level setting, 1st-motor	(400V Class) 660.0 to 800.0(Vdc)	(400V Class) 720

- This function disables the AVR(Automatic output Voltage Regulation) function, works while in over-excitation.
- When [AA121]=00 to 02, 04 to 06, (V/f) is enabled.
- When [bA146]=03/04, it will be operative if DC bus voltage exceeds [bA-149] level.

Dynamic braking (BRD) function

Code/Name	Range (unit)	Initial value
bA-60 Dynamic brake use ratio	0.0 to 10.0(%) *1)	10.0
bA-61 Dynamic brake activation selection	00(Disable)/ 01(Only while running) 02(Enable during stop)	00
bA-62 Dynamic brake activation level	(400V class) 660.0 to 800.0(V)	(400V class) 720.0
bA-63 Dynamic brake resistor value	Inverter minimum resistor value to 600(Ω)	Minimum resistance

- *1) The actual dynamic brake use ratio is $[bA-60] \times ([bA-63] / (\text{Inverter minimum resistor}))^2$.
- This function operates the braking resistor of the built-in braking circuits models. To use the BRD, setting [bA-60] and [bA-61] is required.
- Refer to the specification table of Chapter 7 for the minimum resistance value that can be connected.

[bA-70] to [bA-71][bA201] to [bA249]

Cooling-fan operation

Code/Name	Range (unit)	Initial value
bA-70 Cooling fan control method selection	00(Always ON)/ 01(While inverter operates)/ 02(Depends on temperature)	00
bA-71 Clear accumulated cooling fan run time monitor	00(Disable)/01(Clear)	00

- The Inverter cooling fan can be stopped.
- If you change the cooling-fan, assigning [bA-71]=01 you will be able to clear the accumulated operation time.

2nd motor When Intelligent Input terminal O24[SET] is enabled.

Code/Name	Range (unit)	Initial value
bA201 Upper frequency limit source selection, 2nd-motor	Same as bA101	
bA202 Upper Frequency limit, 2nd-motor	Same as bA102	
bA203 Lower Frequency limit, 2nd-motor	Same as bA103	
bA210 Torque limit selection, 2nd-motor	Same as bA110	
bA211 Torque limiting parameters mode selection, 2nd-motor	Same as bA111	
bA212 Torque limit 1 (Forward drive), 2nd-motor	Same as bA112	
bA213 Torque limit 2 (Reverse regenerative), 2nd-motor	Same as bA113	
bA214 Torque limit 3 (Reverse drive), 2nd-motor	Same as bA114	
bA215 Torque limit 4 (Forward regenerative), 2nd-motor	Same as bA115	
bA216 Torque limit LADSTOP selection, 2nd-motor	Same as bA116	
bA220 Overcurrent suppression enable, 2nd-motor	Same as bA120	
bA221 Overcurrent suppression level, 2nd-motor	Same as bA121	
bA222 Overload restriction 1 mode selection, 2nd-motor	Same as bA122	
bA223 Overload restriction 1 active level, 2nd-motor	Same as bA123	
bA224 Overload restriction 1 action time, 2nd-motor	Same as bA124	
bA226 Overload restriction 2 mode selection, 2nd-motor	Same as bA126	
bA227 Overload restriction 2 active level, 2nd-motor	Same as bA127	
bA228 Overload restriction 2 action time, 2nd-motor	Same as bA128	
bA240 Overvoltage suppression enable, 2nd-motor	Same as bA140	
bA241 Overvoltage suppression active level, 2nd-motor	Same as bA141	
bA242 Overvoltage suppression active time, 2nd-motor	Same as bA142	
bA244 Constant DC bus voltage control P gain, 2nd-motor	Same as bA144	
bA245 Constant DC bus voltage control I gain, 2nd-motor	Same as bA145	
bA246 Over magnetization function selection, 2nd-motor	Same as bA146	
bA247 Over magnetization function output filter time constant, 2nd-motor	Same as bA147	
bA248 Over magnetization function voltage gain, 2nd-motor	Same as bA148	
bA249 Over magnetization function level setting, 2nd-motor	Same as bA149	

[bb101] to [bb-23]

Reduction of electromagnetic sound

Code/Name	Range (unit)	Initial value
bb101 Carrier frequency setting, 1st-motor	<ul style="list-style-type: none"> • 400V LH1-055H to LH1-750H [Ub-03]= 00(VLD): 0.5 to 10.0(kHz) • 400V LH1-900H to LH1-1600H [Ub-03]= 00(VLD):0.5 to 8.0(kHz) 	2.0
bb102 Sprinkle carrier pattern selection, 1st-motor	00(Disable)/ 01(Enable: Patern-1)/ 02(Enable: Patern-2)/ 03(Enable: Patern-3)	00
bb103 Automatic carrier reduction selection, 1st-motor	00(Disable)/ 01(Enable: Current)/ 02(Enable: Temperature)	00

- To decrease high frequency electromagnetic noise, [bb101] should be set small. To lower motor sound loudness, [bb101] has to be set bigger.
- For the sake of the inverter protection, the Automatic carrier reduction [bb103] decreases the carrier in certain cases.

Reset operation after error event

Code/Name	Range (unit)	Initial value
bb-10 Automatic error reset selection	00(Disable)/ 01(If RUN command is OFF) 02(After set time)	00
bb-11 Alarm signal selection at automatic error reset	00(Enable)/ 01(Disable)	00
bb-12 Automatic error reset wait time	0 to 600(s)	2
bb-13 Automatic error reset number	0 to 10(count)	3

- Adjustment of the automatic reset that follows an error event. In the case that RUN command was on execution, after resetting, the motor re-operates according to the setting of [bb-41] Restart mode after RS release.200

Retry/trip setting in error event

Code/Name	Range (unit)	Initial value
bb-20 Number of retries after instantaneous power failure	0 to 16/255	0
bb-21 Number of retries after under voltage	0 to 16/255	0
bb-22 Number of retries after overcurrent	0 to 5	0
bb-23 Number of retries after over voltage	0 to 5	0

- Set the number of times to retry after each error.
- If 0 is set, as soon as an error occurs, it will trip.
- To retry, set the value of these parameters other than 0.

[bb-24] to [bb-42]

[bb-43] to [bb-62]

Restart mode after instantaneous power failure/under-voltage error

Code/Name	Range (unit)	Initial value
bb-24 Restart mode selection after instantaneous power failure/under-voltage error	*1)	01
bb-25 Instantaneous power failure allowed time	0.3 to 25.0(s)	1.0
bb-26 Retry wait time after instantaneous power failure/under-voltage error	0.3 to 100.0(s)	0.3
bb-27 Enable instantaneous power failure/ under-voltage trip while in stop status	00(Disable)/01(Enable)/02(Disable at Stop/Decel. stop)	00
bb-28 Restart mode selection after an overcurrent error	*1)	01
bb-29 Retry wait time after an overcurrent error	0.3 to 100.0(s)	0.3
bb-30 Restart mode selection after an overvoltage error	*1)	01
bb-31 Retry wait time after an overvoltage error	0.3 to 100.0(s)	0.3

*1) 00(Restart at 0Hz)/01(Restart with matching frequency)/02(Restart with active frequency matching)/03(Detect speed)/04(Decelerate and stop with matching frequency and then trip)
 · Regarding the restart, after the waiting time is completed the selected restart method is carried out.

Restart mode after FRS/RS

Code/Name	Range (unit)	Initial value
bb-40 Restart mode after FRS release	00(Restart at 0Hz)/01(Restart with matching frequency)/02(Restart with active frequency matching)/03(Detect speed) *2)	00
bb-41 Restart mode after RS release	00	00

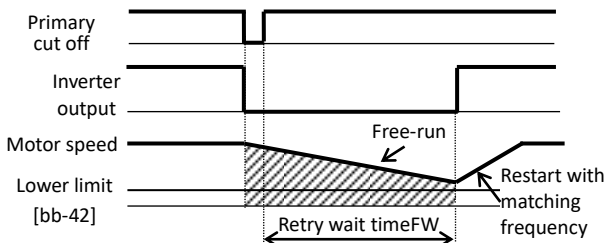
*2) Requires encoder feedback to the P1-FB option or the input terminal 103[PLA]/104[PLB] assigned [A]/[B] terminals.
 · When using input terminal 032[FRS] and 028[RS], restart mode can be selected.
 · By [bb-40], input terminal 032 [FRS] Free run ON and restart operation after free run at stop are selected.
 · By [bb-41], select the operation after input terminal 028[RS] reset ON, the operation after reset by power off, and the restart operation after reset release at trip.
 · When the input terminal 035[CS] commercial power supply change is turned ON, the inverter will be in free running state, and restart with matching frequency will be performed after [bb-26] time has elapsed.

For more information, contact to your supplier or local Hitachi distributor or service station.

Minimum level of frequency matching

Code/Name	Range (unit)	Initial value
bb-42 Frequency matching minimum restart frequency	0.00 to 590.00(Hz)	0.00

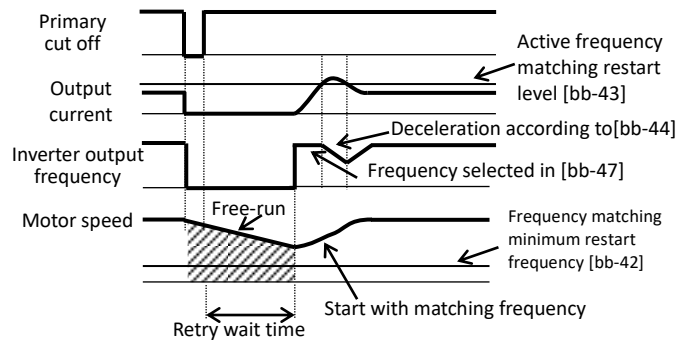
· The matching frequency function adopts the motor frequency for a shockless start-up.
 · If at the restart the frequency is under the [bb-42] frequency, a 0Hz restart will be used instead.



Active frequency matching

Code/Name	Range (unit)	Initial value
bb-43 Active frequency matching restart level	Inverter rated current ×(0.2 to 2.0)(A)	Inverter rated current×1.0
bb-44 Active frequency matching restart constant(speed)	0.10 to 30.00(s)	0.50
bb-45 Active frequency matching restart constant (voltage)	0.10 to 30.00(s)	0.50
bb-46 OC-suppress level at active frequency matching	Inverter rated current ×(0.0 to 2.0)(A)	Inverter rated current × 1.0(A)
bb-47 Active frequency matching restart speed selection	00(Output frequency at shut down)/01(Maximum frequency)/02(Setting frequency)	00

· The reset interval is set with [bb-46].
 · Pull in at the frequency set in [bb-47] and start up.



Overcurrent level

Code/Name	Range (unit)	Initial value
bb160 Overcurrent detection level, 1st-motor	Inverter rated ND current × (0.2 to 2.2) (A)	Inverter ND rated current × 2.2(A)

· The motor protection level for overcurrent can be set.
 · In the case of a permanent magnet motor, set this parameter lower than the motor demagnetizing level.

Overvoltage warning

Code/Name	Range (unit)	Initial value
bb-61 Power supply overvoltage selection	00(Warning)/01(Error)	00
bb-62 Power supply overvoltage level setting	(400V Class) 600.0 to 820.0(V)	(400V Class) 780.0

· When the input suffers an overvoltage and if the DC bus voltage is higher than the value in [bb-62], a warning is issued in accordance with [bb-61].
 · If [bb-61] is 01, the output terminal 081 [OVS]"Overvoltage power Supply" signal turns on and trips with [E015] error. if [bb-61] is 00, only the output terminal 081[OVS] signal is ON.

Selection of Ground fault detection

Code/Name	Range (unit)	Initial value
bb-64 Detect ground fault selection	00(Disable)/01(Enable)	01

· Ground fault detection enable/disable is selectable.

[bb-65] to [bb260]

Phase loss detection

Code/Name	Range (unit)	Initial value
bb-65 Input phase loss detection enable	00(Disable)/01(Enable)	00
bb-66 Output phase loss detection enable	00(Disable)/01(Enable)	00
bb-67 Output phase loss detection sensitivity	1 to 100(%)	10

• Above function detects the disconnection of the supply RST input line and UVW output line.

Thermistor error detection

Code/Name	Range (unit)	Initial value
bb-70 Thermistor error level	0 to 10000(Ω)	3000
Cb-40 Thermistor type selection	00(Disable)/01(PTC)/02(NTC)	00

• In [TH] terminal must be attached the kind of thermistor specified in [Cb-40]. If [Cb-40]=01 or 02, error level must be set in [bb-70].

Over-speed detection

Code/Name	Range (unit)	Initial value
bb-80 Over-speed detection level	0.0 to 150.0(%)	135.0
bb-81 Over-speed detection time	0.0 to 5.0(s)	0.5

• In vector control, when speed surpass "maximum speed"×[bb-80] for more than the [bb-81] time, it will result in an error.

Abnormal deviation in speed control

Code/Name	Range (unit)	Initial value
bb-82 Speed deviation error mode selection	00(Warning)/01(Error)	00
bb-83 Speed deviation error detection level	0.0 to 100.0(%)	15.0
bb-84 Speed deviation error detection time	0.0 to 5.0(s)	0.5

• In vector control, if the time which the speed deviation (absolute of [dA-12]-[dA-08]) is greater than the "maximum frequency setting" × [bb-83] exceeds [bb-84] value, an error or warning will occur and the output terminal 041[DSE] turn ON.

Abnormal deviation in position control

Code/Name	Range (unit)	Initial value
bb-85 Position deviation error mode selection	00(Warning)/01(Error)	00
bb-86 Position deviation error detection level	0 to 65535 (×100pulse)	4096
bb-87 Position deviation error detection time	0.0 to 5.0(s)	0.5

• In position control, an error will occur if the time which position deviation is greater than [bb-86] exceeds [bb-87].
 • When the input terminal 072[PCLR] is turned ON, the position deviation is cleared.

2nd motor When Intelligent Input terminal 024[SET] is enabled.

Code/Name	Range (unit)	Initial value
bb201 Carrier frequency setting, 2nd-motor	Same as bb101	
bb202 Sprinkle carrier pattern selection, 2nd-motor	Same as bb102	
bb203 Automatic carrier reduction selection, 2nd-motor	Same as bb103	
bb260 Overcurrent detection level, 2nd-motor	Same as bb160	

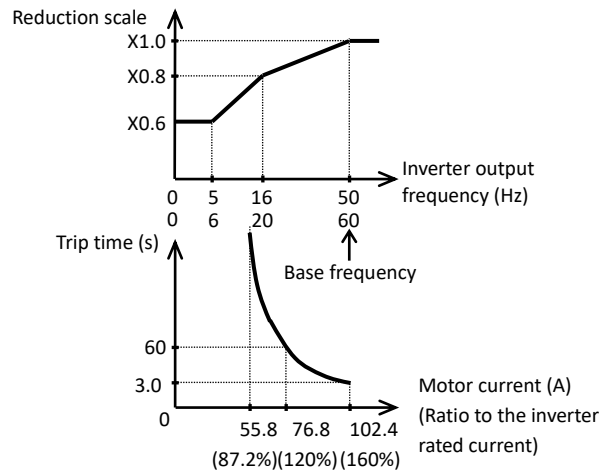
[bC110] to [bC125]

Electronic thermal protection

Code/Name	Range (unit)	Initial value
bC110 Electronic thermal level setting, 1st-motor	Inverter rated current × (0.0 to 3.0)(A)	Inverter rated current ×1.0(A)
bC111 Electronic thermal characteristic selection, 1st-motor	00(Reduced torque (VT))/01(Constant torque (CT))/02(Free setting)	00(JPN)/01(EU)(USA)(ASIA)(CHN)
bC112 Electronic thermal decrease function enable, 1st-motor	00(Disable)/01(Enable)	01
bC113 Electronic thermal decreasing time, 1st-motor	1 to 1000(s)	600
bC-14 Store electronic thermal counter at power-off	00(Disable)/01(Enable)	01
bC120 Free electronic thermal frequency-1, 1st-motor	0.00 to bC122(Hz)	0.00
bC121 Free electronic thermal current-1, 1st-motor	Inverter rated current × (0.0 to 3.0)(A)	0.0
bC122 Free electronic thermal frequency-2, 1st-motor	bC120 to bC124(Hz)	0.00
bC123 Free electronic thermal current-2, 1st-motor	Inverter rated current × (0.0 to 3.0)(A)	0.0
bC124 Free electronic thermal frequency-3, 1st-motor	bC122 to 590.00(Hz)	0.00
bC125 Free electronic thermal current-3, 1st-motor	Inverter rated current × (0.0 to 3.0)(A)	0.0

• The setting of [bC112] enables subtraction of the motor's thermal integration value. If [bC113] is lowered from the initial value, the risk of motor burnout may increase, so set it appropriately according to the heat dissipation characteristics of the motor. The inverter protection thermal (user setting not possible) operates separately.

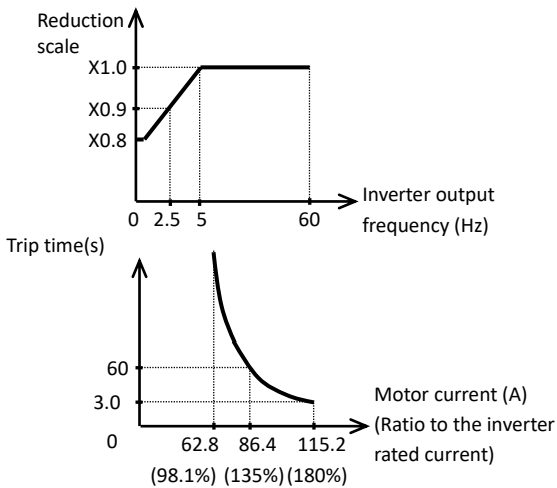
(Example) When [bC111]=00, Inverter rated current:64A, [bC110]=64(A), Base frequency [Hb104]=60Hz, Output frequency=20Hz



• In case of output frequency = 16Hz (base=50Hz) or 20Hz (base = 60hz), the reduction scale is ×0.8, then the inverter will trip when the output current of 120%(150%×0.8) flows continuously within 60s according to the curve.

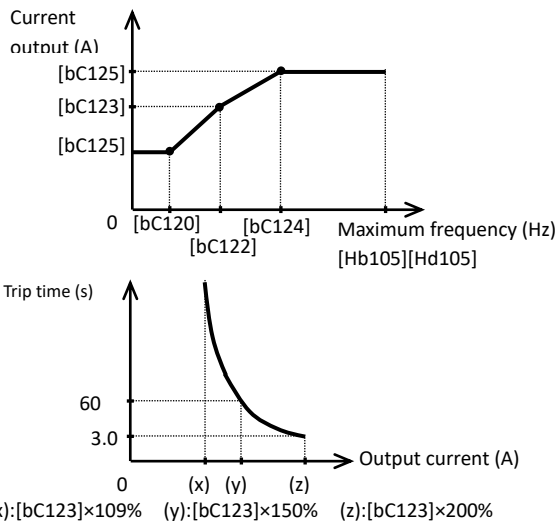
[bC210] to [bC225]

(Example) When [bC111]=01, Inverter rated current:64A, [bC110]=64(A), Base frequency[Hb103]=60Hz, Output frequency=2.5Hz



• In case of output frequency = 2.5Hz, the reduction scale is x0.9, then, the inverter will trip when the output current of 135%(=150%×0.9) flows continuously within 60s according to the curve.

(Example) When [bC111] = 02, and Output frequency = [bC122]



2nd motor When Intelligent Input terminal 024[SET] is enabled.

Code/Name	Range (unit)	Initial value
bC210 Electronic thermal level setting, 2nd-motor	Same as bC110	
bC211 Electronic thermal characteristic selection, 2nd-motor	Same as bC111	
bC212 Electronic thermal decrease function selection, 2nd-motor	Same as bC112	
bC213 Electronic thermal decreasing time, 2nd-motor	Same as bC113	
bC220 Free electronic thermal frequency-1, 2nd-motor	Same as bC120	
bC221 Free electronic thermal current-1, 2nd-motor	Same as bC121	
bC222 Free electronic thermal frequency-2, 2nd-motor	Same as bC122	
bC223 Free electronic thermal current-2, 2nd-motor	Same as bC123	
bC224 Free electronic thermal frequency-3, 2nd-motor	Same as bC124	
bC225 Free electronic thermal current-3, 2nd-motor	Same as bC125	

[bd-01] to [bd-04]

functional Safety terminal (STO) *1)

Code/Name	Range (unit)	Initial value
bd-01 STO input display selection *1)	00(Warning(display))/01(Warning(without display))/02(Trip)	00
bd-02 STO input change time *1)	0.00 to 60.00(s)	1.00
bd-03 Display selection during STO input change time *1)	00(Warning(display))/01(Warning(without display))	00
bd-04 Action selection after STO input change time *1)	00(Maintain current status)/01(Disable)/02(Trip)	00

*1)These parameters are just about Safety function, not suitable for LH1 series.

Contact to your supplier or local Hitachi distributor or service station for more details.

[CA-01] to [CA-31]

■ Parameter mode (C code)

Intelligent input terminals setting

Code/Name	Range (unit)	Initial value	
CA-01 Input terminal [1] function	Reference <Input terminal function list> 103 [PLA] Pulse train input A is restricted to [CA-10],	028(RS)	
CA-02 Input terminal [2] function		015(SCHG)	
CA-03 Input terminal [3] function		029(JG)	
CA-04 Input terminal [4] function		032(FRS)	
CA-05 Input terminal [5] function		031(2CH)	
CA-06 Input terminal [6] function		003(CF1)	
CA-07 Input terminal [7] function		004(CF2)	
CA-08 Input terminal [8] function		002(RV)	
CA-09 Input terminal [9] function		104 [PLB] Pulse train input B is restricted to [CA-11],	001(FW)
CA-10 Input terminal [A] function		033(EXT)	
CA-11 Input terminal [B] function		034(USP)	

- The functions for the input terminals 1 to 9,A,B are assigned in [CA-01] to [CA-09],[CA-10],[CA-11].

Input terminal NO/NC setting

Code/Name	Range (unit)	Initial value
CA-21 Input terminal [1] active state	00(Normally Open: NO)/ 01(Normally Closed: NC)	00
CA-22 Input terminal [2] active state		00
CA-23 Input terminal [3] active state		00
CA-24 Input terminal [4] active state		00
CA-25 Input terminal [5] active state		00
CA-26 Input terminal [6] active state		00
CA-27 Input terminal [7] active state		00
CA-28 Input terminal [8] active state		00
CA-29 Input terminal [9] active state		00
CA-30 Input terminal [A] active state		00
CA-31 Input terminal [B] active state		00

- NO/NC for the Intelligent input terminals 1 to 9,A,B are assigned in [CA-21] to [CA-29],[CA-30],[CA-31].
- However, in the case of [RS] assignment the NO/NC will not apply, only NO will apply.

[CA-41] to [CA-55]

Input terminal chatter prevention

Code/Name	Range (unit)	Initial value
CA-41 Input terminal [1] response time	0 to 400(ms)	2
CA-42 Input terminal [2] response time		2
CA-43 Input terminal [3] response time		2
CA-44 Input terminal [4] response time		2
CA-45 Input terminal [5] response time		2
CA-46 Input terminal [6] response time		2
CA-47 Input terminal [7] response time		2
CA-48 Input terminal [8] response time		2
CA-49 Input terminal [9] response time		2
CA-50 Input terminal [A] response time		2
CA-51 Input terminal [B] response time		2

- Above parameters set the time to wait after the input change has ended, and for the input to become stable and responsive.

Time allowed in simultaneous terminal change

Code/Name	Range (unit)	Initial value
CA-55 Multistage input determination time	0 to 2000(ms)	0

- Sets the dead time for multistage speed and position terminals change.

[Input terminal function list]

Function code	Symbol	Function name	Description
000	No	Not use	-
001	FW	Forward rotation	Activating (ON) only one of them will grant forward or reverse rotation command. ⇒ [AA111] Changing the states of these terminals, allow to set different motor speeds and change among them. ⇒[Ab110] to [Ab-25], [Ab210]
002	RV	Reverse rotation	
003	CF1	Multi-speed selection 1	
004	CF2	Multi-speed selection 2	
005	CF3	Multi-speed selection 3	
006	CF4	Multi-speed selection 4	
007	SF1	Multi-speed Bit-1	
008	SF2	Multi-speed Bit-2	
009	SF3	Multi-speed Bit-3	
010	SF4	Multi-speed Bit-4	
011	SF5	Multi-speed Bit-5	
012	SF6	Multi-speed Bit-6	
013	SF7	Multi-speed Bit-7	
014	ADD	Trigger for frequency addition	
015	SCHG	Main/Sub speed reference change	Main speed(OFF)/Sub-speed (ON), to change between them use ⇒[AA105]
016	STA	3-wire start	[STA]'s ON starts the motor. [STP]'s OFF stops the motor.
017	STP	3-wire stop	The inverter forwards operation direction if [F/R] is (OFF), and reverses operation direction if it is (ON). ⇒[AA111]
018	F/R	3-wire forward/reverse	
019	AHD	Analog command holding	When the main speed input source selection [AA101] is the analog input 01 to 06, if AHD terminal is in ON state, holds the Analog terminal value. ⇒[AA101]
020	FUP	Remote control speed-UP function	If the frequency can be set ([AHD] ON included),[FUP] ON accelerates, and [FDN] ON decelerates. [UDC] returns to the saved value. ⇒[CA-60] to [CA-66]
021	FDN	Remote control speed-DOWN function	
022	UDC	Remote control Speed data clearing	
023	F-OP	Force operation	[F-OP]'s ON switches command. ⇒[CA-70],[CA-71]
024	SET	2nd-motor control	Change between 1st-motor (OFF) and 2nd-motor (ON). ⇒By parameter
028	RS	Reset	Reset trip ⇒[bb-41], [CA-72]
029	JG	Jogging	Activates Jogging operation. ⇒[AG-20],[AG-21]
030	DB	External dynamic brake	Enables the DC braking operation ⇒[AF101] to [AF109]
031	2CH	2-stage Accel/Decel time	[2CH]'s ON changes the Accel/Decel time. ⇒[AC115]
032	FRS	Free run stop	[FRS]'s ON allows the motor to free run. ⇒[AA115],[bb-40]
033	EXT	External fault	[EXT]'s ON occurs error E012.
034	USP	Unattended start protection	When [USP] is ON, the RUN command is ON when the power supply is turned on to prevent the inverter from starting suddenly (Ex: Power supply is turned on with the [FW] ON). In this case, E013 error occurs.
035	CS	Commercial power supply change	[CS] is used when switching to commercial power. When [CS] is turned ON, the inverter output is cut off.
036	SFT	Soft-Lock	[SFT]'s prevent parameters from being changed. ⇒UA [UA-16]

[Input terminal function list]

Function code	Symbol	Function name	Description
037	BOK	Answer back from Brake	The brake confirmation signal is inputted for the brake control.
038	OLR	Overload restriction selection	Switches between Overload limit 1(OFF) and 2(ON). ⇒[bA122] to [bA128]
039	KHC	Accumulation input power clearance	[KHC]'s ON clears the Accumulated input power monitor. ⇒[UA-12]
040	OKHC	Accumulation output power clearance	[OKHC]'s ON clears the Accumulated input power monitor. ⇒[UA-14]
041	PID	Disable PID1	If ON, disables PID1 and changes the PID target value for the frequency reference. ⇒[AH-01]
042	PIDC	PID1 integration reset	If ON, clears the integral value of the control. ⇒[AH-62],[AH-65]
043	PID2	Disable PID2	If ON, disables PID2 and changes the PID target value for the frequency reference. ⇒[AJ-01]
044	PIDC2	PID2 integration reset	If ON, clears the integral value of the control. ⇒[AJ-14]
045	PID3	Disable PID3	If ON, disables PID3 and changes the PID target value for the frequency reference. ⇒[AJ-21]
046	PIDC3	PID3 integration reset	If ON, clears the integral value of the control. ⇒[AJ-34]
047	PID4	Disable PID4	If ON, disables PID4 and changes the PID target value for the frequency reference. ⇒[AJ-41]
048	PIDC4	PID4 integration reset	If ON, clears the integral value of the control. ⇒[AJ-54]
051	SVC1	Multi set-point selection 1	The target value can be selected by changing the pattern of ON/OFF states. ⇒[AH-06]
052	SVC2	Multi set-point selection 2	
053	SVC3	Multi set-point selection 3	
054	SVC4	Multi set-point selection 4	
055	PRO	PID gain change	Switches between Gain 1(OFF) and Gain 2(ON).
056	PIO1	PID output switching 1	Switches PID Output 1 to 4 by (PIO1:PIO2). PID1 Enable(OFF:OFF) PID2 Enable(OFF:ON) PID3 Enable(ON:OFF) PID4 Enable(ON:ON)
057	PIO2	PID output switching 2	
058	SLEP	SLEEP condition activation	In case of [SLEP] terminal selected as sleep trigger, [SLEP]'s ON activates the sleep function. ⇒ [AH-85]
059	WAKE	WAKE condition activation	In case of [WAKE] terminal selected as wake trigger, [WAKE]'s ON activates the wake function. ⇒ [AH-93]
060	TL	Torque limit enable *1)	[TL]'s ON enables torque limit.
061	TRQ1	Torque limit selection bit 1 *1)	The target value can be selected by changing the pattern of ON/OFF states.
062	TRQ2	Torque limit selection bit 2 *1)	

*1) These functions are disabled when the Control mode selection (AA121/AA221) setting is 00 to 06 (V/f control mode).

[Input terminal function list]

Function code	Symbol	Function name	Description
063	PPI	P/PI control mode selection	For drooping control, [PPI] switches between PI control (OFF) and P control (ON).
064	CAS	Control gain change	Changes between the PI gain 1 (OFF) and 2(ON) of the speed control system.
065	SON	Servo-on	[SON]'s ON executes the Servo-Lock operation.
066	FOC	Forcing (Pre-excitation)	Turning ON this terminal before operation, accelerates the torque rise by supplying an exciting current in advance.
067	ATR	Permission of torque control	[ATR]'s ON enables the torque control.
068	TBS	Torque bias enable	[TBS]'s ON enables the torque bias.
069	ORT	Home search function	[ORT]'s ON execute the home position return function in pulse train position control.
071	LAC	Acceleration/Deceleration (LAD) *1 cancellation	[LAC]'s ON forces Accel/Decel time to 0.00s.
072	PCLR	Clearance of position deviation	Clears the position deviation of position control mode.
073	STAT	Pulse train position reference input enable	In the pulse train position control, if [STAT] is ON, the pulse train input is enabled.
074	PUP	Position bias (ADD)	In pulse train position control, when [PUP]/[PDN] is turned on, "Position bias setting[AE-08]" is added/subtracted to/from the position reference.
075	PDN	Position bias (SUB)	
076	CP1	Multistage position settings selection 1	The position reference can be selected by changing the pattern of ON/OFF states.
077	CP2	Multistage position settings selection 2	
078	CP3	Multistage position settings selection 3	
079	CP4	Multistage position settings selection 4	
080	ORL	Limit signal of homing function	Used by the Zero-Return position operations of the position control.
081	ORG	Start signal of homing function	
082	FOT	Forward over travel	When this signal is ON, the forward drive in absolute position control mode is limited (The torque limit value in the forward direction is set to 10%).
083	ROT	Reverse over travel	When this signal is ON, reverse drive in absolute position control mode is limited (Torque limit value in reverse direction is set to 10%).
084	SPD	Speed/Position switching	Switches position control (OFF) and speed control (ON).

*1) LAD :Lead to acceleration and deceleration

[Input terminal function list]

Function code	Symbol	Function name	Description
085	PSET	Position data presetting	[PSET]'s ON sets the actual position to the Pre-set position [AE-62].
086	MI1	General-purpose input 1	When these functions are assigned, they become general purpose input signals of the EzSQ function.
087	MI2	General-purpose input 2	
088	MI3	General-purpose input 3	
089	MI4	General-purpose input 4	
090	MI5	General-purpose input 5	
091	MI6	General-purpose input 6	
092	MI7	General-purpose input 7	
093	MI8	General-purpose input 8	
094	MI9	General-purpose input 9	
095	MI10	General-purpose input 10	
096	MI11	General-purpose input 11	
097	PCC	Pulse counter clearing	[PCC]'s ON clears the count for the pulse counter function.
098	ECOM	EzCOM activation	[ECOM]'s ON activates EzCOM.
099	PRG	Program RUN	[PRG]'s ON executes EzSQ.
100	HLD	Acceleration/Deceleration disable	[HLD]'s ON stagnates Accel/Decel time temporarily.
101	REN	RUN enable	Run command is not possible when the input terminal function [REN] is assigned and it is OFF.
102	DISP	Display lock	[DISP]'s ON locks the keypad screen.
103	PLA	Pulse count A	For pulse train input use.
104	PLB	Pulse count B	For pulse train input use.
105	EMF	Emergency-force drive activation	Forces the set operation in emergency state.
107	COK	Contact check signal	Regarding the braking control, check signal for the contactor.
108	DTR	Data trace start	[DTR]'s ON starts data trace function.
109	PLZ	Pulse train input Z	Z phase pulse input of the external encoder. It is invalid when using P1-FB.
110	TCH	Teach-in signal	[TCH]'s ON starts teach-in function.

[CA-60] to [CA-84]

[FUP] / [FDN] operations

Code/Name	Range (unit)	Initial value
CA-60 FUP/FDN overwrite target selection	00(Speed reference) 01(PID1 Set point)	00
CA-61 FUP/FDN data save enable	00(No save)/ 01(Save)	00
CA-62 FUP/FDN UDC selection	00(OHz)/ 01(Save data)	00
CA-64 Acceleration time setting for FUP/FDN function	0.00 to 3600.00(s)	30.00
CA-66 Deceleration time setting for FUP/FDN function		30.00

- [CA-60] sets as operation target the frequency reference or the PID target value for 020[FUP]/021[FDN].
- [CA-61] sets whether the modified values of [FUP] / [FDN] should be saved or not in the inverter nonvolatile memory.
- [CA-62] selects the frequency reference when input terminal 022[UDC] is ON.
- If [FUP]/[FDN] is turn ON, in the case the frequency reference is changed you can set the acceleration and deceleration time [CA-64][CA-66].

[F-OP] Speed/Operation change

Code/Name	Range (unit)	Initial value
CA-70 Speed reference source selection when [F-OP] is active	01(Terminal[Ai1])/02(Terminal[Ai2])/03(Terminal[Ai3])/04(Terminal[Ai4])/05(Terminal[Ai5])/06(Terminal[Ai1])/07(Parameter Setting)/08(RS485)/09(Option-1)/10(Option-2)/11(Option-3)/12(Pulse train input(internal))/13(Pulse train input(option))/14(Program function)/15(PID calc.)/16(MOP VR)	01
CA-71 RUN command source selection when [F-OP] is active	00([FW]/[RV] terminal)/01(3-wire)/02(Keypad's RUN key)/03(RS485)/04(Option-1)/05(Option-2)/06(Option-3)	00

- If input terminal 023[F-OP] is ON, the above settings are carried out.

Reset terminal [RS]

Code/Name	Range (unit)	Initial value
CA-72 Reset mode selection	00(Always enabled (Trip release at turn-ON))/01(Always enabled (Trip release at turn-OFF))/02(Only enable in trip status (Trip release at turn-ON))/03(Only enable in trip status (Trip release at turn-OFF))	00

- Normally, Output is shut off when reset terminal is ON. It is also possible to enable only trip reset.

Main encoder input (For control terminal block [A]/[B])

Code/Name	Range (unit)	Initial value
CA-81 Encoder constant setting	32 to 65535(pulse)	1024
CA-82 Encoder phase sequence selection	00(A Phase lead)/01(B Phase lead)	00
CA-83 Motor gear ratio numerator	1 to 10000	1
CA-84 Motor gear ratio denominator	1 to 10000	1

- Above parameters set the main encoder input and the motor gear ratio involved in the encoder feedback.

[CA-90] to [CA-99]

Pulse train input terminal[A]/[B]

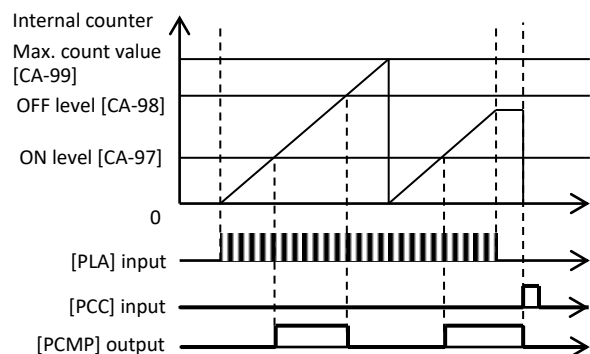
Code/Name	Range (unit)	Initial value
CA-90 Pulse train input, target function selection	00(Disable)/01(Reference)/02(Speed feedback)/03(Pulse count)	00
CA-91 Pulse train input mode selection	00(90 degrees shift pulse train)/01(Forward/Reverse pulse train and direction signal)/02(Forward pulse train and reverse pulse train)	00
CA-92 Pulse train frequency scale	0.05 to 32.00(kHz)	25.00
CA-93 Pulse train frequency filter time constant	0.01 to 2.00(s)	0.10
CA-94 Pulse train frequency bias value	-100.0 to 100.0(%)	0.0
CA-95 Pulse train upper frequency detection level	0.0 to 100.0(%)	100.0
CA-96 Pulse train lower frequency detection level	0.0 to 100.0(%)	0.0

- When [CA-90] is other than 00, the input terminals [A]/[B] become pulse train input terminals. Assign the input terminal function 103[PLA]/104[PLB] to terminals [A]/[B] to perform pulse train input frequency reference, vector control with encoder feedback or absolute position control. The pulse train count method follows the setting of [CA-91].

Pulse train input counter

Code/Name	Range (unit)	Initial value
CA-97 Pulse counter compare match output ON value	0 to 65535	0
CA-98 Pulse counter compare match output OFF value	0 to 65535	0
CA-99 Pulse counter maximum value	0 to 65535	65535

- Set 044[PCMP] to output the compare results of the pulse train counters of functions 103[PLA]/104[PLB].
- Turning 097[PCC] terminal in ON state resets the counter.



[Cb-01] to [Cb-35]

Analog input adjustment

Code/Name	Range (unit)	Initial value
Cb-01 [Ai1] Filter time constant	1 to 500(ms)	16
Cb-03 [Ai1] Start value	0.00 to 100.00(%)	0.00
Cb-04 [Ai1] End value	0.00 to 100.00(%)	100.00
Cb-05 [Ai1] Start rate	0.0 to [Cb-06](%)	0.0
Cb-06 [Ai1] End rate	[Cb-05] to 100.0(%)	100.0
Cb-07 [Ai1] Start value selection	00(Start value)/01(0%)	01
Cb-11 [Ai2] Filter time constant	1 to 500(ms)	16
Cb-13 [Ai2] Start value	0.00 to 100.00(%)	0.00
Cb-14 [Ai2] End value	0.00 to 100.00(%)	100.00
Cb-15 [Ai2] Start rate	0.0 to [Cb-16](%)	20.0
Cb-16 [Ai2] End rate	[Cb-15] to 100.0(%)	100.0
Cb-17 [Ai2] Start value selection	00(Start value)/01(0%)	01
Cb-21 [Ai3] Filter time constant	1 to 500(ms)	16
Cb-22 Terminal [Ai3] selection	00(Single)/01(Added to Ai1/Ai2: forward and reverse)/02(Added to Ai1/Ai2: Forward only)	00
Cb-23 [Ai3] Start value	-100.00 to 100.00(%)	-100.00
Cb-24 [Ai3] End value	-100.00 to 100.00(%)	100.00
Cb-25 [Ai3] Start rate	-100.0 to [Cb-26]	-100.0
Cb-26 [Ai3] End rate	[Cb-25] to 100.0	100.0
Cb-30 [Ai1] Voltage/Current bias adjustment	-100.00 to 100.00(%)	0.00
Cb-31 [Ai1] Voltage/Current gain adjustment	0.00 to 200.00(%)	100.00
Cb-32 [Ai2] Voltage/Current bias adjustment	-100.00 to 100.00(%)	0.00
Cb-33 [Ai2] Voltage/Current gain adjustment	0.00 to 200.00(%)	100.00
Cb-34 [Ai3] Voltage bias adjustment	-100.00 to 100.00(%)	0.00
Cb-35 [Ai3] Voltage gain adjustment	0.00 to 200.00(%)	100.00

- Regarding the adjustment method of the Analog input, refer to the “chapter 3.9 Adjust the analog input (Ai1/Ai2)” and “chapter 3.11 Adjust the analog input (Ai3)”.

[Cb-40] to [Cb-57][CC-01] to [CC-17]

Thermistor error detection

Code/Name	Range (unit)	Initial value
Cb-40 Thermistor type selection	00(Disable)/01(PTC)/02(NTC)	00
Cb-41 Thermistor gain adjustment	0.0 to 1000.0	100.0

- Set [Cb-40] according to the connected thermistor in TH input terminal.
- When [CA-40]=01 or 02, set [bb-70] the error level. Refer to [bb-70].
- In [Cb-41] thermistor gain adjustment, when the adjustment value is raised the resistance value is lowered.

MOP(VR) input adjustment

Code/Name	Range (unit)	Initial value
Cb-51 MOP-VR input filter time constant	1 to 500	100
Cb-53 MOP-VR start value	0.00 to 100.00(%)	0.00
Cb-54 MOP-VR end value	0.00 to 100.00(%)	100.00
Cb-55 MOP-VR start ratio	0.0 to [Cb-56](%)	0.0
Cb-56 MOP-VR end ratio	[Cb-55] to 100.0(%)	100.0
Cb-57 MOP-VR start selection	00(Start value)/01(0%)	01

- These are the parameters when using optional operation keypad (MOP(VR))(option).

Intelligent Output terminals setting

Code/Name	Range (unit)	Initial value
CC-01 Output terminal [11] function	Reference <Intelligent output terminal function list>	001(RUN)
CC-02 Output terminal [12] function		002(FA1)
CC-03 Output terminal [13] function		003(FA2)
CC-04 Output terminal [14] function		007(IRDY)
CC-05 Output terminal [15] function		035(OL)
CC-06 Output terminal [16] function *1)		000(NO)
CC-07 Output terminal [AL] function		017(AL)

- The functions for the output terminals 11 to 15 ,AL are assigned in [CC-01] to [CC-05] ,[CC-07].

Output terminal NO/NC setting

Code/Name	Range (unit)	Initial value
CC-11 Output terminal [11] active state	00(Normally open: NO)/01(Normally closed: NC)	00
CC-12 Output terminal [12] active state		00
CC-13 Output terminal [13] active state		00
CC-14 Output terminal [14] active state		00
CC-15 Output terminal [15] active state		00
CC-16 Output terminal [16] active state *1)		00
CC-17 Output terminal [AL] active state		01

- The NO/NC setting for the Intelligent output terminals 11 to 15 ,AL are assigned in [CC-11] to [CC-15] ,[CC-17].

*1) LH1 series do not have this terminal.

[CC-20] to [CC-33]

Output terminals stabilization

Code/Name	Range (unit)	Initial value
CC-20 Output terminal [11] on-delay time	0.00 to 100.00(s)	0.00
CC-21 Output terminal [11] off-delay time	0.00 to 100.00(s)	0.00
CC-22 Output terminal [12] on-delay time	0.00 to 100.00(s)	0.00
CC-23 Output terminal [12] off-delay time	0.00 to 100.00(s)	0.00
CC-24 Output terminal [13] on-delay time	0.00 to 100.00(s)	0.00
CC-25 Output terminal [13] off-delay time	0.00 to 100.00(s)	0.00
CC-26 Output terminal [14] on-delay time	0.00 to 100.00(s)	0.00
CC-27 Output terminal [14] off-delay time	0.00 to 100.00(s)	0.00
CC-28 Output terminal [15] on-delay time	0.00 to 100.00(s)	0.00
CC-29 Output terminal [15] off-delay time	0.00 to 100.00(s)	0.00
CC-30 Output terminal [16] on-delay time*1)	0.00 to 100.00(s)	0.00
CC-31 Output terminal [16] off-delay time*1)	0.00 to 100.00(s)	0.00
CC-32 Output terminal [AL] on-delay time	0.00 to 100.00(s)	0.00
CC-33 Output terminal [AL] off-delay time	0.00 to 100.00(s)	0.00

• The above parameters set the delay time from the change of the output terminal to the actual response.

*1) LH1 series do not have this terminal.

[output terminal function list]

Function code	Symbol	Function name	Description
000	No	Not use	-
001	RUN	Running	While output is active
002	FA1	Constant-frequency reached	Turn on when output frequency is reached frequency reference.
003	FA2	Set frequency overreached	Turns ON when the output frequency reaches or exceeds the specified arrival value. [CE-10][CE-11]
004	FA3	Set frequency reached	Turns ON only when the specified arrival frequency has been reached. [CE-12][CE-13]
005	FA4	Set frequency overreached 2	Turns ON when the specified arrival frequency is reached or exceeded. [CE-12][CE-13]
006	FA5	Set frequency reached 2	Turns ON only when the specified arrival frequency has been reached. [CE-12][CE-13]
007	IRDY	Inverter ready	ON when inverter is ready
008	FWR	Forward rotation	ON while in forward drive
009	RVR	Reverse rotation	ON while in reverse drive
010	FREF	Frequency reference = Keypad is selected	ON if the frequency reference is from keypad
011	REF	Run command = Keypad is selected	ON if the RUN command is from keypad.
012	SETM	2nd control is selected	ON if 2nd-motor selected
016	OPO	Option output	Controlled by the Option
017	AL	Alarm	ON when trip happens
018	MJA	Major failure	ON if major failure trips
019	OTQ	Over-torque *2)	ON if torque exceeds the level [CE120] to [CE123].
020	IP	Instantaneous power failure	After the main power supply R,S,T is established, it turns ON when an instantaneous power failure of the main power supply is detected.
021	UV	Under-voltage	Turns on when main power drops or control power fails.
022	TRQ	Torque limited	ON if torque limit operates
023	IPS	IP-Nonstop function is active	ON if IP-Nonstop function operates in power loss.
024	RNT	Accumulated operation time over	ON if set time [CE-36] is exceeded
025	ONT	Accumulated power-on time over	ON if set time [CE-36] is exceeded
026	THM	Electronic thermal alarm signal(MTR)	ON if motor thermal integral value exceeds set value [CE-30]
027	THC	Electronic thermal alarm signal(CTL)	ON if inverter thermal integral value exceeds set value [CE-31]
029	WAC	Capacitor life warning	ON by life warning
030	WAF	Cooling-fan speed drop	ON by life warning
031	FR	Starting contact signal	ON while in operation
032	OHF	Heat sink overheat warning	ON when the heatsink temperature is over the setting value [CE-34].
033	LOC	Low-current indication signal	ON if output current is less than the setting value [CE102].

*2) This function is disabled when the Control mode selection (AA121/AA221) setting is 00 to 06 (V/f control mode).

[Output terminal function list]

Function code	Symbol	Function name	Description
034	LOC2	Low-current indication signal 2	ON if output current is less than the setting value [CE103].
035	OL	Overload notice advance signal 1	ON if output current exceeds specified value [CE106]
036	OL2	Overload notice advance signal 2	ON if output current exceeds specified value [CE107]
037	BRK	Brake release	ON when brake releases
038	BER	Brake error	ON if abnormality in sequence happens.
039	CON	Contact control	This signal is used for power line contactor control.
040	ZS	0Hz speed detection	ON if output frequency is less than set value [CE-33]
041	DSE	Speed deviation over	ON if speed deviation exceeds the set value.[bb-82] [bb-83] [bb-84]
042	PDD	Position deviation over	ON if position deviation exceeds the set value.[bb-85] [bb-86] [bb-87]
043	POK	Positioning completed	ON if positioning is completed
044	PCMP	Pulse count compare match output	ON when set value and pulse train counter match. [CA-97] to [CA-99]
045	OD	Deviation over for PID control	ON if PID control deviation exceeds the set value [AH-72]
046	FBV	PID1 feedback comparison	ON if PID feedback is within range. [AH-73] [AH-74]
047	OD2	OD: Deviation over for PID2 control	ON if PID control deviation exceeds the set value [AJ-17]
048	FBV2	PID2 feedback comparison	ON if PID feedback is within range. [AJ-18] [AJ-19]
049	NDc	Communication line disconnection	ON if communication is lost with operation keypad
050	Ai1Dc	Analog [Ai1] disconnection detection	ON if Analog input 1 is less than the set value [CE-50] [CE-51]
051	Ai2Dc	Analog [Ai2] disconnection detection	ON if Analog input 2 is less than the set value [CE-52] [CE-53]
052	Ai3Dc	Analog [Ai3] disconnection detection	ON if Analog input 3 is less than the set value [CE-54] [CE-55]
053	Ai4Dc	Analog [Ai4] disconnection detection	ON if Analog input 4 is less than the set value [oE-44] [oE-45]
054	Ai5Dc	Analog [Ai5] disconnection detection	ON if Analog input 5 is less than the set value [oE-46] [oE-47]
055	Ai6Dc	Analog [Ai6] disconnection detection	ON if Analog input 6 is less than the set value [oE-48] [oE-49]
056	WCAi1	Window comparator Ai1	ON if Analog input 1 is within range. [CE-40] to [CE-42]
057	WCAi2	Window comparator Ai2	ON if Analog input 2 is within range. [CE-43] to [CE-45]
058	WCAi3	Window comparator Ai3	ON if Analog input 3 is within range. [CE-46] to [CE-48]
059	WCAi4	Window comparator Ai4	ON if Analog input 4 is within range. [oE-35] to [oE-37]
060	WCAi5	Window comparator Ai5	ON if Analog input 5 is within range. [oE-38] to [oE-40]
061	WCAi6	Window comparator Ai6	ON if Analog input 6 is within range. [oE-41] to [oE-43]

[Output terminal function list]

Function code	Symbol	Function name	Description
062	LOG1	Logical operation result 1	Determined by the calculation results of two output terminals
063	LOG2	Logical operation result 2	
064	LOG3	Logical operation result 3	
065	LOG4	Logical operation result 4	
066	LOG5	Logical operation result 5	
067	LOG6	Logical operation result 6	
068	LOG7	Logical operation result 7	
069	MO1	General-purpose output 1	Set if case of use of EzSQ
070	MO2	General-purpose output 2	
071	MO3	General-purpose output 3	
072	MO4	General-purpose output 4	
073	MO5	General-purpose output 5	
074	MO6	General-purpose output 6	
075	MO7	General-purpose output 7	
076	EMFC	Emergency force drive indicator	ON while in force operation
077	EMBP	Bypass mode indicator	ON while in bypass operation
078	WFT	Trace function waiting for trigger	This signal turns on until the trace start triggers are input.
079	TRA	Trace function data logging	ON while in data sampling.
080	LBK	Low-battery of keypad	ON while in low battery or when keypad transfers no clock data.
081	OVS	Overvoltage power Supply	ON when overvoltage is detected in stop status.
084	AC0	Alarm code bit-0	Alarm information is output as bits by these signals. *1)
085	AC1	Alarm code bit-1	
086	AC2	Alarm code bit-2	
087	AC3	Alarm code bit-3	
089	OD3	Deviation over for PID3 control	ON when PID deviation exceeds the value [AJ-37]
090	FBV3	PID3 feedback comparison	ON when PID feedback is between [AJ-38]/[AJ-39]
091	OD4	Deviation over for PID4 control	ON when PID deviation exceeds the value [AJ-57]
092	FBV4	PID4 feedback comparison	ON when PID feedback is between [AJ-58]/[AJ-59]
093	SSE	PID soft start error	ON when PID soft start became in warning status

*1) It will be effective when you use the Liquid crystal operator VOP (option).

[CC-40] to [CC-60]

Logic output terminals setting

Code/Name	Range (unit)	Initial value
CC-40 LOG1 operand-1 selection	<Intelligent output terminal function list> reference *1)	000
CC-41 LOG1 operand-2 selection	<Intelligent output terminal function list> reference *1)	000
CC-42 LOG1 logical calculation selection	00(AND)/01(OR)/02(XOR)	00
CC-43 LOG2 operand-1 selection	<Intelligent output terminal function list> reference *1)	000
CC-44 LOG2 operand-2 selection	<Intelligent output terminal function list> reference *1)	000
CC-45 LOG2 logical calculation selection	00(AND)/01(OR)/02(XOR)	00
CC-46 LOG3 operand-1 selection	<Intelligent output terminal function list> reference *1)	000
CC-47 LOG3 operand-2 selection	<Intelligent output terminal function list> reference *1)	000
CC-48 LOG3 logical calculation selection	00(AND)/01(OR)/02(XOR)	00
CC-49 LOG4 operand-1 selection	<Intelligent output terminal function list> reference *1)	000
CC-50 LOG4 operand-2 selection	<Intelligent output terminal function list> reference *1)	000
CC-51 LOG4 logical calculation selection	00(AND)/01(OR)/02(XOR)	00
CC-52 LOG5 operand-1 selection	<Intelligent output terminal function list> reference *1)	000
CC-53 LOG5 operand-2 selection	<Intelligent output terminal function list> reference *1)	000
CC-54 LOG5 logical calculation selection	00(AND)/01(OR)/02(XOR)	00
CC-55 LOG6 operand-1 selection	<Intelligent output terminal function list> reference *1)	000
CC-56 LOG6 operand-2 selection	<Intelligent output terminal function list> reference *1)	000
CC-57 LOG6 logical calculation selection	00(AND)/01(OR)/02(XOR)	00
CC-58 LOG7 operand-1 selection	<Intelligent output terminal function list> reference *1)	000
CC-59 LOG7 operand-2 selection	<Intelligent output terminal function list> reference *1)	000
CC-60 LOG7 logical calculation selection	00(AND)/01(OR)/02(XOR)	00

*1) 062[LOG1] to 068[LOG7] can not be selected.

- The logical operation function outputs the operation results of the two selected output functions to the output terminal functions [LOG1] to [LOG7].

[Cd-01] to [Cd-35]

Analog output terminal adjustment

Code/Name	Range (unit)	Initial value
Cd-01 [FM] Output wave form selection	00(PWM)/01(Frequency)	00
Cd-02 [FM] Output base frequency (At digital frequency output)	0 to 3600(Hz)	2880
Cd-03 [FM] Output monitor selection	Set monitor code	dA-01
Cd-04 [Ao1] Output monitor selection		dA-01
Cd-05 [Ao2] Output monitor selection		dA-01
Cd-10 Analog monitor adjustment mode enable	00(Disable)/01(Enable)	00
Cd-11 [FM] Output filter time constant	1 to 500(ms)	100
Cd-12 [FM] Data type selection	00(Absolute value)/01(Signed value)	00
Cd-13 [FM] Bias adjustment	-100.0 to 100.0(%)	0.0
Cd-14 [FM] Gain adjustment	-1000.0 to 1000.0(%)	100.0
Cd-15 Adjustment mode [FM] output level	-100.0 to 100.0(%)	100.0
Cd-21 [Ao1] Output filter time constant	1 to 500(ms)	100
Cd-22 [Ao1] Data type selection	00(Absolute value)/01(Signed value)	00
Cd-23 [Ao1] Bias adjustment	-100.0 to 100.0(%)	0.0
Cd-24 [Ao1] Gain adjustment	-1000.0 to 1000.0(%)	100.0
Cd-25 Adjustment mode [Ao1] output level	-100.0 to 100.0(%)	100.0
Cd-31 [Ao2] Output filter time constant	1 to 500(ms)	100
Cd-32 [Ao2] Data type selection	00(Absolute value)/01(Signed value)	00
Cd-33 [Ao2] Bias adjustment	-100.0 to 100.0(%)	20.0
Cd-34 [Ao2] Gain adjustment	-1000.0 to 1000.0(%)	80.0
Cd-35 Adjustment mode [Ao2] output level	-100.0 to 100.0(%)	100.0

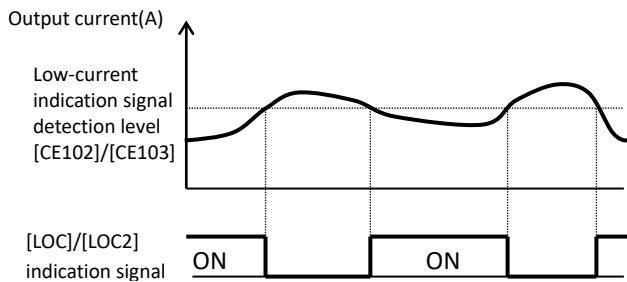
- Regarding the adjustment method of the Analog output, refer to the “chapter 3.10 Adjust the analog output (Ao1/Ao2/FM)”

[CE101] to [CE107]

Low-current detection signal

Code/Name	Range (unit)	Initial value
CE101 Low current signal output mode selection, 1st motor	00(During Accel/Decel and constant speed) 01(During constant speed only)	01
CE102 Low current detection level 1, 1st motor	Inverter rated current×(0.00 to 2.00)(A)	Inverter rated current ×1.00(A)
CE103 Low current detection level 2, 1st motor	Inverter rated current×(0.00 to 2.00)(A)	Inverter rated current ×1.00(A)

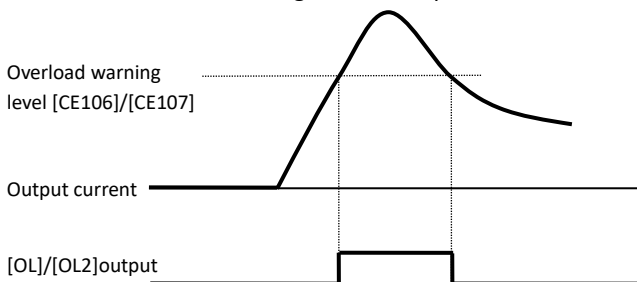
- When the output current is low, output terminal 033[LOC]/034[LOC2] Low-current indication signal 1/2 Outputs low current signal.



Overload detection signal

Code/Name	Range (unit)	Initial value
CE105 Overload signal output mode selection, 1st motor	00(During Accel/Decel and constant speed)/ 01(During constant speed only)	01
CE106 Overload warning level 1, 1st motor	Inverter rated current×(0.00 to 2.00)(A)	Inverter rated current ×1.00(A)
CE107 Overload warning level 2, 1st motor	Inverter rated current×(0.00 to 2.00)(A)	Inverter rated current ×1.00(A)

- When overload occurs, Output terminal 035[OL]/036[OL2] overload notice advance signals are output.



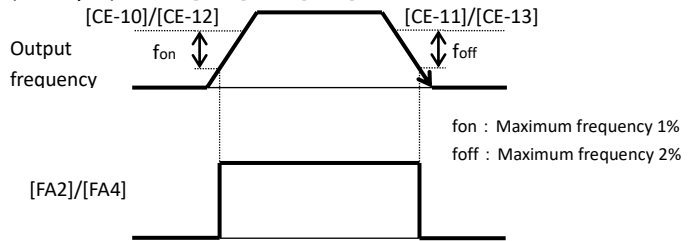
[CE-10] to [CE-31]

Frequency arrival signal setting

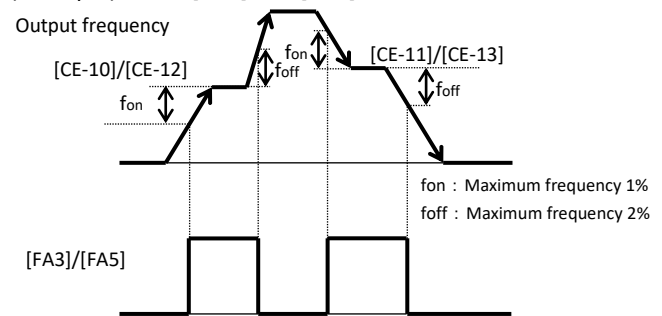
Code/Name	Range (unit)	Initial value
CE-10 Arrival frequency 1 value setting during acceleration	0.00 to 590.00(Hz)	0.00
CE-11 Arrival frequency 1 value setting during deceleration		0.00
CE-12 Arrival frequency 2 value setting during acceleration		0.00
CE-13 Arrival frequency 2 value setting during deceleration		0.00

- Set the operation of the frequency arrival signal.

(Example) In 003[FA2]/005[FA4] case:



(Example) In 004[FA3]/006[FA5] case:



Over-torque signal

Code/Name	Range (unit)	Initial value
CE120 Over-torque level (Forward drive), 1st motor	0.0 to 500.0(%)	100.0
CE121 Over-torque level (Reverse regenerative), 1st motor		100.0
CE122 Over-torque level (Reverse drive), 1st motor		100.0
CE123 Over-torque level (Forward regenerative), 1st motor		100.0

- Set the level to output the 019[OTQ] signal, when using vector control and the torque goes over the limit.

Electronic thermal warning

Code/Name	Range (unit)	Initial value
CE-30 Electronic thermal warning level (MTR)	0.00 to 100.00(%)	80.00
CE-31 Electronic thermal warning level (CTL)		80.00

- [CE-30] sets the level to output the motor electronic thermal warning 026[THM].
- [CE-31] sets the level to output the inverter electronic thermal warning 027[THC].

[CE-33] to [CE-51]

0Hz speed detection signal

Code/Name	Range (unit)	Initial value
CE-33 Zero speed detection level	0.00 to 100.00(Hz)	0.50

- Set the level in which the output terminal 040[ZS] Zero speed detection turns ON.

Cooling fin overheat warning signal

Code/Name	Range (unit)	Initial value
CE-34 Cooling fin overheat warning level	0 to 200(°C)	120

- Set the level in which output terminal 032[OHF]Heat sink overheat warning turns ON.

Accumulated RUN time / Accumulated PowerON time warning

Code/Name	Range (unit)	Initial value
CE-36 Accum. RUN time (RNT) / Accum. Power-On time (ONT) setting	0 to 100000(hr)	0

- Set the warning level in which the output terminal 024[RNT] accumulated operation time over and output terminal 025[ONT] accumulated power-on time over turn ON.

Window comparator (detection of terminal disconnection)

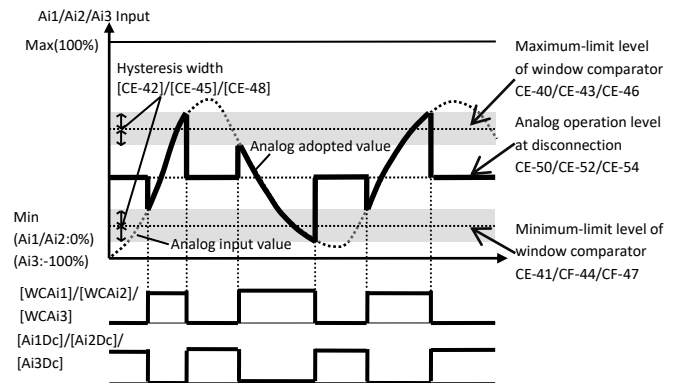
Code/Name	Range (unit)	Initial value
CE-40 [Ai1] Window comparator higher limit	0 to 100(%)	100
CE-41 [Ai1] Window comparator lower limit	0 to 100(%)	0
CE-42 [Ai1] Window comparator hysteresis width	0 to 10(%)	0
CE-43 [Ai2] Window comparator higher limit	0 to 100(%)	100
CE-44 [Ai2] Window comparator lower limit	0 to 100(%)	0
CE-45 [Ai2] Window comparator hysteresis width	0 to 10(%)	0
CE-46 [Ai3] Window comparator higher limit	-100 to 100(%)	100
CE-47 [Ai3] Window comparator lower limit	-100 to 100(%)	-100
CE-48 [Ai3] Window comparator hysteresis width	0 to 10(%)	0
CE-50 [Ai1] Operation set level at disconnection or compare event	0 to 100(%)	0
CE-51 [Ai1] Operation set level implement timing	00(Disable)/01(Enable(at WC*active)/02(Enable(at WC*de-active)	00

[CE-52] to [CE-55][CE201]to[CE223]

Code/Name	Range (unit)	Initial value
CE-52 [Ai2] Operation set level at disconnection or compare event	0 to 100(%)	0
CE-53 [Ai2] Operation set level implement timing	00(Disable)/01(Enable (at WC*active)/02(Enable (at WC*de-active)	00
CE-54 [Ai3] Operation set level at disconnection or compare event	-100 to 100(%)	0
CE-55 [Ai3] Operation set level implement timing	00(Disable)/01(Enable (at WC*active)/02(Enable (at WC*de-active)	00

- Window comparator function output signals whenever the analog inputs value are within or out of range.
- In the case of disconnection judgment, the reference value can be set to the [CE-50]/[CE-52]/[CE-54] setting value when it is within or out of the range of the window comparator.

If in case [CE-51] [CE-53] [CE-55] = 02:



- When using the P1-AG analog input/output option, Output terminal 053[Ai4Dc] to 055[Ai6Dc] and 059 [WCAi4] to 061[WCAi6] can be output in the same operation as the above figure by using parameters [oE-35] to [oE-49].

2nd motor When Intelligent Input terminal 024[SET] is enabled.

Code/Name	Range (unit)	Initial value
CE201 Low current signal output mode selection, 2nd-motor	Same as CE101	
CE202 Low current detection level 1, 2nd-motor	Same as CE102	
CE203 Low current detection level 2, 2nd-motor	Same as CE103	
CE205 Overcurrent signal output mode selection, 2nd-motor	Same as CE105	
CE206 Overcurrent detection level 1, 2nd-motor	Same as CE106	
CE207 Overcurrent detection level 2, 2nd-motor	Same as CE107	
CE220 Over-torque level (Forward drive), 2nd-motor	Same as CE120	
CE221 Over-torque level (Reverse regenerative), 2nd-motor	Same as CE121	
CE222 Over-torque level (Reverse drive), 2nd-motor	Same as CE122	
CE223 Over-torque level (Forward regenerative), 2nd motor	Same as CE123	

[CF-01] to [CF-11]**Modbus communication**

Code/Name	Range (unit)	Initial value
CF-01 RS485 communication baud rate selection	03(2400bps)/ 04(4800bps)/ 05(9600bps)/ 06(19.2kbps)/ 07(38.4kbps)/ 08(57.6kbps)/ 09(76.8kbps)/ 10(115.2kbps)	05
CF-02 RS485 communication node address	1 to 247	1
CF-03 RS485 communication parity selection	00(No parity)/ 01(Even parity)/ 02(Odd parity)	00
CF-04 RS485 communication stop bit selection	01(1bit)/02(2bit)	01
CF-05 RS485 communication error selection	00(Error)/ 01(Error output after Deceleration stop)/ 02(Ignore)/ 03(Free run stop)/ 04(Deceleration stop)	02
CF-06 RS485 communication timeout setting	0.00 to 100.00(s)	0.00
CF-07 RS485 communication wait time setting	0 to 1000(ms)	2
CF-08 RS485 communication mode selection	01(Modbus-RTU)/ 02(EzCOM)/ 03(EzCOM Administrator)	01
CF-11 Register data conversion function (A,V↔%)	00(A, V)/ 01(%)	00

- Set the Modbus communication function for its use.
- When using communication function between inverter EzCOM, set a value except 01 for [CF-08].
- When communication disconnection occurs, the output terminal 049[NDc] turns ON. 049[NDc] signal is turned off when the error is cleared. Contact to your supplier or local Hitachi distributor or service station for more details.

[CF-20] to [CF-50]**EzCOM peer to peer communication**

Code/Name	Range (unit)	Initial value
CF-20 EzCOM start node No.	1 to 8	1
CF-21 EzCOM end node No.	1 to 8	1
CF-22 EzCOM start method selection	00(Terminal [EzCOM])/ 01(Always)	00
CF-23 EzCOM data size	1 to 5	5
CF-24 EzCOM destination address 1	1 to 247	1
CF-25 EzCOM destination register 1	0000 to FFFF	0000
CF-26 EzCOM source register 1	0000 to FFFF	0000
CF-27 EzCOM destination address 2	1 to 247	2
CF-28 EzCOM destination register 2	0000 to FFFF	0000
CF-29 EzCOM source register 2	0000 to FFFF	0000
CF-30 EzCOM destination address 3	1 to 247	3
CF-31 EzCOM destination register 3	0000 to FFFF	0000
CF-32 EzCOM source register 3	0000 to FFFF	0000
CF-33 EzCOM destination address 4	1 to 247	4
CF-34 EzCOM destination register 4	0000 to FFFF	0000
CF-35 EzCOM source register 4	0000 to FFFF	0000
CF-36 EzCOM destination address 5	1 to 247	5
CF-37 EzCOM destination register 5	0000 to FFFF	0000
CF-38 EzCOM source register 5	0000 to FFFF	0000

- Set for the use of EzCOM function.

Contact to your supplier or local Hitachi distributor or service station for more details.

USB node setting

Code/Name	Range (unit)	Initial value
CF-50 USB communication node address	1 to 247	1

- Sets the USB node address in the case of connection with ProDriveNext(PC software). It is also required to confirm the USB node in the ProDriveNext side (The initial value of ProDriveNext is also node address 1).
- When connecting LH1 and ProDriveNext at first time, keep the setting value 1 .

[HA-01] to [HA115]

■ Parameter mode (H code)

Auto-tuning

Code/Name	Range (unit)	Initial value
HA-01 Auto-tuning selection	00(Disable)/ 01(No-rotation)/ 02(Rotation)/ 03(IVMS) *1)	00
HA-02 Auto-tuning RUN command source selection	00(Keypad "RUN" key)/ 01(Setting by [AA111]/[AA211])	00
HA-03 Online auto-tuning selection	00(Disable)/ 01(Enable)	00

- After setting the motor basic parameters, by the auto-tuning operation the constant of the motor will be able to acquired.
- For no-rotation auto-tuning, the following variables are acquired, IM:[Hb110] to [Hb114], SM(PMM):[Hd110] to [Hd114].
- For rotation auto-tuning, the following variables are acquired, IM:[Hb110] to [Hb118]. Keep the operation conditions, as the motor can rotate.
- Auto-tuning start is done by the RUN-key ([HA-02] Initial value)

*1) This setting (03) is not suitable for LH1 series.

Motor stabilization (Hunting)

Code/Name	Range (unit)	Initial value
HA110 Stabilization constant, 1st-motor	0 to 1000(%)	100

- If hunting occurs while a pump or a fan is being operated, lower the stabilization constant for adjustment.
- In the case the load is relatively light and hunting occurs, then increase the stabilization constant.

Control mode response adjustment

Code/Name	Range (unit)	Initial value
HA115 Speed response, 1st-motor	0 to 1000(%)	100

- The speed response in the operation control of the inverter will be adjusted.
- ⇒[AA121] control mode

[HA120] to [HA134]

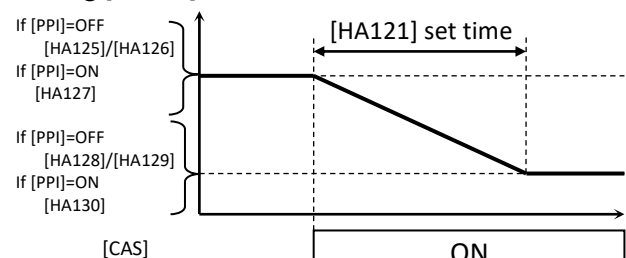
Control response ASR gain switching

Code/Name	Range (unit)	Initial value
HA120 ASR gain switching mode selection, 1st-motor	00([CAS] terminal)/ 01(Parameter setting)	00
HA121 ASR gain switching time setting, 1st-motor	0 to 10000(ms)	100
HA122 ASR gain mapping intermediate speed 1, 1st-motor	0.00 to 590.00(Hz)	0.00
HA123 ASR gain mapping intermediate speed 2, 1st-motor	0.00 to 590.00(Hz)	0.00
HA124 ASR gain mapping maximum speed, 1st-motor	0.00 to 590.00(Hz)	0.00
HA125 ASR gain mapping P-gain 1, 1st-motor	0.0 to 1000.0(%)	100.0
HA126 ASR gain mapping I-gain 1, 1st-motor	0.0 to 1000.0(%)	100.0
HA127 ASR gain mapping P control P-gain 1, 1st-motor	0.0 to 1000.0(%)	100.0
HA128 ASR gain mapping P-gain 2, 1st-motor	0.0 to 1000.0(%)	100.0
HA129 ASR gain mapping I-gain 2, 1st-motor	0.0 to 1000.0(%)	100.0
HA130 ASR gain mapping P control P-gain 2, 1st-motor	0.0 to 1000.0(%)	100.0
HA131 ASR gain mapping P-gain 3, 1st-motor	0.0 to 1000.0(%)	100.0
HA132 ASR gain mapping I-gain 3, 1st-motor	0.0 to 1000.0(%)	100.0
HA133 ASR gain mapping P-gain 4, 1st-motor	0.0 to 1000.0(%)	100.0
HA134 ASR gain mapping I-gain 4, 1st-motor	0.0 to 1000.0(%)	100.0

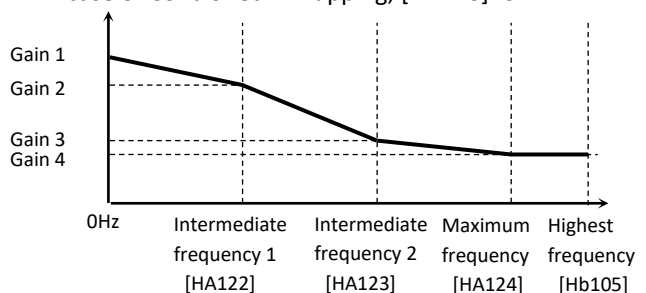
*ASR: Automatic Speed Regulator

- Speed response gain of the motor control can be changed.
- The PI gain used for control is as follows according to the state of the input terminal 063[CAS] and 064[PPI] terminals.

■ In the case of input terminal [cas] witching, [HA120]=00



■ In case of Control Gain Mapping, [HA120]=01



[HA210] to [HA234]

2nd motor When Intelligent Input terminal 024[SET] is enabled.

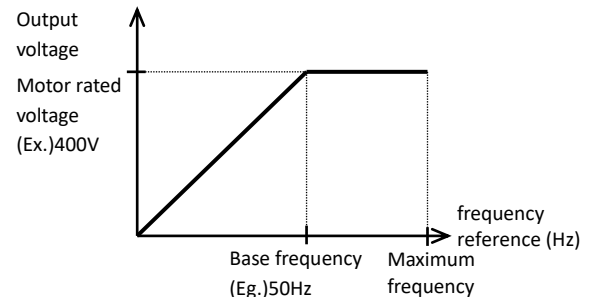
Code/Name	Range (unit)	Initial value
HA210 Stabilization constant, 2nd-motor	Same as HA110	
HA215 Speed response, 2nd-motor	Same as HA115	
HA220 ASR gain switching mode selection, 2nd-motor	Same as HA120	
HA221 ASR gain switching time setting, 2nd-motor	Same as HA121	
HA222 ASR gain mapping intermediate speed 1, 2nd-motor	Same as HA122	
HA223 ASR gain mapping intermediate speed 2, 2nd-motor	Same as HA123	
HA224 ASR gain mapping maximum speed, 2nd-motor	Same as HA124	
HA225 ASR gain mapping P-gain 1, 2nd-motor	Same as HA125	
HA226 ASR gain mapping I-gain 1, 2nd-motor	Same as HA126	
HA227 ASR gain mapping P control P-gain 1, 2nd-motor	Same as HA127	
HA228 ASR gain mapping P-gain 2, 2nd-motor	Same as HA128	
HA229 ASR gain mapping I-gain 2, 2nd-motor	Same as HA129	
HA230 ASR gain mapping P control P-gain 2, 2nd-motor	Same as HA130	
HA231 ASR gain mapping P-gain 3, 2nd-motor	Same as HA131	
HA232 ASR gain mapping I-gain 3, 2nd-motor	Same as HA132	
HA233 ASR gain mapping P-gain 4, 2nd-motor	Same as HA133	
HA234 ASR gain mapping I-gain 4, 2nd-motor	Same as HA134	

[Hb102] to [Hb108]

Basic parameters for Induction motor

Code/Name	Range (unit)	Initial value
Hb102 Async. Motor capacity setting, 1st-motor	0.01 to 160.00 (kW)	Motor capacity setting
Hb103 Async. Motor number of poles setting, 1st-motor	2 to 48 (Pole)	4P
Hb104 Async. Motor base frequency setting, 1st-motor	10.00 to [Hb105] (Hz)	60.00(JPN)(USA)/ 50.00(EU)(ASIA)(CHN)
Hb105 Async. Motor maximum frequency setting, 1st-motor	[Hb104] to 590.00 (Hz)	60.00(JPN)(USA)/ 50.00(EU)(ASIA)(CHN)
Hb106 Async. Motor rated voltage, 1st-motor	1 to 1000 (V)	(400V Class) 400(JPN)(EU)(ASIA)(CHN) 460(USA)
Hb108 Async. Motor rated current, 1st-motor	0.01 to 10000.00 (A)	Motor capacity setting

- If the motor capacity [Hb102] and number of poles [Hb103] are changed, the motor characteristics are set according to the internal Hitachi table values.
- The output is decided by setting the frequency and voltage. Below there is an example of V/f control.



- By setting the motor rated current, a reference current for the motor protection is set.

※Initial value depends on the inverter.

Motor typical data	Code	Range of values (Unit)
Capacity	[Hb102]	0.01 to 160.00 (kW)
Number of poles	[Hb103]	2 to 48 (poles)
Frequency	[Hb104]	10.00 to 590.00 (Hz)
	[Hb105]	10.00 to 590.00 (Hz)
Voltage	[Hb106]	1 to 1000 (V)
Current	[Hb108]	0.01 to 10000.00 (A)

[Hb110] to [Hb131]

Induction motor constants

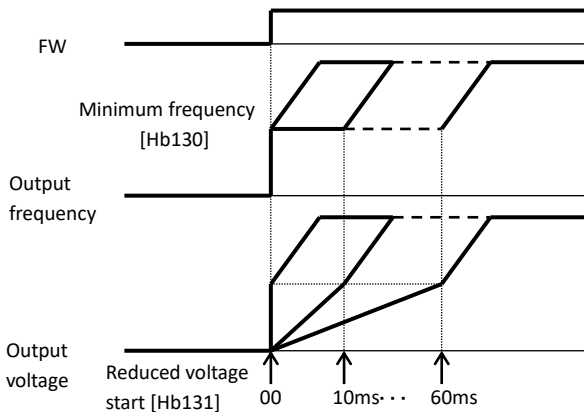
Code/Name	Range (unit)	Initial value
Hb110 Async. Motor constant R1, 1st-motor	0.000001 to 1000.000000 (Ω)	Motor capacity setting
Hb112 Async. Motor constant R2, 1st-motor	0.000001 to 1000.000000 (Ω)	Motor capacity setting
Hb114 Async. Motor constant L, 1st-motor	0.000001 to 1000.000000 (mH)	Motor capacity setting
Hb116 Async. Motor constant I0, 1st-motor	0.01 to 10000.00 (A)	Motor capacity setting
Hb118 Async. Motor constant J, 1st-motor	0.00001 to 10000.00000 (kgm ²)	Motor capacity setting

- If the motor capacity[Hb102] and number of poles [Hb103] are changed, the motor characteristics are set according to the internal Hitachi table values.
- For no-rotation auto-tuning, the following variables are acquired:[Hb110] to [Hb114].
- For rotation auto-tuning, the following variables are acquired:[Hb110] to [Hb118]
- It is possible to input the data obtained from the motor manufacturer. However, it must also include the data of the wiring and the like.

Minimum frequency setting

Code/Name	Range (unit)	Initial value
Hb130 Minimum frequency adjustment, 1st-motor	0.10 to 10.00(Hz)	0.50
Hb131 Reduced voltage start time setting, 1st-motor	0 to 2000(ms)	36

- If the torque at the time of start-up is not enough, you can change the setting to raise the lowest frequency.
- if the trip occurs when raised the minimum frequency, set a longer "reduced voltage start time setting".

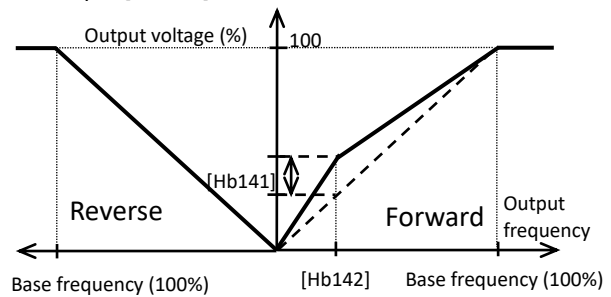


[Hb140] to [Hb146]

Manual torque boost adjustment

Code/Name	Range (unit)	Initial value
Hb140 Manual torque boost operation mode selection, 1st-motor	00(Disabled)/ 01(Always enable)/ 02(Enable at Forward rotation)/ 03(Enable at Reverse rotation)	01
Hb141 Manual torque boost value, 1st-motor	0.0 to 20.0(%)	0.0
Hb142 Manual torque boost peak speed, 1st-motor	0.0 to 50.0(%)	0.0

- The manual torque operation mode selection will allow to restrict the boost to forward only or reverse only operation.
- Example [Hb140]=02



Eco Drive function

Code/Name	Range (unit)	Initial value
Hb145 Eco drive enable, 1st-motor	00(Disable)/ 01(Enable)	00
Hb146 Eco drive response adjustment, 1st-motor	0 to 100	050

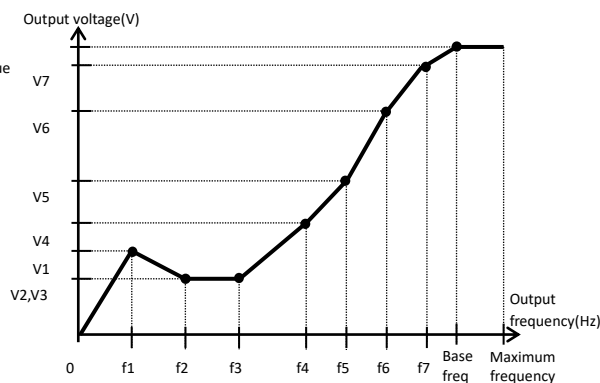
- In V/f control, if the Eco Drive function is enabled, enters an energy saving control.

[Hb150] to [Hb171]

Free V/f setting

Code/Name	Range (unit)	Initial value
Hb150 Free-V/f frequency 1 setting, 1st-motor	0.00 to [Hb152](Hz)	0.00
Hb151 Free-V/f voltage 1 setting, 1st-motor	0.0 to 1000.0(V)	0.0
Hb152 Free-V/f frequency 2 setting, 1st-motor	[Hb150] to [Hb154](Hz)	0.00
Hb153 Free-V/f voltage 2 setting, 1st-motor	0.0 to 1000.0(V)	0.0
Hb154 Free-V/f frequency 3 setting, 1st-motor	[Hb152] to [Hb156](Hz)	0.00
Hb155 Free-V/f voltage 3 setting, 1st-motor	0.0 to 1000.0(V)	0.0
Hb156 Free-V/f frequency 4 setting, 1st-motor	[Hb154] to [Hb158](Hz)	0.00
Hb157 Free-V/f voltage 4 setting, 1st-motor	0.0 to 1000.0(V)	0.0
Hb158 Free-V/f frequency 5 setting, 1st-motor	[Hb156] to [Hb160](Hz)	0.00
Hb159 Free-V/f voltage 5 setting, 1st-motor	0.0 to 1000.0(V)	0.0
Hb160 Free-V/f frequency 6 setting, 1st-motor	[Hb158] to [Hb162](Hz)	0.00
Hb161 Free-V/f voltage 6 setting, 1st-motor	0.0 to 1000.0(V)	0.0
Hb162 Free-V/f frequency 7 setting, 1st-motor	[Hb160] to [Hb164](Hz)	0.00
Hb163 Free-V/f voltage 7 setting, 1st-motor	0.0 to 1000.0(V)	0.0

- Frequency 1(f1) to frequency (f7) and the corresponding voltage 1(V1) to voltage 7(V7) are set below the base frequency and rated voltage. In the case of a high-frequency motor, set the base/highest frequency at first.



V/f feedback control adjustment

Code/Name	Range (unit)	Initial value
Hb170 Slip compensation P-gain at V/f with encoder, 1st-motor	0 to 1000(%)	100
Hb171 Slip compensation I-gain at V/f with encoder, 1st-motor	0 to 1000(%)	100

- When [AA121] is set as feedback control, slip compensation is possible.

[Hb180] [Hb202] to [Hb280]

Output voltage adjustment

Code/Name	Range (unit)	Initial value
Hb180 Output voltage gain, 1st-motor	0 to 255(%)	100

- When the motor is hunting, there is a possibility that the motor stabilizes by adjustment of the output voltage gain.

2nd motor When Intelligent Input terminal 024[SET] is enabled.

Code/Name	Range (unit)	Initial value
Hb202 Async. Motor capacity setting, 2nd-motor	Same as Hb102	
Hb203 Async. Motor number of poles setting, 2nd-motor	Same as Hb103	
Hb204 Async. Motor base frequency setting, 2nd-motor	Same as Hb104	
Hb205 Async. Motor maximum frequency setting, 2nd-motor	Same as Hb105	
Hb206 Async. Motor rated voltage, 2nd-motor	Same as Hb106	
Hb208 Async. Motor rated current, 2nd-motor	Same as Hb108	
Hb210 Async. Motor constant R1, 2nd-motor	Same as Hb110	
Hb212 Async. Motor constant R2, 2nd-motor	Same as Hb112	
Hb214 Async. Motor constant L, 2nd-motor	Same as Hb114	
Hb216 Async. Motor constant Io, 2nd-motor	Same as Hb116	
Hb218 Async. Motor constant J, 2nd-motor	Same as Hb118	

2nd motor When Intelligent Input terminal 024[SET] is enabled.

Code/Name	Range (unit)	Initial value
Hb230 Minimum frequency adjustment, 2nd-motor	Same as Hb130	
Hb231 Reduced voltage start time setting, 2nd-motor	Same as Hb131	
Hb240 Manual torque boost operation mode selection, 2nd-motor	Same as Hb140	
Hb241 Manual torque boost value, 2nd-motor	Same as Hb141	
Hb242 Manual torque boost Peak speed, 2nd-motor	Same as Hb142	
Hb245 Eco drive enable, 2nd-motor	Same as Hb145	
Hb246 Eco drive response adjustment, 2nd-motor	Same as Hb146	
Hb250 Free-V/f frequency 1 setting, 2nd-motor	Same as Hb150	
Hb251 Free-V/f voltage 1 setting, 2nd-motor	Same as Hb151	
Hb252 Free-V/f frequency 2 setting, 2nd-motor	Same as Hb152	
Hb253 Free-V/f voltage 2 setting, 2nd-motor	Same as Hb153	
Hb254 Free-V/f frequency 3 setting, 2nd-motor	Same as Hb154	
Hb255 Free-V/f voltage 3 setting, 2nd-motor	Same as Hb155	
Hb256 Free-V/f frequency 4 setting, 2nd-motor	Same as Hb156	
Hb257 Free-V/f voltage 4 setting, 2nd-motor	Same as Hb157	
Hb258 Free-V/f frequency 5 setting, 2nd-motor	Same as Hb158	
Hb259 Free-V/f voltage 5 setting, 2nd-motor	Same as Hb159	
Hb260 Free-V/f frequency 6 setting, 2nd-motor	Same as Hb160	
Hb261 Free-V/f voltage 6 setting, 2nd-motor	Same as Hb161	
Hb262 Free-V/f frequency 7 setting, 2nd-motor	Same as Hb162	
Hb263 Free-V/f voltage 7 setting, 2nd-motor	Same as Hb163	
Hb270 Slip compensation P-gain at V/f with encoder, 2nd-motor	Same as Hb170	
Hb271 Slip compensation I-gain at V/f with encoder, 2nd-motor	Same as Hb171	
Hb280 Output voltage gain, 2nd-motor	Same as Hb180	

[HC101] to [HC115]**Automatic torque boost adjustment**

Code/Name	Range (unit)	Initial value
HC101 Automatic torque boost voltage compensation gain, 1st-motor	0 to 255(%)	100
HC102 Automatic torque boost slip compensation gain, 1st-motor	0 to 255(%)	100

- These parameters are adjusted when the automatic torque boost control function is selected in [AA121]. For more information, please Contact to your supplier or local Hitachi distributor or service station.

Vector control start adjustment

Code/Name	Range (unit)	Initial value
HC110 Zero speed range limit, 1st-motor(IM-0Hz-SLV) *1)	0 to 100(%)	80
HC111 Boost value at start, 1st-motor (IM-SLV,IM-CLV) *1)	0 to 50(%)	0
HC112 Boost value at start, 1st-motor (IM-0Hz-SLV) *1)	0 to 50(%)	10

- When [AA121] is sensorless vector control ,start boost is possible.

*1)0Hz-SLV and CLV have no effect on LH1 series.

Secondary resistor compensation function

Code/Name	Range (unit)	Initial value
HC113 Secondary resistance (R2) correction, 1st-motor	00(Disable)/ 01(Enable)	00

- When the vector control (with encoder/ sensorless) is being used and the temperature of the motor can be sensed, the inverter is capable of reducing the speed variations due to temperature changes.
- If use this function, use a thermistor PB-41E from Shibaura Electronics(Ltd.) with [Cb-40]=02(NTC).

Reverse run protection function

Code/Name	Range (unit)	Initial value
HC114 Direction reversal protection, 1st-motor	00(Disable)/ 01(Enable)	00

- This function is to prevent the change of direction of the output in a low frequency range for vector control such as (SLV).

Torque reference value conversion method

Code/Name	Range (unit)	Initial value
HC115 Torque conversion method selection, 1st-motor	00(Torque)/ 01(Current)	00

- Select the 100% reference value of the torque related setting parameter. (Setting 01 is the same method as the SJ700 series.)

For more information, please Contact to your supplier or local Hitachi distributor or service station.

[HC120] to [HC221]**Motor control adjustment gain**

Code/Name	Range (unit)	Initial value
HC120 Torque current reference filter time constant, 1st-motor	0 to 100(ms)	2
HC121 Speed feedforward compensation gain, 1st-motor	0 to 1000(%)	0

- [HC120] can put into effect a filter for torque reference of sensorless vector control vector control with encoder.
- [HC121] adjusts the compensation amount of feedforward control for sensorless vector control, and vector control with encoder.

2nd motor When Intelligent Input terminal 024[SET] is enabled.

Code/Name	Range (unit)	Initial value
HC201 Automatic torque boost voltage compensation gain, 2nd-motor	Same as HC101	
HC202 Automatic torque boost slip compensation gain, 2nd-motor	Same as HC102	
HC210 Zero speed range limit, 2nd-motor(IM-0Hz-SLV) *2)	Same as HC110	
HC211 Boost value at start, 2nd-motor (IM-SLV,IM-CLV) *2)	Same as HC111	
HC212 Boost value at start, 2nd-motor (IM-0Hz-SLV) *2)	Same as HC112	
HC213 Secondary resistor (R2) compensation enable, 2nd-motor	Same as HC113	
HC214 Direction reversal protection, 2nd-motor	Same as HC114	
HC215 Torque conversion method selection, 2nd-motor	Same as HC115	
HC220 Torque current reference filter time constant, 2nd-motor	Same as HC120	
HC221 Speed feedforward compensation gain, 2nd-motor	Same as HC121	

*2)0Hz-SLV and CLV have no effect on LH1 series.

[Hd102] to [Hd118]

Permanent Magnet Sync. Motor(SM/PMM)
basic parameters

Code/Name	Range (unit)	Initial value
Hd102 Sync. Motor capacity setting, 1st-motor	0.01 to 160.00(kW)	Factory setting
Hd103 Sync. Motor number of poles setting, 1st-motor	2 to 48(Pole)	Factory setting
Hd104 Sync. Base frequency setting, 1st-motor	10.00 to [Hd105](Hz)	60.00(JPN)(USA)/ 50.00(EU)(ASIA)(CHN)
Hd105 Sync. Maximum frequency setting, 1st-motor	[Hd104] to 590.00(Hz)	60.00(JPN)(USA)/ 50.00(EU)(ASIA)(CHN)
Hd106 Sync. Motor rated voltage, 1st-motor	1 to 1000(V)	(400V Class) 400(JPN)(EU)(ASIA)(CHN) 460(USA)
Hd108 Sync. Motor rated current, 1st-motor	0.01 to 10000.00 (A)	Factory setting

Code/Name	Range (unit)	Initial value
Hd110 Sync. Motor constant R, 1st-motor	0.000001 to 1000.000000 (Ω)	Factory setting
Hd112 Sync. Motor constant Ld, 1st-motor	0.000001 to 1000.000000 (mH)	Factory setting
Hd114 Sync. Motor constant Lq, 1st-motor	0.000001 to 1000.000000 (mH)	Factory setting
Hd116 Sync. Motor constant Ke, 1st-motor	0.1 to 100000.0 (mVs/rad)	Factory setting
Hd118 Sync. Motor constant J, 1st-motor	0.00001 to 10000.00000 (kgm ²)	Factory setting

- The motor capacity and the number of poles will be set by Hitachi characteristics table.
- For SM/PMM, frequency, voltage, and the motor constants setting are necessary.
- If the maximum current is decided, sets with a margin the overcurrent detection level [bb160].

Motor typical data	Code	Range of values (unit)
Capacity	[Hd102]	0.01 to 160.00 (kW)
Number of poles	[Hd103]	2 to 48 (Poles)
Frequency	[Hd104]	10.00 to 590.00 (Hz)
	[Hd105]	10.00 to 590.00 (Hz)
Voltage	[Hd106]	1 to 1000 (V)
Current	[Hd108]	0.01 to 10000.00 (A)

※Initial value depends on the inverter.

- If motor capacity [Hd102], number of poles [Hd103] are changed, the motor characteristics are set according to the internal Hitachi table values.
- The values of [Hd110] to [Hd114] can be acquired by no rotation auto-tuning.

[Hd130] to [Hd-58]

Minimum frequency setting

Code/Name	Range (unit)	Initial value
Hd130 Minimum frequency adjustment for Sync.M, 1st-motor	0 to 50(%)	8
Hd131 No-Load current for Sync.M, 1st-motor	0 to 100(%)	10

- The synchronous control is switched to sensorless vector control when the frequency reference is the base frequency[Hd104] × [Hd130].
- By [Hd131], the sensorless vector control no-load current is set.

Magnetic pole position estimation SM(PMM)

Code/Name	Range (unit)	Initial value
Hd132 Starting method for Sync.M, 1st-motor	00(Synchronous)/ 01(Initial motor position estimate (IMPE))	00
Hd133 IMPE 0V wait number for Sync.M, 1st-motor	0 to 255	10
Hd134 IMPE detect wait number for Sync.M, 1st-motor	0 to 255	10
Hd135 IMPE detect number for Sync.M, 1st-motor	0 to 255	30
Hd136 IMPE voltage gain for Sync.M, 1st-motor	0 to 200(%)	100
Hd137 IMPE Mg-pole position offset, 1st-motor	0 to 359(deg)	0

- For SM/PMM, if initial motor position estimate is enabled by [Hd132], the inverter drives after magnetic pole position estimation. Offset [Hd137] is added at the first start when doing reverse motion.

IVMS setting *1)

Code/Name	Range(unit)	Initial Value
Hd-41 IVMS carrier frequency *1)	0.5 to 10.0(kHz)	2.0
Hd-42 Filter gain of IVMS current detection *1)	0 to 1000	100
Hd-43 Open-phase voltage detection gain *1)	00/01/02/03	00
Hd-44 Open-phase switching threshold compensation *1)	00(Disable)/ 01(Enable)	01
Hd-45 SM(PMM)-IVMS speed control P gain *1)	0 to 1000	100
Hd-46 SM(PMM)-IVMS speed control I gain *1)	0 to 10000	100
Hd-47 SM(PMM)-IVMS wait time for open-phase switching *1)	0 to 1000	15
Hd-48 SM(PMM)-IVMS restriction on the rotation-direction determination *1)	00(Disable)/ 01(Enable)	01
Hd-49 SM(PMM)-IVMS open-phase voltage detection timing adjustment *1)	0 to 1000	10
Hd-50 SM(PMM)-IVMS minimum pulse width adjustment *1)	0 to 1000	100
Hd-51 IVMS threshold current limit *1)	0 to 255(%)	100
Hd-52 IVMS threshold gain *1)	0 to 255(%)	100
Hd-58 IVMS carrier-frequency switching start/finish point *1)	0 to 50(%)	5

*1) This setting is not suitable for LH1 series.

[Hd202] to [Hd237]

2nd motor When Intelligent Input terminal O24[SET] is enabled.

Code/Name		Range (unit)	Initial value
Perm. Magnet Sync. Motor (SM/PMM)	Hd202 Sync. Motor capacity setting, 2nd-motor	Same as Hd102	
	Hd203 Sync. Motor number of poles setting, 2nd-motor	Same as Hd103	
	Hd204 Sync. Base frequency setting, 2nd-motor	Same as Hd104	
	Hd205 Sync. Maximum frequency setting, 2nd-motor	Same as Hd105	
	Hd206 Sync. Motor rated voltage, 2nd-motor	Same as Hd106	
	Hd208 Sync. Motor rated current, 2nd-motor	Same as Hd108	
	Hd210 Sync. Motor constant R, 2nd-motor	Same as Hd110	
	Hd212 Sync. Motor constant Ld, 2nd-motor	Same as Hd112	
	Hd214 Sync. Motor constant Lq, 2nd-motor	Same as Hd114	
	Hd216 Sync. Motor constant Ke, 2nd-motor	Same as Hd116	
Hd218 Sync. Motor constant J, 2nd-motor	Same as Hd118		

2nd motor When Intelligent Input terminal O24[SET] is enabled.

Code/Name	Range (unit)	Initial value
Hd230 Minimum frequency adjustment for Sync.M, 2nd-motor	Same as Hd130	
Hd231 No-Load current for Sync.M, 2nd-motor	Same as Hd131	
Hd232 Starting method for Sync.M, 2nd-motor	Same as Hd132	
Hd233 IMPE OV wait number for Sync.M, 2nd-motor	Same as Hd133	
Hd234 IMPE detect wait number for Sync.M, 2nd-motor	Same as Hd134	
Hd235 IMPE detect number for Sync.M, 2nd-motor	Same as Hd135	
Hd236 IMPE voltage gain for Sync.M, 2nd-motor	Same as Hd136	
Hd237 IMPE Mg-pole position offset, 2nd-motor	Same as Hd137	

[oA-10] to [oA-33][ob-01] to [ob-04]

Parameter mode (o code)

- "o" parameters are displayed by the [UA-22] = 01. This configuration is not necessary except when option is used.
- The implementation of the following parameters might differ depending on the type of option being used. For more information, contact to your supplier or local Hitachi distributor or service station.

Optional cassette error operation

Code/Name	Range (unit)	Initial value
oA-10 Operation selection at an option error (SLOT-1)	00(Error)/ 01((Ignore error (keep running)))	00
oA-11 Communication Watch Dog Timer (SLOT-1)	0.00 to 100.00(s)	1.00
oA-12 Action selection at a communication error (SLOT-1)	00(Error)/ 01(Trip after Deceleration stop)/02(Ignore)/ 03(Free run stop)/ 04(Deceleration stop)	01
oA-13 RUN command selection at start up (SLOT-1)	00(Disable)/ 01(Enable)	00
oA-20 Operation selection at an option error (SLOT-2)	00(Error)/ 01((Ignore error (keep running)))	00
oA-21 Communication Watch Dog Timer (SLOT-2)	0.00 to 100.00(s)	1.00
oA-22 Action selection at a communication error (SLOT-2)	00(Error)/ 01(Trip after Deceleration stop)/ 02(Ignore)/ 03(Free run stop)/ 04(Deceleration stop)	01
oA-23 RUN command selection at start up (SLOT-2)	00(Disable)/ 01(Enable)	00
oA-30 Operation selection at an option error (SLOT-3)	00(Error)/ 01((Ignore error (keep running)))	00
oA-31 Communication Watch Dog Timer (SLOT-3)	0.00 to 100.00(s)	1.00
oA-32 Action selection at a communication error (SLOT-3)	00(Error)/ 01(Trip after Deceleration stop)/02(Ignore)/ 03(Free run stop)/ 04(Deceleration stop)	01
oA-33 RUN command selection at start up (SLOT-3)	00(Disable)/ 01(Enable)	00

- In P1-CCL CC-Link communication option, there are no dedicated parameters other than the above parameters. For more information, contact to your supplier or local Hitachi distributor or service station.

P1-FB Encoder Feedback Option setting

Code/Name	Range (unit)	Initial value
ob-01 Encoder constant setting	32 to 65535(pls)	1024
ob-02 Encoder phase sequence selection	00(A Phase lead)/ 01(B Phase lead)	0
ob-03 Motor gear ratio numerator	1 to 10000	1
ob-04 Motor gear ratio denominator	1 to 10000	1

- Above parameters set the main encoder input and the motor gear ratio involved in the encoder feedback for the P1-FB.

[ob-10] to [ob-16][oC-01] to [oC-28]

P1-FB Encoder Feedback Option
Pulse train input terminal setting

Code/Name	Range (unit)	Initial value
ob-10 Pulse train input, target function selection (option)	00(Frequency reference)/01(Pulse train position reference)	00
ob-11 Pulse train input mode selection (option)	00(90° shift pulse train)/01(Forward/ Reverse pulse train and direction signal)/02(Forward pulse train and Reverse pulse train)	01
ob-12 Pulse train frequency scale (option)	0.05 to 200.00(kHz)	25.00
ob-13 Pulse train frequency filter time constant (option)	0.01 to 2.00(s)	0.10
ob-14 Pulse train frequency bias value (option)	-100.0 to 100.0(%)	0.0
ob-15 Pulse train upper frequency detection level(option)	0.0 to 100.0(%)	100.0
ob-16 Pulse train lower frequency detection level (option)	0.0 to 100.0(%)	0.0

- Set when using the option feedback.
- For more information, contact to your supplier or local Hitachi distributor or service station.

P1-FS Functional Safety Option operation

Code/Name	Range(unit)	Initial value
oC-01 Safety option input display selection	00(Warning: with display)/01(Warning: without display)	00
oC-10 SS1-A deceleration time setting	0.00 to 3600.00(s)	30.00
oC-12 SLS-A deceleration time setting	0.00 to 3600.00(s)	30.00
oC-14 SLS-A speed upper limit (Forward)	0.00 to 590.00(Hz)	0.00
oC-15 SLS-A speed upper limit (Reverse)	0.00 to 590.00(Hz)	0.00
oC-16 SDI-A deceleration time setting	0.00 to 3600.00(s)	30.00
oC-18 SDI-A direction limit mode	00(Limit) 01(Invert)	00
oC-20 SS1-B deceleration time setting	0.00 to 3600.00(s)	30.00
oC-22 SLS-B deceleration time setting	0.00 to 3600.00(s)	30.00
oC-24 SLS-B speed upper limit (Forward)	0.00 to 590.00(Hz)	0.00
oC-25 SLS-B speed upper limit (Reverse)	0.00 to 590.00(Hz)	0.00
oC-26 SDI-B deceleration time setting	0.00 to 3600.00(s)	30.00
oC-28 SDI-B direction limit mode	00(Limit)/01(Invert)	00

- For more information, contact to your supplier or local Hitachi distributor or service station.

[oE-01] to [oE-33]

P1-AG Analog Input/Output Option
analog input adjustment

Code/Name	Range (unit)	Initial value
oE-01 [Ai4] Filter time constant	1 to 500(ms)	16
oE-03 [Ai4] Start value	0.00 to 100.00(%)	0.00
oE-04 [Ai4] End value	0.00 to 100.00(%)	100.00
oE-05 [Ai4] Start rate	0.0 to [oE-06] (%)	0.0
oE-06 [Ai4] End rate	[oE-05] to 100.0(%)	100.0
oE-07 [Ai4] Start point selection	00(Start value[oE-03])/01(0%)	01
oE-11 [Ai5] Filter time constant	1 to 500(ms)	16
oE-13 [Ai5] Start value	0.00 to 100.00(%)	0.00
oE-14 [Ai5] End value	0.00 to 100.00(%)	100.00
oE-15 [Ai5] Start rate	0.0 to [oE-16] (%)	0.0
oE-16 [Ai5] End rate	[oE-15] to 100.0(%)	100.0
oE-17 [Ai5] Start point selection	00(Start value[oE-13])/01(0%)	01
oE-21 [Ai6] Filter time constant	1 to 500(ms)	16
oE-23 [Ai6] Start value	-100.00 to 100.00(%)	-100.00
oE-24 [Ai6] End value	-100.00 to 100.00(%)	100.00
oE-25 [Ai6] Start rate	-100.0 to [oE-26] (%)	-100.0
oE-26 [Ai6] End rate	[oE-25] to 100.0(%)	100.0
oE-28 [Ai4] Voltage/Current bias adjustment	-100.00 to 100.00(%)	0.00
oE-29 [Ai4] Voltage/Current gain adjustment	0.00 to 200.00(%)	100.00
oE-30 [Ai5] Voltage/Current bias adjustment	-100.00 to 100.00(%)	0.00
oE-31 [Ai5] Voltage/Current gain adjustment	0.00 to 200.00(%)	100.00
oE-32 [Ai6] Voltage bias adjustment	-100.00 to 100.00(%)	0.00
oE-33 [Ai6] Voltage gain adjustment	0.00 to 200.00(%)	100.00

- Regarding the adjustment method of the analog input/output option, For more information, contact to your supplier or local Hitachi distributor or service station.

[oE-35] to [oE-49]

P1-AG Analog Input/Output Option
Window comparator output condition

Code/Name	Range (unit)	Initial value
oE-35 [Ai4] Window comparator upper limit	0 to 100(%)	100
oE-36 [Ai4] Window comparator lower limit	0 to 100(%)	0
oE-37 [Ai4] Window comparator hysteresis width	0 to 10(%)	0
oE-38 [Ai5] Window comparator upper limit	0 to 100(%)	100
oE-39 [Ai5] Window comparator lower limit	0 to 100(%)	0
oE-40 [Ai5] Window comparator hysteresis width	0 to 10(%)	0
oE-41 [Ai6] Window comparator upper limit	-100 to 100(%)	100
oE-42 [Ai6] Window comparator lower limit	-100 to 100(%)	-100
oE-43 [Ai6] Window comparator hysteresis width	0 to 10(%)	0
oE-44 [Ai4] Temporal operation level set at disconnection or compare event	0 to 100(%)	0
oE-45 [Ai4] Temporal operation level implementation timing	00(Disable)/ 01(Enable: At WC* is active)/ 02(Enable: At WC* is not active)	00
oE-46 [Ai5] Temporal operation level set at disconnection or compare event	0 to 100(%)	0
oE-47 [Ai5] Temporal operation level implementation timing	00(Disable)/ 01(Enable: At WC* is active)/ 02(Enable: At WC* is not active)	00
oE-48 [Ai6] Temporal operation level set at disconnection or compare event	-100 to 100(%)	0
oE-49 [Ai6] Temporal operation level implementation timing	00(Disable)/ 01(Enable: At WC* is active)/ 02(Enable: At WC* is not active)	00

- Window comparator function output signals whenever the analog value inputs are within or out of range.
- As for disconnection detection, if is within or out of range, the operation frequency is limited the setting value.

[oE-50] to [oE-70] [oH-01] ~ [oH-06]

P1-AG Analog Input/Output Option
Analog output terminal adjustment

Code/Name	Range (unit)	Initial value
oE-50 [Ao3] Output monitor selection	Set monitor code	dA-01
oE-51 [Ao4] Output monitor selection		dA-01
oE-52 [Ao5] Output monitor selection		dA-01
oE-56 [Ao3] Output filter time constant	1 to 500(ms)	100
oE-57 [Ao3] Data type selection	00(Absolute value)/ 01(Signed value)	00
oE-58 [Ao3] Bias adjustment	-100.0 to 100.0(%)	100.0
oE-59 [Ao3] Gain adjustment	-1000.0 to 1000.0(%)	100.0
oE-60 Adjustment mode [Ao3] output level	-100.0 to 100.0(%)	100.0
oE-61 [Ao4] Output filter time constant	1 to 500(ms)	100
oE-62 [Ao4] Data type selection	00(Absolute value)/ 01(Signed value)	00
oE-63 [Ao4] Bias adjustment	-100.0 to 100.0(%)	0.0
oE-64 [Ao4] Gain adjustment	-1000.0 to 1000.0(%)	100.0
oE-65 Adjustment mode [Ao4] output level	-100.0 to 100.0(%)	100.0
oE-66 [Ao5] Output filter time constant	1 to 500(ms)	100
oE-67 [Ao5] Data type selection	00(Absolute value)/ 01(Signed value)	00
oE-68 [Ao5] Bias adjustment	-100.0 to 100.0(%)	0.0
oE-69 [Ao5] Gain adjustment	-1000.0 to 1000.0(%)	100.0
oE-70 Adjustment mode [Ao5] output level	-100.0 to 100.0(%)	100.0

- Regarding the adjustment method of the analog input/output option, For more information, contact to your supplier or local Hitachi distributor or service station.

P1-EN Ethernet communication Option setting

Code/Name	Range (unit)	Initial value
oH-01 IP-address selection(P1-EN)	00(Group 1)/ 01(Group 2)	00
oH-02 Communication speed (port-1) (P1-EN)	00(Auto-negotiation)/ 01(100M:full duplex)/ 02(100M:half duplex)/	00
oH-03 Communication speed (port-2) (P1-EN)	03(10M:full duplex)/ 04(10M:half duplex)	00
oH-04 Ethernet communication timeout(P1-EN)	1 to 65535(× 10ms)	3000
oH-05 Modbus TCP Port No.(IPv4) (P1-EN)	502, 1024 to 65535	502
oH-06 Modbus TCP Port No.(IPv6) (P1-EN)	502, 1024 to 65535	502

- For more information, contact to your supplier or local Hitachi distributor or service station.

[oH-20] to [oH-45]

P1-PB PROFIBUS Communication Option setting

Code/Name	Range (unit)	Initial value
oH-20 PROFIBUS Node address(P1-PB)	0 to 125	0
oH-21 Profibus Clear Mode selection(P1-PB)	(For factory setting. Do not change.)	00
oH-22 Profibus Map selection(P1-PB)		00
oH-23 Profibus master setting selection(P1-PB)		00
oH-24 PROFIBUS Telegram group selection(P1-PB)	00(Gr.A)/01(Gr.B)/02(Gr.C)	00

- For more information, contact to your supplier or local Hitachi distributor or service station.

P1-PN PROFINET Communication Option setting

Code/Name	Range (unit)	Initial value
oH-30 PN IP-Address select(P1-PN)	(For factory setting. Do not change.)	00
oH-31 PN Communication speed (port-1) (P1-PN)		00
oH-32 PN Communication speed (port-2)(P1-PN)		00
oH-33 PN Ethernet communication timeout(P1-PN)		3000
oH-34 PROFINET Telegram group selection	00(Gr.A)/01(Gr.B)/02(Gr.C)	00

- For more information, contact to your supplier or local Hitachi distributor or service station.

P1-DN DeviceNet Communication Option setting

Code/Name	Range (unit)	Initial value
oH-40 DeviceNet Node address (MAC ID)(P1-DN)	0 to 63	0
oH-41 DeviceNet assembly instance number selection(P1-DN)	00(Instance 20, 70)/01(Instance 21, 71)/02(Instance 100, 150)/03(Instance 101, 151)/04(Instance 101, 153)/05(Instance 110, 111)/06(Instance 123, 173)/07(Instance 139, 159)	00
oH-42 DeviceNet speed unit selection(P1-DN)	00(Hz)/ 01(min-1)	01
oH-44 DeviceNet flexible Gr. format selection(P1-DN)	00(Gr. A)/01(Gr. B)/02(Gr. C)	00
oH-45 DeviceNet idle mode action selection(P1-DN)	00(Trip)/01(Decel-Trip)/02(Ignore)/03(Free run stop)/04(Decel stop)/	00

- For more information, contact to your supplier or local Hitachi distributor or service station.

[oJ-01] to [oJ-20]

Communication Option Interface

- Group A option I/F flexible command

Code/Name	Range (unit)	Initial value
oJ-01 Writing register 1, Gr.A	0000 to FFFF	0000
oJ-02 Writing register 2, Gr.A	0000 to FFFF	0000
oJ-03 Writing register 3, Gr.A	0000 to FFFF	0000
oJ-04 Writing register 4, Gr.A	0000 to FFFF	0000
oJ-05 Writing register 5, Gr.A	0000 to FFFF	0000
oJ-06 Writing register 6, Gr.A	0000 to FFFF	0000
oJ-07 Writing register 7, Gr.A	0000 to FFFF	0000
oJ-08 Writing register 8, Gr.A	0000 to FFFF	0000
oJ-09 Writing register 9, Gr.A	0000 to FFFF	0000
oJ-10 Writing register 10, Gr.A	0000 to FFFF	0000
oJ-11 Reading register 1 Gr.A	0000 to FFFF	0000
oJ-12 Reading register 2 Gr.A	0000 to FFFF	0000
oJ-13 Reading register 3 Gr.A	0000 to FFFF	0000
oJ-14 Reading register 4 Gr.A	0000 to FFFF	0000
oJ-15 Reading register 5 Gr.A	0000 to FFFF	0000
oJ-16 Reading register 6 Gr.A	0000 to FFFF	0000
oJ-17 Reading register 7 Gr.A	0000 to FFFF	0000
oJ-18 Reading register 8 Gr.A	0000 to FFFF	0000
oJ-19 Reading register 9 Gr.A	0000 to FFFF	0000
oJ-20 Reading register 10 Gr.A	0000 to FFFF	0000

- For more information, contact to your supplier or local Hitachi distributor or service station.

[oJ-21] to [oJ-40]

- Group B option I/F flexible command

Code/Name	Range (unit)	Initial value
oJ-21 Writing register 1, Gr.B	0000 to FFFF	0000
oJ-22 Writing register 2, Gr.B	0000 to FFFF	0000
oJ-23 Writing register 3, Gr.B	0000 to FFFF	0000
oJ-24 Writing register 4, Gr.B	0000 to FFFF	0000
oJ-25 Writing register 5, Gr.B	0000 to FFFF	0000
oJ-26 Writing register 6, Gr.B	0000 to FFFF	0000
oJ-27 Writing register 7, Gr.B	0000 to FFFF	0000
oJ-28 Writing register 8, Gr.B	0000 to FFFF	0000
oJ-29 Writing register 9, Gr.B	0000 to FFFF	0000
oJ-30 Writing register 10, Gr.B	0000 to FFFF	0000
oJ-31 Reading register 1 Gr.B	0000 to FFFF	0000
oJ-32 Reading register 2 Gr.B	0000 to FFFF	0000
oJ-33 Reading register 3 Gr.B	0000 to FFFF	0000
oJ-34 Reading register 4 Gr.B	0000 to FFFF	0000
oJ-35 Reading register 5 Gr.B	0000 to FFFF	0000
oJ-36 Reading register 6 Gr.B	0000 to FFFF	0000
oJ-37 Reading register 7 Gr.B	0000 to FFFF	0000
oJ-38 Reading register 8 Gr.B	0000 to FFFF	0000
oJ-39 Reading register 9 Gr.B	0000 to FFFF	0000
oJ-40 Reading register 10 Gr.B	0000 to FFFF	0000

- For more information, contact to your supplier or local Hitachi distributor or service station.

[oJ-41] to [oJ-60]

- Group C option I/F flexible command

Code/Name	Range (unit)	Initial value
oJ-41 Writing register 1, Gr.C	0000 to FFFF	0000
oJ-42 Writing register 2, Gr.C	0000 to FFFF	0000
oJ-43 Writing register 3, Gr.C	0000 to FFFF	0000
oJ-44 Writing register 4, Gr.C	0000 to FFFF	0000
oJ-45 Writing register 5, Gr.C	0000 to FFFF	0000
oJ-46 Writing register 6, Gr.C	0000 to FFFF	0000
oJ-47 Writing register 7, Gr.C	0000 to FFFF	0000
oJ-48 Writing register 8, Gr.C	0000 to FFFF	0000
oJ-49 Writing register 9, Gr.C	0000 to FFFF	0000
oJ-50 Writing register 10, Gr.C	0000 to FFFF	0000
oJ-51 Reading register 1 Gr.C	0000 to FFFF	0000
oJ-52 Reading register 2 Gr.C	0000 to FFFF	0000
oJ-53 Reading register 3 Gr.C	0000 to FFFF	0000
oJ-54 Reading register 4 Gr.C	0000 to FFFF	0000
oJ-55 Reading register 5 Gr.C	0000 to FFFF	0000
oJ-56 Reading register 6 Gr.C	0000 to FFFF	0000
oJ-57 Reading register 7 Gr.C	0000 to FFFF	0000
oJ-58 Reading register 8 Gr.C	0000 to FFFF	0000
oJ-59 Reading register 9 Gr.C	0000 to FFFF	0000
oJ-60 Reading register 10 Gr.C	0000 to FFFF	0000

- For more information, contact to your supplier or local Hitachi distributor or service station.

[oL-01] to [oL-36]

P1-EN Ethernet communication Option

Group 1 setting

Code/Name	Range (unit)	Initial value
oL-01 IPv4 IP address (1) Gr.1	0 to 255	192
oL-02 IPv4 IP address (2) Gr.1	0 to 255	168
oL-03 IPv4 IP address (3) Gr.1	0 to 255	0
oL-04 IPv4 IP address (4) Gr.1	0 to 255	2
oL-05 IPv4 subnet mask (1) Gr.1	0 to 255	255
oL-06 IPv4 subnet mask (2) Gr.1	0 to 255	255
oL-07 IPv4 subnet mask (3) Gr.1	0 to 255	255
oL-08 IPv4 subnet mask (4) Gr.1	0 to 255	0
oL-09 IPv4 default gateway (1) Gr.1	0 to 255	192
oL-10 IPv4 default gateway (2) Gr.1	0 to 255	168
oL-11 IPv4 default gateway (3) Gr.1	0 to 255	0
oL-12 IPv4 default gateway (4) Gr.1	0 to 255	1
oL-20 IPv6 IP address (1) Gr.1	0000 to FFFF	0000
oL-21 IPv6 IP address (2) Gr.1	0000 to FFFF	0000
oL-22 IPv6 IP address (3) Gr.1	0000 to FFFF	0000
oL-23 IPv6 IP address (4) Gr.1	0000 to FFFF	0000
oL-24 IPv6 IP address (5) Gr.1	0000 to FFFF	0000
oL-25 IPv6 IP address (6) Gr.1	0000 to FFFF	0000
oL-26 IPv6 IP address (7) Gr.1	0000 to FFFF	0000
oL-27 IPv6 IP address (8) Gr.1	0000 to FFFF	0000
oL-28 IPv6 Prefix of subnet, Gr.1	0 to 127	64
oL-29 IPv6 default gateway (1) Gr.1	0000 to FFFF	0000
oL-30 IPv6 default gateway (2) Gr.1	0000 to FFFF	0000
oL-31 IPv6 default gateway (3) Gr.1	0000 to FFFF	0000
oL-32 IPv6 default gateway (4) Gr.1	0000 to FFFF	0000
oL-33 IPv6 default gateway (5) Gr.1	0000 to FFFF	0000
oL-34 IPv6 default gateway (6) Gr.1	0000 to FFFF	0000
oL-35 IPv6 default gateway (7) Gr.1	0000 to FFFF	0000
oL-36 IPv6 default gateway (8) Gr.1	0000 to FFFF	0000

- For more information, contact to your supplier or local Hitachi distributor or service station.

[oL-40] to [oL-76]

P1-EN Ethernet communication Option

Group 2 setting

Code/Name	Range (unit)	Initial value
oL-40 IPv4 IP-address (1) Gr.2	0 to 255	192
oL-41 IPv4 IP-address (2) Gr.2	0 to 255	168
oL-42 IPv4 IP-address (3) Gr.2	0 to 255	0
oL-43 IPv4 IP-address (4) Gr.2	0 to 255	2
oL-44 IPv4 subnet mask (1) Gr.2	0 to 255	255
oL-45 IPv4 subnet mask (2) Gr.2	0 to 255	255
oL-46 IPv4 subnet mask (3) Gr.2	0 to 255	255
oL-47 IPv4 subnet mask (4) Gr.2	0 to 255	0
oL-48 IPv4 default gateway (1) Gr.2	0 to 255	192
oL-49 IPv4 default gateway (2) Gr.2	0 to 255	168
oL-50 IPv4 default gateway (3) Gr.2	0 to 255	0
oL-51 IPv4 default gateway (4) Gr.2	0 to 255	1
oL-60 IPv6 IP address (1) Gr.2	0000 to FFFF	0000
oL-61 IPv6 IP address (2) Gr.2	0000 to FFFF	0000
oL-62 IPv6 IP address (3) Gr.2	0000 to FFFF	0000
oL-63 IPv6 IP address (4) Gr.2	0000 to FFFF	0000
oL-64 IPv6 IP address (5) Gr.2	0000 to FFFF	0000
oL-65 IPv6 IP address (6) Gr.2	0000 to FFFF	0000
oL-66 IPv6 IP address (7) Gr.2	0000 to FFFF	0000
oL-67 IPv6 IP address (8) Gr.2	0000 to FFFF	0000
oL-68 IPv6 Prefix of subnet, Gr.2	0 to 127	64
oL-69 IPv6 default gateway (1) Gr.2	0000 to FFFF	0000
oL-70 IPv6 default gateway (2) Gr.2	0000 to FFFF	0000
oL-71 IPv6 default gateway (3) Gr.2	0000 to FFFF	0000
oL-72 IPv6 default gateway (4) Gr.2	0000 to FFFF	0000
oL-73 IPv6 default gateway (5) Gr.2	0000 to FFFF	0000
oL-74 IPv6 default gateway (6) Gr.2	0000 to FFFF	0000
oL-75 IPv6 default gateway (7) Gr.2	0000 to FFFF	0000
oL-76 IPv6 default gateway (8) Gr.2	0000 to FFFF	0000

- For more information, contact to your supplier or local Hitachi distributor or service station.

[PA-01] to [PA-05]

■ Parameter mode (P code)

Em-force mode setting

Code/Name	Range (unit)	Initial value
PA-01 Enable Emergency-force drive mode	00(Disable)/ 01(Enable)	00
PA-02 Emergency-force drive frequency reference	0.00 to 590.00(Hz) *1)	0.00
PA-03 Emergency-force drive direction command	00(Forward)/ 01(Reverse)	00
PA-04 Commercial power supply bypass function selection	00(Disable)/ 01(Enable)	00
PA-05 Commercial power supply bypass function delay time	0.0 to 1000.0(s)	5.0

*1) The actual setting range is limited to the maximum frequency setting ((Hb105/205) [Hd105/205])

- Settings for EM-force mode in case of abnormality.
- Enable Emergency-force drive mode [PA-01] is set to 01(Enable) and input terminal 105[EMF] is turned on, the forced operation mode is executed.
The output terminal 076[EMFC] turns on during the Em-forced drive mode.
- When [PA-04] is set to 01 (enabled), it is possible to switch to the commercial power operation mode (bypass mode) when the specified operation is not able to changed during forced operation. In bypass mode, the output terminal 077 [EMBP] signal in bypass mode is ON and the inverter output is cut off.
For more information, contact to your supplier or local Hitachi distributor or service station.

[PA-20] to [PA-31]

Simulation mode setting

Code/Name	Range (unit)	Initial value
PA-20 Simulation mode enable	00(Disable)/01(Enable)	00
PA-21 Error code selection for alarm test	0 to 255	0
PA-22 Simulation mode: Optional output selection for the output current monitor	00(Disable)/ 01(Parameter[PA-23])/ 02(Setting by terminal [Ai1])/ 03(Setting by terminal [Ai2])/ 04(Setting by terminal [Ai3])/ 05(Setting by terminal [Ai4])/ 06(Setting by terminal [Ai5])/ 07(Setting by terminal [Ai6])	01
PA-23 Optional output value setting for the output current monitor	0.0 to Inverter rated current × 3.0(A)	0.0
PA-24 Simulation mode: Optional output selection for the DC bus voltage monitor	00(Disable)/ 01(Parameter[PA-25])/ 02(Setting by terminal [Ai1])/ 03(Setting by terminal [Ai2])/ 04(Setting by terminal [Ai3])/ 05(Setting by terminal [Ai4])/ 06(Setting by terminal [Ai5])/ 07(Setting by terminal [Ai6])	01
PA-25 Optional output value setting for the DC bus voltage monitor	400V Class: 0.0 to 900.0(Vdc)	400V: 540.0
PA-26 Simulation mode: Optional output selection for the output voltage monitor	00(Disable)/ 01(Parameter[PA-27])/ 02(Setting by terminal [Ai1])/ 03(Setting by terminal [Ai2])/ 04(Setting by terminal [Ai3])/ 05(Setting by terminal [Ai4])/ 06(Setting by terminal [Ai5])/ 07(Setting by terminal [Ai6])	01
PA-27 Optional output value setting for the output voltage monitor	400V Class: 0.0 to 600.0(V)	0.0
PA-28 Simulation mode: Optional output selection for the output torque monitor	00(Disable)/ 01(Parameter[PA-29])/ 02(Setting by terminal [Ai1])/ 03(Setting by terminal [Ai2])/ 04(Setting by terminal [Ai3])/ 05(Setting by terminal [Ai4])/ 06(Setting by terminal [Ai5])/ 07(Setting by terminal [Ai6])	01
PA-29 Optional output value setting for the output torque monitor	-500.0 to 500.0(%)	0.0
PA-30 Simulation mode: Optional frequency matching start enable setting	00(Disable)/ 01(Parameter[PA-31])/ 02(Setting by terminal [Ai1])/ 03(Setting by terminal [Ai2])/ 04(Setting by terminal [Ai3])/ 05(Setting by terminal [Ai4])/ 06(Setting by terminal [Ai5])/ 07(Setting by terminal [Ai6])	01
PA-31 Optional frequency matching start setting value	0.0 to 590.0(Hz)	0.0

- Settings for the simulation mode functions.
For more information, contact to your supplier or local Hitachi distributor or service station.

[UA-01] to [UA-19]

■ Parameter mode (U code)

Password setting

Code/Name	Range (unit)	Initial value
UA-01 Password for display(UA-10)	0000 to FFFF	0000
UA-02 Password for softlock(UA-16)	0000 to FFFF	0000

- When using the password, display and parameter settings are locked.
- The inverter will be locked by password when setting any value other than 0000. The password can be cancelled by entering the set password. Please note that, the restrictions will not be cancelled if you forget the password.

Keypad display mode

Code/Name	Range (unit)	Initial value
UA-10 Display restriction selection	00(Full display)/ 01(Function-specific display)/ 02(User setting)/ 03(Data comparison display)/ 04(Monitor only)	00

- Limit the displayed contents of the keypad.
- For more information, contact to your supplier or local Hitachi distributor or service station.

Accumulated power display adjustment/clear

Code/Name	Range (unit)	Initial value
UA-12 Accumulated input power monitor clear	00(Disable)/ 01(Clear)	00
UA-13 Display gain for the accumulated input power monitor	1 to 1000	1
UA-14 Accumulated output power monitor clear	00(Disable)/ 01(Clear)	00
UA-15 Display gain for the accumulated output power monitor	1 to 1000	1

- If input terminal 039[KHC] is turned ON, the accumulated input power can be clear.
- If input terminal [OKHC] is turned ON, the accumulated output power can be clear.

Software lock operation setting

Code/Name	Range (unit)	Initial value
UA-16 Soft-Lock selection	00([SFT] terminal)/ 01(Always enable)	00
UA-17 Soft-Lock target selection	00(All data)/ 01(All, except speed related values)	00

- Sets the software lock operation.

Keypad copy function restriction *1)

Code/Name	Range (unit)	Initial value
UA-18 Data R/W selection	00(Enable R/W by operator) 01(Disable R/W by operator)	00

- Restricts the copy function(Read/Write function).
- *1) This parameter will be effective when you use the liquid crystal operator VOP (option).

Keypad low battery warning *2)

Code/Name	Range (unit)	Initial value
UA-19 Low battery warning enable	00(Disable)/ 01(Warning [LBK])/ 02(Error[E042])	00

- Sets the behaviour when the battery in the keypad is low.
- *2) This parameter will be effective when you use the liquid crystal operator VOP (option)..

[UA-20] to [UA-62]

Keypad communication lost operation

Code/Name	Range (unit)	Initial value
UA-20 Action selection at keypad disconnection	00(Error)/ 01(Error output after deceleration stop)/ 02(Ignore)/03(Free run stop)/ 04(Deceleration stop)	02

2nd-motor/option parameter display selection

Code/Name	Range (unit)	Initial value
UA-21 2nd-motor parameter display selection	00(Hidden)/01(Display)	01
UA-22 Option parameter display selection	00(Hidden)/01(Display)	01

- If options and 2nd-motor are not used, it is recommended to hide their parameters.
- For more information, contact to your supplier or local Hitachi distributor or service station.

User-parameter setting function

Code/Name	Range (unit)	Initial value
UA-30 User-parameter auto setting function enable	00(Disable)/ 01(Enable)	00
UA-31 User-parameter 1 selection	no/ (Parameters excluding [UA-31] to [UA-62])	no
UA-32 User-parameter 2 selection		no
UA-33 User-parameter 3 selection		no
UA-34 User-parameter 4 selection		no
UA-35 User-parameter 5 selection		no
UA-36 User-parameter 6 selection		no
UA-37 User-parameter 7 selection		no
UA-38 User-parameter 8 selection		no
UA-39 User-parameter 9 selection		no
UA-40 User-parameter 10 selection		no
UA-41 User-parameter 11 selection		no
UA-42 User-parameter 12 selection		no
UA-43 User-parameter 13 selection		no
UA-44 User-parameter 14 selection		no
UA-45 User-parameter 15 selection		no
UA-46 User-parameter 16 selection		no
UA-47 User-parameter 17 selection		no
UA-48 User-parameter 18 selection		no
UA-49 User-parameter 19 selection		no
UA-50 User-parameter 20 selection		no
UA-51 User-parameter 21 selection		no
UA-52 User-parameter 22 selection		no
UA-53 User-parameter 23 selection		no
UA-54 User-parameter 24 selection		no
UA-55 User-parameter 25 selection		no
UA-56 User-parameter 26 selection		no
UA-57 User-parameter 27 selection		no
UA-58 User-parameter 28 selection		no
UA-59 User-parameter 29 selection		no
UA-60 User-parameter 30 selection		no
UA-61 User-parameter 31 selection		no
UA-62 User-parameter 32 selection		no

- The above parameters store the changed parameters history in [UA-31] to [UA-62] when [UA-30] = 01, or set the data to be displayed when [UA-10] = 02. ([UA-10] = 02 setting is priority)

[UA-90] to [UA-94][Ub-01] to [Ub-05]

[Ud-01] to [Ud-37]

MOP(VR) keypad setting

Code/Name	Range (unit)	Initial value
UA-90 Waiting time for turning off the display(MOP)	0 to 60(min)	0
UA-91 Initial display selection (MOP)	(Select from d----, F---- parameters)	dA-01
UA-92 Enable auto-return to the initial display (MOP)	00(Disable)/ 01(Enable)	00
UA-93 Enable frequency changes through monitor display(MOP)	00(Disable)/ 01(Enable)	00
UA-94 Enable multi-speed frequency changes through monitor display (MOP)	00(Disable)/ 01(Enable)	00

• Setting parameter for MOP(VR) keypad(option).

Initialize

Code/Name	Range (unit)	Initial value
Ub-01 Initialize mode selection	00(Disable)/ 01(Error history clear)/ 02(Data initialize)/ 03(Error history clear & Data initialize)/ 04(Error history clear & Data initialize & EzSQ clear)/ 05(All data except terminal configuration)/ 06(All data except communication configuration)/ 07(All data except terminal & communication configuration)/ 08(EzSQ only)	00
Ub-02 Initialize data selection	00(JP)/01(EU)/ 02(US)/03(CHN)	00(JPN) 01(EU) 02(USA) 03(CHN)
Ub-03 *1) Load type selection	00(Very Low Duty)/ 01(Low Duty)/ 02(Normal Duty)	00
Ub-05 Enable initialization	00(Disable)/ 01(Execute initialization)	00

• How to initialize; at first select the initial mode at [Ub-01], next, when [Ub-05] is set to 1, initialize process is start.

*1) LH1 series can only select 00(VLD), and the setting is forbidden to change.

Factory setting

Code/Name	Range (unit)	Initial value
UC-01 (-)	(Do not change)	(00)

*2) Trace start is also possible from ON of input terminal 108[DTR] or from ProDriveNext. And while the inverter is in trace function, the output terminal [TRA] turns ON.
For more information, contact to your supplier or local Hitachi distributor or service station.

Trace function

Code/Name	Range (unit)	Initial value
Ud-01 Trace function enable	00(Disable)/01(Enable)	00
Ud-02 Trace start *2)	00(Stop)/01(Start)	00
Ud-03 Number of trace data setting	0 to 8	1
Ud-04 Number of trace signals setting	0 to 8	1
Ud-10 Trace data 0 selection	(parameters of the d**** and F**** mode)	dA-01
Ud-11 Trace data 1 selection		dA-01
Ud-12 Trace data 2 selection		dA-01
Ud-13 Trace data 3 selection		dA-01
Ud-14 Trace data 4 selection		dA-01
Ud-15 Trace data 5 selection		dA-01
Ud-16 Trace data 6 selection		dA-01
Ud-17 Trace data 7 selection		dA-01
Ud-20 Trace signal 0 input/output selection	00(Input:[Ud-21])/ 01(Output:[Ud-22])	00
Ud-21 Trace signal 0 input terminal selection	Same as [CA-01]	001
Ud-22 Trace signal 0 output terminal selection	Same as [CC-01]	001
Ud-23 Trace signal 1 input/output selection	00(Input:[Ud-24])/ 01(Output:[Ud-25])	00
Ud-24 Trace signal 1 input terminal selection	Same as [CA-01]	001
Ud-25 Trace signal 1 output terminal selection	Same as [CC-01]	001
Ud-26 Trace signal 2 input/output selection	00(Input:[Ud-27])/ 01(Output:[Ud-28])	00
Ud-27 Trace signal 2 input terminal selection	Same as [CA-01]	001
Ud-28 Trace signal 2 output terminal selection	Same as [CC-01]	001
Ud-29 Trace signal 3 input/output selection	00(Input:[Ud-30])/ 01(Output:[Ud-31])	00
Ud-30 Trace signal 3 input terminal selection	Same as [CA-01]	001
Ud-31 Trace signal 3 output terminal selection	Same as [CC-01]	001
Ud-32 Trace signal 4 input/output selection	00(Input:[Ud-33])/ 01(Output:[Ud-34])	00
Ud-33 Trace signal 4 input terminal selection	Same as [CA-01]	001
Ud-34 Trace signal 4 output terminal selection	Same as [CC-01]	001
Ud-35 Trace signal 5 input/output selection	00(Input:[Ud-36])/ 01(Output:[Ud-37])	00
Ud-36 Trace signal 5 input terminal selection	Same as [CA-01]	001
Ud-37 Trace signal 5 output terminal selection	Same as [CC-01]	001

[Ud-38] to [Ud-60]

Code/Name	Range (unit)	Initial value
Ud-38 Trace signal 6 input/output selection	00 (Input: [Ud-39])/01 (Output: [Ud-40])	00
Ud-39 Trace signal 6 input terminal selection	Similar to [CA-01]	001
Ud-40 Trace signal 6 output terminal selection	Similar to [CC-01]	001
Ud-41 Trace signal 7 input/output selection	00 (Input: [Ud-42])/01 (Output: [Ud-43])	00
Ud-42 Trace signal 7 input terminal selection	Similar to [CA-01]	001
Ud-43 Trace signal 7 output terminal selection	Similar to [CC-01]	001
Ud-50 Trace trigger 1 selection	00(Trip)/01(Data 0)/02(Data 1)/03(Data 2)/04(Data 3)/05(Data 4)/06(Data 5)/07(Data 6)/08(Data 7)/09(Signal 0)/10(Signal 1)/11(Signal 2)/12(Signal 3)/13(Signal 4)/14(Signal 5)/15(Signal 6)/16(Signal 7)	00
Ud-51 Trigger 1 activation selection at trace data trigger	00(Action at rising above the trigger level)/01(Action at falling below the trigger level)	00
Ud-52 Trigger 1 level setting at trace data trigger	0 to 100(%)	0
Ud-53 Trigger 1 activation selection at trace signal trigger	00(Action by signal on)/01(Action by signal off)	00
Ud-54 Trace trigger 2 selection	00(Trip)/01(Data 0)/02(Data 1)/03(Data 2)/04(Data 3)/05(Data 4)/06(Data 5)/07(Data 6)/08(Data 7)/09(Signal 0)/10(Signal 1)/11(Signal 2)/12(Signal 3)/13(Signal 4)/14(Signal 5)/15(Signal 6)/16(Signal 7)	00
Ud-55 Trigger 2 activation selection at trace data trigger	00(Action at rising above the trigger level)/01(Action at falling below the trigger level)	00
Ud-56 Trigger 2 level setting at trace data trigger	0 to 100(%)	0
Ud-57 Trigger 2 activation selection at trace signal trigger	00(Action by signal on)/01(Action by signal off)	00
Ud-58 Trigger condition selection	00(At trace trigger 1 activation)/01(At trace trigger 2 activation)/02(Trigger-1 OR trigger-2 activation)/03(Trigger-1 AND trigger-2 activation)	00
Ud-59 Trigger point setting	0 to 100(%)	0
Ud-60 Sampling time setting	01(0.2ms)/02(0.5ms)/03(1ms)/04(2ms)/05(5ms)/06(10ms)/07(50ms)/08(100ms)/09(500ms)/10(1000ms)	03

• For more information, contact to your supplier or local Hitachi distributor or service station.

[UE-01] to [UE-48]

EzSQ (Program operation function)

Code/Name	Range (unit)	Initial value
UE-01 EzSQ execution cycle	00(1ms)/01(2ms: SJ700/L700 compatible)	00
UE-02 EzSQ enable setting	00(Disable)/01([PRG] terminal)/02(Always enabled)	00

• EzSQ creates a program with inverter setup software ProdriveNext. To operate the EzSQ function, it is necessary to download the program into the inverter.

Code/Name	Range (unit)	Initial value
UE-10 EzSQ User parameter U(00)	0 to 65535	0
UE-11 EzSQ User parameter U(01)	0 to 65535	0
UE-12 EzSQ User parameter U(02)	0 to 65535	0
UE-13 EzSQ User parameter U(03)	0 to 65535	0
UE-14 EzSQ User parameter U(04)	0 to 65535	0
UE-15 EzSQ User parameter U(05)	0 to 65535	0
UE-16 EzSQ User parameter U(06)	0 to 65535	0
UE-17 EzSQ User parameter U(07)	0 to 65535	0
UE-18 EzSQ User parameter U(08)	0 to 65535	0
UE-19 EzSQ User parameter U(09)	0 to 65535	0
UE-20 EzSQ User parameter U(10)	0 to 65535	0
UE-21 EzSQ User parameter U(11)	0 to 65535	0
UE-22 EzSQ User parameter U(12)	0 to 65535	0
UE-23 EzSQ User parameter U(13)	0 to 65535	0
UE-24 EzSQ User parameter U(14)	0 to 65535	0
UE-25 EzSQ User parameter U(15)	0 to 65535	0
UE-26 EzSQ User parameter U(16)	0 to 65535	0
UE-27 EzSQ User parameter U(17)	0 to 65535	0
UE-28 EzSQ User parameter U(18)	0 to 65535	0
UE-29 EzSQ User parameter U(19)	0 to 65535	0
UE-30 EzSQ User parameter U(20)	0 to 65535	0
UE-31 EzSQ User parameter U(21)	0 to 65535	0
UE-32 EzSQ User parameter U(22)	0 to 65535	0
UE-33 EzSQ User parameter U(23)	0 to 65535	0
UE-34 EzSQ User parameter U(24)	0 to 65535	0
UE-35 EzSQ User parameter U(25)	0 to 65535	0
UE-36 EzSQ User parameter U(26)	0 to 65535	0
UE-37 EzSQ User parameter U(27)	0 to 65535	0
UE-38 EzSQ User parameter U(28)	0 to 65535	0
UE-39 EzSQ User parameter U(29)	0 to 65535	0
UE-40 EzSQ User parameter U(30)	0 to 65535	0
UE-41 EzSQ User parameter U(31)	0 to 65535	0
UE-42 EzSQ User parameter U(32)	0 to 65535	0
UE-43 EzSQ User parameter U(33)	0 to 65535	0
UE-44 EzSQ User parameter U(34)	0 to 65535	0
UE-45 EzSQ User parameter U(35)	0 to 65535	0
UE-46 EzSQ User parameter U(36)	0 to 65535	0
UE-47 EzSQ User parameter U(37)	0 to 65535	0
UE-48 EzSQ User parameter U(38)	0 to 65535	0

[UE-49] to [UE-73][UF-02] to [UF-32]

[Unit table]

Code/Name	Range (unit)	Initial value
UE-49 EzSQ User parameter U(39)	0 to 65535	0
UE-50 EzSQ User parameter U(40)	0 to 65535	0
UE-51 EzSQ User parameter U(41)	0 to 65535	0
UE-52 EzSQ User parameter U(42)	0 to 65535	0
UE-53 EzSQ User parameter U(43)	0 to 65535	0
UE-54 EzSQ User parameter U(44)	0 to 65535	0
UE-55 EzSQ User parameter U(45)	0 to 65535	0
UE-56 EzSQ User parameter U(46)	0 to 65535	0
UE-57 EzSQ User parameter U(47)	0 to 65535	0
UE-58 EzSQ User parameter U(48)	0 to 65535	0
UE-59 EzSQ User parameter U(49)	0 to 65535	0
UE-60 EzSQ User parameter U(50)	0 to 65535	0
UE-61 EzSQ User parameter U(51)	0 to 65535	0
UE-62 EzSQ User parameter U(52)	0 to 65535	0
UE-63 EzSQ User parameter U(53)	0 to 65535	0
UE-64 EzSQ User parameter U(54)	0 to 65535	0
UE-65 EzSQ User parameter U(55)	0 to 65535	0
UE-66 EzSQ User parameter U(56)	0 to 65535	0
UE-67 EzSQ User parameter U(57)	0 to 65535	0
UE-68 EzSQ User parameter U(58)	0 to 65535	0
UE-69 EzSQ User parameter U(59)	0 to 65535	0
UE-70 EzSQ User parameter U(60)	0 to 65535	0
UE-71 EzSQ User parameter U(61)	0 to 65535	0
UE-72 EzSQ User parameter U(62)	0 to 65535	0
UE-73 EzSQ User parameter U(63)	0 to 65535	0

• EzSQ up to 16 bits data can be set.

Code/Name	Range (unit)	Initial value
UF-02 EzSQ User parameter UL(00)	-2147483647 to 2147483647	0
UF-04 EzSQ User parameter UL(01)	-2147483647 to 2147483647	0
UF-06 EzSQ User parameter UL(02)	-2147483647 to 2147483647	0
UF-08 EzSQ User parameter UL(03)	-2147483647 to 2147483647	0
UF-10 EzSQ User parameter UL(04)	-2147483647 to 2147483647	0
UF-12 EzSQ User parameter UL(05)	-2147483647 to 2147483647	0
UF-14 EzSQ User parameter UL(06)	-2147483647 to 2147483647	0
UF-16 EzSQ User parameter UL(07)	-2147483647 to 2147483647	0
UF-18 EzSQ User parameter UL(08)	-2147483647 to 2147483647	0
UF-20 EzSQ User parameter UL(09)	-2147483647 to 2147483647	0
UF-22 EzSQ User parameter UL(10)	-2147483647 to 2147483647	0
UF-24 EzSQ User parameter UL(11)	-2147483647 to 2147483647	0
UF-26 EzSQ User parameter UL(12)	-2147483647 to 2147483647	0
UF-28 EzSQ User parameter UL(13)	-2147483647 to 2147483647	0
UF-30 EzSQ User parameter UL(14)	-2147483647 to 2147483647	0
UF-32 EzSQ User parameter UL(15)	-2147483647 to 2147483647	0

• EzSQ up to 32 bits data can be set.

Number	Unit
00	Non
01	%
02	A
03	Hz
04	V
05	kW
06	W
07	hr
08	S
09	kHz
10	ohm
11	mA
12	ms
13	P
14	kgm2
15	pls
16	mH
17	Vdc
18	°C
19	kWh
20	mF
21	mVs/rad
22	Nm
23	min-1
24	m/s
25	m/min
26	m/h
27	ft/s
28	ft/min
29	ft/h
30	m

Number	Unit
31	cm
32	°F
33	l/s
34	l/min
35	l/h
36	m3/s
37	m3/min
38	m3/h
39	kg/s
40	kg/min
41	kg/h
42	t/min
43	t/h
44	gal/s
45	gal/min
46	gal/h
47	ft3/s
48	ft3/min
49	ft3/h
50	lb/s
51	lb/min
52	lb/h
53	mbar
54	bar
55	Pa
56	kPa
57	PSI
58	mm

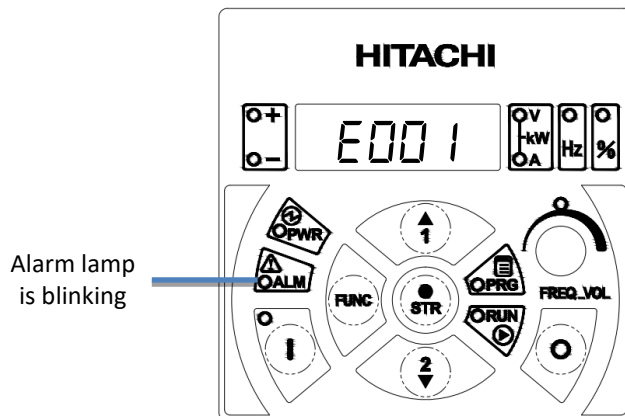
Chapter 5

Troubleshooting

5.1 Error events

Next are the descriptions of the basic errors that may occur. For more information, contact to your supplier or local Hitachi distributor or service station .

■ Trip event screen



■ Error events

Code	Details	Corrective actions	Related parameter
E001	<ul style="list-style-type: none"> By the load and the operating conditions, overcurrent has occurred 	<ul style="list-style-type: none"> If the acceleration is fast, increase the acceleration time 	[AC120]
		<ul style="list-style-type: none"> Use the overcurrent suppression function 	[bA120]
		<ul style="list-style-type: none"> Use the overload restriction function 	[bA122]
		<ul style="list-style-type: none"> Use the overcurrent retry function 	[bb-22]
		<ul style="list-style-type: none"> In order to stabilize the control, adjust the constant 	[HA-01]
E005 E039	<ul style="list-style-type: none"> By the load and the operating conditions, current has increased. 	<ul style="list-style-type: none"> If the acceleration is fast, increase the acceleration time 	[AC120]
		<ul style="list-style-type: none"> Use the overload restriction function 	[bA122]
E006	<ul style="list-style-type: none"> Braking resistor use is limited. 	<ul style="list-style-type: none"> If the deceleration is fast, increase the deceleration time 	[AC122]
		<ul style="list-style-type: none"> Reselection of the braking resistor is necessary 	[bA-60]
E007	<ul style="list-style-type: none"> Internal voltage has increased Insufficient capacity of the inverter 	<ul style="list-style-type: none"> If the deceleration is fast, increase the deceleration time 	[AC122]
		<ul style="list-style-type: none"> Use the overvoltage suppression functions 	[bA140][bA146]
		<ul style="list-style-type: none"> Use the overvoltage retry function 	[bb-23]
		<ul style="list-style-type: none"> Use a braking option 	-
E008 E011	<ul style="list-style-type: none"> Main CPU abnormality 	<ul style="list-style-type: none"> Carry out counter measures for the inverter noise 	-
		<ul style="list-style-type: none"> Consecutive errors may cause a failure 	-
E009	<ul style="list-style-type: none"> Main circuit supply has drop 	<ul style="list-style-type: none"> To disable the undervoltage error, change setting 	[bb-27]
		<ul style="list-style-type: none"> Use the undervoltage retry function 	[bb-21]
E010	<ul style="list-style-type: none"> Current detector abnormality 	<ul style="list-style-type: none"> Carry out counter measures for the inverter noise 	-
		<ul style="list-style-type: none"> Consecutive errors may cause a failure, replacement of the components is necessary 	-
E012	<ul style="list-style-type: none"> [EXT] input terminal is ON 	<ul style="list-style-type: none"> Check the signal status of the input terminal 	[dA-51]
		<ul style="list-style-type: none"> Check if there are no operations by communication or programme 	-
E013	<ul style="list-style-type: none"> [USP] input terminal is ON if at the start-up, the RUN command was issued right at the start up 	<ul style="list-style-type: none"> Make sure that an operation command is not introduced at the time of turning ON the inverter 	[dA-51]

Code	Details	Corrective actions	Related parameter
E014	▪ Ground fault detected at main circuit voltage turning-on	▪ Check for ground fault of the motor, wiring, etc.	-
E015	▪ Continued state of incoming high power	▪ Review the power circumstances, such as the power supply capacity	[dA-40]
E016	▪ Instantaneous power failure, control supply has dropped	▪ If you wish to avoid the tripping, use the power loss retry function.	[bb-20]
E019	▪ Abnormality in temperature detector circuit	▪ Carry out counter measures for the inverter noise	-
		▪ Consecutive errors may cause a failure	-
E020	▪ Because of cooling-fan life span, internal temperature has raised	▪ Change of the cooling-fan is necessary	-
		▪ Lower the carrier frequency	[bb101]
E021	▪ Internal temperature has increased	▪ Requires a review of the installation circumstances	-
		▪ Lower the carrier frequency	[bb101]
E024	▪ Disconnection of the wiring in the supply side has occurred	▪ Check the fastening of the input wiring with screws	-
		▪ Check that the 3 phases are correctly inserted	-
E030	▪ Suddenly current increase	▪ Output wiring ground fault ▪ Disconnection confirm	-
		▪ Check that the motor is not locked	-
E034	▪ Disconnection of the wiring in the motor side has occurred	▪ Check the output wiring disconnection, motor insulation failure, ...etc.	-
		▪ Check that the 3 phases are correctly inserted	-
E035	▪ Abnormal motor temperature ▪ Thermistor abnormality	▪ Improve the motor cooling circumstances	-
		▪ Use the overload restriction function	[bA122]
E036	▪ Brake abnormality	▪ Check for the break-down of the brake and for the disconnection of the wiring for the [BOK] signal	[dA-51]
		▪ Check the brake waiting time	[AF134][AF141]
E038	▪ During slow speed, current has increased	▪ If torque is needed during slow speed, a review of the inverter capacity is necessary	-
E040	▪ Panel disconnection error	▪ Check for the disconnection of the panel from the inverter	[UA-20]
		▪ Noise counter-measures are necessary	-
E041	▪ RS485 communication error	▪ Noise counter-measures are necessary	-
		▪ Check the communication setting	[CF-01]
E042	▪ RTC error	▪ Battery replacement for the panel is necessary	-
E043 ~ E045 E050 ~ E059	▪ There is an error in the EzSQ programme.	▪ For more information, contact to your supplier or local Hitachi distributor or service station .	
E060 ~ E089	▪ There is an error in the option.	▪ For more information, contact to your supplier or local Hitachi distributor or service station .	
E090 ~ E093	▪ There is an error in the STO path *1).	▪ For more information, contact to your supplier or local Hitachi distributor or service station .	

※For others errors not shown above, contact to your supplier or local Hitachi distributor or service station .

*1)STO function is not suitable for LH1 series.

■ Warning events

※Regarding the warnings, please refer to Page4-8. Fixing the parameter details shown in the panel screen may end the warning.

5.3 Possible errors and solutions

- ✧ If the corrective action does not solve the problem, please contact to your supplier or local Hitachi distributor or service station .

Event ▶	Estimated cause ▶	Corrective action
Screen is off even when POWER Led is illuminated	▪ Keypad in idle mode	▪ Press a key of the Keypad and the screen will light up
	▪ Keypad has been detached	▪ Recover and reinsert the keypad
After issuing a RUN command, the motor does not start	▪ Trip has occurred	▪ If an error causes a trip, the cause of the trip will have to be removed before resetting
	▪ A warning came up	▪ In a warning event is necessary to resolve any data inconsistency
	▪ Command function not introduced	▪ Check that the RUN command [AA111] and the reference (terminal, keypad, etc.) are correct
	▪ Speed source not introduced	▪ Check that the main speed source [AA101] and the reference (terminal, panel, etc.) are correct
	▪ Activate a stop function	▪ Check if functional safety terminals and [RS]/[FRS] terminals are not enabled through the terminal status [dA-51]
	▪ Motor is restricted/locked	▪ Check if there is a braking operation or something inhibiting the motor (Like something clogged)
	▪ Wiring is disconnected	▪ Check that there are not disconnected cables in the output to the motor and in the internal side.
Cannot change settings	▪ Is running	▪ There are parameters that cannot be modified while running, please refer to the parameter list
Motor rotates in reverse	▪ Wrong wiring order of the motor phases	▪ Rotation is reversed by replacing two phases of the motor
Motor/machinery sound is loud	▪ Carrier frequency setting is low	▪ Set higher carrier frequency [bb101], however, that may increase the generated noise or leakage current, therefore, depending on the model, derating is necessary.

Event ▶	Estimated cause ▶	Corrective action
Motor speed does not increase	<ul style="list-style-type: none"> Overload restriction function is in use 	<ul style="list-style-type: none"> If output current is high, the overload restriction function [bA122] lowers the frequency. To increase the acceleration time [AC120], it is necessary to suppress the current increase.
	<ul style="list-style-type: none"> Frequency is being limited 	<ul style="list-style-type: none"> The upper limit [bA102] setting may be low, and it should be increased. The frequency limiting does not make use of the maximum frequency, but the upper limit function.
	<ul style="list-style-type: none"> Frequency source is low 	<ul style="list-style-type: none"> Increase the frequency source or cancel any other high priority frequency command such as jogging or multi-speed.
	<ul style="list-style-type: none"> Acceleration time is long 	<ul style="list-style-type: none"> Acceleration time [AC120] setting is long, so will accelerate really slowly. Shorten gradually the acceleration time.
Output frequency is unstable	<ul style="list-style-type: none"> Several parameters are not adequately set 	<ul style="list-style-type: none"> Check for the motor basic parameters.
	<ul style="list-style-type: none"> Big variation in the load 	<ul style="list-style-type: none"> Review the power capacity of both the inverter and motor.
	<ul style="list-style-type: none"> Supply voltage fluctuates 	<ul style="list-style-type: none"> To keep to a minimum the supply fluctuations, by using an optional AC reactor, DC choke or and input filter, improvement is possible.
No torque	<ul style="list-style-type: none"> V/f control is in use 	<ul style="list-style-type: none"> Can switch in [AA121] to torque boost, sensorless vector control, ... etc.
	<ul style="list-style-type: none"> It is being used for lift down application 	<ul style="list-style-type: none"> If the torque in the regenerative operation is not enough, you can use a braking resistor or regenerative braking unit.
	<ul style="list-style-type: none"> Very heavy load 	<ul style="list-style-type: none"> Review the capacity of both the inverter and motor.
In operation the circuit breaker gets activated	<ul style="list-style-type: none"> Large leakage current 	<ul style="list-style-type: none"> Lower the carrier frequency [bb101] Increase the current sensitivity of the circuit breaker, or replace the sensitivity current sensor/part.
Noise interferes with the TVs and radios nearby the inverter	<ul style="list-style-type: none"> Irradiated noise from the inverter 	<ul style="list-style-type: none"> If possible, separate the wiring from the TV and radio Put a zero-phase reactor either in the main supply input or in the output.

Chapter 6

Inspection and maintenance



Read this before performing any inspection or maintenance!

There is risk of electric shock!

- Before an inspection the supply power must to be cut off, and then wait at least 10 minutes *1) or 15 minutes *2) before proceeding.
(Make sure that the charge lamp in the inverter is off. Furthermore, measure the voltage between the P and N terminals and make sure that the voltage is less than 45V)

*1) For models LH1-055H~LH1-300H

*2) For models LH1-370H~LH1-1600H

- Other than the designated person, do not perform any maintenance, inspection or component replacement.
(Before starting to operate, remove any wristwatch or metal accessories such as bracelets, and use always isolated tools)

6.1 Inspection and maintenance notes

6.1.1 Daily inspection

Check and confirm for the following abnormalities while the inverter is operating:

No.	Details	✓
1	Motor operates as per settings	<input type="checkbox"/>
2	No abnormalities in the environment	<input type="checkbox"/>
3	Cooling-system running normally	<input type="checkbox"/>
4	Abnormal vibration or noise	<input type="checkbox"/>
5	Discolouration and superheating	<input type="checkbox"/>
6	Unusual odour	<input type="checkbox"/>

While operating, check the inverter input voltage using a multimeter or a similar tool to confirm:

No.	Details	✓
1	Voltage supply fluctuation	<input type="checkbox"/>
2	Line-to-line voltage balance	<input type="checkbox"/>

6.1.2 Cleaning

Keep the inverter in a clean condition.

No.	Details	✓
1	When cleaning the inverter, use a soft cloth soaked in neutral detergent to gently wipe up the dirtied parts.	<input type="checkbox"/>
2	Do not use solvents like acetone, benzene, toluene or alcohol to clean the inverter, as it can melt its surface or peel off the coating.	<input type="checkbox"/>
3	For the display of the panel do not use detergent or alcohol to clean it.	<input type="checkbox"/>

6.1.3 Periodic inspection

Check the parts that are only accessible while the inverter is stopped. The periodic inspection is a vital point that has to be carried out, for any periodic inspection, please contact to your supplier or local Hitachi distributor or service station.

No.	Details	✓
1	Check for abnormalities in cooling system • Heat sink cleaning, etc.	<input type="checkbox"/>
2	Check the fastening and tighten • By the effects of oscillations, thermal expansion, etc..., the screws and bolts may become loose, proceed to tighten after confirming.	<input type="checkbox"/>
3	Check that there is no damage or corrosion to the conductors and insulators	<input type="checkbox"/>
4	Measurement of the dielectric breakdown voltage of insulators	<input type="checkbox"/>
5	Check and replacement of cooling-fan, smoothing capacitor and relay.	<input type="checkbox"/>

6.2 Daily and periodic inspections

Inspected part	Inspection entry	Details of inspection	Inspection cycle			Inspection method	Criterion	Tester device
			Daily	Every				
				1 year	2 years			
General	Surrounding environment	Check the ambient temperature, level of humidity, dust, ... etc.	○			Refer to the installation guide.	Ambient temperature, level of humidity are within the range. No frozen part. No condensation.	Thermometer Hygrometer Data logger
	Whole inverter	Check abnormal vibrations or noises	○			Check visually and auditorily.	Without abnormalities	
	Power supply voltage	Check that the main circuit voltage is normal.	○			Measure the line-to-line voltage of the inverter main circuit terminals R,S and T.	Within the AC voltage permissible variation.	Multimeter, Digital multimeter Meter
Main circuit	General check	(1)Check the resistance between the main circuit and the ground terminals.		○		Dismantle the inverter main circuit terminals input/output wiring and the control terminal board, and remove the jumper for the internal filter, after that, shortcircuit the terminals R,S,T,U,V,W,P,PD,N,RB,RO,TO, and measure between this shortcircuit and the ground.	Resistance no less than 5MΩ.	DC 500V class Ohmmeter (megger®)
		(2)Check looseness in fastened parts		○		Confirm tighten of fasteners.	Without abnormalities	
		(3)Check for overheating traces.		○		Check visually.	Without abnormalities	
	Conductor and cables	(1)Check for straining in conductors		○		Check visually.	Without abnormalities	
		(2)Check for cable coating damage		○				
	Terminal block	Check for any damage.		○		Check visually.	Without abnormalities	
	Inverter and converter circuits (Including resistors)	Check the resistance between all the terminals			○	Remove the inverter main circuit terminal wiring, and measure the following: - Resistance between terminals RST and PN. - Resistance between terminals UVW and PN	Consult the "Method of checking the inverter and converter circuits". The inverter, capacitor and thyristor lifespan before replacing the components is of 10 ⁶ start/stop cycles *3)	Analogue multimeter
	Smoothing capacitor	(1)Check for capacitor fluid leakage		○		Check visually.	That there are no abnormalities Estimated number life span before exchanging component: 10 years *1) *3) *4)	Capacitance meter
(2)Check that the relief valve does not swells or protudes.			○					
Relay	(1)No chatter sound while operating			○	Check auditorily.	That there are no abnormalities.		
	(2)Check contacts for damage			○	Check visually.	That there are no abnormalities.		
Control and protection circuits	Operation check	(1) While performing a unit operation of the inverter, check the balance of the output voltage among the individual phases		○		Measure the voltage between the U,V,W terminals of the inverter main circuit.	Phase-to-phase voltage balance 200V class: within 4V 400V class: within 8V	Digital multimeter Voltmeter Ammeter
		(2)Carry out a sequential protection test, and check the protective and display circuits for any abnormality		○		Simulate a shortcircuit or open of the inverter output protection circuit.	An error must be detected according to the sequence.	
Cooling system	Cooling-fan	(1) Check for abnormal vibrations or noises	○			Turn by hand while electricity is not being supplied	Smooth operation without abnormalities. Replace every: 10 years *2) *3) *5)	
		(2)Check for loose joints		○		Check visually.		
	Heat sink	Check for obstructions/clogging.		○		Check visually.	That there are not obstructions.	
Display	Display	(1)Check that LED lamps lights up	○			Check visually.	Confirm it lights up	
		(2)Display cleaning		○		With cleaning rag.		
Meter	Meter	Check that Indicated values are normal.	○			Check the meter readings on the panel.	Regulation and control value are satisfactory.	Voltmeter Ammeter Etc.
			○			Check visually, auditorily, and by touch	Without abnormalities	
Motor	General	(2)Check that there is no stench.	○			Check for abnormal superheating, damages an so on.	Without abnormalities	
		Insulation resistance	Check the resistance between the main circuit and the ground terminals.			*6)	Detach the U,V,W terminals from the inverter main circuit, and shortcircuit the motor wiring, mesure with the Megger® between the motor wiring and ground terminal.	No less than 5MΩ.

*1) The life span of the smoothing capacitor is influenced by the ambient temperature. Refer to [Smoothing capacitor life span curve] for replacing measures.

*2) The life span of the cooling-fan is influenced by the ambient temperature, the dirt and the change in its environmental conditions. Check these circumstances on the usual inspection.

*3) The estimated time before replacement (Number of years/cycle) and the [Smoothing capacitor life span curve] are based on the design lifespan, not guaranteed.

*4) In the case that the capacitors are replaced after that the storage period of 3 years has expired, before the first use please refer to the aging process under the following conditions before using them:

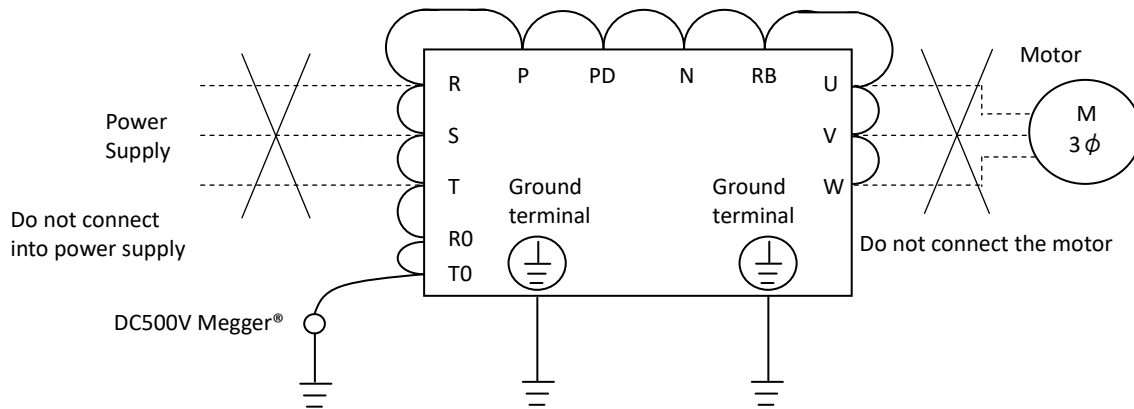
- First, apply for 1 hour the 80% of the capacitor rated voltage at ambient temperature
- Then, raise the voltage to 90%, and keep it for 1 more hour.
- Finally, apply for 5 hours the rated voltage at ambient temperature

*5) In the case that the cooling-fan is affected by dust, obstructing it; remove the dust, after that may take 5 to 10 seconds to start again.

*6) Follow the installed motor instructions.

6.3 Insulation resistance test

- When performing a insulation resistance test, remove all cables to external circuits and the components connected to the terminals, to prevent it to be exposed to the test voltage.
- In the control circuit carry out a conduction test, use a multimeter (with high resistance range), do not use a megger® or buzzer /continuity tester.
- The insulation resistance test of the inverter itself is carried out only at the main circuit, do not perform an insulation resistance test in the control circuit.
- Is recommended the use of a DC500V megger® for the insulation resistance test.
- Before the main circuit test with a megger, remove the jumper for switching the inverter's internal filter function, and then connect terminals R, S, T, U, V, W, P, PD, N, RB, RO, and TO by wires as shown in the figure below. Subsequently, carry out the test.
- After the insulation resistance test, remove the cable connected to R, S, T, U, V, W, P, PD, N, RB, RO, TO, and leave the jumper of the filter as it was before.
- Furthermore, depending on the model, the RB terminal may not be present. Please confirm in "2.9 Wiring to the main circuit terminal block".



6.4 Dielectric Withstand Test

- Do not carry out a withstand voltage test for the inverter. The test may damage its internal parts, deteriorating the inverter.

6.5 Checking method for inverter/converter

- Using the multimeter, you can check if the inverter or converter unit are defective or non-defective.

(Preparation)

- Remove the supply (R,S,T) and motor wiring (U,V,W), and also the regenerative braking resistor(P,RB).
- Prepare the multimeter. (Application measurement range is 1Ω)

(Checking method)

- Measure and check the current conduction at each of the inverter main circuit terminals R, S, T, U, V, W, RB, P, N, by changing the polarity of the multimeter alternately.

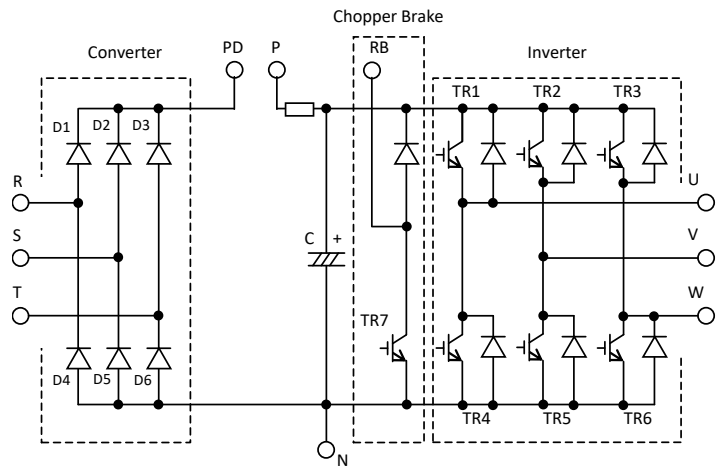
*1) Before checking the circuits, measure the voltage across terminals P and N with the multimeter in DC voltage range mode to confirm that the smoothing capacitor has been fully discharged.

*2) When not conducting, it shows an infinite value. Due to the influence of the smoothing capacitor, it may show momentarily any other value other than infinite. When conducting, indicates a value around several tens of ohms Ω. The measurements with different multimeters may not match exactly, but as long the values are close between them, it is acceptable.

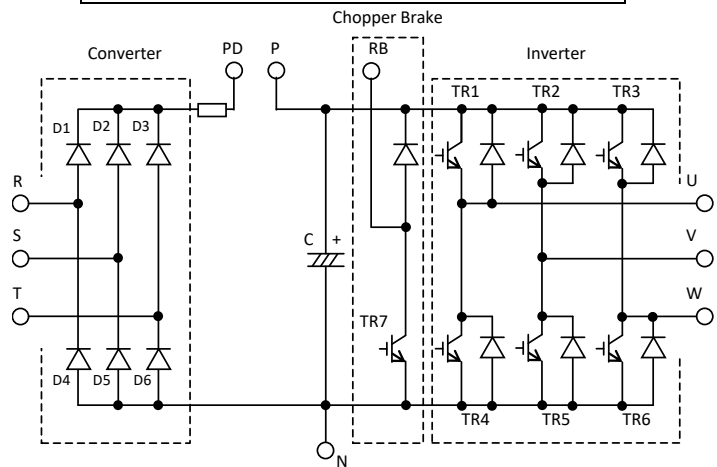
*3) The chopper braking circuit is built-in in the models below:
LH1-055H~LH1-450H

		Multimeter polarity		Measured result
		⊕ (Red)	⊖ (Black)	
Converter circuit	D1	R	PD	No conduction
		PD	R	Conduction
	D2	S	PD	No conduction
		PD	S	Conduction
	D3	T	PD	No conduction
		PD	T	Conduction
Inverter circuit	D4	R	N	Conduction
		N	R	No conduction
	D5	S	N	Conduction
		N	S	No conduction
	D6	T	N	Conduction
		N	T	No conduction
BRD part	TR1	U	P	No conduction
		P	U	Conduction
	TR2	V	P	No conduction
		P	V	Conduction
	TR3	W	P	No conduction
		P	W	Conduction
TR4	U	N	Conduction	
	N	U	No conduction	
TR5	V	N	Conduction	
	N	V	No conduction	
TR6	W	N	Conduction	
	N	W	No conduction	
TR7	RB	P	No conduction	
	P	RB	Conduction	
	RB	N	No conduction	
		N	RB	No conduction

Model(LH1-*H)**
400V class : 055H~150H

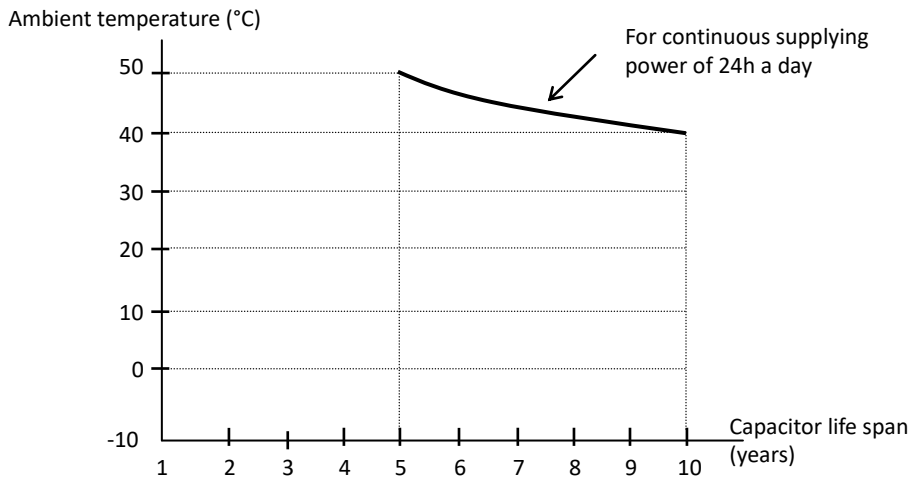


Model(LH1-*/**H)**
400V class : 185H~1600H



6.6 Smoothing capacitor life span curve

※80% of the rated current value for continuous drive.



1) The ambient temperature is considered to be measured around 5 cm of the bottom centre of the inverter (Atmosphere temperature). If the inverter is in an enclosure, it will be the temperature inside the case.

2) The smoothing capacitor has a limited life because of the chemical reactions occurring inside the capacitor while operating. The capacitor should be replaced after 10 years *1) of use, as a reference standard (10 years is not the guaranteed lifespan, but rather, the design lifespan). Note that the smoothing capacitor lifespan will be shortened if the inverter is used at a high ambient temperature or with a heavy load that requires a current beyond the rated current.

*1) Ambient temperature : annual average temperature 40°C (using in without causticity gas, flammability gas, oil fog, dust, and so on)

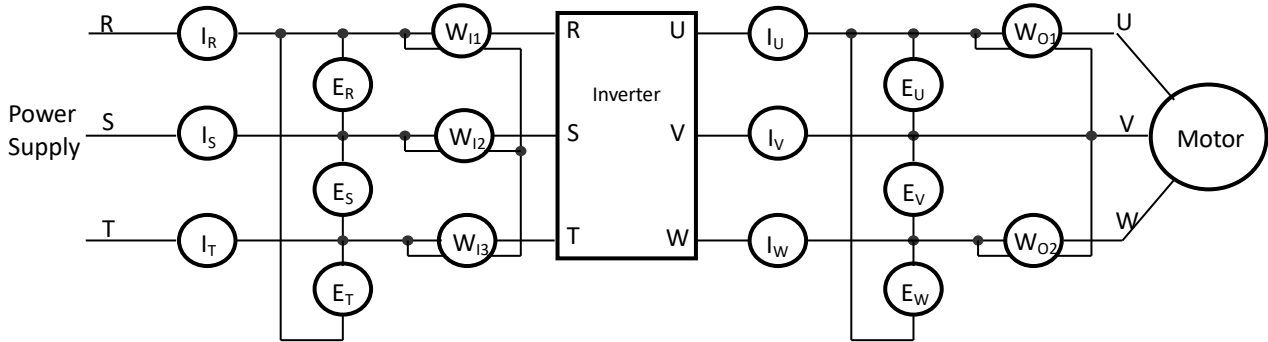
Output Current : 80% of the rated current value
Continuous Operation Hours : 7000 Hours/year

6.7 Lifespan alarm output

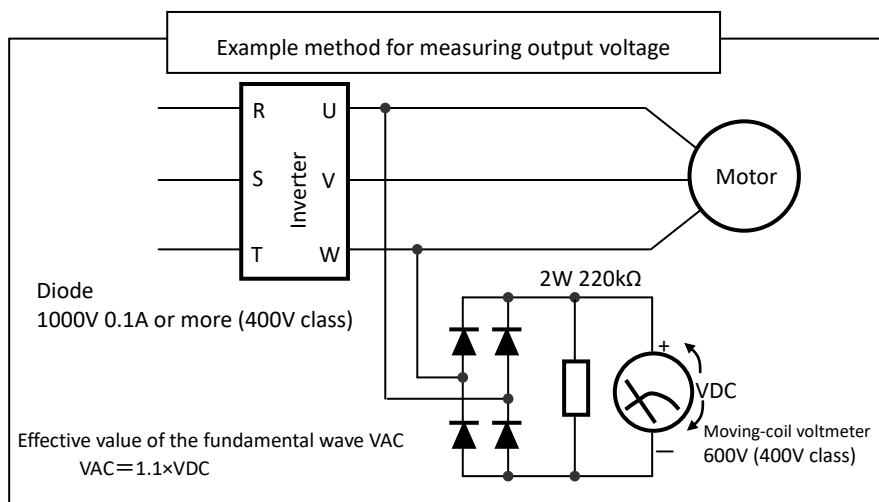
- Thanks to the self-diagnostic, you can output an alarm in regards of the inverter own internal components lifespan when the lifespan is nearing to its end (Including the circuit board smoothing capacitor and cooling-fan, and excluding the main circuit smoothing capacitor). Use this to get a reference for when the components should be replaced. Particularly, consult the lifespan diagnosis monitor [dC-16] and the output terminal function selection [CC-01]~[CC-07]. It should be noted that the warning itself is based on the design lifespan, and thus, is not a guaranteed measurement. Depending on the environment, the operation conditions, etc. problems may arise, to avoid that, is recommended an early maintenance.

6.8 Input/output voltage, current and power measurement methods

Standard equipment for measuring input/output voltage, current, and power measurement.



Measured data	Measuring point	Measuring instrument	Remarks	Standard reference values
Input voltage E_{IN}	R-S, S-T, T-R (E_R), (E_S), (E_T)	Moving-iron voltmeter or Rectifier-type voltmeter	Effective value of full waves	400V class:380~460V 50/60Hz
Input current I_{IN}	R, S, T current (I_R), (I_S), (I_T)	Moving-iron ammeter	Effective value of full waves	If there is unbalance in the input supply $I_{IN}=(I_R+I_S+ I_T)/3$
Input power W_{IN}	R-S, S-T, T-R (W_{I1})+(W_{I2})+(W_{I3})	Electro-dynamometer-type wattmeter	Effective value of full waves	Three-wattmeter method
Input power factor Pf_{IN}	Is calculated from the measured values of the input voltage (E_{IN}), input current (I_{IN}) and supply power (W_{IN}) $Pf_{IN} = \frac{W_{IN}}{\sqrt{3} \times E_{IN} \times I_{IN}} \times 100$			
Output voltage E_{OUT}	U-V, V-W, W-U (E_U), (E_V), (E_W)	Moving-iron voltmeter or Rectifier-type voltmeter	Effective value of fundamental wave	
Output current I_{OUT}	U, V, W current (I_U), (I_V), (I_W)	Moving-iron ammeter	Effective value of full waves	
Output power W_{OUT}	U-V, V-W (W_{O1})+(W_{O2})	Electro-dynamometer-type wattmeter	Effective value of full waves	Two-wattmeter method (Otherwise the three-wattmeter method)
Output power factor Pf_{OUT}	Is calculated from the measured values of the output voltage (E_{OUT}), output current (I_{OUT}) and output power (W_{OUT}). $Pf_{OUT} = \frac{W_{OUT}}{\sqrt{3} \times E_{OUT} \times I_{OUT}} \times 100$			



When measuring...

1. To measure the output voltage, use an instrument that reads the effective value of the fundamental wave. To measure the current or the power, use an instrument that reads the effective value of full waves.
2. Since the inverter output waveform is controlled by PWM, it has a large margin of error, especially at low frequencies. In many cases, general testers may be defective for the measurement, because of the adverse effects of the noise.

Chapter 7 Specifications

7.1 400V class specifications

Model name		LH1-***H/****H															
standard capacity		055	075	110	150	185	220	300	370	450	550	750	900	1100	1320	1600	
Applicable motor capacity (4 poles)(kW)		5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110	132	160	
Output	Rated output current(A)	14.0	17.0	23.0	30.0	39.0	45.0	60.0	72.0	88.0	105.0	142.0	168.0	208.0	253.0	305.0	
	Overload current rating *1)	120% 60sec / 150% 3sec															
	Rated output voltage	Three-phase(3 wire)380 to 460V (Corresponding to the incoming voltage)															
	Rated capacity (kVA)	400V	9.7	11.8	15.9	20.8	27.0	31.2	41.6	49.9	61.0	72.7	98.4	116.4	144.1	175.3	211.3
	460V	11.2	13.5	18.3	23.9	31.1	35.9	47.8	57.4	70.1	83.7	113.1	133.9	165.7	201.6	243.0	
Input	Rated input current(A) *2)	16.6	20.2	27.4	35.7	46.4	53.6	71.5	85.7	104.8	125.0	169.0	200.0	247.6	301.2	363.1	
	Rated input AC voltage	Control power supply : Single-phase supply 380 to 460V (Permissible AC voltage 323 to 506) , 50Hz(allowable variation range: 47.5-52.5Hz)/60Hz (allowable variation range:57-63Hz) , Main circuit power supply: Three-phase(3 wire) 380to 460V (Permissible AC voltage 323 to 506) , 50Hz(allowable variation range: 47.5-52.5Hz)/60Hz (allowable variation range:57-63Hz)															
	Power supply capacity (kVA) *3)	12.7	15.4	20.9	27.2	35.3	40.8	54.5	65.3	79.8	95.3	128.8	152.4	188.7	229.5	276.7	
Carrier frequency variation *4)		0.5~10.0kHz										0.5~8.0kHz					
Braking	Regenerative	Internal BRD circuit (external discharge resistor value)										*5)		External regenerative braking unit			
	Minimum resistance value(Ω)	70	70	35	35	24	24	20	15	15	10	10	-	-	-	-	
Dimensions *6)	H(height)(mm)	255	260	260	260	390	390	390	540	550	550	550	700	700	740	740	
	W(width)(mm)	150	210	210	210	245	245	245	300	390	390	390	390	390	480	480	
	D(Depth)(mm)	140	170	170	170	190	190	190	195	250	250	250	270	270	270	270	
Protective structure		IP20 – UL Open Type															
Aprox. weight (kg)		3	6	6	6	8.5	8.5	8.5	22	31	31	31	41	41	53	53	

*1) Electronic thermal protection is accordance to derating.

*2) The rated input current is the value when the drive is operated in the rated output current. The value of the impedance at the supply side changes due to the wiring, breaker, input reactor, etc.

*3) The power supply capacity is the value of the rated output current at 440V. The value of the impedance at the supply side changes due to the wiring, breaker, input reactor, etc.

*4) It is recommended to set the carrier frequency settings [bb101]/[bb201] equal or greater than the (maximum output frequency x 10)Hz. For induction motor IM, it is recommended to set the carrier frequency to 2 kHz or more except V/f control. For synchronous motor (SM)/Permanent magnet motor (PMM), it is recommended to set the carrier frequency to 8 kHz or more.

*5) Usually an external regenerative braking unit is required. However, with an optional built-in chopper braking circuit and external discharge resistor can eliminate an external regenerative unit. The built-in chopper braking circuit is offered by order. In order to purchase, contact to the nearest sales office

*6) The key height of keypad are excluded from dimensions. When an option is connected, the depth is increased. Refer to the each optional instruction.

7.2 Common specifications

PWM system		Sine-wave PWM system		
Output frequency range *1)		0.00~590.00Hz		
Frequency accuracy		For the highest frequency, digital \pm 0.01%, analog \pm 0.2% (25 \pm 10°C)		
Frequency resolution		Digital: 0.01Hz Analog: Max. frequency/4000 (Ai1 terminal/Ai2 terminal:12bit/0~+10V or 0~+20mA, Ai3 terminal 12bit/-10~+10V)		
Control system *2)		IM	V/f control (constant torque/reduced torque/ free / automatic boost control) V/f with encoder(constant torque/reduced torque/ free / automatic boost control) Cascade type sensorless vector control, Vector control with encoder	
		SM/PMM	synchronous startup for smart sensorless vector control	
Speed fluctuation *3)		\pm 0.5%(sensorless vector control)		
Acceleration/deceleration time		0.00~3600.00s (Linear, S-curve, U-curve, Inverted-U-curve, EL-S-curve)		
Display		Output frequency, Output current, Output torque, trip history, input/output terminal status, input/output terminal function, input/output power *4), PN matching, etc, the rest is described in the chapter 4.		
Start functions		DC braking after the start, matching frequency after the start, active frequency matching start, Low-voltage start, retry restart.		
Stop functions		After free run stop, deceleration stop, DC braking or external DC braking operation (Braking force, time, adjustment of operation speed)		
Stall prevention function		Overload limit function, overcurrent suppression, overvoltage suppression function		
Protection functions *5)		Overcurrent error, Overload error, Brake resistor overload, Overvoltage error, Memory error, Undervoltage error, Current detector error, CPU error, External trip error, USP error, Ground error, Supply overvoltage error, Power loss error, Temperature detector error, Cooling-fan rotation speed decrease temperature error, Temperature error, Input open-phase error, IGBT error, Output open-phase error, Thermistor error, brake error, low-speed range overload error, Controller overload error, RS485communication error, RTC error, EzSQ related error, option related error, functional safety related error, position control range error, speed deviation error, position deviation error, overspeed error, contactor error, PID start error.		
Other functions		V/f free setting (7 points), upper and lower speed limit, speed jump, curve acceleration and deceleration, manual torque boost, energy-saven operation, analog output adjustment, minimum speed, carrier frequency adjustment, motor electronic thermal function(free is possible), inverter thermal function, external start-end(speed and rate), frequency input selection, trip retry, restart stop, various signal output, initialization setting, PID control, auto-decel at shut-off, brake control function, commercial power switching function, auto-tuning (on/offline), etc. the rest is described in the chapter 4.		
Input	Frequency reference	Keypad	UP, DOWN keys according to the set parameter.	
		External signal *6)	Ai1/Ai2 terminal (for voltage input)	0~10Vdc set by the voltage input (Input impedance:10k Ω)
			Ai1/Ai2 terminal (for current input)	0~20mA set by the current input (Input impedance:100 Ω)
			Ai3 terminal	-10~+10Vdc set by the voltage input (Input impedance:10k Ω)
			Multi-speed terminal	16multi-speed(With the use of the intelligent input terminal)
	Pulse train-input	Maximum 32kHz \times 2		
	Communication port	RS485 serial communication (Protocol: Modbus-RTU)		
	RUN/Stop Forward/Reverse	Keypad	By RUN/Stop key (With the set parameter, forward/reverse can be switched)	
		External signal	Forward (FW)/Reverse(RV)(When input terminal functions are allocated) 3-wire input allowed(When input terminal functions are allocated)	
		Communication Port	Set by RS485 communication (Maximum: 115.2kbps)	
	Intelligent input terminals	11 terminals (A or B terminal accept a pulse train) FW(Forward rotation)/RV(Reverse rotation), CF1 to CF4(Multi-speed 1 to 4), SF1 to SF7(Multi-speed bit 1 to 7), ADD(Trigger for frequency addition), SCHG(Main/Sub speed reference change), STA(3-wire start)/STP(3-wire stop)/ F/R(3-wire Forward/reverse), AHD(Analog command holding), FUP(Remote speed up)/FDN(Remote speed down)/UDC(Remote speed data clearing), F-OP(Force operation), SET(2nd-motor), RS(Reset), JG(Jogging), DB(External Dynamic brake), 2CH(2-stage Accel/Decel), FRS(Free-run stop), EXT(External fault), USP(Unattended start protection), CS(Commercial power supply change), SFT(Software lock), BOK(Braking confirmation), OLR(Overload restriction selection), KHC(Accumulated input power clearance), OKHC(Accumulated output power clearance), PID to PID4(PID1 to PID4 disable), PIDC to PIDC4(PID1 to PID4 integration reset), SVC1 to 4(PID1 multistage target value 1 to 4), PRO(PID gain change), PIO1/2(PID output switching 1/2), SLEP(SLEEP condition activation)/WAKE(WAKE condition activation), TL(Torque limit enable), TRQ1/2(Torque limit selection1/2), PPI(P/PI mode selection), CAS(Control gain change), SON(Servo-ON), FOC(Forcing), ATR(Permission of torque control), TBS(Torque bias enable), ORT(Home search function), LAC(LAD cancellation), PCLR(Clearance of position deviation), STAT(pulse train position reference input enable), PUP(Position bias (ADD)), PDN(Position bias (SUB)), CP1 to CP4(Multistage position 1 to 4), ORL(Limit signal of Homing), ORG(Start signal of Homing), FOT(Forward over travel), ROT(Reserve over travel), SPD(Speed/position switching), PSET(Position data presetting), Mi1~11(General-purpose input 1 to 11), PCC(Pulse counter clearing), ECOM(EzCOM activation), PRG(Program RUN), HLD(accel/decel disable), REN(RUN enable), DISP(Display lock), PLA(Pulse count A), PLB(Pulse count B), EMF(Emergency-force drive activation), COK(Contactor check signal), DTR(Data trace start), PLZ(Pulse train input Z), TCH(Teach-in signal)		
Backup supply terminal	P+/P-: DC24V input(Input allowable voltage: 24V \pm 10%)			
Thermistor input terminal	1 terminal (PTC/NTC resistor allowed)			

*1) Output frequency range will depend on the motor control method and the motor used. Consult the motor manufacturer for the maximum allowable frequency of the motor when operating beyond 60Hz.

*2) In case of the control mode is changed and the motor constant is not set appropriately, the desired starting torque cannot be obtained and also exists the possibility of tripping.

*3) Regarding the speed range regulation of motor, the variable range depends on the client system and the environment in which the motor is used. Please contact Hitachi inverter distributors for more information.

*4) Both the input power and output power are reference values, which are not appropriate for use in calculation of efficiency values, etc. To obtain an accurate value, use an external device.

*5) If the IGBT error [E030] occurs by the protective function, it may have happened by the short-circuit protection, but also can occur if the IGBT is damaged. Depending on the operation status of the inverter, instead of the IGBT error, the overcurrent error [E001] may also occur.

*6) At factory setting, the maximum output frequency for analog input signal Ai1/Ai2 is adjusted to 9.8V for voltage input and 19.6mA for current input. In order to adjust the specification use analog start/end function.

7.3 Common specifications (continue)

Output	Intelligent output terminals	Transistor output terminal 5, 1c contact relay 1 point		
	Relay/ Alarm relay (1a, 1c) function	RUN(Running), FA1~5(Reached frequency signal), IRDY(Inverter ready), FWR(Forward rotation), RVR(Reverse rotation), FREF(Frequency referenc=Keypad is selected), REF(Run command = Keypad is selected), SETM(2nd-motor selected), OPO(Option-Output), AL(Alarm signal), MJA(Major failure signal), OTQ(Over-torque) *7), IP(Instantaneous power failure), UV(Undervoltage), TRQ(Torque limited), IPS(Decel. Power loss), RNT(Accumulated RUN time over), ONT(Accumulated power-on time over), THM(Motor electronic thermal warning), THC(Iverter Electronic thermal warning), WAC(Capacitor life warning), WAF(Cooling-fan life warning), FR(Starting contact signal), OHF(heat sink overheat warning), LOC/LOC2(Low-current indication signal), OL/OL2(Overload warning signal 1/2), BRK(Brake release)/BER(Brake error)/CON(Contactor control), ZS(Zero speed detection), DSE(Speed deviation over), PDD(Position deviation over), POK(Positioning completed), PCMP(Pulse counter compare match output), OD/OD2/OD3/OD4(Output deviation for PID control), FBV/FBV2/FBV3/FBV4(PID feedback comparison), NDC(Communication line disconnection), Ai1Dc/Ai2Dc/Ai3Dc(Analog Ai1/Ai2/Ai3 disconnection), Ai4Dc/Ai5Dc/Ai6Dc(Option analog Ai4/Ai5/Ai6 disconnection), WCAi1/WCAi2/WCAi3(Window comparator Ai1/Ai2/Ai3), WCAi4/WCAi5/WCAi6(Window comparator Ai4/Ai5/Ai6), LOG1 to 7(logical operation result 1 to 7), MO1 to 7(General-purpose output 1 to 7), EMFC(Emergency force drive indicator), EMBP(Bypass mode indicator), WFT(Trace waiting signal), TRA(Trace running signal), LBK(Low battery of keypad), OVS(Overvoltage power Supply), AC0-3(Alarm code bit-0 to 4), SSE(PID soft start error)		
	Output terminal monitor *7)	The data of the monitor can be selected by the parameter of the output.		
PC external access		USB Micro-B		
Operating environment	Ambient temperature *8)	-10 to 45°C		
	Storage temperature *9)	-20 to 65°C		
	Level of humidity	20~90%RH(No condensation allowed)		
	Vibration tolerance *10)	5.9m/s ² (0.6G), 10~55Hz	LH1-055H~LH1-300H	
		2.94m/s ² (0.3G) 10~55Hz	LH1-370H~LH1-1600H	
Installation place *11)	1000 altitude or lower (location free from corrosive gas, oil mist, and dust)			
Coating color		Black		
Optional slots		2 ports(Communication:1 Feedback:1)		
Option cassettes *12)		<ul style="list-style-type: none"> • Communication option : Ethernet(Modbus-TCP)(P1-EN), EtherCAT® (P1-ECT), PROFINET® (P1-PN), PROFIBUS® (P1-PB), CC-Link® (P1-CCL), DeviceNet® (P1-DN) • Encoder Feedback option (Line driver input(RS422))(P1-FB) • Analog input/output option (P1-AG) 		
Other optional components		Braking resistor, AC reactor, DC reactor, noise filter, operator cable, harmonics suppression unit, LCRfilter, analog panel, regenerative braking unit, power regeneration converter, SJ300/SJ700 compatible screw type control terminal block option(P1-TM2), PC software ProdriveNext.		

*7)The analog voltage and analog current monitor are estimated outputs of the analog meter connection. Maximum output value might deviate slightly from 10V or 20mA by variation of the analog output circuit. If you want to change the characteristics, adjust the Ao1 and Ao2 adjustment functions. There are some monitor data that cannot be output.

*8) Derating is set in accordance to carrier frequency.

*9) Storage temperature is the temperature during transport.

*10) In accordance with the test methods of JIS C 60068-2-6:2010(IEC 60068-2-6:2007).

*11) In case of utilization at an altitude of 1000m or more, take into account that the atmospheric pressure is reduced by 1% for every 100m up. Apply 1% derating from the rated current by increasing every 100m, and conduct an evaluation test. When using above 2500m ambient, please contact Hitachi Inverter distributor.

*12) Modbus® is a registered trademark of Schneider Automation Inc.

EtherCAT® is registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany.

PROFIBUS® and PROFINET® is registered trademark of PROFIBUS Nutzerorganisation e.V. (PNO).

CC-Link® is trade names of Mitsubishi Electric Co. DeviceNet® is the trademark of Open DeviceNet Vendor Association, Inc.

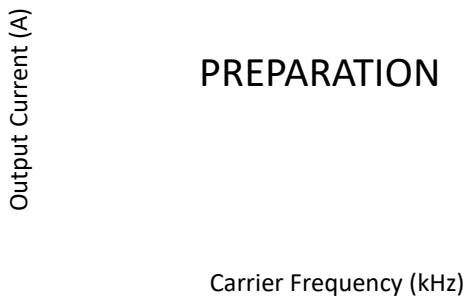
7.4 Current derating

For using with carrier frequency over 2.1kHz, refer to the Current derating table as below.

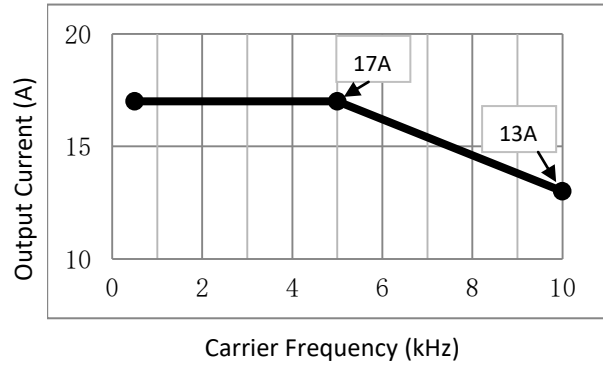


Please use the inverter within the current range according to the derating table of each model. Please note that exceeding the derating range may cause damage to the inverter or shorten the service life.

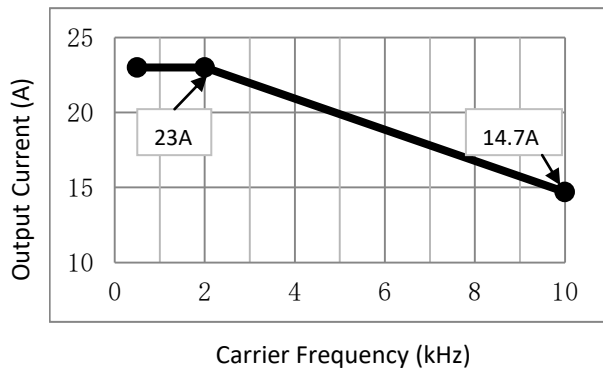
LH1-055HFC



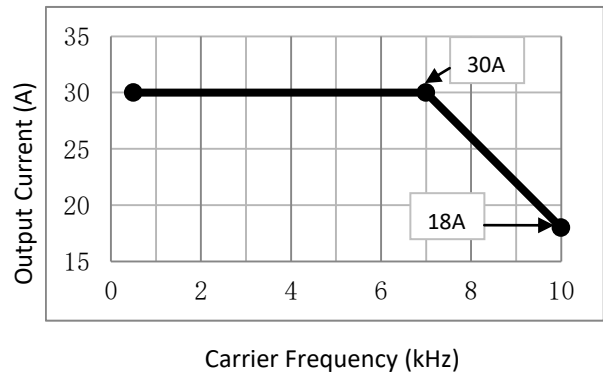
LH1-075HFC



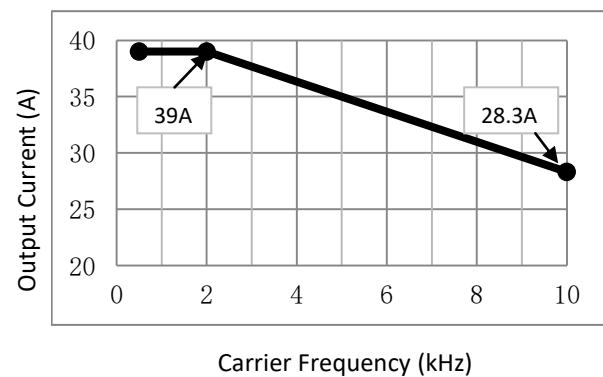
LH1-110HFC



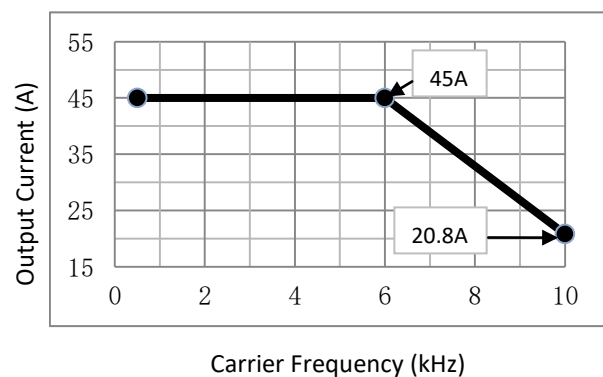
LH1-150HFC



LH1-185HFC



LH1-220HFC



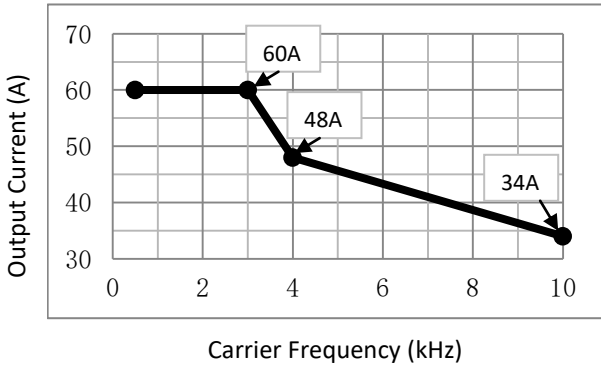
7.4 Current derating(continue)

For using with carrier frequency over 2.1kHz, refer to the Current derating table as below.

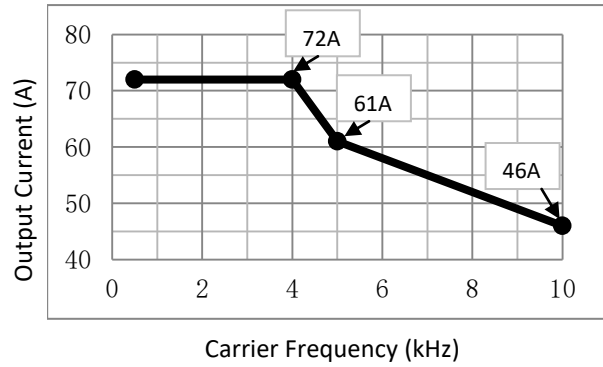


Please use the inverter within the current range according to the derating table of each model. Please note that exceeding the derating range may cause damage to the inverter or shorten the service life.

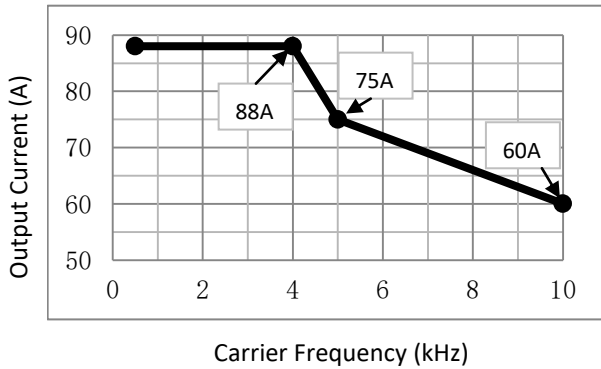
LH1-300HFC



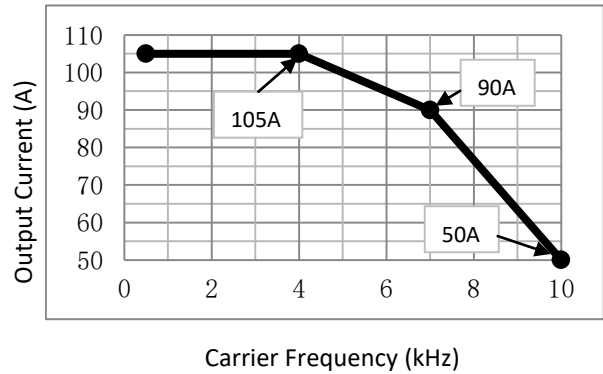
LH1-370HFC



LH1-450HFC



LH1-550HFC



※The current derating of LH1-750HFC~LH1-1600HFC is preparation.

(Memo)

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(memo)

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Revised record

Version No.	Contant	Update date
NT9461 X	Initial version	2020/1

※We will Correct the incorrect words,missing words and so on without prior notice.