# HITACHI <br> Inspire the Next 

## Variable Frequency Drives

## Intuitively innovative!




At the point where ease of use meets high performance

(0) Hitachi Industrial Equipment Systems Co., Ltd.

## SJ series P1, setting the new global standard

## Easy access to all the functionality

The intuitive color TFT operator and Various convenient features.


# A High Performance drive for the most demanding of applications 

A variety of motors (IM/PM) can be adjustable to drive. The most stable operation ever.


# Versatility through multi mode operation, to meet your specific application needs 

SJ-P1 meet a wide range of needs by achieving variety of functions necessary for drive systems.

## Corresponds to variety of applications.



Fan
P. 11


Pump P. 11


Crane P. 13

P. 7


Injection molding


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Corresponding to the global standard.
Input voltage is Max.AC500 Voltage. (400V class)


JQA-1153 JQA-EM6974

Hitachi Industrial Equipment Systems Co., Ltd. NARASHINO division is certified for ISO 14001 (standard of environmental management system) and ISO 9001 (standard of quality assurance management system).


Machine
Tools

## Intuitive, easy-to-use LCD operator is standard

Easily monitor, set, or review operational data and parameters.

## Operation Panel Description

MONITOR SCREEN
Displays Parameters and data.

| F1 KEY |
| :--- |
| Transition to home, cancel, etc. |
| POWER LED KEY |
| Save data, etc. |
| User defined function of the key |
| is indicated at the bottom |
| right of the screen. |

powered-on.
RUN KEY the panel is
Motor starts rotation
when this Key is active.

## Features of the operation panel

## "Visualization Icon" Easy to understand the inverter status

RUN, STOP, TRIP,OVERLOAD, FAN LIFE NOTICE and other is very obvious. For this Icon, error diagnosis is also easy.

Background color can be selected Selectable from Blue / Green / Black. Easy visualization can be achieved in every cases!

Example of "Operation visualization Icon"

| RUN <br> FW | The motor is in forward running. | LIM | Output frequency is limited by such <br> as overload. |
| :--- | :--- | :--- | :--- |
| RUN |  |  |  |
| RV |  |  |  | The motor is in reverse running. $\quad$ ALT | The inverter is in overload notice or |
| :--- |
| thermal notice. |
| TRe | board notice state.

"Setting visualization icon"
Some of the setting is easy to understand.

## Large character display

Great visibility thanks
to the large character display.

## Assist bar

Show function of F1, F2, and RUN key to assist user operation. Also clock information can be shown in this area.

## Real-time at the alarm occurrence is recorded.

Alarm record available based on Real-time-clock.
Date and time can be set in the operator by placing battery. Speedy fault diagnosis and root cause investigation will be possible, since alarm is record on actual time.
(Note:Battery is prepared by user.)

## Multiple languages.

The display of 7 languages (Japanese, English, French, Spanish, Turkish, Polish, Czech) is available as standard.
(Note: Firmware version of the operation panel (VOP) that can display 7 languages is 2.01 or later (Previous versions is available only in Japanese and English. VOP version can be confirmed with the nameplate seal on the back of the operation panel.)

Example of main screen transition and parameter setting
Check at once!

\author{

| Monitor while |
| :---: |
| setting! |

Verify View
}
Easy to see!
Clear View

## Quick trouble shoot! <br> Error View



Multi-monitor (3lines)



Reference screen


Large monitor screen unit!


Trip history screen


Trip information details

## Other features!

- Parameter data can be saved in the memory of the operation panel!
Data can be kept safe even if the inverter fails.
- Operation panel can be also used as copy
- If the battery is used, the real-time data is retained even when the power is cut off of the inverter.
- Operation panel can be remotely connected via option cable ICS-1 or ICS-3.
(Note) While the power is supplied, please do not remove the operation panel!



## OTrip monitor

- Display of
former models
- Inverter state is easy to understand when an error has occurred.


| TRIP NRDY ${ }^{\text {ancII }}$ Hil | Shown the |
| :---: | :---: |
| Dcaurime trio | inverter is in trip condition. |
| Inder-tloltage | Shows the cause of trip. |
| dms 16.0.23 11. | -Displays trip event information: |
|  | Output frequency at trip point/Motor |
|  | current at trip point/ |
| Stetus | DC bus voltage at trip point/Cumulative |
| Let 4 In 110 | inverter operation/ |



Status 1 to 5 indicates the inverter state at the time of the trip occurs.
(Note)Please refer to the user guide for more information
(Note)These display is a state of the moment of error occurrence, the actual motor behavior might be different.

# Easy access to all the functionality 

## Various convenient features.

## Direct field replacement, when needed

Panel mounting portion is supplied as separate part. ( 5.5 kW or more)
Even if its body size is different, it is possible to correspond in flexible ways.


## Screw type terminal block is also abailable.

-Optional screw type terminal block is available by removing the standard termina block.
Note: Removable terminal blocks of SJ300/L 300P/SJ700/L700 can not be mounted on SJ-P1
-Data conversion can be made via PC setting software
(ProDriveNext). (Is in developing)

Cooling fan and the main circuit capacitor is designed for 10 years life.
(Note: The ambient temperature is $40^{\circ} \mathrm{C}$ (annual average).
Without corrosive gas, flammable gas, oil mist and dust.)
The above design life is a calculated value, not a guaranteed value.
Output current at the calculation is $80 \%$ of the rated current of the inverter.)


Monitor lifetime prediction functions.

Electrolytic capacitor of control circuit
(internal estimation calculation).
Cooling fan.

## Easy data copy to multiple inverters.

Operation panel is removable and memory is built in.
Parameter data and EzSQ programing data can be copied to multiple inverters, which allows users to replace inverter in a short working time.


[^0]
## Control circuit terminal designed for easy wiring

Easy to use screw less terminal block for control terminal block.

Rod terminal achieved easy wiring.


Modbus communication is standard. 2 communication terminals provided for Modbus communication as standard.

Daisy chain wiring of RS-485 is easy.

$0 / 10 \mathrm{~V}$ and 4 to 20 mA inputs and as well as output are easily selected via DIP switch.

- 2 analog inputs (3inputs in total). - 2 analog outputs.



## Programming ease through the use of 24 Version

 VDC to power up inverter CPU memoryNormal power supply (RO, TO) to CPU. Also possible to utilize an external 24VDC control power supply.

Parameter setting is also possible with the main power is turned off. Thus saving time and effort. Possible use of logic standby power will also contribute to energy conservation. Connecting to the PLC and Setting via PC configuration software are also available.


## Quick diagnose during failure UP

The SJ-P1 automatically stores internal data in retentive memory*.
Users can upload the data to a PC for review and diagnosis of issue.


## Control Simulation Logic operation without direct motor output

The simulation mode makes it easier to verify connection with the system control equipment.

In the simulation mode, only the motor output is shut off while all inverter functions are enabled. Full simulation allows to generate an alarm by setting the virtual output conditions, such as current etc. utilizing parameter and the analog inputs. Hence, it is possible to confirm the operation of the control equipment without a motor. The simulation mode can also be active by using an external 24VDC power supply.


## Easy customize by PC configuration software

 EzSaPC setting software.
Using the PC configuration software (ProDriveNext), parameter setting, monitor, and diagnosis can be easily achieved.

Easy customizationto your own inverter. $\quad$ P.17-18
Specific behavior can be easily programmed into the inverter by BASIC like program.


# A High Performance drive for the most demanding of applications 

## Performance

## "Smooth operation" in critical and demanding applications, such as vertical lift

High starting torque at low speed range while in control of heavy loads. (ND rating). [Sensor less vector control(SLV)]
[OHz sensor less vector control]

(*Sensorless vector control with ND Rating)
Cog-less motor operation for crane, lift, transport, etc.
Trip-less operation for better productivity.

Refer to the Parameter AA121/HA-01 to / Hb102 to

## Save on spare control costs

Our multi-mode inverter can control both your induction motor, or permanent magnet AC motor.
All while offering programmable current limit to protect from demagnetization of the PM motor.



Decreasing overshoot and undershoot contributes to smooth and stabilized operation with reduced load shock. [Gain mapping Function]


## For long time operation (fan, pumps)

Significant energy savings can be obtained in comparison to an induction motor, even in 24 hours 365 days operation.


## "High speed rotation" for non-traditional applications

590 Hz at the maximum operation is available for precise metal processing. For PM motor, also up to 400 Hz . (actual output frequency depends on motor)


## For metal tooling

High speed rotation contributes the high quality of metal processing.


Automatic speed adjustment manages ideal acceleration / deceleration speed to reduce the trip possibility from over current, over voltage, and impact load.

Over magnetize function


OFF

Over-current suppress function



[^1]
# Versatility through multi mode operation, to meet your specific application needs. 

SJ-P1 meet a wide range of needs by achieving variety of functions

## Certified "functional safety" international standard

UP

## Certified functional safety.

(Certification in process)
Third party certified electrical safety,
In compliance to IEC61508, IEC/EN61800-5-2 SIL3 STO, available as standard.


STO (Safe torque off)


SS1, SLS and others are available with slot-in option cassette. (In design phase)


## "Save space and save cost" by multi rating function!

Triple-rated for Induction motor for various applications is selectable. Dual-rated for PM motor control. Multiple rating helps to save space and cost.

| Rating | VLD(Very Light Load) | LD(Light Load) | ND(Normal Load) |
| :---: | :---: | :---: | :---: |
| Induction motor |  |  |  |
| $\underset{\text { mior }}{\text { mid }}$ PM motor |  |  |  |
| Applications | Fan-Pump |  |  |
|  |  | Metal tooling ${ }^{\text {Conveyer }}$ |  |
|  |  |  | Crane-Mixer |
| Overload current rating | $110 \%$ 60sec, <br> 120\% 3sec | 120\% 60sec, $150 \%$ 3sec | 150\% 60sec, 200\% 3sec |
| Example 400V/18.5kW Max rated output current | $47.0 \mathrm{~A}$ | $43.0 \mathrm{~A}$ | $39.0 \mathrm{~A}$ |

## Easy customize with "Slot-in" option cassette

Cassette type option boards for intuitive installation.
Visible indicators on the various option boards allow for user to verify functionality with ease.
Tasks such as setting a station number is simplified by use of a rotary selection switch.
Replacement is also simplified by the cassette design. Replacement after failure is also easy.


| Options List. |
| :--- |
| Ethernet |
| EtherCAT |
| PROFIBUS-DP |
| PROFINET * |
| Feedback |
| Safety $*$ |
| Analog input and output * |
| *Contact Sales Office for availability |

## Network options available for system expansion.

- Option commuication and standard Modbus-RTU can be used together.

-Following fieldbus network available with option on slot
(PROFIBUS-DP, PROFINET, EtherCAT, Ethernet )
(Modbus is a registered trademark of Modicon Inc. EtherCAT ${ }^{\circledR}$ is registered trademark and patented technology, licensed by Beckoff Automation GmbH, Germany. Other company names and product names mentioned are the property of the respective trademarks or registered trademarks.)


## "High quality" to comply international standards

Corresponds to the EC directive, UL and cUL in order to guarantee the quality and safety. Equipped with a quality that is recognized in Europe.


| EC directive | LVD | : IEC61800-5-1 |
| :---: | :--- | :--- |
|  | EMC directive $:$ IEC61800-3 |  |

Built-in noise filters corresponding to the European EMC Directive. (IEC61800-3 2nd Environment Category C3)

Since complies with the RoHS, Environmental considerations also sufficient.


Braking circuit is built-in. Further "Space and Cost saving"
The regenerative braking circuit is built-in, therefore a separate regenerative braking unit (BRD) is not necessary. Saving space and cost.
$\left[\begin{array}{c}\text { Applicable models } \\ 200 \mathrm{~V} \text { class } 0.4 \text { to } 22 \mathrm{~kW} \\ 400 \mathrm{~V} \text { class } 0.75 \text { to } 55 \mathrm{~kW} \\ (400 \mathrm{~V} \text { class } 45 \mathrm{~kW} \text { and } 55 \mathrm{~kW} \\ \text { is the order) }\end{array}\right.$


Regenerative braking unit(BRD) Unnecessary

## Application Note

## Expand energy savings in applications

The SJ-P1 inverter is applicable in a wide variety of applications. Introducing

## Fan \& Pump

PM
motor

## 【Energy saving by the inverter】

## Optimize for energy savings in pumping applications.

By utilizing the SJ-P1 inverter control versus the valve control, significant energy saving can be obtained over the various flow rates.

$\square$ Examples of energy-saving effect


[Further energy saving by the PM motor]
Corresponds to both Induction motor and PM motor.

By using a PM motor, further energy savings can be realized.(Please refer to the motor efficiency graph of right)

Obtain the high performance from your PM motor by using our simple adjustment.

By PM motor auto-tuning function, the characteristics of the motor will be optimized for best performance.
$\square$ Efficiency comparison of the induction motor and the PM motor


Hitachi induction motor and PM motor


Premium efficiency motor (IE3)

## ■Permanent magnet motor



> PM motor drive Multiple rating Modbus communication PID control PID Sleep mode PID Soft-start function Refer to the next page Automatic energy-saving function

## more useful features of each application!

## New

application
features!
Fan \& Pump

## Optimal PID functions for Fan \& Pump applications

At the time of the PID function start-up, the SJ-P1 will reduce the output to eliminate water hammer effect on the system.


Refer to the Parameter
AH-75 to

Execute a stop command of the operation when it is unnecessary, saving energy and wear on motor and pump system.


Refer to the Parameter AH-85 to

Hydraulic pump
EZSQ

## Energy-saving achieved by EzSQ (programming function).

By increasing the rotation speed when pressure is necessary, and reducing the rotational speed during standby, the SJ-P1 will optimize energy consumption. In addition, EzSQ can utilize signals from external sources such as a pressure sensor and/or a relay circuit. Therefore, cost reduction and space saving can be achieved.

$\square$ Example of the results of the hydraulic pump energy-saving test


# High Performance Applications 

## Crane, Lift, Automatic warehouse Ezsa

Provides smooth drive control even for heavy weights.
Provide stable drive control even for the heavy weights (such as winding of the cranes) by high start-up torque ( $0.3 \mathrm{~Hz}, 200 \%$ ).
*Note Hitachi Induction motor 4P (ND load/Sensor-less vector control)
Reduce the shock such as swing load by multi setting speed response gain.


Gain mapping function provides a vibration reduction and stable operation.
It will be also effective in the tact time reduction.
Space-saving and cost-down by the EzSQ(programming function). By using EzSQ, it is possible to reduce components by eliminating the host controller for the drive, thus saving-space and cost.


## Recommended function

Sensorless vector control Gain mapping function EzSQ(programming function)

## Injection molding machine

## Torque control can be applied to the injection molding machine.

"Overload warning signal" and "Over torque signal" can apply the operation timing of the injection and mold clamping axis.


## Recommended function

> Torque control Torque limit function Overload signal Over torque signal Overload restriction function
of its high efficiency and high quality.

## Winder

## Utilizing Gain Control.

When you allow the speed response gain to be variable by the output frequency band, the drive is more stable.
This is suitable for winder and re-winder applications.
In Winding machine applications highly precise rotation is required.


For closed-Loop application optional feedback board is required.


## Recommended function

## Grinder

## Miniaturization by utilizing a PM motor.

Hitachi supports PM motor control.

## Further support to high-quality machining applications.

Maximum output frequency is 590 Hz (induction motor) and 400 Hz (PM motor).
EzSQ expands the possibility for a wide variety of simpler applications.
By utilizing the EzSQ program operation functionality, The drive logic (EzSQ) can be developed and edited to optimize the motor operation based on conditional or logical programming to enhance and increase production.
In addition, the programming functionality can reduce cost, function, and panel space as well as some of the logic allocated to the controller and peripheral devices.
e. g. Depend on application desired operation, the logic program (EzSQ) can control many of the of operational parameters, such as frequency, overload level, overload signals and others.

## EzSQ

PM motor


# Hitachi's ProDriveNext Software 

Easy configuration, such as start/stop and fault diagnosis.

## ProDriveNext(PC setting software)

ProDriveNext supports various functions.


## Monitor Function.

All display parameters can be monitored.


Monitor display format can be uniquely customized by selecting the required items, and can be displayed in a tabular or graphical format.


Device Name: SJ-P1

| No. | Data ID | Data Name |
| :--- | :--- | :--- | :--- |
| 1 | $\mathrm{dA}-01$ | Output frequency monitor |
| 2 | $\mathrm{dA}-02$ | Output current monitor |
| 3 | $\mathrm{dA}-03$ | Rotation direction monitor |
| 4 | $\mathrm{dA}-04$ | Frequency reference monitor(After calcula... |
| 5 | $\mathrm{dA}-06$ | Output frequency scale conversion monitor |
| 6 | $\mathrm{dA}-10$ | Observer speed monitor (at OLV) |
| 7 | $\mathrm{dA}-15$ | Torque reference monitor(After calculation) |
| 8 | $\mathrm{dA}-16$ | Torque limit monitor |
| 9 | $\mathrm{dA}-17$ | Output Torque monitor |
| 10 | $\mathrm{dA}-18$ | Output Voltage monitor |
| 11 | $\mathrm{dA}-28$ | Pulse counter monitor |
| 12 | $\mathrm{dA}-30$ | Input power monitor |
| 13 | $\mathrm{dA}-32$ | Accumulation input power monitor |



## Parameter Setting.

Changes made by keyboard input.

Changed parameters highlighted "PINK" which indicates that it needs to be download to the device.

[Parameter setting display】

## Extensive parameter comparison function.

Parameter management is supported by comparison functions below.
[Setting value] - [Current value],
[Setting value] - [Default value]
[Setting value] - [File value]


## Data Trace function support an failure diagnosis.

By frequency reached, alarm or other signal trigger, the internal data of inverter is stored in real-time in the internal memory*.
Operation adjustment and failure analysis becomes more quickly.
(*This memory data is cleared at power shutdown.)


## PC setting Software

## Easily Customizable

Hitachi's programming function (EzSQ) and inverter-to-inverter your VFD for each application beyond available fixed parameters.

## EzSQ (programming function for customization)

| Line | Label | Mnemonic | Parameter 1 | Parameter2 | Parameter3 | Parameter 4 | Parameter5 | F |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 7 |  | case | 1 |  |  |  |  |  |
| 8 |  | call | RUN_FW |  |  |  |  |  |
| 9 |  | case | 2 |  |  |  |  |  |
| 10 |  | call | RUN_RV |  |  |  |  |  |
| 11 |  | case | 3 |  |  |  |  |  |
| 12 |  | call | WAT_RUN |  |  |  |  |  |
| 13 |  | case else |  |  |  |  |  |  |
| 14 |  | call | STOP |  |  |  |  |  |
| 15 |  | end select |  |  |  |  |  |  |
| 16 |  | goto | LOOP |  |  |  |  |  |
| 17 |  |  |  |  |  |  |  |  |
| 18 |  | sub | STOP |  |  |  |  |  |
| 19 |  | UB $\mathrm{w}=$ | X $w$ | and | 3 |  |  |  |
| 20 |  | if | UBw | <> | 2 | then | LBLO |  |
| 21 |  | FW= | 1 |  |  |  |  |  |
| 22 |  | timer set | TD(0) | $\mathrm{U}(00)$ |  |  |  |  |
| 23 |  | $\mathrm{U}(31)=$ |  |  | 1 |  |  |  |
| 24 | LBLO | end sub |  |  |  |  |  |  |
| 25 |  | $\Lambda$ |  |  |  |  |  |  |
|  |  | $]$ |  |  |  |  |  |  |
| The program is easy to create with available condition branches and timer settings. |  |  |  |  |  |  |  |  |

Hitachi's EzSQ makes it possible to achieve a level of control that cannot be realized by a general purpose inverter. Providing a unique solution and added value through cost savings and improved performance.
Simultaneous execution task in SJ-P1 extended to 5tasks/2ms.(SJ700 is 1task/2ms.)

The program is created on a PC setting software (ProDriveNext).
It is easy to programming because similar BASIC!


## EzCOM

## Inverter-to-Inverter communication

## SJ-P1 makes it possible to have Inverter-to-Inverter communication without a PLC or PC. [EzCOM function]

It is easy to build a small coarsely synchronized system using multiple inverters. Since SJ-P1 can use both of EzCOM and external communication option cassette, you can create a system that does not require complicated control components. (The maximum number of EzCOM units is 8 inverters)


Available together, EzCOM communication and field network communication options.

By simple wiring and easy parameter settings, the synchronous operation can be achieved without the host controller (Resulting in cost and wiring savings).

## Application case 1

## Reduction of the external circuit components.

In a system that would normally require external circuit components such as a relay, timer and switch, it is possible to reduce the use of those external components by using the EzSQ ( programming function).

For example the Forward, Reverse, and Stop system shown below are part of the external relay circuit which are no longer required when using EzSQ function.


## Application case 2

Advanced operation pattern is reproduced without sensors.
Mixing Machine:
At first mixing the material slowly and then increasing the mixing speed (by monitoring the load current). This speed change can be done automatically when using EzSQ.
Advanced speed patterns can be easily created for each application.

## Application case 3

Multiple control is easy.

## Winder:

EzCOM is a simple communication function that can be used for winders that would previously required multiple controllers. Construction of multiple systems can be simply achieved by reducing wiring works. Maintenance is also easy.

## Application case 4

## Check for water leakage without sensors.

Pump control:
Attaching a sensor to various places of the drainage pipe is costly.
EzSQ program that outputs an alarm to calculate the water leakage from the operating status of the pump can be utilized in place of a sensor.

## Further examples of EzSQ use

For reducing maintenance cost...
$\rightarrow$ Water leakage detections from pipe, Dust blowouts for fans.
-For additional protective features...
$\rightarrow$ Avoiding water hammers, Multi speed adjustment during mixing process.

OFor example of Water leakage detections from pipe


For further energy savings...
$\rightarrow$ Ideal output controls for fan \& pumps, Sleep modes for conveyers non-regular used
For stand-alone works on multi uses...
$\rightarrow$ Automatic operations of the fan and pumps based on user customization PID

## Contact Hitachi

for
more information!

## EzSQ function can enable following.

With the combination of these, customized functions can be easily implemented.
Collect information of inverter's internal data such as load current, frequency, and etc.
Onput and output IO (including analogue IOs) can be freely assigned to your own function.
Arithmetic operations (internal calculation), Rewriting inverter parameters, Sequential programming(such as conditions branches), Internal timers, and more other functions..

## Model configuration

- SJ series model name indication

Type Name

## P1-00175-H F $\square$ F

Motor maximum rated current (at VLD rated current)

00001: 0.1A
to
99999: 9999.9A

F: Integrated EMC filter
Region
E : Europe version U: North America version None:Japan version

F: with keypad
Power Source
L: 3-phase 200V class
H: 3-phase 400 V class

## - Lineup

| -Available |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Applicable motor (kW) | 0.4 | 0.75 | 1.5 | 2.2 | 3.7 | 5.5 | 7.5 | 11 | 15 | 18.5 | 22 | 30 | 37 | 45 | 55 | 75 | 90 | 110 | 132 |
| 3-phase 200 V (ND rating) | - | - | - | - | - | $\bigcirc$ | - | - | - | - | - | - | - | - | - |  |  |  |  |
| 3-phase 400 V (ND rating) |  | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | $\bigcirc$ | $\bigcirc$ |

(Note) The applicable motor refers to Hitachi standard 3-phase motor (4-pole).
To use other motors, be sure to prevent the rated motor current ( 50 Hz ) from exceeding the rated output current of the inverter.

## Applicable motor capacity by rating

## - Overload current rating

VLD (Very light duty): 110\% 60sec, 120\% 3sec
LD (Light duty): $120 \% 60 \mathrm{sec}, 150 \% 3 \mathrm{sec}$
ND (Normal duty): 150\% 60sec, $200 \%$ 3sec

- 200 V class

| ND <br> Rating <br> Code | Model name | VLD <br> (Very light duty) |  | LD <br> (Light duty) |  | ND <br> (Normal duty) |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| P1- $\square \square \square-$ <br> LF $\square F$ |  | Motor <br> capacity <br> (kW(HP)) <br> (4pole) | Rated <br> Rurrent <br> (A) | Motor <br> capacity <br> (kW(HP)) <br> (4pole) | Rated <br> current <br> (A) | Motor <br> capacity <br> (kW(HP)) <br> (4pole) | Rated <br> current <br> (A) |
| 004 | 00044 | $0.75(1)$ | 4.4 | $0.75(1)$ | 3.7 | $0.4(1 / 2)$ | 3.2 |
| 007 | 00080 | $1.5(2)$ | 8.0 | $1.5(2)$ | 6.3 | $0.75(1)$ | 5.0 |
| 015 | 00104 | $2.2(3)$ | 10.4 | $2.2(3)$ | 9.4 | $1.5(2)$ | 8.0 |
| 022 | 00156 | $3.7(5)$ | 15.6 | $3.7(5)$ | 12.0 | $2.2(3)$ | 11.0 |
| 037 | 00228 | $5.5(7.5)$ | 22.8 | $5.5(7.5)$ | 19.6 | $3.7(5)$ | 17.5 |
| 055 | 00330 | $7.5(10)$ | 33 | $7.5(10)$ | 30 | $5.5(7.5)$ | 25 |
| 075 | 00460 | $11(15)$ | 46 | $11(15)$ | 40 | $7.5(10)$ | 32 |
| 110 | 00600 | $15(20)$ | 60 | $15(20)$ | 56 | $11(15)$ | 46 |
| 150 | 00800 | $18.5(25)$ | 80 | $18.5(25)$ | 73 | $15(20)$ | 64 |
| 185 | 00930 | $22(30)$ | 93 | $22(30)$ | 85 | $18.5(25)$ | 76 |
| 220 | 01240 | $30(40)$ | 124 | $30(40)$ | 113 | $22(30)$ | 95 |
| 300 | 01530 | $37(50)$ | 153 | $37(50)$ | 140 | $30(40)$ | 122 |
| 370 | 01850 | $45(60)$ | 185 | $45(60)$ | 169 | $37(50)$ | 146 |
| 450 | 02290 | $55(75)$ | 229 | $55(75)$ | 210 | $45(60)$ | 182 |
| 550 | 02950 | $75(100)$ | 295 | $75(100)$ | 270 | $55(75)$ | 220 |

- 400V class

| ND <br> Rating <br> Code | Model name | VLD <br> (Very light duty) |  | LD <br> (Light duty) |  | ND <br> (Normal duty) |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| P1- <br> HF $\square \square-$ <br> HF <br> $\square$ |  | Motor <br> capacity <br> (kW(HP)) <br> (4pole) | Rated <br> Rurrent <br> (A) | Motor <br> capacity <br> (kW(HP)) <br> (4pole) | Rated <br> current <br> (A) | Motor <br> capacity <br> (kW(HP)) <br> (4pole) | Rated <br> current <br> (A) |
| 007 | 00041 | $1.5(2)$ | 4.1 | $1.5(2)$ | 3.1 | $0.75(1)$ | 2.5 |
| 015 | 00054 | $2.2(3)$ | 5.4 | $2.2(3)$ | 4.8 | $1.5(2)$ | 4.0 |
| 022 | 00083 | $3.7(5)$ | 8.3 | $3.7(5)$ | 6.7 | $2.2(3)$ | 5.5 |
| 037 | 00126 | $5.5(7.5)$ | 12.6 | $5.5(7.5)$ | 11.1 | $3.7(5)$ | 9.2 |
| 055 | 00175 | $7.5(10)$ | 17.5 | $7.5(10)$ | 16 | $5.5(7.5)$ | 14.8 |
| 075 | 00250 | $11(15)$ | 25 | $11(15)$ | 22 | $7.5(10)$ | 19 |
| 110 | 00310 | $15(20)$ | 31 | $15(20)$ | 29 | $11(15)$ | 25 |
| 150 | 00400 | $18.5(25)$ | 40 | $18.5(25)$ | 37 | $15(20)$ | 32 |
| 185 | 00470 | $22(30)$ | 47 | $22(30)$ | 43 | $18.5(25)$ | 39 |
| 220 | 00620 | $30(40)$ | 62 | $30(40)$ | 57 | $22(30)$ | 48 |
| 300 | 00770 | $37(50)$ | 77 | $37(50)$ | 70 | $30(40)$ | 61 |
| 370 | 00930 | $45(60)$ | 93 | $45(60)$ | 85 | $37(50)$ | 75 |
| 450 | 01160 | $55(75)$ | 116 | $55(75)$ | 105 | $45(60)$ | 91 |
| 550 | 01470 | $75(100)$ | 147 | $75(100)$ | 135 | $55(75)$ | 112 |
| 750 | 01760 | $90(125)$ | 176 | $90(125)$ | 160 | $75(100)$ | 150 |
| 900 | 02130 | $110(150)$ | 213 | $110(150)$ | 195 | $90(125)$ | 180 |
| 1100 | 02520 | $132(175)$ | 252 | $132(175)$ | 230 | $110(150)$ | 217 |
| 1320 | 03160 | $160(220)$ | 316 | $160(220)$ | 290 | $132(175)$ | 260 |

## Standard Specifications

## - 200V class specifications

| Model name ( P1- $\square \square \square \square \square$-L) |  |  |  | 00044 | 00080 | 00104 | 00156 | 00228 | 00330 | 00460 | 00600 | 00800 | 00930 | 01240 | 01530 | 01850 | 02290 | 02950 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Applicable motor capacity <br> (4 poles) (kW) (*1) |  |  | VLD | 0.75 | 1.5 | 2.2 | 3.7 | 5.5 | 7.5 | 11 | 15 | 18.5 | 22 | 30 | 37 | 45 | 55 | 75 |
|  |  |  | LD | 0.75 | 1.5 | 2.2 | 3.7 | 5.5 | 7.5 | 11 | 15 | 18.5 | 22 | 30 | 37 | 45 | 55 | 75 |
|  |  |  | ND | 0.4 | 0.75 | 1.5 | 2.2 | 3.7 | 5.5 | 7.5 | 11 | 15 | 18.5 | 22 | 30 | 37 | 45 | 55 |
| Output | Rated output current (A) |  | VLD | 4.4 | 8.0 | 10.4 | 15.6 | 22.8 | 33.0 | 46.0 | 60.0 | 80.0 | 93.0 | 124 | 153 | 185 | 229 | 295 |
|  |  |  | LD | 3.7 | 6.3 | 9.4 | 12.0 | 19.6 | 30.0 | 40.0 | 56.0 | 73.0 | 85.0 | 113 | 140 | 169 | 210 | 270 |
|  |  |  | ND | 3.2 | 5.0 | 8.0 | 11.0 | 17.5 | 25.0 | 32.0 | 46.0 | 64.0 | 76.0 | 95.0 | 122 | 146 | 182 | 220 |
|  | Overload current rating(*2) |  | VLD | 110\% 60sec / 120\% 3sec |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  | LD | 120\% 60sec / 150\% 3sec |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  | ND | 150\% 60sec / 200\% 3sec |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Rated output voltage |  |  | 3-phase (3-wire) 200 to 240 V (corresponding to input voltage) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Rated capacity (kVA) | 200V | VLD | 1.5 | 2.8 | 3.6 | 5.4 | 7.9 | 11.4 | 15.9 | 20.8 | 27.7 | 32.2 | 43.0 | 53.0 | 64.1 | 79.3 | 102.2 |
|  |  |  | LD | 1.3 | 2.2 | 3.3 | 4.2 | 6.8 | 10.4 | 13.9 | 19.4 | 25.3 | 29.4 | 39.1 | 48.5 | 58.5 | 72.7 | 93.5 |
|  |  |  | ND | 1.1 | 1.7 | 2.8 | 3.8 | 6.1 | 8.7 | 11.1 | 15.9 | 22.2 | 26.3 | 32.9 | 42.3 | 50.6 | 63.0 | 76.2 |
|  |  | 240V | VLD | 1.8 | 3.3 | 4.3 | 6.5 | 9.5 | 13.7 | 19.1 | 24.9 | 33.3 | 38.7 | 51.5 | 63.6 | 76.9 | 95.2 | 122.6 |
|  |  |  | LD | 1.5 | 2.6 | 3.9 | 5.0 | 8.1 | 12.5 | 16.6 | 23.3 | 30.3 | 35.3 | 47.0 | 58.2 | 70.3 | 87.3 | 112.2 |
|  |  |  | ND | 1.3 | 2.1 | 3.3 | 4.6 | 7.3 | 10.4 | 13.3 | 19.1 | 26.6 | 31.6 | 39.5 | 50.7 | 60.7 | 75.7 | 91.5 |
| Input | Rated input AC voltage (*3) |  |  | Main circuit power supply: 3-phase 200 to $240 \mathrm{~V} 50 / 60 \mathrm{~Hz}$, Control power supply: 1-phase 200 to 240V $50 / 60 \mathrm{~Hz}$ |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Permissible AC voltage/ Frequency fluctuation |  |  | AC voltage : 170 to $264 \mathrm{~V} 50 / 60 \mathrm{~Hz}$, Frequency : $\pm 5 \%$ |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Power supply capacity (kVA) (*4) |  | VLD | 2.0 | 3.6 | 4.7 | 7.1 | 10.3 | 15.0 | 20.9 | 27.2 | 36.3 | 42.2 | 56.3 | 69.4 | 83.9 | 103.9 | 133.8 |
|  |  |  | LD | 1.7 | 2.9 | 4.3 | 5.4 | 8.9 | 13.6 | 18.1 | 25.4 | 33.1 | 38.6 | 51.3 | 63.5 | 76.7 | 95.3 | 122.5 |
|  |  |  | ND | 1.5 | 2.3 | 3.6 | 5.0 | 7.9 | 11.3 | 14.5 | 20.9 | 29.0 | 34.5 | 43.1 | 55.3 | 66.2 | 82.6 | 99.8 |
| Carrier frequency range (*5) |  |  | VLD | 0.5 to 10.0 kHz |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  | LD | 0.5 to 12.0 kHz |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  | ND | 0.5 to 16.0 kHz |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Starting torque (*6) |  |  |  | 200\% / 0.3Hz |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Braking | Regenerative Braking |  |  | Internal BRD circuit (external discarge resistor) |  |  |  |  |  |  |  |  |  |  | Ext. regen. braking unit |  |  |  |
|  | Minimum resistance value ( $\Omega$ ) |  |  | 50 | 50 | 35 | 35 | 35 | 16 | 10 | 10 | 7.5 | 7.5 | 5 | - | - | - | - |
| Protective structure |  |  |  | IP20 - UL Open Type |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Aprox. weight (kg) |  |  |  | 3 | 3 | 3 | 3 | 3 | 6 | 6 | 6 | 10 | 10 | 10 | 22 | 33 | 33 | 47 |

## - 400V class specifications

| Model name ( P1- $\square \square \square \square \square$ - ${ }^{\text {a }}$ ) |  |  |  | 00041 | 00054 | 00083 | 00126 | 00175 | 00250 | 00310 | 00400 | 00470 | 00620 | 00770 | 00930 | 01160 | 01470 | 01760 | 02130 | 02520 | 03160 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Applicable motor capacity <br> (4 poles) (kW) (*1) |  |  | VLD | 1.5 | 2.2 | 3.7 | 5.5 | 7.5 | 11 | 15 | 18.5 | 22 | 30 | 37 | 45 | 55 | 75 | 90 | 110 | 132 | 160 |
|  |  |  | LD | 1.5 | 2.2 | 3.7 | 5.5 | 7.5 | 11 | 15 | 18.5 | 22 | 30 | 37 | 45 | 55 | 75 | 90 | 110 | 132 | 160 |
|  |  |  | ND | 0.75 | 1.5 | 2.2 | 3.7 | 5.5 | 7.5 | 11 | 15 | 18.5 | 22 | 30 | 37 | 45 | 55 | 75 | 90 | 110 | 132 |
| Output | Rated output current (A) |  | VLD | 4.1 | 5.4 | 8.3 | 12.6 | 17.5 | 25.0 | 31.0 | 40.0 | 47.0 | 62.0 | 77.0 | 93.0 | 116 | 147 | 176 | 213 | 252 | 316 |
|  |  |  | LD | 3.1 | 4.8 | 6.7 | 11.1 | 16.0 | 22.0 | 29.0 | 37.0 | 43.0 | 57.0 | 70.0 | 85.0 | 105 | 135 | 160 | 195 | 230 | 290 |
|  |  |  | ND | 2.5 | 4.0 | 5.5 | 9.2 | 14.8 | 19.0 | 25.0 | 32.0 | 39.0 | 48.0 | 61.0 | 75.0 | 91.0 | 112 | 150 | 180 | 217 | 260 |
|  | Overload current rating(*2) |  | VLD | 110\% 60sec / 120\% 3sec |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  | LD | 120\% 60sec / 150\% 3sec |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  | ND | 150\% 60sec / 200\% 3sec |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Rated output voltage |  |  | 3-phase (3-wire) 380 to 500 V (corresponding to input voltage) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Rated capacity (kVA) | 400V | VLD | 2.8 | 3.7 | 5.8 | 8.7 | 12.1 | 17.3 | 21.5 | 27.7 | 32.6 | 43.0 | 53.3 | 64.4 | 80.4 | 101.8 | 121.9 | 147.6 | 174.6 | 218.9 |
|  |  |  | LD | 2.1 | 3.3 | 4.6 | 7.7 | 11.1 | 15.2 | 20.1 | 25.6 | 29.8 | 39.5 | 48.5 | 58.9 | 72.7 | 93.5 | 110.9 | 135.1 | 159.3 | 200.9 |
|  |  |  | ND | 1.7 | 2.8 | 3.8 | 6.4 | 10.3 | 13.2 | 17.3 | 22.2 | 27.0 | 33.3 | 42.3 | 52.0 | 63.0 | 77.6 | 103.9 | 124.7 | 150.3 | 180.1 |
|  |  | 500V | VLD | 3.6 | 4.7 | 7.2 | 10.9 | 15.2 | 21.7 | 26.8 | 34.6 | 40.7 | 53.7 | 66.7 | 80.5 | 100.5 | 127.3 | 152.4 | 184.5 | 218.2 | 273.7 |
|  |  |  | LD | 2.7 | 4.2 | 5.8 | 9.6 | 13.9 | 19.1 | 25.1 | 32.0 | 37.2 | 49.4 | 60.6 | 73.6 | 90.9 | 116.9 | 138.6 | 168.9 | 199.2 | 251.1 |
|  |  |  | ND | 2.2 | 3.5 | 4.8 | 8.0 | 12.8 | 16.5 | 21.7 | 27.7 | 33.8 | 41.6 | 52.8 | 65.0 | 78.8 | 97.0 | 129.9 | 155.9 | 187.9 | 225.2 |
| Input | Rated input AC voltage (*3) |  |  | Main circuit power supply: 3-phase 380 to $500 \mathrm{~V} 50 / 60 \mathrm{~Hz}$, Control power supply: 1-phase 380 to $500 \mathrm{~V} 50 / 60 \mathrm{~Hz}$ |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Permissible AC voltage/ Frequency fluctuation |  |  | AC voltage: 323 to $550 \mathrm{~V} 50 / 60 \mathrm{~Hz}$, Frequency : $\pm 5 \%$ |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Power supply capacity (kVA) (*4) |  | VLD | 3.7 | 4.9 | 7.5 | 11.4 | 15.9 | 22.7 | 28.1 | 36.3 | 42.6 | 56.3 | 69.9 | 84.4 | 105.2 | 133.4 | 159.7 | 193.2 | 228.6 | 286.7 |
|  |  |  | LD | 2.8 | 4.4 | 6.1 | 10.1 | 14.5 | 20.0 | 26.3 | 33.6 | 39.0 | 51.7 | 63.5 | 77.1 | 95.3 | 122.5 | 145.2 | 176.9 | 208.7 | 263.1 |
|  |  |  | ND | 2.3 | 3.6 | 5.0 | 8.3 | 13.4 | 17.2 | 22.7 | 29.0 | 35.4 | 43.5 | 55.3 | 68.0 | 82.6 | 101.6 | 136.1 | 163.3 | 196.9 | 235.9 |
| Carrier frequency range (*5) |  |  | VLD | 0.5 to 10.0 kHz |  |  |  |  |  |  |  |  |  |  |  |  |  | 0.5 to 8.0 kHz |  |  |  |
|  |  |  | LD | 0.5 to 12.0 kHz |  |  |  |  |  |  |  |  |  |  |  |  |  | 0.5 to 8.0 kHz |  |  |  |
|  |  |  | ND | 0.5 to 16.0 kHz |  |  |  |  |  |  |  |  |  |  |  |  |  | 0.5 to 10.0 kHz |  |  |  |
| Starting torque (*6) |  |  |  | $200 \% / 0.3 \mathrm{~Hz}$ |  |  |  |  |  |  |  |  |  |  |  |  |  | $180 \% / 0.3 \mathrm{~Hz}$ |  |  |  |
| Braking | Regenerative Braking |  |  | Internal BRD circuit (external discarge resistor) |  |  |  |  |  |  |  |  |  |  |  | (*7) |  | Ext. regen. Braking unit |  |  |  |
|  | Minimum resistance value ( $\Omega$ ) |  |  | 100 | 100 | 100 | 70 | 70 | 35 | 35 | 24 | 24 | 20 | 15 | 15 | 10 | 10 | - | - | - | - |
| Protective structure |  |  |  | IP20 - UL Open Type |  |  |  |  |  |  |  |  |  |  |  |  |  | IP00 |  |  |  |
| Aprox. weight (kg) |  |  |  | 3 | 3 | 3 | 3 | 6 | 6 | 6 | 8.5 | 8.5 | 8.5 | 22 | 31 | 31 | 31 | 41 | 41 | 53 | 53 |

[^2]| Items |  |  |
| :---: | :---: | :---: |
| PWM system |  |  |
| Output frequency range (*1) |  |  |
| Frequency accuracy |  |  |
| Frequency resolution |  |  |
| Control system (*2) |  |  |
| Speed fluctuation (*3) |  |  |
| Acceleration/deceleration time |  |  |
| Display |  |  |
| Start functions |  |  |
| Stop functions |  |  |
| Stall prevention function |  |  |
| Protection functions (*5) |  |  |
| Other functions |  |  |
| Input | Frequency setting | Panel |
|  |  | External signal (*6) |
|  |  | External port |
|  | Forward / reverse Start / stop | Panel |
|  |  | External signal |
|  |  | External port |
|  | Intelligent input terminals |  |
|  |  |  |
|  | Backup sup | ly terminal |
|  | STO input ter | minal |
|  | Thermistor in | put terminal |
| Output | Intelligent output terminalsIntelligent alarm relay(1a, 1c) |  |
|  |  |  |
|  | EDM outpu | erminal |
|  | Output term | nal monitor (*7) |
| EMC filter activation (*8) |  |  |
| PC external access |  |  |
| Environment | Ambient tem | erature (*9) |
|  | Storage tem | perature(*10) |
|  | Level of hum | idity |
|  | Vibration tolerance (*11) |  |
|  | Installation Place (*12) |  |
| Components life span |  |  |
| Conformity standars (*13) |  |  |
| Optional slots |  |  |
| Option | Input / ouput |  |
|  | Communication |  |
|  | Feedback |  |
| Other optional components |  |  |

## Sine-wave PWM system

0.00 to 590.00 Hz

For the highest frequency, digital $\pm 0.01 \%$, analogue $\pm 0.2 \%\left(25 \pm 10^{\circ} \mathrm{C}\right)$
Digital: 0.01 Hz , Analogue: Max. frequency / 4000 (Ai1 terminal / Ai2 terminal: 12 bit / 0 to +10 V or 0 to $+20 \mathrm{~mA}, \mathrm{Ai} 3$ terminal: 12 bit/ -10 to +10 V ) V/f control (constant torque / reduced torque / free),
Automatic boost control,V/f control with encoder (constant torque / reduced torque / free),
Automatic boost control, $/$ / control with encoder (constant torque /reduced torque / free),
Automatic boost control with encoder, Cascade type sensorless vector control, OHz sensorless vector control,

| IM | $\begin{array}{l}\text { Automatic boost control with encoder, Cascade type sensorless vector control, } \mathrm{OHz} \text { sensorless vector control, } \\ \text { Cascade type vector control with encoder (position and torque). }\end{array}$ |
| :--- | :--- |

SM/PMM Methods of synchronous startup for vectorless smart control / Methods of IVMS startup for vectorless smart control $\pm 0.5 \%$ (sensorless vector control)
0.00 to 3600.00 s (Linear, S-curve, U-curve, Inverted-U-curve, EL-S-curve)

Output frequency, Output current, output torque, trip history, input/output terminal function, input/output power (*4), PN voltage, etc.
DC braking after the start, matching frequency after the start, active frequency matching start, Low-voltage start, retry restart.
After free run stop, deceleration stop; DC braking or external DC braking operation (Braking force, time, adjustment of operation speed) Overload limit function, overcurrent supression, overvoltage suppresion function
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, phase input error, IGBT error, phase output error, thermistor error, brake error, low-speed range overload error, inverter overload, RS485communication error, RTC error etc.
V/f free setting (7 points), upper and lower frequency limit, frequency jump, curve acceleration and deceleration, manual torque boost, energysaving operation, analogue 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 switching function, auto-tuning (on/offline) etc. Up, down left and right keys to the set parameter.
Ai1 / Ai2 terminal (Current and Voltage is able to switched.) 0 to 10 Vdc (input impedance: $10 \mathrm{k} \Omega$ ) / 0 to 20 mA (input impedance: $100 \Omega$ ) Ai3 terminal
Multi-speed terminal Pulse train-input
-10 to +10 Vdc (Input impedance: $10 \mathrm{k} \Omega$ )
16 multi-speed (With the use of the intelligent input terminal)
RS485serial communication (Protocol: Modbus-RTU, Maximum: 115.2kbps)
By RUN / Stop key (With the set parameter, forward / reverse can be switched)
Forward (FW) / Reverse (RV) / 3-wire input allowed (STA,STP,FR) (When input terminal functions are assigned)
RS485serial communication (Protocol: Modbus-RTU, Maximum: 115.2kbps)
11 terminals (A or B terminal accept a pulse train)
FW (Forward rotation) / RV (Reverse rotation), CF1 to 4 (Multi-speed 1 to 4), SF1 to 7 (Multi-speed bit 1 to 7), ADD (Trigger for frequency addition), SCHG (Command change), STA (3-wire start) / STP (3-wire stop) / FR (Forward/reverse by 3-wire), AHD (Analogue command holding, FUP (Remote control up) / FDN (Remote control down), UDC (Remote data clearance), F-OP(Forcible operation), SET (2nd-motor),
RS (Reset), JG (Jogging), DB (External DC braking), 2CH (2-stage acc / decel), FRS (Free-run stop), EXT (External trip),
USP (Unattended start protection), CS (Commercial power supply switching), SFT (Software lock), BOK (Braking confirmation),
OLR (Overload restriction selection), KHC (Accumulated input power clear), OKHC (Accumulated input), PID (PID1 disable),
PIDC (PID1 integration reset), PID2 (PID2 disable), PIDC2 (PID2 integration reset), SVC1 to 4 (PID1 multistage target value 1 to 4),
PRO (PID gain change), PIO1 (PID output change), SLP (SLEEP trigger) / WAKE (WAKE trigger), TL (Enable torque limit),
TRQ1/2 (Torque limit 1/2), PPI (P/PI switching), CAS (Control gain switching), FOC (Forcing), ATR (Enable torque command input),
TBS (Enable torque bias), LAC (Acceleration / Deceleration cancellation), Mi1 to 11 (General-purpose input1 to 11), PCC (Pulse counter clearance), ECOM (EzCOM activation), PRG (EzSQ programme start), HLD (Acc / decel stop), REN (Motion enable signal), DISP (Display lock),
PLA (Pulse train input A), PLB (Pulse train input B), DTR (Data trace start), DISP (Display lock) SON (servo on) ORT (orientation), PLA (Pulse train input A), PLB (Pulse train input B), DTR (Data trace start), DISP (Display lock), SON (servo on), ORT (orientation), PCLR (Clearance of position deviation), STAT (pulse train position command input enable), PUP (Position bias (ADD)),
PDN (Position bias (SUB)), CP1 to 4 (Multistage position settings selection 1 to 4), ORL (Limit signal of Homing function),
ORG (Start signal of Homing function), FOT (Forward Over Travel), ROT (Reserve Over Travel), SPD (speed / position switching), PSET (Position data presetting),
P+ / P-: DC24V input (Input allowable voltage: $24 \mathrm{~V} \pm 10 \%$ )
2 terminals (Simultaneous input)
1 terminal (PTC / NTC resistor allowed)
Transistor output terminal 5, 1a contact relay 1 point, 1c contact relay 1 point
RUN (While in run), FA1 to 5 (Reached frequency signal), IRDY (Inverter ready), FWR (Forward rotation), RVR (Reverse rotation),
FREF (panel frequency reference), REF (panel motion operation), SETM (2nd-motor selected), AL (Alarm signal), MJA (Major failure signal),
OTQ (Over-torque), IP (Power loss), UV (Undervoltage), TRQ (Torque limited), IPS (Decel. Power loss), RNT (RUN time exceeded),
ONT (ON time exceeded), THM (Motor electronic thermal warning), THC (Electronic thermal warning), WAC (Capacitor life warning),
WAF (Cooling-fan life warning), FR (Operation 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), ZS (OHz detection signal),
OD / OD2 (Output deviation for PID control), FBV / FBV2 (PID feedback comparison), NDc (Communication disconnection),
Ai1Dc / Ai2Dc /Ai3Dc (Analogue Ai1 / Ai2 /Ai3 disconnection), WCAi1 / WCAi / WCAi3 (Window comparator Ai1 / Ai / Ai3),
Ai1Dc / Ai2Dc / Ai3Dc (Analogue Ai1 / Ai2 / Ai3 disconnection), WCAi1 / WCAi2 / WCAi3 (Window comparator Ai1 / Ai2 / Ai3),
LOG1 to 7 (logical operation result 1 to 7), MO1 to 7 (General-output 1 to 7), OVS (Over-Voltage power supply), PCMP (Pulse counter compare output), WFT (Trace function waiting for trriger), TRA (Trace function data logging), PDD (Position deviation over),
POK (Positioning completed), etc.
Functional safety diagnostic output
The data of the monitor can be selected by the parameter of the output.
EMC filter can be activated (method to switch bares )
USB Micro-B
-10 to $50^{\circ} \mathrm{C}$ (ND), -10 to $45^{\circ} \mathrm{C}$ (LD), -10 to $40^{\circ} \mathrm{C}$ (VLD)
-20 to $65^{\circ} \mathrm{C}$
20 to $90 \%$ RH(No condensation allowed)
P1-00044-L (P1-004L) to P1-01240-L (P1-220L), P1-00041-H (P1-004H) to P1-00620H (P1-220H)
$5.9 \mathrm{~m} / \mathrm{s}^{2}(0.6 \mathrm{G}), 10$ to 55 Hz
More than P1-01530-L (P1-300L), More than P1-00770-H (P1-300H)
$2.94 \mathrm{~m} / \mathrm{s}^{2}(0.3 \mathrm{G}), 10$ to 55 Hz
A maximum altitude of 1000 m , without gases or dust.
Main circuit smoothing capacitors is 10 years. / Cooling-fan is 10 years.
UL, cUL, CE marking, RCM, Functional safety(SIL3, PLe, STO)(Crertification in process)
3 ports
Analog I/O (available soon)
Ethernet (Modbus TCP), EtherCAT, PROFIBUS-DP, PROFINET(available soon)
Line driver input (RS422)
Braking resistor, AC reactor, noise filter, operator cable, harmonics suppresion unit, noise filter, LCRfilter, analog panel, regenerative braking unit, PC software ProdriveNext, Screw type terminal block(P1-TM2)
*1: To operate the motor beyond $50 / 60 \mathrm{~Hz}$, please consult with the motor manufacturer about the maximum allowable rotation speed. *2: If the setting of the motor constant is not appropriate, there is a case when the starting torque is not sufficient or unstable. *3: Speed fluctuation will vary depending on your system and the motor of the use environment. Please contact us for more information.
*4: Both Input power and the output power are reference (not actual) value. Not suitable for calculations for such as the actual efficiency. *5: IGBT error [EO30] also occurs by IGBT damage not only 4: Both Input power and the output power are reference (not actual) value. Not suitable for calculations for such as the actual efficiency. *5: IGBT error [ENB] also occurs by IGBT damage not only
by short-circuit protection. Depending on the operating status of the inverter, Overcurrent error [E001] occurs instead of the IGBT error [E030]. *6: The frequency command is the maximum frequency at 9.8 V for input voltage 0 to 10 Vdc , or at 19.8 mA for input current 4 to 20 mA . Characteristic change is adjusted by using external start-end function. * 7 : The analogue voltage and analogue current monitor are estimated outputs of the analogue meter connection. Maximum output value might deviate slightly from 10 V or 20 mA by variation of the analogue output circuit. If you want to change the monitor are estimated outputs of the analogue meter connection. Maximum output value might deviate slightly from 10 V or 20 mA by variation of the analogue output circuit. If you want to change the
characteristics, adjust the Ao1 and Ao2 adjustment functions. There is monitor data that cannot be part of the output. ${ }^{*} 8$ : When the EMC filter is enabled, please connected to the power supply with characteristics, adjust the A01 and Ao2 adjustment functions. There is monitor data that cannot be part of the output. *8: When the EMC filter is enabled, please connected to the pow
neutral grounding. Otherwise, it may increase leakage current. ${ }^{*} 9$ : Derating is set in accordance to carrier frequency. *10: Storage temperature is the temperature during transport.
${ }^{*}$ neutral grounding. In accordance with the test methods of JIS C $60068-2-6: 2010$ (IEC $60068-2-6: 2007$ ). *12: In case of utilization at an altitude of 1000 m or more, take into account that the atmospheric pressure is reduced by $1 \%$ for very 100 m up. Please apply a derating of a $1 \%$ from the rated current every 100 m . Conduct and evaluation and contact us if you plan on using it above 2500 m .
reduced by $1 \%$ for very 100 m up. Please apply a derating of a 1\% from
*13: Insulation distance is in accordance with the UL and CE standards.

## Protective Functions

| Name | Cause (s) | Trip code |
| :---: | :---: | :---: |
| Over-current | The inverter output was short-circuited, or the motor shaft is locked or has a heavy load. <br> These conditions cause excessive current for the inverter, so the inverter output is turned OFF. <br> The protection circuit operates at approximately $220 \%$ (Parameter setting changeable) of the rated output current (ND rated). | E001 |
| Overload protection (*1) | When a motor overload is detected by the electronic thermal function, the inverter trips and turns off its output. | E005 |
| Braking resistor overload protection | When the regenerative braking resistor exceeds the usage time allowance or an over-voltage caused by the stop of the BRD function is detected, the inverter trips and turns off its output. | E006 |
| Over-voltage protection | When the DC bus voltage exceeds a threshold, due to regenerative energy from the motor, the inverter trips and turns off its output. | E007 |
| Memory error (*2) | When the built-in memory element has problems due to noise or excessive temperature, the inverter trips and turns off its output. | E008 |
| Under-voltage error (*3) | A decrease of internal DC bus voltage below a threshold results in a control circuit fault. This condition can also generate excessive motor heat or cause low torque. The inverter trips and turns off its output. | E009 |
| Current transformer error | If a strong source of electrical interference is close to the inverter or abnormal operations occur in the built-in CT , the inverter trips and turns off its output. | E010 |
| CPU error (*4) | When a malfunction in the built-in CPU has occurred, the inverter trips and turns off its output. | E011 |
| External trip | When a signal to an intelligent input terminal configured as EXT has occurred, the inverter trips and turns off its output. | E012 |
| USP error | An error occurs when power is cycled while the inverter is in RUN mode if the Unattended Start Protection (USP) is enabled. The inverter trips and does not go into RUN mode until the error is cleared. | E013 |
| Ground fault(*14) | The inverter is protected by the detection of ground faults between the inverter output and the motor during power-up tests. This feature protects the inverter only. | E014 |
| Input over-voltage protection | When the input voltage is higher than the specified value, it is detected 100 seconds after power-up and the inverter trips and turns of its output. The overvoltage detection voltage is about 390 VDC ( 200 V class) and $780 \mathrm{VDC}(400 \mathrm{~V}$ class) between PN. (Parameter changeable). | E015 |
| Instantaneous power failure | When power is cut for more than 15 ms , the inverter trips and turns off its output. If power failure continues, the error will be cleared. The inverter restarts if it is in RUN mode when power is cycled. | E016 |
| Temperature detector error | The inverter will display the error code shown on the right if the lowering of cooling-fan speed is detected at the occurrence of the temperature error described below. | E019 |
| Temperature error due to low cooling-fan speed | The inverter will display the error code shown on the right if the lowering of cooling-fan speed is detected at the occurrence of the temperature error described below. | E020 |
| Inverter thermal trip | When the inverter internal temperature is higher than the specified value, the thermal sensor in the inverter module detects the higher temperature of the power devices and trips, turning off the inverter output. | E021 |
| Phase loss input protection (*5) | One of three lines of 3-phase power supply is missing. Decision time is about 1 s . (When the input phase loss effective function is enabled. | E024 |
| IGBT error (*6) | When an instantaneous over-current has occurred, the inverter trips and turns off its output to protect main circuit element. | E030 |
| Phase loss output protection (*7) | One of three lines of 3-phase power output is missing. Decision time is about 1 s . (When the output phase loss effective function is enabled. | E034 |
| Thermistor error | When the thermistor inside the motor detects temperature higher than the specified value, the inverter trips and turns off its output. | E035 |
| Braking error | The inverter turns off its output when it can not detect whether the braking is ON or OFF within waiting time after it has released the brake. (When braking function is enabled.) | E036 |
| Low-speed overload protection | If overload occurs during the motor operation at a very low speed at 0.2 Hz or less, the electronic thermal protection circuit in the inverter will detect the overload and shut off the inverter output. <br> (Note that a high frequency may be recorded as the error history data.) | E038 |
| Inverter's Overload protection (*1) | When the inverter itself overload is detected by the electronic thermal function, the inverter trips and turns off its output. | E039 |
| Modbus (RS-485) communication error | If timeout occurs because of line disconnection during the communication in Modbus-RTU mode, the inverter will display the error code shown on the right. | E041 |
| EzSQ invalid instruction | This trip occurs when an invalid instruction is detected in EzSQ program. | E043 |
| EzSQ Nesting count Error | This trip occurs when number of nesting times is exceeded in EzSQ program. | E044 |
| EzSQ instruction Error | This trip occurs when an can not executed instruction is detected in EzSQ program. | E045 |
| EzSQ User Setting Error 0 to 9 | These trips occur when a user specified trip instruction is executed in the program. | $\begin{aligned} & \text { E050 } \\ & \text { to E059 } \end{aligned}$ |
| There is an error in the STO path | For more information, please refer to the P1 functional safety guide. | $\begin{gathered} \text { E090 } \\ \text { to E093 } \end{gathered}$ |




 detected correctly. *8: Inverter repair is necessary when this error occurs. Please contact your service or sales dept.
-P1-00044-LF $\square \mathrm{F}$ to 00228-LF $\square \mathrm{F}$
-P1-00041-HF $\square \mathrm{F}$ to 00126-HF $\square F$

$\cdot P 1-00600-L F \square F \quad \cdot P 1-00310-H F \square F$

-P1-00330-LF $\square$ F, P1-00460-LF $\square F$ -P1-00175-HF $\square$ F, P1-00250-HF $\square F$

-P1-00800-LF $\square \mathrm{F}, \mathrm{P} 1-00930-L F \square \mathrm{~F}, \mathrm{P} 1-01240-L F \square \mathrm{~F}$

$\cdot P 1-00400-H F \square F$, P1-00470-HF $\square F$, P1-00620-HF $\square F$

-P1-01850-LF $\square \mathrm{F}, \mathrm{P} 1-02290-\mathrm{LF} \square \mathrm{F}$
$\cdot P 1-00930-H F \square F, P 1-01160-H F \square F, P 1-01470-H F \square F$

$\cdot P 1-01530-L F \square F \quad \cdot P 1-00770-H F \square F$

-P1-02950-LF $\square F$

-P1-01760-HF $\square$ F, P1-02130-HF $\square$ F

-P1-02520-HF $\square$ F, P1-03160-HF $\square F$


## Terminals

## Main Circuit Terminals

## - Terminal Description

| Terminal Symbol | Terminal Name | Terminal Symbol | Terminal Name |
| :--- | :--- | :--- | :--- |
| R/L1, S/L2, T/L3 | Main power supply input terminals | P/+, N/- | External braking unit connection terminals |
| U/T1, V/T2, W/T3 | Inverter output terminals | G | Ground connection terminal |
| PD/+1, P/+ | DC reactor connection terminals | RO, TO | Control power supply input terminals |
| P/+, RB | External braking resistor connection terminals |  |  |
|  |  |  |  |

## - Screw Diameter and Terminal Width



| Model | Screw <br> diameter | Ground Screw <br> diameter | Terminal <br> width (mm) | Terminal <br> Arrangement |
| :--- | :---: | :---: | :---: | :---: |
| P1-00044-LFF to P1-00228-LFF / P1-00041-HFF to P1-00126-HFF | M 4 | M 4 | 10 | Figure 1 |
| P1-00330-LFF, P1-00460-LFF / P1-00175-HFF, P1-00250-HFF | M 5 | M 5 | 13 | Figure 2 |
| P1-00600-LFF, P1-00310-HFF | M 6 | M 6 | 16.5 | Figure 2 |
| P1-00800-LFF, P1-00930-LFF | M 6 | M 6 | 23 | Figure 3 |
| P1-01240-LFF | M 8 | M 6 | 23 | Figure 3 |
| P1-00400-HFF to P1-00620-HFF | M 6 | M 6 | 16.5 | Figure 4 |
| P1-01530-LFF | M 8 | M 6 | 22 | Figure 5 |
| P1-01850-LFF, P1-02290-LFF | M 8 | M 8 | 29 | Figure 5 |
| P1-02950-LFF | M 10 | M 8 | 40 | Figure 5 |
| P1-00770-HFF | M 6 | M 6 | 22 | Figure 6 |
| P1-00930-HFF to P1-01470-HFF | M 8 | M 8 | 29 | Figure 6 |
| P1-01760-HFF, P1-02130-HFF | M 10 | M 8 | 29 | Figure 7 |
| P1-02520-HFF, P1-03160-HFF | M 10 | $\mathrm{M8}$ | 40 | Figure 5 |

## - Terminal Arrangement

Figure 1 P1-00044-L to P1-00228-L / P1-00041-H to P1-00126-H


Figure 3 P1-00800-L, P1-01240-L


Figure 5 P1-01530-F to P1-02950-L / P1-02520-H, P1-03160-H


Figure 7 P1-01760-H, P1-02130-H


Figure 2 P1-00330-L to P1-00600-L / P1-00175-H to P1-00310-H


Figure 4 P1-00400-H to P1-00620-H

| ge le |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| R0 | T0 | R/L1 | S/L2 | T/L3 | U/T1 | V/T2 | W/T3 |
|  |  | $\mathbf{G}+$ | PD/+1 | P/+ | N/- | RB | $\mathbf{G}(\underset{)}{ }$ |



Figure 6 P1-00770-H to P1-01470-H


## Control Circuit Terminals

## - Terminal Arrangement


(*1 Certification in process) ( $* 2$ Please note that the initial state of the P1-*****_**E*(Europe version) is SourceType, so it is different from this figure.)

## - Configuration of switches

| Indication | Name of switch |  |
| :---: | :--- | :--- |
| Ai1(SW1) | Analog input 1 change | Change the input specification of Analog input 1 (Ai1 terminal). 10V: Voltage input is available. 20mA: Current input is <br> available. |
| Ai2(SW2) | Analog input 2 change | Change the input specification of Analog input 2 (Ai2 terminal). 10V: Voltage input is available. 20mA: Current input is <br> available. |
| Ao1(SW3) | Analog output 1 change | Change the output specification of Analog output 1 (Ao1 terminal). 10V: Voltage output is applied. 20mA: Current <br> output is applied. |
| Ao2(SW4) | Analog output 2 change | Change the output specification of Analog output 2 (Ao2 terminal). 10V: Voltage output is applied. 20mA: Current <br> output is applied. |
| P.SEL(SW5) | Change of the power supply <br> method to input terminals | Change the power supply method to input terminals. IN: Activate input terminals by an internal power source. EX: <br> Activate input terminals by inputting an external power source.(For EX, power supply is required between input <br> terminals and COM.) |
| SRC/SINK(SW6) | Input terminal Sink/Source logic <br> switching | Sink or source logic of the input terminal is switched. <br> This is enabled when SW5 is IN. SINK: Switch to Sink logic. SRC: Switch to Source logic. |
|  |  |  |

## - Terminal Description

|  |  | Symbol | 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 resister. | Max. allowable input current 20 mA |
|  | Analog input | Ai1 | Analog input terminal 1 (Voltage/current selector SW1) | Either Ai1 or Ai2 can be used by switching the selector switch to DCO to 10 V voltage input or 0 -to 20 mA current input. Used as speed input and feedback input. | For voltage input: <br> - Input impedance Approx.10k $\Omega$ <br> - Allowable input voltage DC-0.3V to 12 V <br> For current input: <br> - Input impedance Approx. $100 \Omega$ <br> - Max. allowable input current 24 mA |
|  |  | Ai2 | Analog input terminal 2 (Voltage/current selector SW2) |  |  |
|  |  | Ai3 | Analog input terminal 3 | DC-10 to 10 V voltage input is available. Used as speed input and feedback input. | Voltage input only: <br> - Input impedance Approx.10k $\Omega$ <br> - Allowable voltage input DC-12V to 12 V |
|  | 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 10 V voltage output or 0 to 20 mA current output. | For voltage output: <br> - Max. allowable output current 2mA <br> - Output voltage accuracy $\pm 10 \%$ (Ambient temperature: $25 \pm 10$ degrees C) <br> For current input: <br> - Allowable load impedance $250 \Omega$ or less <br> - Output current accuracy $\pm 20 \%$ (Ambient temperature: $25 \pm 10$ degrees C) |
|  |  | Ao2 | Analog output terminal 2 (Voltage/current selector SW4) |  |  |
| 24 V power supply | Power input | P24 | 24 V output power source terminal | This terminal supplies DC24V power for contact signals. | Max. output 100mA |
|  |  | P+ | Terminal for external 24 V input (24V) | Input external DC24V power supply to the inverter. Inputting 24 V power supply can change parameter settings and perform optional communication operations without control power supply. | Allowable input voltage $\mathrm{DC} 24 \mathrm{~V} \pm 10 \%$ Max. allowable current 1A |
|  |  | P- | Terminal for external 24 V input ( 0 V ) |  |  |


|  |  |  | Symbol | Terminal name | Description | Electric characteristics |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Intelligent input terminal | Digital input | Contact point | 9 8 7 6 5 4 3 2 1 | Input terminal | Terminal functions are selectable according to the parameter settings for each terminal. <br> Switching SW6 to SRC or SINK allows you to select SINK or Source logic. | Voltage between each input and COM terminals <br> - ON voltage Min.DC18V <br> - OFF voltage Max.DC3V <br> - Max. allowable voltage DC27V <br> - Load current 5.6mA(at DC27V) |
|  |  |  | A | Pulse input-A |  | Voltage between an input and COM terminals |
|  |  | Pulse | B | Pulse input-B | as an input terminal. <br> Terminal functions are selectable according to the parameter settings for each terminal. <br> The maximum input pulse rate is 32 kpps . | - OFF voltage Max.DC3V <br> - Max. allowable voltage DC27V <br> - Load current 5.6mA(at DC27V) <br> - Max input pulse rate 32 kpps |
|  |  | Common | COM | Input (common) | This is a common terminal for digital input terminals ( $1,2,3,4,5,6,7,8,9, \mathrm{~A}$ and B). Three COM terminals are available. |  |
| Intelligent output terminals | Digital output | Open collector | $\begin{aligned} & 15 \\ & 14 \\ & 13 \\ & 12 \\ & 11 \end{aligned}$ | 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 <br> Between each terminal and CM2 <br> - Voltage drop when turned on:4V or less <br> - Max. allowable voltage 27V <br> - Max. allowable current 50 mA |
|  |  |  | CM2 | Output (common) | This is a common terminal for output terminals 11 to 15. |  |
|  |  | Relay | $\begin{aligned} & 16 \mathrm{~A} \\ & 16 \mathrm{C} \end{aligned}$ | 1a relay terminal | Relays for A contact output | Maximum contact capacity <br> - AC250V, 2A(resistance) <br> - $\mathrm{AC} 250 \mathrm{~V}, 1 \mathrm{~A}$ (inductive load) (Minimum contact capacity) <br> - DC1V, 1 mA |
|  |  |  | ALO <br> AL1 <br> AL2 | 1c relay terminal | Relays for C contact output | Maximum contact capacity <br> AL1/ALO: <br> - AC250V, 2A(resistance) <br> - AC250V, 0.2A(inductive load) <br> AL2/ALO: <br> - AC250V, 1A(resistance) <br> - AC250V, 0.2A(inductive load) Minimum contact capacity (common) <br> - AC100V, 10 mA <br> - DC5V, 100 mA |
| FM output terminal | FM output | Monitor output | FM | Digital monitor (voltage) | Digital monitor output is selectable from PWM output with 6.4 ms cycle or pulse output with a variable duty cycle of approx. $50 \%$. | Pulse train output DC0 to 10 V <br> - Max. allowable output current 1.2 mA <br> - Maximum frequency 3.60 kHz |
|  |  |  | CM1 | COM for digital monitor | This is a common terminal for digital monitor. This is also used as 0 V reference potential for P24. |  |
| Thermistor terminal | Analog input |  | TH+ TH- | External thermistor input <br> Common terminal for external thermistor input | Connect to an external thermistor to make the inverter trip if an abnormal temperature is detected. <br> Connect the thermistor to TH+ and TH-. The impedance to detect temperature errors can be adjusted within the range $0 \Omega$ to $9,999 \Omega$. <br> [Recommended thermistor properties] <br> Allowable rated power: 100 mW or more <br> Impedance at temperature error: $3 \mathrm{k} \Omega$ | DC0 to 5V[Input circuit] |
| RS485 communication | Serial communic |  | SP <br> SN <br> RP <br> (CM1) | MODBUS terminal (RS-485) | SP terminal : RS-485 differential(+) signal <br> SN terminal : RS-485 differential(-) signal <br> RP terminal : Connect to SP through a termination resistor <br> CM1 terminal : Connect to the signal ground of external cmmunication devices. <br> There are two SP and two SN terminals, which are connected internally. <br> The maximum baud rate is 115.2 kbps . | Termination resistor (120 $)$ integrated Enabled: RP-SN shorted Disabled: RP-SN opened |
| Safety terminals | Power supply for Safety |  | P24S | 24 V output power source terminal | DC24V power supply for ST1/ST2 terminals. Using in source logic, this terminal becomes input COM. | Max. allowable output current 20 mA . |
|  |  |  | CMS | COM terminal for functional safety | COM terminal for ST1/ST2 terminals. Using in sink logic, this terminal becomes input COM. |  |
|  |  |  | STC | Logic switching terminal | Using ST1/ST2 in source logic, connect STC and CMS. Using ST1/ST2 in sink logic, connect STC and P24S. <br> Using external power supply, connect external circuit to STC. |  |
|  | Input | STO functions | ST1 ST2 | STO input1 STO input2 | Redundancy input terminals of the STO. For STO function, input to both terminals. | Voltage between each input and P24S or between each input and CMS. <br> - ON voltage Min.DC18V <br> - OFF voltage Max.DC3V <br> - Max. allowable voltage DC27V <br> - Load current 5.6mA(at DC27V) |
|  | Monitoring | Open collector | ED+ | Output terminal for monitoring | Monitoring terminals for STO operation. <br> This terminal can not be used for safety function operation. | Open collector output between ED+ and ED- <br> - Voltage drop when turned on:4V or less <br> - Max. allowable voltage 27V <br> - Max. allowable current 50 mA |
|  |  |  | ED- | Output COM terminal for monitoring |  |  |



## Connecting to PLC

## - Connection with Input Terminals

1. Using Internal Power Supply of The Inverter

-When using internal power supply of the inverter, the SW5 to "IN". -When connecting sink type module, the SW6 to "SINK".

## 2.Using External Power Supply


(2) Source type logic

-When using internal power supply of the inverter, the SW5 to "IN". -When connecting source type module, the SW6 to "SRC".
(2) Source type logic

-When using external power supply, the SW5 to "EXT". -When connecting source type module, the SW6 to "SRC".
(Note: Be sure to turn on the inverter after turning on the PLC and its external power source to prevent the parameters in the inverter from being modified.)

## - Connection with Output Terminals



## Function List

■Monitor mode List

| Code No. | Parameter Meaning | Selectable User Setting |
| :---: | :---: | :---: |
| dA-01 | Output frequency monitor | 0.00 to 590.00 (Hz)<current outout frequency> |
| dA-02 | Output current monitor | 0.00 to 655.35(A) |
| dA-03 | Rotation direction monitor | F (Forward RUN) /r (Reverse RUN) /d (Zero-speed Out) /o (Stop) |
| dA-04 | Frequency reference monitor(After calculation) | -590.00 to $590.00(\mathrm{~Hz})$ ¢target value> |
| dA-06 | Output frequency scale conversion monitor | 0.00 to 59000.00 (Hz) |
| dA-08 | Detect speed monitor | -590.00 to $590.00(\mathrm{~Hz}$ <monitor feedback is 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) | -1000.0 to 1000.0(\%)<Torque control mode required> |
| dA-16 | Torque limit monitor | 0.0 to 500.0(\%) |
| dA-17 | Output Torque monitor | -1000.0 to 1000.0(\%) |
| dA-18 | Output Voltage monitor | 0.0 to 800.0 (V) |
| dA-20 | Current position monitor | when [AA123] $\neq 03$ <br> -268435455 to +268435455 (pulse)/ when [AA123]=03 <br> -1073741823 to +1073741823 (pulse) |
| dA-26 | Pulse train position deviation monitor | -2147483647 to +2147483647(pulse) |
| dA-28 | Pulse count monitor | 0 to 2147483647(pulse) |
| dA-30 | Input power monitor | 0.00 to $600.00(\mathrm{~kW})$ |
| dA-32 | Accumulation input power monitor | 0.0 to 1000000.0 (kWh |
| dA-34 | Output power monitor | 0.00 to 600.00 (kW) |
| dA-36 | Accumulation output power monitor | 0.0 to 1000000.0 (kWh) |
| dA-38 | Motor temperature monitor | -20.0 to 200.0 ${ }^{( } \mathrm{C}$ ) |
| dA-40 | DC-bus voltage monitor | 0.0 to $1000.0(\mathrm{Vdc})$ |
| dA-41 | BRD Load rating monitor | 0.00 to 100.00 (\%) |
| dA-42 | Electronic thermal Load rating monitor (MTR) |  |
| dA-43 | Electronic thermal Load rating monitor (CTL) |  |
| dA-45 | Safety STO monitor | 00 (no) /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 | Refer to guidebook for option |
| dA-47 | Safety option monitor |  |
| dA-50 | Control terminal status | 00 (Standard) 02 (P1-TM2) /15 (Not connect) |
| dA-51 | Input terminal monitor | LLLLLLLLLLLL to HHHHHHHHHHH [L:OFF/H:ON] <br> $[\mathrm{left]}(\mathrm{~B})(\mathrm{A})(9)(8)(7)(6) \quad(5)(4)(3)(2)(1)[$ right $]$ |
| dA-54 | Output terminal monitor | LLLLLLL to HHHHHHH <br> [L:OFF/H:ON] <br> [left](AL)(16c)(15)(14)(13) (12)(11)[right] |
| dA-60 | Analog input/output status monitor | AAAAAAAA to VVVVVVVV <br> [A:current/V:voltage] <br> [left](Ao4)(Ao3)(EAi2)(EAi1) (Ao2)(Ao1)(Ai2)(Ai1)[right] |
| dA-61 | Analog input [Aii] monitor | 0.00 to 100.00(\%) |
| dA-62 | Analog input [Ai2] monitor |  |
| dA-63 | Analog input [Aili] monitor | -100.00 to 100.00(\%) |
| dA-64 | Extension Analog input [Ai4] monitor | 0.0 to 100.00(\%) |
| dA-65 | Extension Analog input [Ais] monitor |  |
| dA-66 | Extension Analog input [Ait] monitor | -100.00 to 100.00(\%) |
| dA-70 | Pusse 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 |  |
| dA-82 | Option slot-2 status |  |
| dA-83 | Option slot-3 status |  |
| 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 |  |
| db-18 | Analog output monitor YAO | 0 to 10000 |
| 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 |  |
| db-30 | PID1 Feedback value 1 monitor | 0.00 to 100.00(\%)(adjustable with [AH-04][AH-05][AH-06]) |
| db-32 | PID1 Feedback value 2 monitor |  |
| db-34 | PID1 Feedback value 3 monitor |  |
| db-36 | PID2 Feedback value monitor | 0.00 to 100.00(\%)(adjustable with [AJ-04][AJ-05][AJ-06]) |
| db-38 | PID3 Feedback value monitor | 0.00 to 100.00(\%)(adjustable with [AJ-24][AJ-25][AJ-26]) |
| db-40 | PID4 Feedback value monitor | 0.00 to 100.00(\%)(adjustable with [AJ-44][AJ-45][AJ-46]) |
| db-42 | PID1 target value monitor | 0.00 to 100.00(\%)(adjustable with [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 |  |
| db-52 | PID1 Deviation 1 monitor |  |
| db-53 | PID1 Deviation 2 monitor |  |
| db-54 | PID1 Deviation 3 monitor |  |


| Code No. | Parameter Meaning | Selectable User Setting |
| :---: | :---: | :---: |
| db-55 | PID2 Output monitor | -100.00 to $+100.00(\%)$ |
| db-56 | PID2 Deviation monitor |  |
| db-57 | PID3 Output monitor |  |
| db-58 | PID3 Deviation monitor |  |
| db-59 | PID4 Output monitor |  |
| db-60 | PID4 Deviation monitor |  |
| 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 |  |
| dC-01 | Inverter Load type status | 00 (VLD) /01 (LD) /02 (ND) |
| dC-02 | Rated current monitor | 0.0 to 6553.5(A) |
| dC-07 | Main speed input source monitor | Displayed on operator panel. Refer to user's guide for detail. |
| dC-08 | Sub speed input source monitor |  |
| dC-10 | RUN command input source monitor |  |
| dC-15 | Cooling-fin temperature monitor | -20.0 to $200.0\left({ }^{\circ} \mathrm{C}\right)$ |
| dC-16 | Life assessment monitor | LL to HH[L:normal/H:Fatigued] [left](FAN lifetime)(Capacitor on board lifetime)[right] |
| dC-20 | Accumulation Start number monitor | 1 to 65535(times) |
| dC-21 | Accumlation Power-on number monitor |  |
| dC-22 | Accumulated time monitor in RUN status monitor | 0 to 1000000(hour) |
| dC-24 | Accumulation power-on time monitor |  |
| dC-26 | Accumulation cooling fan running time monitor |  |
| dC-37 | Icon 2 LIM monitor | 00:-- /01(OC suppress) /02 (OL restriction) /03 (OV suppress) /04 (TRQ Limit) /05 (Freq Limit) /06 (Min.Freq) |
| dC-38 | Icons2 ALT monitor | 00 (--) /01(Over Load) /02 (Thermal(Motor)) /03 (Thermal(CTR)) /04 (Over Heat(MTR)) |
| dC-39 | Icons2 RETRY detail monitor | 00(--) / 01(waiting to retry) $/ 02$ (waiting to restart) |
| dC-40 | Icons2 NRDY detail monitor | 00 (--) /01(Trip) /02 (Power failure) /03 (Reset) /04 (STO) /05 (Wait) /06 (Warning) /07 (Sequence Error) /08 (Freerun) /09 (interrupted) |
| dC-45 | IM/SM monitor | 00 (IM) /01 (SM) |
| dC-50 | Firmware Ver. Monitor | 00.00 to 99.255 |
| dC-53 | Firmware Gr. Monitor | 00(Standard) |
| dE-50 | Warnning monitor | Refer to user's guide |

## - Variable mode monitor (F code)

| Code No. | Parameter Meaning | Selectable User Setting |
| :---: | :---: | :---: |
| FA-01 | Main Speed reference monitor | 0.00 to $590.00(\mathrm{~Hz})$ |
| FA-02 | Sub Speed reference monitor | -590.00 to $590.00(\mathrm{~Hz})$ when configured with parameter, 0.00 to $590.00(\mathrm{~Hz})$ |
| FA-10 | Acceleration time monitor | 0.00 to 3600.00(s) |
| FA-12 | Deceleration time monitor |  |
| FA-15 | Torque reference monitor | -500.0 to 500.0(\%) |
| FA-16 | Torque bias monitor | -500.0 to 500.0(\%) |
| FA-20 | Position reference monitor | ```when [AA123] \(\neq 0\) -268435455 to +268435455 (pulse)/ when [AA123]=03 -1073741823 to +1073741823 (pulse)``` |
| FA-30 | PID1 Set Value 1 monitor | 0.00 to 100.00(\%)(adjustable with [AH-04][AH-05][AH-06]) |
| FA-32 | PID1 Set Value 2 monitor |  |
| FA-34 | PID1 Set Value 3 monitor |  |
| FA-36 | PID2 Set Value monitor | 0.00 to 100.00(\%)(adjustable with [AJ-04][AJ-05][AJ-06]) |
| FA-38 | PID3 Set Value monitor | 0.00 to 100.00(\%)(adjustable with [AJ-24][AJ-25][AJ-26]) |
| FA-40 | PID4 Set Value monitor | 0.00 to 100.00(\%)(adjustable with [AJ-44][AJ-45][AJ-46]) |

## - Parameter mode List

## Parameter naming (Nomenclature)

*By default the motor 1 us enabled in the case that $08:[\mathrm{SET}]$ is not assigned in the intelligent Input terminals [CA-01] to [CA-11].

# AA 101 <br> Internal number in the group <br> ■ -:Common for 1st and 2nd motor $1: 1$ st motor enabled if function [SET] is OFF 2:2nd motor enabled if function [SET] is ON <br> - Parameter group 

## - Parameter mode (A code)

| Code No. | Parameter Meaning | Selectable User Setting | Initial value |
| :---: | :---: | :---: | :---: |
| AA101 | Main speed input source selection, 1st-motor | 01 (Setting by Terminal [Ai1])/02 (Setting by Terminal [Ai2]) 103 (Setting by Terminal [Ai3]) /04 (Setting by Terminal [Ai4]) 105 (Setting by Terminal [Ai5]) /06 (Setting by Terminal [Ai6]) 107 (Setting by parameter) /08 (Setting by RS485) /09 (Option-1) /10 (Option-2) /11 (Option-3) /12 (Pulse train input(internal)) /13 (Pulse train input(Option)) /14 (Setting by EzSQ) <br> /15 (PID function) /16 (Volume on keypad) | 07(*FF) / <br> 01(*FEF, *FUF) |
| AA102 | Sub frequency input source selection, 1st-motor | 00 (Disable) /01 (Setting by Terminal [Ai1]) <br> 102 (Setting by Terminal [Air]) /03 (Setting by Terminal [Ai3]) <br> /04 (Setting by Terminal [Ai4]) /05 (Setting by Terminal [Ai5]) <br> 106 (Setting by Terminal [Ai6]) /07 (Setting by parameter) <br> 108 (Setting by RS485) 09 (Option-1) /10 (Option-2) <br> /11 (Option-3) /12 (Pulse train input(internal)) <br> /13 (Pulse train input(Option)) /14 (Setting by EzSQ) <br> /15 (PID function) /16 (Volume on keypad) | 00 |
| AA104 | Sub speed setting, 1st-motor | 0.00 to $590.00(\mathrm{~Hz})$ | 0.00 |
| AA105 | Calculation symbol selection for Speed reference, 1st-motor | 00 (Disable) /01 (Addition(ADD)) /02 (Subtraction(SUB)) /03 (Multiplication(MUL)) | 00 |
| AA106 | Add frequency setting, 1st-motor | -590.00 to $+590.00(\mathrm{~Hz})$ | 0.00 |
| AA111 | Run-command input source selection, 1st-motor | 00 (Terminal [FW]/[RV]) /01 (3-wire) /02 (RUN key on keypad) /03 (Setting by RS485) /04 (Option-1) /05 (Option-2) <br> 106 (Option-3) | 02(*FF)/ <br> 00 (*FEF, *FUF) |
| AA-12 | RUN-key of keypad Rotation Direction, 1st-motor | 00 (Forward) /01 (Reverse) | 00 |
| AA-13 | STOP-key enable at RUNcommand from terminal, 1st-motor | 00 (Disable)/01 (Enable)/02 (Enable at only trip reset) | 01 |
| AA114 | RUN-direction restriction, 1st-motor | 00 (Disable) /01 (Enable only Forward rotation) /02 (Enable only Reverse rotation) | 00 |
| AA115 | STOP mode selection, 1st-motor | 00 (Deceleration until stop)/01 (Free-run stop) | 00 |
| AA121 | Control mode selection, 1st-motor | IM control: 00 (VF control (Constant torque)) <br> 101 (VF control (Reduced torque)) /02 (VF control (Free-V/f)) <br> 103 (Constant torque with Automatic- trq boost)) <br> 104 (VF control with encoder (Constant torque)) <br> 105 (VF control with encoder (Reduced torque)) <br> 106 (VF control with encoder (Free-V/f)) <br> 107 (VF control with PG (Constant torque with Automatc-trq boost)) <br> 108 (Sensorless vector control) <br> $109(0 \mathrm{~Hz}$ Sensorless vector control) <br> /10 (Vector control with encoder) <br> SM/PMM control: <br> 11 (Synchronous start up for smart sensorless vector control) <br> /12 (IVMS start up for smart sensorless vector control) | 00 |
| AA123 | Vector control mode selection, 1st-motor | 00 (Speed/Torque control mode) /01 (Pulse train position control) 102 (Position control) /03 (High-resolution position control) | 00 |
| AA201 | Main speed input source selection, 2nd-motor | same to AA101 | 07(*FF)/ <br> 01(*FEF, *FUF) |
| AA202 | Sub speed input source selection, 2nd-motor | same to AA102 | 00 |
| AA204 | Sub speed setting, 2nd-motor | same to AA104 | 0.00 |
| AA205 | Calculation symbol selection for Speed reference, 2nd-motor | same to AA105 | 00 |
| AA206 | Add frequency setting, 2nd-motor | same to AA106 | 0.00 |
| AA211 | Run-command input source selection, 2nd-motor | same to AA111 | 02(*FF)/ <br> 00 (*FEF, *FUF) |
| AA214 | RUN-direction restriction, 1st-motor | same to AA114 | 00 |
| AA215 | STOP mode selection, 1st-motor | same to AA115 | 00 |
| AA221 | Control mode selection, 2nd-motor | same as AA121 | 00 |
| AA223 | Vector control mode selection, 2nd-motor | same to AA123 | 00 |
| Ab-01 | Frequency conversion gain | 0.01 to 100.00 | 1.00 |
| Ab-03 | Multispeed operation selection | 00 (Binary (16-speeds)) /01 (Bit (8-speeds)) | 00 |
| Ab110 | Multispeed-0 setting, 1st-motor | 0.00 to $590.00(\mathrm{~Hz})$ | 0.00 |
| $\begin{gathered} \mathrm{Ab}-11 \text { to } \\ \mathrm{Ab}-25 \end{gathered}$ | Multispeed-1 to Multispeed-15 setting |  |  |
| Ab210 | Multispeed-0 setting, 2nd-motor |  |  |


| Code No. | Parameter Meaning | Selectable User Setting | Initial value |
| :---: | :---: | :---: | :---: |
| AC-01 | Acceleration/ Deceleration time input selection | 00 (Setting by parameter) /01 (Setting from Option-1) 102 (Setting from Option-2) /02 (Setting from Option-3) /04 (Setting by programing function) | 00 |
| AC-02 | Acceleration/ Deceleration selection | 00 (Common setting) <br> /01 (Multi stage Acceleration/ Deceleration) | 00 |
| AC-03 | Acceleration curve selection | 00 (Liner Acceleration) /01 (S-curve Acceleration) <br> /02 (U-curve Acceleration) /03 (Reverse U-curve Acceleration) <br> /04 (Eleveter S-curve Acceleration) | 00 |
| AC-04 | Deceleration curve selection |  |  |
| AC-05 | Acceleration curve constant setting | 1 to 10 | 2 |
| AC-06 | Deceleration curve constant setting |  |  |
| AC-08 | EL-S-curve ratio @start of acceleration | 0 to 100 | 25 |
| AC-09 | EL-S-curve ratio @end of acceleration |  |  |
| AC-10 | EL-S-curve ratio @start of deceleration |  |  |
| AC-11 | EL-S-curve ratio @end of deceleration |  |  |
| AC115 | Select method to switch to Accel2/Decel2 Profile, 1st-motor | 00 (Switching by $[2 \mathrm{CH}]$ 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 $590.00(\mathrm{~Hz})$ | 0.00 |
| AC117 | Decel1 to Decel2 Frequency transition point, 1st-motor |  |  |
| AC120 | Acceleration time setting 1 , 1st-motor | 0.00 to 3600.00(s) | 30.00 |
| AC122 | Deceleration time setting 1 , 1st-motor |  |  |
| AC124 | Acceleration time setting 2, 1st-motor |  | 15.00 |
| AC126 | Deceleration time setting 2, 1st-motor |  |  |
| AC-30, <br> 34, 38, <br> 42, 46, <br> 50, 54, <br> 58, 62, <br> 66, 70, <br> 74, 78, <br> 82, 86 | Acceleration time setting for Multispeed-1 to Multispeed-15 | 0.00 to 3600.00(s) | 0.00 |
| AC-32, <br> 36, 40, <br> 44, 48, <br> 52, 56, <br> 60, 64, <br> 68, 72, <br> 76, 80, <br> 84, 88 | Deceleration time setting for Multispeed-1 to Multispeed-15 |  |  |
| AC215 | Select method to switch to Accel2/Decel2 Profile, 2nd-motor | same to AC115 | 00 |
| AC216 | Accel1 to Accel2 Frequency transition point, 2nd-motor | same to AC116 | 0.00 |
| AC217 | Decel1 to Decel2 Frequency transition point, 2nd-motor | same to AC117 |  |
| AC220 | Acceleration time setting 1, 2nd-motor | same to AC120 | 30.00 |
| AC222 | Deceleration time setting 1 , 2nd-motor | same to AC122 |  |
| AC224 | Acceleration time setting 1, 2nd-motor | same to AC124 | 15.00 |
| AC226 | Deceleration time setting 1 , 2nd-motor | same to AC126 |  |
| Ad-01 | Torque reference input source selection | 01 (Setting by Terminal [Ai1])/02 (Setting by Terminal [Ai2]) /03 (Setting by Terminal [Ai3])/04 (Setting by Terminal [Ai4]) 105 (Setting by Terminal [Ai5]) /06 (Setting by Terminal [Ai6]) 107 (Setting by parameter) /08 (Setting by RS485) /09 (Option-1) /10 (Option-2) /11 (Option-3) /12 (Pulse train input(internal)) /13 (Pulse train input(Option)) /14 (Setting by EzSQ) /15 (PID function) | 07 |
| Ad-02 | Torque reference value setting | -500.0 to 500.0(\%) | 0.0 |
| Ad-03 | Polarity selection for torque reference | 00 (As indication by the sign) <br> 101 (Depending on the operation direction) | 00 |
| Ad-04 | Switching time of Speed contorl to Torque control | 0 to 1000(ms) | 100 |
| Ad-11 | Torque bias input source selection | 00 (Disable) /01 (Setting by Terminal [Ai1]) <br> /02 (Setting by Terminal [Ai2]) /03 (Setting by Terminal [Ai3]) <br> 104 (Setting by Terminal [Ai4]) /05 (Setting by Terminal [Ai5]) <br> /06 (Setting by Terminal [Ai6]) /07 (Setting by parameter) <br> /08 (Setting by RS485) 09 (Option-1) /10 (Option-2) <br> /11 (Option-3) /12 (Pulse train input(internal)) <br> /13 (Pulse train input(Option)) /15 (PID function) | 00 |
| Ad-12 | Torque bias value setting | -500.0 to 500.0(\%) | 0.0 |
| Ad-13 | Polarity selection for torque bias | 00 (As indication by the sign) <br> /01 (Depending on the operation direction) | 00 |
| Ad-14 | Terminal [TBS] active | 00 (Disable) /01 (Enable) | 00 |
| Ad-40 | Input selection for speed limit at torque control | 01 (Setting by Terminal [Ai1])/02 (Setting by Terminal [Ai2]) /03 (Setting by Terminal [Ai3]) /04 (Setting by Terminal [Ai4]) 105 (Setting by Terminal [Ai5]) /06 (Setting by Terminal [Ai6]) 107 (Setting by parameter) /08 (Setting by RS485) /09 (Option-1) /10 (Option-2) /11 (Option-3) /12 (Pulse train input(internal)) /13 (Pulse train input(Option)) | 07 |
| Ad-41 | Speed limit at torque control (at Forward rotation) | 0.00 to $590.00(\mathrm{~Hz})$ | 0.00 |
| Ad-42 | Speed limit at torque control (at Reverse rotation) |  |  |


| Code No. | Parameter Meaning | Selectable User Setting | Initial value | Code No. | Parameter Meaning | Selectable User Setting | Initial value |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| AE-01 | Electronic gear setting point selection | 00 (Feedback side) /01 (Reference side) | 00 | AF136 | Brake Release Current Setting, 1st-motor | INV rated current $\times(0.00$ to 2.00 ) | $1.00 \times$ Inverter rated current |
| AE-02 | Electronic gear ratio numerator | 1 to 10000 | 1 |  | (Forward side) |  |  |
| AE-03 | Electronic gear ratio | 1 to 10000 | 1 |  | (Forward side) | 0.00 to 590.00 (Hz) | 0.00 |
|  |  |  | 1 | AF138 | Brake Wait Time for Release, 1st-motor (Reverse side) | 0.00 to 5.00(s) | 0.00 |
| AE-04 | Positioning complete range setting | 0 to 10000(Pulse) | 5 | AF139 | Brake Wait Time for Accel. , |  |  |
| AE-05 | Positioning complete delay time setting | 0.00 to 10.00(s) | 0.00 |  | 1st-motor (Reverse side) |  |  |
| AE-06 | Position feed-forward gain setting | 0 to 655.35 | 0.00 | AF141 | Brake Wait Time for Confirmation, 1st-motor (Reverse side) |  |  |
| AE-07 | Position loop gain setting | 0.00 to 100.00 | 0.50 |  |  |  |  |
| AE-08 | Position bias setting | -2048 to 2048(Pulse) | 0 |  |  |  |  |
| AE-10 | Stop position selection of Home search function | $\begin{aligned} & 00 \text { (Setting by parameter) /01 (Option-1) /02 (Option-2) } \\ & / 03 \text { (Option-3) } \end{aligned}$ | 00 | AF142 | Brake Release Frequency <br> Setting, 1st-motor <br> (Reverse side) | 0.00 to 590.00 (Hz) | 0.00 |
| AE-11 | Stop position of Home search function | 0 to 4095 | 0 | AF143 | Brake Release Current Setting, 1st-motor (Reverse side) | INV rated current $\times(0.00$ to 2.00 ) | $1.00 \times$ Inverter rated current |
| AE-12 | Speed reference of Home search function | 0.00 to 120.00 (Hz) | 0.00 |  |  |  |  |
| AE-13 | Direction of Home search | 00 (forward) /01 (reverse) | 00 | AF144 | Braking Frequency, 1st-motor (Reverse side) | 0.00 to 590.00 (Hz) | 0.00 |
| AE-20 |  | When [AA121] $\ddagger 10$ or [AA123] $\ddagger 03$ |  | AF150 | Brake open delay time, 1st-motor | 0.00 to 2.00 (s) | 0.20 |
| $\begin{gathered} \text { to } \\ \text { AE-50 } \end{gathered}$ | [15] setting | When [AA121]=10 and [AA123]=03 -1073741823 to +1073741823 (pls) | 0 | AF151 | Brake close delay time, 1st-motor |  |  |
| AE-52 | Position control range setting(forward) | $\begin{aligned} & \text { When }[\text { [AA121 }] \neq 10 \text { or }[\text { AA123 }] \neq 03 \\ & 0 \text { to }+268435455 \text { (pls)/ } \\ & \text { When }[\text { [AA121 }]=10 \text { and }[\text { [AA123 }]=03 \\ & 0 \text { to }+1073741823 \text { (pls) } \end{aligned}$ | 268435455 | AF152 | Brake answer back check time, 1st-motor | 0.00 to 5.00 (s) | 0.10 |
|  |  |  |  | AF153 | Servo lock/ DC injection time at start, 1st-motor | 0.00 to 10.00(s) | 0.60 |
| AE-54 | Position control range setting(reverse) | ```When [AA121]#10 or [AA123]*03 -268435455 to 0 (pls)/ When [AA121]=10 and [AA123]=03 -1073741823 to 0 (pls)``` | -268435455 | AF154 | Servo lock/ DC injection time at stop, 1st-motor |  |  |
|  |  |  |  | AF201 | DC braking selection, 2nd-motor | same to AF101 | 00 |
| AE-56 | Position control mode selection | 00 (Enabling Position control range) <br> 101 (Disabling Position control range) | 00 | AF202 | Braking type selection, 2nd-motor | same to AF102 | 00 |
| AE-60 | Teach-in function target selection | 00 to 15(X00 to X15) | 00 | AF203 | DC braking frequency, 2nd-motor | same to AF103 | 0.50 |
| AE-61 | Current position saving at power-off | 00(disabled)/01(enabled) | 00 | AF204 | DC braking delay time, 2nd-motor | same to AF104 | 0.00 |
| AE-62 | Preset position data | $\begin{aligned} & \text { when }[\text { AA123 }] \neq 03,-268435455 \text { to }+268435455 \text { (pulse) } \\ & \text { when }[\text { AA123 }]=03,-1073741823 \text { to }+1073741823 \text { (pulse) } \end{aligned}$ | 0 | AF205 | DC braking force setting, 2nd-motor | same to AF105 | 30 |
| AE-64 | Deceleration stop distance calculation Gain | 50.00 to 200.00(\%) | 100.00 | AF206 | DC braking active time at stop, 2nd-motor | same to AF106 | 0.00 |
| AE-65 | Deceleration stop distance calculation Bias | 0.00 to $655.35(\%)$ | 0.00 | AF207 | DC braking operation method selection, 2nd-motor | same to AF107 | 01 |
| 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 | AF208 | DC braking force at start, 2nd-motor | same to AF108 | 30 |
| AE-70 | Homing function selection | 00 (Low speed homing) /01 (High speed homing 1) 101 (High speed homing 2) | 00 | AF209 | DC braking active time at start, 2nd-motor | same to AF109 | 0.00 |
| AE-71 | Direction of Homing function | 00(Foward)/01(Reverse) | 00 | AF220 | ContactorControl Enable, 2nd-motor | same to AF120 | 00 |
| AE-72 | Low-speed of homing function | 0.00 to 10.00 (Hz) | 0.00 | AF221 | Run delay time, 2nd-motor | same to AF121 | 0.20 |
| AE-73 | High-Speed of homing function | 0.00 to 590.00 (Hz) |  | AF222 | Contactor off delay time, 2nd-motor | same to AF122 | 0.10 |
| AF101 | DC braking selection, 1st-motor | 00 (Disable) /01 (Enable) <br> /02 (Enable (Activate only by a speed reference)) | 00 | AF223 | Contactor answer back check time, 2nd-motor | same to AF123 | 0.10 |
| AF102 | Braking type selection, 1st-motor | 00 (DC braking) /01 (Speed servo lock) /02 (Position servo lock) | 00 | AF230 | Brake Control Enable, 2nd-motor | same to AF130 | 00 |
| AF103 | DC braking frequency, 1st-motor | 0.00 to 590.00(Hz) | 0.50 | AF231 | Brake Wait Time for Release, 2nd-motor (Forward side) | same to AF131 | 0.00 |
| AF104 | DC braking delay time, 1st-motor | 0.00 to 5.00 (s) | 0.00 |  |  |  |  |
| AF105 | DC braking force setting, 1st-motor | 0 to 100(\%) | 30 | AF232 | Brake Wait Time for Accel. , 2nd-motor (Forward side) | same to AF132 |  |
| AF106 | DC braking active time at stop, 1st-motor | 0.00 to 60.00(s) | 0.00 | AF233 | Brake Wait Time for Stopping, 2nd-motor (Forward side) | same to AF133 |  |
| AF107 | DC braking operation method selection, 1st-motor | 00(Edge)/01(Level) | 01 | AF234 | Brake Wait Time for Confirmation, 2nd-motor (Forward side) | same to AF134 |  |
| AF108 | DC braking force at start, 1st-motor | 0 to 100(\%) | 30 |  |  |  |  |
| AF109 | DC braking active time at start, 1st-motor | 0.00 to 60.00(s) | 0.00 | AF235 | Brake Release Frequency <br> Setting, 2nd-motor <br> (Forward side) | same to AF135 | 0.00 |
| AF120 | Contactor Control Enable, 1st-motor | $\begin{aligned} & 00 \text { (Disable) /01 (Enable(Power side)) } \\ & 102 \text { (Enable(Motor side)) } \end{aligned}$ | 00 | AF236 | Brake Release Current <br> Setting, 2nd-motor <br> (Forward side) | same to AF136 | $1.00 \times$ Inverter rated current |
| AF121 | Run delay time, 1st-motor | 0.00 to 2.00(s) | 0.20 |  |  |  |  |
| AF122 | Contactor off delay time, 1st-motor |  | 0.10 | AF237 | Braking Frequency, 2nd-motor (Forward side) | same to AF137 | 0.00 |
| AF123 | Contactor answer back check time, 1st-motor | 0.00 to 5.00 (s) | 0.10 | AF238 | Brake Wait Time for Release, 2nd-motor | same to AF138 | 0.00 |
| AF130 | Brake Control Enable, 1st-motor | 00 (Disable) /01 (Brake control 1 enable) <br> /02 (Brake control 1 enable (FWD/REV separate setting)) <br> 103 (Brake control 2 enable) | 00 | AF239 | (Reverse side) <br> Brake Wait Time for Accel. <br> 2nd-motor (Reverse side) | same to AF139 |  |
| AF131 | Brake Wait Time for Release, 1st-motor (Forward side) | 0.00 to 5.00 (s) | 0.00 | AF240 | Brake Wait Time for Stopping, 2nd-motor (Reverse side) | same to AF140 |  |
| AF132 | Brake Wait Time for Accel. , 1st-motor (Forward side) |  |  | AF241 | Brake Wait Time for Confirmation, 2nd-motor (Reverse side) | same to AF141 |  |
|  | Brake Wait Time for |  |  |  |  |  |  |
| AF133 | Stopping, 1st-motor <br> (Forward side) |  |  | AF242 | Brake Release Frequency Setting, 2nd-motor (Reverse side) | same to AF142 | 0.00 |
|  | Brake Wait Time for |  |  |  |  |  |  |
| AF134 | Confirmation, 1st-motor (Forward side) |  |  | AF243 | Brake Release Current Setting, 2nd-motor (Reverse side) | same to AF143 | $1.00 \times$ Inverter rated current |
| AF135 | Brake Release Frequency Setting, 1st-motor (Forward side) | 0.00 to 590.00 (Hz) | 0.00 | AF244 | Braking Frequency, 2nd-motor (Reverse side) | same to AF144 | 0.00 |


| Code No. | Parameter Meaning | Selectable User Setting | Initial value | Code No. | Parameter Meaning | Selectable User Setting | Initial value |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| AF250 | Brake open delay time, 2nd-motor | same to AF150 | 0.20 | AH-51 | Input source selection of Process data 1 for PID1 | 00 (Disable) /01 (Setting by Terminal [Ai1]) /02 (Setting by Terminal [Ai2]) /03 (Setting by Terminal [Ai3]) /04 (Setting by Terminal [Ai4]) /05 (Setting by Terminal [Ai5]) /06 (Setting by Terminal [Ai6]) /07 (Setting by parameter) /08 (Setting by RS485) 09 (Option-1) /10 (Option-2) <br> /11 (Option-3) /12 (Pulse train input(internal)) <br> /13 (Pulse train input(Option)) | 01 |
| AF251 | Brake close delay time, 2nd-motor | same to AF151 |  | AH-52 | Input source selection of Process data 2 for PID1 |  | 00 |
| AF252 | Brake answer back check time, 2nd-motor | same to AF152 | 0.10 | AH-53 | Input source selection of Process data 3 for PID1 |  | 00 |
| AF253 | Servo lock/ DC injection time at start, 2nd-motor | same to AF153 | 0.60 | AH-54 | Calculation symbol selection of Process data for PID1 | $\begin{aligned} & 01 \text { (Addition) /02 (Subtraction) /03 (Multiplication) /04 (Division) } \\ & 105 \text { (Square root of FB1) /06 (Square root of FB2) } \\ & 107 \text { (Square root of (FB1-FB2)) /08 (Average of PV-1 to PV-3) } \\ & 109 \text { (Minimum data of PV-1 to PV-3) } \\ & / 10 \text { (Maximum data of PV-1 to PV-3) } \end{aligned}$ | 01 |
| AF254 | Servo lock/ DC injection time at stop, 2nd-motor | same to AF154 |  |  |  |  |  |
| AG101 | Jump frequency 1 , 1st-motor | 0.00 to $590.00(\mathrm{~Hz})$ | 0.00 |  |  |  |  |
| AG102 | Jump frequency width 1 , | 0.00 to 10.00 (Hz) |  | AH-60 | PID1 gain change method selection | 00 (Using gain-1 only) $/ 01$ (Changed by Terminal[PRO]) | 00 |
|  |  |  |  | AH-61 | PID1 proportional gain 1 | 0.0 to 100.0 | 1.0 |
| AG103 | Jump frequency 2, 1st-motor | 0.00 to 590.00 (Hz) |  | AH-62 | PID1 integral time constant 1 | 0.0 to 3600.0(s) | 1.0 |
| AG104 | Jump frequency width 2, 1st-motor | 0.00 to 10.00 (Hz) |  | 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 |
| AG105 | 1st-motor | 0.00 to 590.00 (Hz) |  | AH-65 | PID1 integral time constant 2 | 0.0 to 3600.0(s) | 0.0 |
| AG106 | Jump frequency width 3 , 1st-motor | 0.00 to $10.00(\mathrm{~Hz})$ |  | AH-66 | PID1 derivative gain 2 | 0.00 to 100.00(s) | 0.00 |
|  | Acceleration stop frequency |  |  | AH-67AH-70 | PID feed-forward selection | 0 to 10000 (ms) | 100 |
| AG110 | setting, sts-motor | 0.00 to 590.00(Hz) |  |  |  | ```00 (Disable) /01 (Setting by Terminal [Ai1]) /02 (Setting by Terminal [Ai2])/03 (Setting by Terminal [Ai3]) /04 (Setting by Terminal [Ai4])/05 (Setting by Terminal [Ai5]) /06 (Setting by Terminal [Ai6])``` | 00 |
| AG111 | Acceleration stop time setting, 1st-motor | 0.00 to 60.00(s) | 0.0 |  |  |  |  |
| AG112 | Deceleration stop frequency setting, 1st-motor | 0.00 to 590.00(Hz) | 0.00 | AH-71 | PID1 output variable | 0.00 to 100.00(\%) | 0.00 |
|  | Acceleration stop time setting, 1st-motor | 0.00 to 60.00(s) | 0.0 | AH-72 | PID1 Deviation over level |  | 3.00 |
| AG113 |  |  |  | AH-73 | PID1 Feedback compare signal turn-off level |  | 100.00 |
| AG-20 | Jogging frequency | 0.00 to 10.00 (Hz) | 6.00 | AH-74 | PID1 Feedback compare signal turn-on level | 0.00 to 100.00(\%) | 0.00 |
| AG-21 | Jogging stop mode selection | 00 (Free run at Jogging stop (Disable at run) <br> /01 (Deceleration stop at Jogging stop (Disable at run) <br> /02 (Dynamic brake at Jogging stop (Disable at run)) <br> /03 (Free run at Jogging stop (Enable at run)) <br> /04 (Deceleration stop at Jogging stop (Enable at run)) <br> /05 (Dynamic brake at Jogging stop (Enable at run)) | 00 |  |  |  |  |
|  |  |  |  | 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 |
| AG201 | Jump frequency 1 , 2nd-motor | same to AG101 | 0.00 | AH-80 | PID soft start time | 0.00 to 100.00(s) | 0.00 |
| AG202 | Jump frequency width 1 , 2nd-motor | same to AG102 |  | AH-81 | PID soft start error detection enable | 00 (Disable) /01 (Enable(Error output)) | 00 |
| AG203 | Jump frequency 2, 2nd-motor | same to AG103 |  | AH-82 | PID soft start error detection level | 0.00 to 100.00(s) | 0.00 |
| AG204 | Jump frequency width 2, 2nd-motor | same to AG104 |  | AH-85 | PID sleep trigger selection | 00 (Disable) /01 (Low output) /02 (Terminal [SLEP] input) | 00 |
|  |  |  |  | AH-86 | PID sleep start level | 0.00 to 590.00(Hz) | 0.00 |
| AG205 | Jump frequency 3 , 2nd-motor | same to AG105 |  | AH-87 | PID sleep active time | 0.0 to 100.0(s) | 0.00 |
| AG206 | Jump frequency width 3 , 2nd-motor | same to AG106 |  | AH-88 | Setpoint boost before PID sleep enable | 00 (Disable) 010 (Enable) | 00 |
|  |  | same to AG110 |  | H-8 | Setpoint boost time | 0.00 to 100.00(s) | 0.00 |
| AG210 | Acceleration stop riequency setting, 2nd-motor |  |  | AH-90 | Setpoint boost value |  | 0.00 |
| AG211 | Acceleration stop time setting, 2nd-motor | same to AG111 | 0.0 | AH-91 | Minimum RUN time befor PID sleep | 0.00 to 100.00(s) | 0.00 |
| AG212 | Deceleration stop frequency setting, 2nd-motor | same to AG112 | 0.00 | AH-92 | Minimum active time of PID sleep |  |  |
|  | Acceleration stop time | same to AG113 | 0.0 | AH-93 | PID sleep trigger selection | 01 (Deviation value) /02 (Low feedback) /03 (Terminal [WAKE] input) | 01 |
| AG213 | setting, 2nd-motor |  |  | AH-94 | PID wake start level | 0.00 to 100.00(\%) | 0.00 |
| AH-01 | PID1 enable | 00 (Disable) /01 (Enable) 102 (Enable (with reverse output)) | 00 | AH-95 | PID wake start time | 0.00 to 100.00(s) |  |
| AH-02 | PID1 deviation inverse | 00(Disable)/01(Enable) | 00 | AH-96 | PID wake start deviation value | 0.00 to 100.00(\%) |  |
| AH-03 | Unit selection for PID1 | refer to the table for unit | 01 |  |  |  |  |
| AH-04 | PID1 scale adjustment | -10000 to 10000 | 0 | AJ-01 | PID2 enable | 00 (Disable) /01 (Enable) /02 (Enable (with reverse output)) | 00 |
| AH-04 | (at 0\%) |  |  | AJ-02 | PID2 deviation inverse |  | 00 |
| AH-05 | PID1 scale adjustment |  | 10000 | AJ-03 | PID2 unit selection | refer to the separated list for unit | 01 |
| AH-05 | (at 100\%) |  |  | AJ-04 | PID2 scale adjustment(at 0\%) | -10000 to 10000 | 0 |
| AH-06 | PID1 scale adjustment | 0 to 4 | 2 | $\begin{aligned} & \text { AJ-05 } \\ & \hline \text { AJ-06 } \end{aligned}$ | PID2 scale adiustment(at 100\%) |  | 10000 |
|  | (point position) | 00 (Not use) /01 (Setting by Terminal [Ai1]) /02 (Setting by Terminal [Ai2]) /03 (Setting by Terminal [Ai3]) 104 (Setting by Terminal [Ai4]) /05 (Setting by Terminal [Ai5]) 106 (Setting by Terminal [Ai6]) /07 (Setting by parameter) /08 (Setting by RS485) /09 (Option-1) /10 (Option-2) <br> /11 (Option-3) /12 (Pulse train input(internal)) <br> /13 (Pulse train input(Option)) |  |  | PID2 scale adjustment (point position) | 0 to 4 | 07 |
| AH-07 <br>  <br> AH-10 | Input source selection of Set-point for PID1 <br> Set-point-1 setting for |  | 07 | AJ-07 | Input source selection of Set-point for PID2 | 00 (Disable) /01 (Setting by Terminal [Air]) /02 (Setting by Terminal [Ai2]) /03 (Setting by Terminal [Ai3]) /04 (Setting by Terminal [Ai4]) /05 (Setting by Terminal [Ai5]) /06 (Setting by Terminal [Ai6]) /07 (Setting by parameter) /08 (Setting by RS485) 09 (Option-1) /10 (Option-2) <br> /11 (Option-3) /12 (Pulse train input(internal)) <br> $/ 13$ (Pulse train input(Option)) /15 (PID function) |  |
|  | PID1 | 0.00 to $100.00(\%)$ Display range can be changed with [AH-04], [AH-05], [AH-06] | 0.00 | AJ-10 | Set-point setting for PID2 | 0.00 to $100.00(\%)$ Display range can be changed with [AJ-04], [AJ-05], [AJ-06] | 0.00 |
| $\begin{gathered} \text { AH-12 to } \\ \text { AH-40 } \end{gathered}$ | PID1 Multi stage set-point 1 to 15 setting |  |  |  |  |  |  |
| AH-42 | Input source selection of Set-point 2 for PID1 | 00 (Not use) /01 (Setting by Terminal [Ai1]) 102 (Setting by Terminal [Ai2]) /03 (Setting by Terminal [Ai3]) 104 (Setting by Terminal [Ai4]) /05 (Setting by Terminal [Ai5]) $/ 06$ (Setting by Terminal [Ai6]) /07 (Setting by parameter) /08 (Setting by RS485) /09 (Option-1) /10 (Option-2) <br> /11 (Option-3) /12 (Pulse train input(internal)) <br> /13 (Pulse train input(Option)) | 00 | AJ-12 | Input source selection of Process data for PID2 | 00 (Not use) /01 (Setting by Terminal [Ai1]) 102 (Setting by Terminal [Ai2])/03 (Setting by Terminal [Ai3]) 104 (Setting by Terminal [Ai4])/05 (Setting by Terminal [Ai5]) 106 (Setting by Terminal [Ai6]) /07 (Setting by parameter) 108 (Setting by RS485) /09 (Option-1) /10 (Option-2) /11 (Option-3) /12 (Pulse train input(internal)) /13 (Pulse train input(Option)) | 02 |
|  |  |  |  | AJ-13 | PID2 proportional gain | 0.0 to 100.0 | 1.0 |
| AH-44 | Set-point 2 setting for PID1 | 0.00 to 100.00 (\%) Display range can be changed with [AH-04], [AH-05], [AH-06] | 0.00 | AJ-14 | PID2 integral time | 0.0 to 3600.0(s) | 1.0 |
| AH-46 | Input source selection of Set-point 3 for PID1 | ```00 (Not use)/01 (Setting by Terminal [Ai1]) /02 (Setting by Terminal [Ai2]) /03 (Setting by Terminal [Ai3]) /04 (Setting by Terminal [Ai4]) /05 (Setting by Terminal [Ai5]) /06 (Setting by Terminal [Ai6]) /07 (Setting by parameter) /08 (Setting by RS485) /09 (Option-1)/10 (Option-2) /11 (Option-3)/12 (Pulse train input(internal)) /13 (Pulse train input(Option))``` | 00 | AJ-15 | PID2 derivative gain | 0.00 to 100.00(s) | 0.00 |
|  |  |  |  | AJ-16 | PID2 output variable | 0.00 to 100.00(\%) | 0.00 |
|  |  |  |  | AJ-17 | PID2 Deviation over level |  | 3.00 |
|  |  |  |  | AJ-18 | PID2 Feedback compare signal turn-off level |  | 100.00 |
|  |  |  |  | AJ-19 | PID2 Feedback compare signal turn-on level |  | 0.00 |
| AH-48 | Set-point 2 setting for PID1 | 0.00 to $100.00(\%)$ Display range can be changed with [AH-04], [AH-05], [AH-06] | 0.00 |  |  |  | 00 |
| AH-50 | Calculation symbol selection of Set-point 1 for PID1 | 01 (Addition) /02 (Subtraction) /03 (Multiplication) /04 (Division) /05 (Minimum deviation) /06 (Maximum deviation) | 01 | $\begin{aligned} & \text { AJJ-22 } \\ & \hline \text { AJ-23 } \\ & \hline \text { AJ-24 } \\ & \hline \end{aligned}$ | PID3 deviation inverse <br> PID3 unit selection <br> PID3 scale adjustment <br> (at 0\%) | 00 (Disable) /01 (Enable) | 00 |
|  |  |  |  |  |  | refer to the separated list for unit | 01 |
|  |  | /05 (Minimum deviation) /06 (Maximum deviation) |  |  |  | -10000 to 10000 | 0 |


| Code No. | Parameter Meaning | Selectable User Setting | Initial value |
| :---: | :---: | :---: | :---: |
| AJ-25 | PID3 scale adjustment (at 100\%) | -10000 to 10000 | 10000 |
| AJ-26 | PID3 scale adjustment (point position) | 0 to 4 | 2 |
| AJ-27 | Input source selection of Set-point for PID3 | 00 (Not use) /01 (Setting by Terminal [Ai1]) <br> 102 (Setting by Terminal [Ai2]) /03 (Setting by Terminal [Ai3]) <br> 104 (Setting by Terminal [Ai4]) /05 (Setting by Terminal [Ai5]) <br> 106 (Setting by Terminal [Ai6]) /07 (Setting by parameter) <br> /08 (Setting by RS485) /09 (Option-1) /10 (Option-2) <br> /11 (Option-3) /12 (Pulse train input(internal)) <br> /13 (Pulse train input(Option)) | 07 |
| AJ-30 | Set-point setting for PID3 | 0.00 to 100.00(\%) Display range can be changed with [AJ-24], [AJ-25], [AJ-26] | 0.00 |
| AJ-32 | Input source selection of Process data for PID3 | ```00 (Not use)/01 (Setting by Terminal [Ai1]) /02 (Setting by Terminal [Ai2])/03 (Setting by Terminal [Ai3]) /04 (Setting by Terminal [Ai4])/05 (Setting by Terminal [Ai5]) /06 (Setting by Terminal [Ai6]) /07 (Setting by parameter) /08 (Setting by RS485)/09 (Option-1)/10 (Option-2) /11 (Option-3) /12 (Pulse train input(internal)) /13 (Pulse train input(Option))``` | 01 |
| 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 |
| AJ-36 | PID3 output variable | 0.00 to 100.00(\%) | 0.00 |
| AJ-37 | PID3 Deviation over level |  | 3.00 |
| AJ-38 | PID3 Feedback compare signal turn-off level |  | 100.00 |
| AJ-39 | PID3 Feedback compare signal turn-on level |  | 0.00 |
| AJ-41 | PID4 enable | 00 (Disable) /01 (Enable) /02 (Enable (with reverse output)) | 00 |
| AJ-42 | PID4 deviation inverse | 00 (Disable) /01 (Enable) | 00 |
| AJ-43 | PID4 unit selection | refer to the separated list for unit | 01 |
| AJ-44 | PID4 scale adjustment (at 0\%) | -10000 to 10000 | 0 |
| AJ-45 | PID4 scale adjustment (at 100\%) |  | 10000 |
| AJ-46 | PID4 scale adjustment (point position) | 0 to 4 | 2 |
| AJ-47 | Input source selection of Set-point for PID4 | 00 (Not use) /01 (Setting by Terminal [Ai1]) <br> 102 (Setting by Terminal [Ai2]) /03 (Setting by Terminal [Ai3]) <br> 104 (Setting by Terminal [Ai4]) /05 (Setting by Terminal [Ai5]) <br> 106 (Setting by Terminal [Ai6]) /07 (Setting by parameter) <br> /08 (Setting by RS485) /09 (Option-1) /10 (Option-2) <br> /11 (Option-3) /12 (Pulse train input(internal)) <br> /13 (Pulse train input(Option)) | 07 |
| AJ-50 | Set-point setting for PID4 | 0.00 to 100.00(\%) Display range can be changed with [AJ-44], [AJ-45], [AJ-46] | 0.00 |
| AJ-52 | Input source selection of Process data for PID4 | 00 (Not use) /01 (Setting by Terminal [Ai1]) 102 (Setting by Terminal [Ai2]) /03 (Setting by Terminal [Ai3]) 104 (Setting by Terminal [Ai4]) /05 (Setting by Terminal [Ai5]) 106 (Setting by Terminal [Ai6]) /07 (Setting by parameter) /08 (Setting by RS485) /09 (Option-1) /10 (Option-2) <br> /11 (Option-3) /12 (Pulse train input(internal)) <br> /13 (Pulse train input(Option)) | 01 |
| 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 |
| AJ-56 | PID4 output variable | 0.00 to 100.00(\%) | 0.00 |
| AJ-57 | PID4 Deviation over level |  | 3.00 |
| AJ-58 | PID4 Feedback compare signal turn-off level |  | 100.00 |
| AJ-59 | PID4 Feedback compare signal turn-on level |  | 0.00 |

## - Parameter mode (B code)

| Code No. | Parameter Meaning | Selectable User Setting | Initial value |
| :---: | :---: | :---: | :---: |
| bA101 | Frequency limit selection, 1st-motor | 00 (Disable) 01 (Setting by Terminal [Ai1]) <br> 02 (Setting by Terminal [Ai2]) 03 (Setting by Terminal [Ai3]) 04 <br> (Setting by Terminal [Ai4]) 05 (Setting by Terminal [Ai5]) <br> 06 (Setting by Terminal [Ai6]) 07 (Setting by parameter) <br> 08 (Setting by RS485) 09 (Option-1) 10 (Option-2) <br> 11 (Option-3) 12 (Pulse train input(internal)) <br> 13 (Pulse train input(Option)) | 00 |
| bA102 | Upper Frequency limit, 1st-motor | 0.00 to $590.00(\mathrm{~Hz})$ | 0.00 |
| bA103 | Lower Frequency limit , 1st-motor | 0.00 to 590.00 (Hz) | 0.00 |
| bA110 | Torque limit selection, 1st-motor | 00 (Disable) $/ 01$ (Setting by Terminal [Ai1]) <br> 102 (Setting by Terminal [Ai2]) /03 (Setting by Terminal [Ai3]) <br> 104 (Setting by Terminal [Ai4]) /05 (Setting by Terminal [Ai5]) <br> /06 (Setting by Terminal [Ai6]) /07 (Setting by parameter) <br> /08 (Setting by RS485) /09 (Option-1) /10 (Option-2) <br> /11 (Option-3) | 07 |
| bA111 | Torque limit parameter mode selection, 1st-motor | 00 (Quadrant-specific setting) /01 (Switching by terminal [TRQ]) | 00 |
| bA112 | Torque limit 1 (Forward driving), 1st-motor | 0.0 to 500.0(\%) | 150.0 |
| bA113 | Torque limit 2 (Reverse regenerative), 1st-motor |  |  |
| bA114 | Torque limit 3 (Reverse driving), 1st-motor |  |  |
| bA115 | Torque limit 4 (Forward regenerative), 1st-motor |  |  |
| bA116 | Torque limit LADSTOP selection, 1st-motor | 00 (Disable) / 01 (Enable) | 00 |
| bA120 | Over current suppress enable, 1st-motor | 00 (Disable) / 01 (Enable) | 01 |
| bA121 | Over current suppress <br> Level, 1st-motor | INV rated current $\times$ (0.00 to 2.00) | $1.80 \times$ Inverter rated current ( A ) |


| Code No. | Parameter Meaning | Selectable User Setting | Initial value |
| :---: | :---: | :---: | :---: |
| bA122 | Overload restriction 1 mode selection, 1st-motor | 00 (Disable) /01 (Enable during accel. and constant speed) /02 (Enable during constant speed) <br> 103 (Enable during accel. and constant speed (Accel. during regeneration)) | 01 |
| bA123 | Overload restriction 1 active level, 1st-motor | INV rated current $\times(0.00$ to 2.00 ) | $1.50 \times$ Inverter rated current (A) |
| bA124 | Overload restriction 1 active level, 1st-motor | 11 (Option-3) | 1.00 |
| bA126 | Overload restriction 2 mode selection, 1st-motor | 00 (Disable) /01 (Enable during accel. and constant speed) /02 (Enable during constant speed) <br> 103 (Enable during accel. and constant speed (Accel. during regeneration)) | 01 |
| bA127 | Overload restriction 2 active level, 1st-motor | INV rated current $\times$ (0.00 to 2.00) | $1.50 \times$ Inverter rated current ( $A$ ) |
| bA128 | Overload restriction 2 active level, 1st-motor | 0.10 to 3600.00(s) | 1.00 |
| bA-30 | Deceleration-stop at power failure | 00 (Disable) /01 (Deceleration stop) <br> 102 (Deceleration-stop at power failure (with resume)) <br> 103 (Deceleration-stop at power failure (without resume) | 00 |
| bA-31 | Decel.-stop at power failure starting voltage | (200V class) 0.0 to $410.0(\mathrm{Vdc})$ | $\begin{aligned} & \text { (200V class) } 220.0 \\ & (400 \mathrm{~V} \text { class) } 440.0 \end{aligned}$ |
| bA-32 | Decel-stop at power failure control target level | (400V class) 0.0 to $820.0(\mathrm{Vdc})$ | $\begin{aligned} & (200 \mathrm{~V} \text { class) } 360.0 \\ & (400 \mathrm{~V} \text { class) } 720.0 \\ & \hline \end{aligned}$ |
| bA-34 | Decel-stop at power failure control target level | 0.01 to 3600.00(s) | 1.00 |
| bA-36 | Decel-stop at power failure freq. width at deceleration start | 0.00 to 10.00 (Hz) | 0.00 |
| bA-37 | Decel-stop at power failure DC-bus voltage constant control P-gain | 0.00 to 5.00 | 0.20 |
| bA-38 | Decel-stop at power failure DC-bus voltage constant control I-gain | 0.00 to 150.00(s) | 1.00 |
| bA140 | Over-voltage suppression enable, 1st-motor | 00:Disable /01:DC bus constant control (deceleration stop) <br> 102:Enable acceleration <br> 103:Enable acceleration (at constant speed and deceleration) | 00 |
| bA141 | Over-voltage suppression active level, 1st-motor | (200V class) 330.0 to $400.0(\mathrm{Vdc})$ ( 400 V class) 660.0 to $800.0(\mathrm{Vdc})$ | $\begin{aligned} & (200 \mathrm{~V} \text { class) } 380.0 \\ & (400 \mathrm{~V} \text { class) } 760.0 \end{aligned}$ |
| bA142 | Over-voltage suppression active level, 1st-motor | 0.00 to 3600.00 (s) | 1.00 |
| bA144 | DC bus constant control proportional gain, 1st-motor | 0.00 to 5.00 | 0.20 |
| bA145 | DC bus constant control integral gain, 1st-motor | 0.00 to 150.00(s) | 1.00 |
| bA146 | Over magnetization function selection, 1st-motor | 00 (Disable), 01 (Always enable) 02 (At deceleration only) <br> 03 (Operation at setting level) <br> 04 (Operation at setting level at deceleration only) | 02 |
| bA147 | Over magnetization output filter time constant, 1st-motor | 0.00 to 1.00 (s) | 0.30 |
| bA148 | Over magnetization voltage gain, 1st-motor | 50 to 400(\%) | 100 |
| bA149 | Over magnetization level setting, 1st-motor | (200V class) 330.0 to 400.0 (Vdc) ( 400 V class) 660.0 to $800.0(\mathrm{Vdc})$ | (200V class) 360.0 <br> (400V class) 720.0 |
| bA-60 | Dynamic brake usage rate | 0.0 to 10.0x[bA-63]/(minimum resitance)(\%) | 10.0 |
| bA-61 | Dynamic brake selection | 00:Disable 101 (Enable (Disabling at stop)) /02 (Enable (Enabling at stop)) | 00 |
| bA-62 | Dynamic brake active level | (200V class) 330.0 to $400.0(\mathrm{~V})$ <br> (400V class) 660.0 to $800.0(\mathrm{~V}$ ) | (200V class) 360.0 (400V class) 720.0 |
| bA-63 | Dynamic brake resister value | minimum resitance to 600( $\Omega$ ) | Minimum resistance. (It depends on inverter models.) |
| bA-70 | Cooling FAN control method selection | 00 (Usualy active) /01 (Active during driving) /02 (Tempareture matter) | 00 |
| bA-71 | Cooling fan accumulation running time monitor clearance selection | 00 (Disable) 101 (Clear) | 00 |
| bA201 | Frequency limit selection, 2nd motor | same as bA101 | 00 |
| bA202 | Upper frequency limit, 2nd motor | same as bA102 | 0.00 |
| bA203 | Lower frequency limit, 2nd motor | same as bA103 | 0.00 |
| bA210 | Torque limit selection, 2nd-motor | same as bA110 | 07 |
| bA211 | Torque limit parameter mode selection, 2nd-motor | same as bA111 | 00 |
| bA212 | Torque limit 1 (Forward driving), 2nd-motor | same as bA112 | 150.0(\%) |
| bA213 | Torque limit 2 (Reverse regenerative), 2nd-motor | same as bA113 |  |
| bA214 | Torque limit 3 (Reverse driving), 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 | 00 |
| bA220 | Over current suppress enable, 2nd-motor | same as bA120 | 01 |
| bA221 | Over current suppress Level, 2nd-motor | same as bA121 | $1.80 \times$ Inverter rated current ( A ) |
| bA222 | Overload restriction 1 mode selection, 2nd-motor | same as bA122 | 01 |
| bA223 | Overload restriction 1 active level, 2nd-motor | same as bA123 | $1.50 \times$ Inverter rated current ( A ) |


| Code No. | Parameter Meaning | Selectable User Setting | Initial value |
| :---: | :---: | :---: | :---: |
| bA224 | Overload restriction 1 active level, 2nd-motor | same as bA124 | 1.00 |
| bA226 | Overload restriction 2 mode selection, 2nd-motor | same as bA126 | 01 |
| bA227 | Overload restriction 2 active level, 2nd-motor | same as bA127 | $1.50 \times$ Inverter rated current (A) |
| bA228 | Overload restriction 2 active level, 2nd-motor | same as bA128 | 1.00 |
| bA240 | Over-voltage suppression enable, 2nd-motor | same as bA140 | 00 |
| bA241 | Over-voltage suppression active level, 2nd-motor | same as bA141 | $\begin{aligned} & \text { (200V Class) } 380.0 \\ & \text { ( } 400 \mathrm{~V} \text { class) } 760.0 \\ & \hline \end{aligned}$ |
| bA242 | Over-voltage suppression active level, 2nd-motor | same as bA142 | 1.00 |
| bA244 | DC bus constant control proportional gain, 2nd-motor | same as bA144 | 0.20 |
| bA245 | DC bus constant control integral gain, 2nd-motor | same as bA145 | 1.00 |
| bA246 | Over magnetization function selection, 2nd-motor | same as bA146 | 02 |
| bA247 | Over magnetization output filter time constant, 2nd-motor | same as bA147 | 0.30 |
| bA248 | Over magnetization voltage gain, 2nd-motor | same as bA148 | 100 |
| bA249 | Over magnetization level setting, 2nd-motor | same as bA149 | $\begin{aligned} & (200 \mathrm{~V} \text { class) } 360.0 \\ & (400 \mathrm{~V} \text { class) } 720.0 \end{aligned}$ |
| bb101 | Carrier frequency setting, 1st-motor | ```[Ub-03]=02 : Normal Duty 0.5 to \(16.0(\mathrm{kHz})\) [Ub-03]=01 : Light Duty 0.5 to \(12.0(\mathrm{kHz})\) [Ub-03]=00 : Very Light Duty 0.5 to \(10.0(\mathrm{kHz})\) \(\mathrm{P} 1-01760-\mathrm{H}(\mathrm{P} 1-750 \mathrm{H})\) to \(\mathrm{P} 1-03160-\mathrm{H}(\mathrm{P} 1-1320 \mathrm{H})\) are as follows [Ub-03]=02 : 0.5 to \(10.0(\mathrm{kHz})\) [Ub-03]=00 or \(01: 0.5\) to \(8.0(\mathrm{kHz})\)``` | 2.0 |
| bb102 | Sprinkle carrier pattern selection, 1st-motor | $\begin{aligned} & 00 \text { (Disable) /01 (Enable Pattern-1) } \\ & / 02 \text { (Enable Pattern-2) /03 (Enable Pattern-3) } \end{aligned}$ | 00 |
| bb103 | Automatic-carrier reduction selection, 1st-motor | 00 (Disable) /01 (Enable(Current)) /02 (Enable(Temperature)) | 00 |
| bb-10 | Automatic error reset selection | 00 (Disable) /01 (Effective by Run command is turn-off) 102 (effective after set time) /03 (Emergency force drive) | 00 |
| bb-11 | Alarm signal selection at Automatic error reset is active | 00 (Output) /01 (No output ) | 00 |
| bb-12 | Automatic error reset wait time | 0 to 600(s) | 2 |
| bb-13 | Automatic error reset number | 0 to 10(times) | 3 |
| bb-20 | The number of retries after instantaneous power failure | Oto 16,255 | 0 |
| bb-21 | The number of retries after under voltage | 010 16,255 | 0 |
| bb-22 | The number of retries after over current |  | 0 |
| bb-23 | The number of retries after over voltage | Oto | 0 |
| bb-24 | Selection of restart mode at Instantaneous power failure/ under-voltage trip | 00 (Start with OHz ) 01 (Start with frequency matching) 02 (Start with Active frequency matching) 03 (Detect speed) <br> 04 (Trip after Deceleration stop) | 01 |
| bb-25 | Allowable under-voltage power failure time | 0.3 to 25.0(s) | 1.0 |
| bb-26 | Retry wait time before motor restart | 0.3 to 100.0(s) | 0.3 |
| bb-27 | Instantaneous power failure/under-voltage trip alarm enable | 00 (Disable) /01 (Enable) <br> 102 (Disable at during stop \& during deceleration stop) | 00 |
| bb-28 | Selection of restart mode at over-current | 00 (Start with 0 Hz ) 01 (Start with frequency matching) <br> 02 (Start with Active frequency matching) 03 (Detect speed) <br> 04 (Trip after Deceleration stop) | 01 |
| bb-29 | Wait time of restart at over-current | 0.3 to 100.0(s) | 0.3 |
| bb-30 | Selection of restart mode at over-voltage | 00 (Start with OHz ) 01 (Start with frequency matching) 02 (Start with Active frequency matching) 03 (Detect speed) 04 (Trip after Deceleration stop) | 01 |
| bb-31 | Wait time of restart at over-voltage | 0.3 to 100.0(s) | 0.3 |
| bb-40 | Restart mode after FRS release | 00 (Start with 0Hz)/01 (Start with frequency matching) | 00 |
| bb-41 | Restart mode after RS release | 102 (Start with Active frequency matching) 103 (Detect speed) | 00 |
| bb-42 | Restart frequency threshold | 0.00 to 590.00(Hz) | 0.00 |
| bb-43 | Restart level of Active frequency matching | INV rated currentx(0.20 to 2.00) | $1.00 \times$ Inverter rated current |
| bb-44 | Restart constant(speed) of Active Frequency matching | 0.10 to 30.00(s) | 0.50 |
| bb-45 | Restart constant(Voltage) of Active Frequency matching | .1010 30.0(3) | 0.50 |
| bb-46 | OC-supress level of Active frequency matching | INV rated currentx(0.20 to 2.00) | $1.00 \times$ Inverter rated current |
| bb-47 | Restart speed selection of Active frequency matching | 00 (Output frequency at shut down) /01 (Maximum frequency) /02 (Setting frequency) | 00 |
| bb160 | Over current detection level, 1st-motor | INV rated current×(0.20 to 2.20) | $2.20 \times$ Inverter <br> ND rated current |


| Code No. | Parameter Meaning | Selectable User Setting | Initial value |
| :---: | :---: | :---: | :---: |
| bb-61 | Power supply over voltage selection | 00 (warning) /01 (error) | 00 |
| bb-62 | Power supply over voltage level setting | (200V class) 300.0 to $410.0(\mathrm{~V})$ <br> (400V class) 600.0 to $820.0(\mathrm{~V})$ | $\begin{aligned} & \text { (200V class) } 390.0 \\ & (400 \mathrm{~V} \text { class) } 780.0 \end{aligned}$ |
| bb-64 | Ground fault selection |  | 01 |
| bb-65 | Input phase loss enable | 00 (Disable) $/ 01$ (Enable) | 00 |
| bb-66 | Output phase loss enable |  | 00 |
| bb-67 | Output phase loss detection sensitivity | 1 to 100(\%) | 10 |
| bb-70 | Thermistor error level | 0 to 10000( $\Omega$ ) | 3000 |
| 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 |
| 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 |
| bb-85 | Position deviation error mode selection | 00 (warning) 101 (error) | 00 |
| bb-86 | Position deviation error detection level | 0 to 65535(x100pulse) | 4096 |
| bb-87 | Position deviation error detection time | 0.0 to 5.0(s) | 0.5 |
| bb201 | Carrier frequency setting, 2nd-motor | same as bb101 | 2.0 |
| bb202 | Sprinkle carrier pattern selection, 2nd-motor | same as bb102 | 00 |
| bb203 | Automatic-carrier reduction selection, 2nd-motor | same as bb103 | 00 |
| bb260 | Over current detection level, 2nd-motor | same as bb160 | $2.20 \times$ Inverter rated current |
| bC110 | Electronic thermal level setting, 1st-motor | INV rated currentx(0.20 to 3.00) | $1.00 \times$ Inverter rated current |
| bC111 | Electronic thermal characteristic selection, 1st-motor | 00 (Reduced torque characteristic(VT)) <br> 101 (Constant torque characteristic(CT)) <br> /02 (Free setting(FREE)) | 00(*FF) <br> /01(*FEF, *FUF) |
| bC112 | Electronic thermal Subtraction function enable, 1st-motor | 00 (Disable) $/ 01$ (Enable) | 01 |
| bC113 | Electronic thermal Subtraction time, 1st-motor | 1 to 1000(s) | 600 |
| bC-14 | Electronic thermal counter memory selection at Power-off | 00 (Disable) $/ 01$ (Enable) | 01 |
| bC120 | Free electronic thermal frequency-3, 1st-motor | 0.00 to $\mathrm{bC122}(\mathrm{~Hz})$ | 0.00 |
| bC121 | Free electronic thermal current-1, 1st-motor | INV rated currentx(0.20 to 3.00) | 0.0 |
| bC122 | Free electronic thermal frequency-2, 1st-motor | bC120 to bC124(Hz) | 0.00 |
| bC123 | Free electronic thermal current-2, 1st-motor | INV rated currentx(0.20 to 3.00) | 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 | INV rated current×(0.20 to 3.00) | 0.0 |
| bC210 | Electronic thermal level setting, 2nd-motor | same as bC110 | $1.00 \times$ Inverter rated current |
| bC211 | Electronic thermal characteristic selection, 2nd-motor | same as bC111 | 00 (*FF) <br> 101(*FEF, *FUF) |
| bC212 | Electronic thermal Subtraction function enable, 2nd-motor | same as bC112 | 01 |
| bC213 | Electronic thermal Subtraction time, 2nd-motor | same as bC113 | 600 |
| bC220 | Free electronic thermal frequency-1, 2nd-motor | 0.00 to bC222 | 0.00 |
| bC221 | Free electronic thermal current-1, 2nd-motor | same as bC121 | 0.0 |
| bC222 | Free electronic thermal frequency-2, 2nd-motor | bC220 to bC224 | 0.00 |
| bC223 | Free electronic thermal current-2, 2nd-motor | same as bC123 | 0.0 |
| bC224 | Free electronic thermal frequency-3, 2nd-motor | bC222 to 590.00(Hz) | 0.00 |
| bC225 | Free electronic thermal current-3, 2nd-motor | same as bC125 | 0.0 |
| bd-01 | STO input display selection | 00 (Warning(with display)) <br> /01 (Warning(without display)) /02 (Trip) | 00 |
| bd-02 | STO input change time | 0.00 to 60.00(s) | 1.00 |
| bd-03 | Display selection at STO input change time | 00 (Warning(with display)) /01 (Warning(without display)) | 00 |
| bd-04 | Action selection after STO input change time | 00 (only condition is hold)/01 (Disable)/02 (TRIP) | 00 |

- Parameter mode (C code)

| Code No. | Parameter Meaning | Selectable User Setting | Initial value |
| :---: | :---: | :---: | :---: |
| CA-01 | Input terminal [1] function | refer to "input terminal functions list" | 028 |
| CA-02 | Input terminal [2] function |  | 015 |
| CA-03 | Input terminal [3] function |  | 029 |
| CA-04 | Input terminal [4] function |  | 032 |
| CA-05 | Input terminal [5] function |  | 031 |
| CA-06 | Input terminal [6] function |  | 003 |
| CA-07 | Input terminal [ 7 ] function |  | 004 |
| CA-08 | Input terminal [8] function |  | 002 |
| CA-09 | Input terminal [9] function |  | 001 |
| CA-10 | Input terminal [ $A$ ] function |  | 033 |
| CA-11 | Input terminal [ $[8]$ function |  | 034 |
| $\begin{aligned} & \text { CA-21 to } \\ & \text { CA-31 } \end{aligned}$ | Input terminal [1] to $[9],[\mathrm{A}],[\mathrm{B}]$ active state | 00 (Normal open)/ 01 (Normal close) | 00 |
| $\begin{array}{\|c\|c\|} \hline \text { CA-41 to } \\ \text { CA-51 } \\ \hline \end{array}$ | Input terminal [1] to [9],[A],[B] response time | 0 to 400(ms) | 2 |
| CA-55 | Multistage input determination time | 0 to 2000(ms) | 0 |
| CA-60 | FUP/FDN overwrite target selection | 00 (Speed Reference)/01 (PID1 Setpoint) | 00 |
| CA-61 | FUP/FDN data save enable | 00 (Not save)01 (Save) | 00 |
| CA-62 | FUP/FDN UDC selection | 00 (0Hz)/ 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 |  |  |
| CA-70 | Speed command selection when [F-OP] active | 01 (Setting by Terminal [Ai1])/02 (Setting by Terminal [Ai2]) /03 (Setting by Terminal [Ai3]) $/ 04$ (Setting by Terminal [Ai4]) 105 (Setting by Terminal [Ai5]) /06 (Setting by Terminal [Ai6]) 107 (Setting by parameter) /08 (Setting by RS485) /09 (Option-1) /10 (Option-2) /11 (Option-3) /12 (Pulse train input(internal)) /13 (Pulse train input(Option)) /14 (Setting by EzSQ) /15 (PID function) /16 (Volume on keypad) | 01 |
| CA-71 | RUN command source selection at [F-OP] is active | 00 (Terminal [FW]/[RV]) /01 (3-wire)/02 (RUN key on keypad) $/ 03$ (Setting by RS485) /04 (Option-1) /05 (Option-2) /06 (Option-3) | 00 |
| CA-72 | Reset mode selection | 00 (Trip release at turn-on) /01 (Trip release at turn-off) 102 (Effective only in trip ON condition) 103 (Effective only in trip OFF condition) | 00 |
| CA-81 | Encoder constant setting | 32 to 65535(Pls) | 1024 |
| CA-82 | Encoder position selection | 00 (Phase-A Lead) /01 (Phase-B Lead) | 00 |
| CA-83 | Motor gear ratio Numerator | 1 to 10000 | 1 |
| CA-84 | Motor gear ratio Denominator | 1 to 10000 | 1 |
| CA-90 | Pulse train detection object selection | 00 (Disable) /01 (reference) /02 (Speed feedback) /03 (Pulse count) | 00 |
| CA-91 | Mode selection of pulse train input | 00 (90 $0^{\circ}$ shift pulse train) <br> 101 (Forward/ Reverse pulse train and direction signal) <br> 102 (Forward pulse train and Reverse pulse train) | 00 |
| CA-92 | Pulse train frequency Scale | 0.05 to 32.0 (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 frequency High Limit | 0.0 to 100.0(\%) | 100.0 |
| CA-96 | Pulse train frequency detection low level |  | 0.0 |
| CA-97 | Comparing match output ON-level for Pulse count | 0 to 65535 | 0 |
| CA-98 | Comparing match output OFF-level for Pulse count |  | 0 |
| CA-99 | Comparing match output Maximum value for Pulse count |  | 65535 |
| $\mathrm{Cb}-01$ | Filter time constant of Terminal [Ai1] | 1 to $500(\mathrm{~ms})$ | 16 |
| Cb -03 | Start value of Terminal [Ait] | 0.00 to 100.00(\%) | 0.00 |
| Cb -04 | End value of Terminal [Ait] |  | 100.00 |
| Cb-05 | Start rate of Terminal [Ai1] | 0.0 to [Cb-06](%25) | 0.0 |
| $\mathrm{Cb}-06$ | End rate of Terminal [Ait] | [Cb-05] to 100.0(\%) | 100.0 |
| $\mathrm{Cb}-07$ | Start point selection of Terminal [Air] | 00 (Start value) 01 (0\%) | 01 |
| $\mathrm{Cb}-11$ | Filter time constant of Terminal [Aiz] | 1 to 500(ms) | 16 |
| Cb -13 | Start value of Terminal [Aiz] | 0.00 to 100.00(\%) | 0.00 |
| Cb-14 | End value of Terminal [Air] |  | 100.00 |
| Cb-15 | Start rate of Terminal [Ai2] | 0.0 to [Cb-16](%25) | 20.0 |
| Cb -16 | End rate of Terminal [Ai2] | [Cb-15] to 100.0(\%) | 100.0 |
| Cb-17 | Start point selection of Terminal [Ai2] | 00 (Start value) $/ 01$ (0\%) | 01 |
| $\mathrm{Cb}-21$ | Filter time constant of Terminal [Aiz] | 1 to 500(ms) | 16 |
| $\mathrm{Cb}-22$ | Terminal [Ai3] selection | 00 (single) /01 (added to Ai1/Ai2 : forward and reverse) 102 (added to Ai1/Ai2 : forward only) | 00 |
| Cb-23 | Start value of Terminal [Ai3] | -100.00 to 100.00(\%) | -100.00 |
| Cb-24 | End value of Terminal [Ai3] |  | 100.00 |
| Cb-25 | Start rate of Terminal [Ais] | -100.0 to [Cb-26] | -100.0 |
| $\mathrm{Cb}-26$ | End rate of Terminal [Ai3] | [Cb-25] to 100.0 | 100.0 |
| $\mathrm{Cb}-30$ | [Ai1] Voltage/Current zero-bias adjustment | -100.00 to 100.00(\%) | 0.00 |
| $\mathrm{Cb}-31$ | [Ail] Voltage/Current gain adjustment | 0.00 to 200.00(\%) | 100.00 |
| $\mathrm{Cb}-32$ | [Ai2] Voltage/Current zero-bias adjustment | -100.00 to 100.00(\%) | 0.00 |


| Code No. | Parameter Meaning | Selectable User Setting | Initial value |
| :---: | :---: | :---: | :---: |
| Cb -33 | [Ai2] Voltage/Current gain adjustment | 0.00 to 200.00(\%) | 100.00 |
| Cb -34 | [Ai3] Voltage -10V-bias adjustment | -100.00 to 100.00 (\%) | 0.00 |
| Cb -35 | [Ai3] Voltage gain adjustment | 0.00 to 200.00(\%) | 100.00 |
| Cb -40 | Thermistor type selection | 00 (Disable) /01 (PTC) 002 (NTC) | 00 |
| Cb -41 | Thermistor gain adjustment | 0.0 to 1000.0 | 100.0 |
| Cb -51 | Filter time constant of Volume on QOP | 1 to 500(ms) | 100 |
| $\mathrm{Cb}-53$ | Start value of Volume on QOP | 0.00 to 100.00(\%) | 0.00 |
| Cb -54 | End value of Volume on QOP |  | 100.00 |
| $\mathrm{Cb}-55$ | Start rate of Volume on QOP | 0.0 to [Cb-56]]\%) | 0.0 |
| Cb -56 | End rate of Volume on QOP | [Cb-55] to 100.0(\%) | 100.0 |
| $\mathrm{Cb}-57$ | Start point selection of Volume on QOP | 00 ([Cb-53]) /01 (0\%) | 01 |
| CC-01 | Output terminal [11] function | refer to "output terminal functions list" | 001 |
| CC-02 | Output terminal [12] function |  | 002 |
| CC-03 | Output terminal [13] function |  | 003 |
| CC-04 | Output terminal [14] function |  | 007 |
| CC-05 | Output terminal [15] function |  | 035 |
| CC-06 | Relay output terminal [16] function |  | 040 |
| CC-07 | Relay output terminal [AL] function |  | 017 |
| $\begin{aligned} & \text { CC-11 } \\ & \text { to } 16 \\ & \hline \end{aligned}$ | Output terminal [11] to [16] active state | 00 (Normal open)/ 101 (Normal close) | 00 |
| CC-17 | Relay output terminal [AL] active state |  | 01 |
| CC-20 | Output terminal [11] on-delay time | 0.00 to 100.00(s) | 0.00 |
| CC-21 | Output terminal [11] off-delay time |  |  |
| CC-22 | Output terminal [12] on-delay time |  |  |
| CC-23 | Output terminal [12] off-delay time |  |  |
| CC-24 | Output terminal [13] on-delay time |  |  |
| CC-25 | Output terminal [13] off-delay time |  |  |
| CC-26 | Output terminal [14] on-delay time |  |  |
| CC-27 | Output terminal [14] off-delay time |  |  |
| CC-28 | Output terminal [15] on-delay time |  |  |
| CC-29 | Output terminal [15] off-delay time |  |  |
| CC-30 | Output relay [16] on-delay time |  |  |
| CC-31 | Relay output terminal [16] off-delay time |  |  |
| CC-32 | Relay output terminal [AL] on-delay time |  |  |
| CC-33 | Relay output terminal [AL] off-delay time |  |  |
| CC-40 | Logical calculation target 1 selection of LOG1 | < output terminal functions list > <br> 062 : LOG1 to 068 : LOG7 cannot be selected | 000 |
| CC-41 | Logical calculation target 2 selection of LOG1 |  | 000 |
| CC-42 | Logical calculation symbol selection of LOG1 | 00 (AND) 101 (OR) /02 (XOR) | 00 |
| CC-43 | Logical calculation target 1 selection of LOG2 | < output terminal functions list > 062 : LOG1 to 068 : LOG7 cannot be selected | 000 |
| CC-44 | Logical calculation target 2 selection of LOG2 |  | 000 |
| CC-45 | Logical calculation symbol selection of LOG2 | 00 (AND) 101 (OR) /02 (XOR) | 00 |
| CC-46 | Logical calculation target 1 selection of LOG3 | < output terminal functions list> 062 : LOG1 to 068 : LOG7 cannot be selected | 000 |
| CC-47 | Logical calculation target 2 selection of LOG3 |  | 000 |
| CC-48 | Logical calculation symbol selection of LOG3 | 00 (AND) 101 (OR)/02 (XOR) | 00 |
| CC-49 | Logical calculation target 1 selection of LOG4 | < output terminal functions list > 062 : LOG1 to 068 : LOG7 cannot be selected | 000 |
| CC-50 | Logical calculation target 2 selection of LOG4 |  | 000 |
| CC-51 | Logical calculation symbol selection of LOG4 | 00 (AND) 101 (OR) /02 (XOR) | 00 |
| CC-52 | Logical calculation target 1 selection of LOG5 | < output terminal functions list> <br> 062 : LOG1 to 068 : LOG7 cannot be selected | 000 |
| CC-53 | Logical calculation target 2 selection of LOG5 |  | 000 |
| CC-54 | Logical calculation symbol selection of LOG5 | 00 (AND) 101 (OR) /02 (XOR) | 00 |
| CC-55 | Logical calculation target 1 selection of LOG6 | < output terminal functions list > 062 : LOG1 to 068 : LOG7 cannot be selected | 000 |


| Code No. | Parameter Meaning | Selectable User Setting | Initial value | Code No. | Parameter Meaning | Selectable User Setting | Initial value |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| CC-56 | Logical calculation target 2 selection of LOG6 | < output terminal functions list> 062 : LOG1 to 068 : LOG7 cannot be selected | 000 | CE-45 | Window compareter for [Ai2] hysterisis width | 0 to 10(\%) | 0 |
| CC-57 | Logical calculation symbol selection of LOG6 | 00 (AND) 101 (OR) /02 (XOR) | 00 | CE-46 | Window compareter for [Ai3] higher level | -100 to 100(\%) | 100 |
| CC-58 | Logical calculation target 1 selection of LOG7 | < output terminal functions list > <br> 062 : LOG1 to 068 : LOG7 cannot be selected | 000 | CE-47 | Window compareter for [Ai3] lower level |  | -100 |
| CC-59 | Logical calculation target 2 selection of LOG7 |  | 000 | CE-48 | Window compareter for [Ai3] hysterisis width | 0 to 10(\%) | 0 |
| CC-60 | Logical calculation symbol selection of LOG7 | 00 (AND) 101 (OR) /02 (XOR) | 00 | CE-50 | Operation level at [Ai1] disconnection | 0 to 100(\%) | 0 |
| Cd-01 | [FM] monitor output wave form selection | 00 (PWM output (Duty)) /01 (Frequency output) | 00 | CE-51 | Operation level selection at [Ai1] disconnection | 00 (Disable) /01 (Enable(at WC* active) /02 (Enable(at WC* de-active) | 00 |
| Cd-02 | [FM] monitor output base frequency (at PWM output) | 0 to 3600(Hz) | 2880 | CE-52 | Operation level at [Ai2] disconnection | 0 to 100\%) | 0 |
| Cd-03 | [FM] monitor output selection | Monitor code to be selected. | [dA-01] | CE-53 | Operation level selection at [Ai2] disconnection | 00 (Disable) /01 (Enable(at WC* active) /02 (Enable(at WC* de-active) | 00 |
| Cd-04 | [Ao1] monitor output selection |  | [dA-01] | CE-54 | Operation level at [Ai3] disconnection | -100 to 100(\%) | 0 |
| Cd-05 | [Ao2] monitor output selection |  | [dA-01] | CE-55 | Operation level selection at [Ai3] disconnection | 00 (Disable) /01 (Enable(at WC* active) /02 (Enable(at WC* de-active) | 00 |
| Cd-10 | Analog monitor adjust mode enable | 00 (Disable) 101 (Enable) | 00 | CE201 | Low current signal output mode selection, | Same as CE101 | 01 |
| Cd-11 | Filter time constant of [FM] monitor | 1 to 500(ms) | 100 |  | 2nd-motor |  |  |
| Cd-12 | [FM] Data type selection | 00 (Absolute data) 101 (Signed data) | 00 | CE202 | level 1, 2nd-motor | Same as CE102 | $1.00 \times$ Inverter rated current |
| Cd-13 | [FM] monitor bias adjustment | -100.0 to 100.0(\%) | 0.0 | CE203 | Low current detection | Same as CE103 |  |
| Cd-14 | [FM] monitor gain adjustment | -1000.0 to 1000.0(\%) | 100.0 |  |  |  |  |
| Cd-15 | Output level setting at [FM] monitor adjust mode | -100.0 to 100.0(\%) | 100.0 | CE205 | Over load signal output mode selection, 2nd-motor | Same as CE105 | 01 |
| Cd-21 | Filter time constant of [Ao1] monitor | 1 to 500(ms) | 100 | CE206 | Over load detection level 1, 2nd-motor | Same as CE106 | $1.00 \times$ Inverter rated current |
| Cd-22 | [A01] Data type selection | 00 (Absolute data) 101 (Signed data) | 00 | CE207 | Over load detection level | Same as CE107 |  |
| Cd-23 | [Ao1] monitor bias adjustment | -100.0 to 100.0(\%) | 0.0 |  | 2, 2nd-motor |  |  |
| Cd-24 | [Ao1] monitor gain adjustment | -1000.0 to 1000.0(\%) | 100.0 | CE220 | Over torque level (Forward driving), 2nd-motor | Same as CE120 | 100.0 |
| Cd-25 | Output level setting at <br> [Ao1] monitor adjust mode | -100.0 to 100.0(\%) | 100.0 | CE221 | Over torque level (Reverse regenerative), | Same as CE121 |  |
| Cd-31 | Filter time constant of [Ao2] monitor | 1 to 500(ms) | 100 |  |  |  |  |
| Cd-32 | [A02] Data type selection | 00 (Absolute data) 0101 (Signed data) | 00 | CE222 | (Reverse driving), | Same as CE122 |  |
| Cd-33 | [Ao2] monitor bias adjustment | -100.0 to 100.0(\%) | 20.0 |  | 2nd-motor |  |  |
| Cd-34 | [Ao2] monitor gain adjustment | -1000.0 to 1000.0(\%) | 100.0 | CE223 | (Forward regenerative), <br> 2nd motor | Same as CE123 |  |
| Cd-35 | Output level setting at [Ao2] monitor adjust mode | -100.0 to 100.0(\%) | 100.0 | CF-01 | RS485 communication baud rate selection | 03 (2400bps) /04 (4800bps) /05 (9600bps) /06 (19.2kbps) /07 ( 38.4 kbps ) / 08 ( 57.6 kbps ) /09 ( 76.8 kbps ) /10 ( 115.2 kbps ) | 05 |
| CE101 | Low current signal output mode selection, 1st motor | 00 (During Accel./Decel. and constant speed) <br> 101 (During constant speed only) | 01 | CF-02 | RS485 communication Node allocation | 1 to 247 | 1 |
| CE102 | Low current detection level 1, 1st motor | INV rated current $\times$ (0.00 to 2.00 ) | $1.00 \times$ Inverter rated current | CF-03 | RS485 communication parity selection | 00 (No parity) /01 (Even parity) /02 (Odd parity) | 00 |
| CE103 | Low current detection level 2, 1st motor |  |  | CF-04 | RS485 communication stop-bit selection | 01 (1bit) /02 (2bit) | 01 |
| CE105 | Over load signal output mode selection, 1st motor | 00 (During Accel./Decel. and constant speed) /01 (During constant speed only) | 01 | CF-05 | RS485 communication error selection | 00 (Error) /01 (Error output after Deceleration stop) /02 (Ignore) /03 (Free run stop) /04 (Decelration stop) | 02 |
| CE106 | Over load detection level 1, 1st motor | INV rated current $\times$ (0.00 to 2.00 ) | $1.00 \times$ Inverter rated current | CF-06 | RS485 communication timeout setting | 0.00 to 100.00(s) | 0.00 |
| CE107 | Over load detection level 2, 1st motor |  |  | CF-07 | RS485 communication wait time setting | 0 to 1000 (ms) | 2 |
| CE-10 | Arrival frequency setting during acceleration 1 | 0.00 to 590.00 (Hz) | 0.00 | CF-08 | RS485 communication mode selection | 01 (Modbus-RTU) <br> 102 (Communication between inverters (EzCOM) <br> /03 (Communication between inverters (EzCOM Administrator)) | 01 |
| CE-11 | Arrival frequency setting during deceleration 1 |  |  | CF-11 | RS485 registor data |  | 00 |
| CE-12 | Arrival frequency setting |  |  |  | selection |  |  |
|  | during acceleration 2 |  |  | CF-20 | EzCOM Start node No. | 01 to 08 | 01 |
| CE-13 | Arrival frequency setting |  |  | CF-21 | EzCOM End node No. | 01 to 08 | 01 |
| CE-13 | during deceleration 2 <br> Over torque level |  |  | CF-22 | EzCOM Start method selection | 00 (Terminal [ECOM]) /01 (Always comm.) | 00 |
| CE120 | (Forward driving), | 0.0 to 500.0(\%) | 100.0 | CF-23 | EzCOM data size | 01 to 05 | 05 |
|  | 1st motor |  |  | CF-24 |  | 1 to 247 | 1 |
| CE121 | Over torque level (Reverse regenera |  |  | CF-24 | address 1 | 1024 |  |
| CE121 | (Reverse regenerative) <br> 1st motor |  |  | CF-25 | EzCOM destination resister 1 | 0000 to FFFF | 0000 |
| 122 | Over torque level |  |  | CF-26 | EzCOM source resister 1 |  |  |
| CEI22 | (Reverse driving <br> 1st motor |  |  | CF-27 | EzCOM destination address 2 | 1 to 247 | 2 |
| CE123 | Over torque level (Forward regenerative), 1st motor |  |  | CF-28 | EzCOM destination resister 2 | 0000 to FFFF | 0000 |
|  |  | 0.00 to 100.00(\%) | 80.00 | CF-29 | EzCOM source resister 2 |  |  |
| CE-30 | level (MTR) |  |  | CF-30 | EzCOM destination address 3 | 1 to 247 | 3 |
| CE-31 | Electronic thermal warning level (CTL) |  |  | CF-31 | EzCOM destination resister 3 | 0000 to FFFF | 0000 |
| CE-33 | Zero speed detection level | 0.00 to 100.00(Hz) | 0.50 |  | resister 3 |  |  |
| CE-34 | Cooling FAN over-heat warnning level | 0 to $200\left({ }^{\circ} \mathrm{C}\right.$ ) | 120 | CF-32 | EzCOM source resister 3 | 1 to 247 | 4 |
| CE-36 | Accum.RUN(RNT)/ Accum.Power-on(ONT) time setting | 0 to 100000(hour) | 0 | CF-34 | address 4 <br> EzCOM destination resister 4 | 0000 to FFFF | 0000 |
| CE-40 | Window compareter for | 0 to 100(\%) | 100 | CF-35 | EzCOM source resister 4 |  |  |
| Ce-40 | [Air] higher level |  | 0 | CF-36 | EzCOM destination address 5 | 1 to 247 | 5 |
| CE-41 | Window compareter for [Ai1] lower level |  |  | CF-37 | EzCOM destination resister 5 | 0000 to FFFF | 0000 |
| CE-42 | Window compareter for [Ai1] hysterisis width | 0 to 10(\%) | 0 |  |  |  |  |
| CE-43 | Window compareter for [Ai2] higher level | 0 to 100(\%) | $100$ | CF-50 | USB communication Node allocation | 1 to 247 | 1 |
|  | Window compareter for |  |  |  |  |  |  |

- Parameter mode (H code)

| Code No. | Parameter Meaning | Selectable User Setting | Initial value |
| :---: | :---: | :---: | :---: |
| HA-01 | Auto-tuning selection | 00 (Disable)/101 (Not rotation) /02 (Rotation)/03 (IVMS) | 00 |
| HA-02 | RUN command selaction at Auto-tuning | 00 (Force "RUN" key) /01 (Setting by AA111/AA211) | 00 |
| HA-03 | Online auto-tuning selection | 00 (Disable) 101 (Enable) | 00 |
| HA110 | Stabilization constant, 1st-motor | 0 to 1000(\%) | 100 |
| HA115 | Speed response, 1st-motor |  | 100 |
| HA12O | ASR gain switching mode selection, 1st-motor | 00 (Switching by Terminal [CAS]) /01 (Switching by parameter) | 00 |
| HA121 | ASR gain switching time setting, 1st-motor | 0 to 10000 (ms) | 100 |
| HA122 | ASR gain mapping intermidiate speed 1 , 1st-motor | 0.00 to $590.00(\mathrm{~Hz})$ | 0.00 |
| HA123 | ASR gain mapping intermidiate speed 2, 1st-motor |  |  |
| HA124 | ASR gain mapping Maximum speed, 1st-motor |  |  |
| HA125 | ASR gain mapping P-gain 1, 1st-motor | 0.0 to 1000.0(\%) | 100.0 |
| HA126 | ASR gain mapping l-gain 1, 1st-motor |  |  |
| HA127 | ASR gain mapping P-gain 1 at P-control, 1st-motor |  |  |
| HA128 | ASR gain mapping P -gain 2, 1st-motor |  |  |
| HA129 | ASR gain mapping l-gain 2, 1st-motor |  |  |
| HA130 | ASR gain mapping P-gain 2 at P-control, 1st-motor |  |  |
| HA131 | ASR gain mapping P-gain 3, 1st-motor |  |  |
| HA132 | ASR gain mapping l-gain 3, 1st-motor |  |  |
| HA133 | ASR gain mapping P-gain 4, 1st-motor |  |  |
| HA134 | ASR gain mapping l-gain 4, 1st-motor |  |  |
| HA210 | Stabilization constant, 2nd-motor | same as HA110 | 100 |
| HA215 | Speed response, 2nd-motor | same as HA115 | 100 |
| HA22O | ASR gain switching mode selection, 2nd-motor | same as HA120 | 00 |
| HA221 | ASR gain switching time setting, 2nd-motor | same as HA121 | 100 |
| HA222 | ASR gain mapping intermidiate speed 1 , 2nd-motor | same as HA122 | 0.00 |
| HA223 | ASR gain mapping intermidiate 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 | 100.0 |
| HA226 | ASR gain mapping l-gain 1, 2nd-motor | same as HA126 |  |
| HA227 | ASR gain mapping P-gain 1 at P-control, 2nd-motor | same as HA127 |  |
| HA228 | ASR gain mapping P -gain 2, 2nd-motor | same as HA128 |  |
| HA229 | ASR gain mapping l-gain 2, 2nd-motor | same as HA129 |  |
| HA23O | ASR gain mapping P-gain 2 at P-control, 2nd-motor | same as HA130 |  |
| HA231 | ASR gain mapping P -gain 3, 2nd-motor | same as HA131 |  |
| HA232 | ASR gain mapping l-gain 3, 2nd-motor | same as HA132 |  |
| HА2З3 | ASR gain mapping P-gain 4, 2nd-motor | same as HA133 |  |
| HA234 | ASR gain mapping l-gain <br> 4, 2nd-motor | same as HA134 |  |
| Hb102 | Async.Motor capacity setting, 1st-motor | 0.01 to 160.00(kW) | *1) |
| Hb103 | Async.Motor poles setting, 1st-motor | 2 to 48(Pole) | 4 |
| Hb104 | Async.Motor Base frequency setting, 1st-motor | 10.00 to 590.00 (Hz) | 60.00(*FF, *FUF) /50.00(*FEF) |
| Hb105 | Async.Motor Maximum frequency setting, 1st-motor | 10.00 to 590.00 (Hz) |  |
| Hb106 | Async.Motor rated voltage, 1st-motor | 1 to 1000(V) | (200V class) : <br> 200(*FF) <br> /230(*FEF, *FUF) <br> (400V class) : <br> 400(*FF, *FEF) <br> /460(*FUF) |


| Code No. | Parameter Meaning | Selectable User Setting | Initial value |
| :---: | :---: | :---: | :---: |
| Hb108 | Async.Motor rated current, 1st-motor | 0.01 to 10000.00(A) | ${ }^{1)}$ |
| Hb110 | Async.Motor constant R1, 1st-motor | 0.000001 to 1000.000000( $\Omega$ ) |  |
| Hb112 | Async.Motor constant R2, 1st-motor | 0.000001 to 1000.000000( $\Omega$ ) |  |
| Hb114 | Async.Motor constant L, 1st-motor | 0.000001 to $1000.000000(\mathrm{mH})$ |  |
| Hb116 | Async.Motor constant lo, 1st-motor | 0.01 to 1000.00(A) |  |
| Hb118 | Async.Motor constant J, 1st-motor | 0.00001 to $10000.00000\left(\mathrm{kgm}^{2}\right)$ |  |
| Hb130 | Minimum frequency adjustment, 1st-motor | 0.00 to 10.00 (Hz) | 0.50 |
| Hb131 | Reduced voltage start time setting, 1st-motor | 0 to 2000(ms) | 36 |
| Hb140 | Manual torque boost operational mode selection, 1st-motor | 00 (Disabled) /01 (Enabled) /02 (Only forward) /03 (Only reverse) | 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 |
| Hb145 | Eco drive enable, 1st-motor | 00 (Disable) 101 (Enable) | 00 |
| Hb146 | Eco drive response adjustment, 1st-motor | 0 to 100(\%) | 50.0 |
| 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 $1000.0(\mathrm{~V})$ | 0.0 |
| Hb152 | Free-V/f frequency 2 setting, 1st-motor | [ Hb 150$]$ to [ $\mathrm{Hb154]}$ ] 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 $1000.0(\mathrm{~V})$ | 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 $1000.0(\mathrm{~V})$ | 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 $1000.0(\mathrm{~V})$ | 0.0 |
| Hb162 | Free-V/f frequency 7 setting, 1st-motor | [Hb160] to [Hb105](Hz) | 0.00 |
| Hb163 | Free-V/f Voltage 7 setting, 1st-motor | 0.0 to $1000.0(\mathrm{~V})$ | 0.0 |
| Hb170 | Slip Compensation P-gain witn encoder, 1st-motor | 0 to 1000(\%) | 100 |
| Hb171 | Slip Compensation I-gain witn encoder, 1st-motor | 0 to 1000(\%) | 100 |
| Hb180 | Output voltage gain, 1st-motor | 0 to 255(\%) | 100 |
| Hb202 | Async.Motor capacity setting, 2nd-motor | Same as Hb102 | *1) |
| Hb203 | Async.Motor poles setting, 2nd-motor | Same as Hb103 | 4 |
| Hb204 | Async.Motor Base frequency setting, 2nd-motor | Same as Hb104 | 60.00(*FF, *FUF) /50.00(*FEF) |
| Hb205 | Async.Motor Maximum frequency setting, 2nd-motor | Same as Hb105 |  |
| Hb206 | Async.Motor rated voltage, 2nd-motor | Same as Hb106 | (200V class) : <br> 200(*FF) <br> /230(*FEF, *FUF) <br> (400V class) : <br> 400(*FF, *FEF) /460(*FUF) |
| Hb208 | Async.Motor rated current, 2nd-motor | Same as Hb108 | *1) |
| 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 lo, 2nd-motor | Same as Hb116 |  |
| Hb218 | Async.Motor constant J, 2nd-motor | Same as Hb118 |  |
| Hb230 | Minimum frequency ajustment, 2nd-motor | Same as Hb130 | 0.50 |
| Hb231 | Reduced voltage start time setting, 2nd-motor | Same as Hb131 | 36 |
| Hb240 | Manual torque boost operational mode selection, 2nd-motor | Same as Hb140 | 01 |
| Hb241 | Manual torque boost value, 2nd-motor | Same as Hb141 | 0.0 |

[^3]| Code No. | Parameter Meaning | Selectable User Setting | Initial value |
| :---: | :---: | :---: | :---: |
| Hb242 | Manual torque boost Peak speed, 2nd-motor | Same as Hb142 | 0.0 |
| Hb245 | Eco drive enable, 2nd-motor | Same as Hb145 | 00 |
| Hb246 | Eco drive response adjustment, 2nd-motor | Same as Hb146 | 50.0 |
| Hb250 | Free-V/f frequency 1 setting, 2nd-motor | Same as Hb150 | 0 |
| Hb251 | Free-V/f Voltage 1 setting, 2nd-motor | Same as Hb151 | 0.0 |
| Hb252 | Free-V/f frequency 2 setting, 2nd-motor | Same as Hb152 | 0.00 |
| Hb253 | Free-V/f Voltage 2 setting, 2nd-motor | Same as Hb153 | 0.0 |
| Hb254 | Free-V/f frequency 3 setting, 2nd-motor | Same as Hb154 | 0.00 |
| Hb255 | Free-V/f Voltage 3 setting, 2nd-motor | Same as Hb155 | 0.0 |
| Hb256 | Free-V/f frequency 4 setting, 2nd-motor | Same as Hb156 | 0.00 |
| Hb257 | Free-V/f Voltage 4 setting, 2nd-motor | Same as Hb157 | 0.0 |
| Hb258 | Free-V/f frequency 5 setting, 2nd-motor | Same as Hb158 | 0.00 |
| Hb259 | Free-V/f Voltage 5 setting, 2nd-motor | Same as Hb159 | 0.0 |
| Hb260 | Free-V/f frequency 6 setting, 2nd-motor | Same as Hb160 | 0.00 |
| Hb261 | Free-V/f Voltage 6 setting, 2nd-motor | Same as Hb161 | 0.0 |
| Hb262 | Free-V/f frequency 7 setting, 2nd-motor | Same as Hb162 | 0.00 |
| Hb263 | Free-V/f Voltage 7 setting, 2nd-motor | Same as Hb163 | 0.0 |
| Hb270 | Slip Compensation P-gain witn encoder, 2nd-motor | Same as Hb170 | 100 |
| Hb271 | Slip Compensation I-gain witn encoder, 2nd-motor | Same as Hb171 | 100 |
| Hb280 | Output voltage gain, 2nd-motor | Same as Hb180 | 100 |
| 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 |
| HC110 | Zero speed area limit, 1st-motor | 0 to 100(\%) | 80 |
| HC111 | Boost value at start, 1st-motor (IM-SLV,IM-CLV) | 0 to 50\%) | 0 |
| HC112 | Boost value at start, 1st-motor(IM-OHz-SLV) | 0 to 50(\%) | 10 |
| HC113 | Secondary resistance correction, 1st-motor | 00 (Disable) /01 (Enable) | 00 |
| HC114 | Reverse direcion run protection selection, 1st-motor | 00 (Disable) /01 (Enable) | 00 |
| 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 |
| HC201 | Automatic torque boost voltage compensation gain, 2nd-motor | same as HC101 | 100 |
| HC202 | Automatic torque boost slip compensation gain, 2nd-motor | same as HC102 | 100 |
| HC210 | Zero speed area limit, 2nd-motor | same as HC110 | 80 |
| HC211 | Boost value at start, 2nd-motor(IM-SLV,IM-CLV) | same as HC111 | 0 |
| HC212 | Boost value at start, 2nd-motor(IM-OHz-SLV) | same as HC112 | 10 |
| HC213 | Secondary resistance correction, 2nd-motor | same as HC113 | 00 |
| HC214 | Counter direcion run protection selection, 2nd-motor | same as HC114 | 00 |
| HC220 | Torque current reference filter time constant, 2nd-motor | same as HC120 | 2 |
| HC221 | Speed feedforward compensation gain, 2nd-motor | same as HC121 | 0 |
| Hd102 | Sync.Motor capacity setting, 1st-motor | 0.01 to 160.00(kW) |  |
| Hd103 | Sync.Motor Poles setting, 1st-motor | 2 to 48(Pole) |  |
| Hd104 | Sync.Base frequency setting, 1st-motor |  |  |
| Hd105 | Sync.Maximum frequency setting, 1st-motor | 10.00 to 590.00( Hz ) | *) |
| Hd106 | Sync.Motor rated voltage, 1st-motor | 1 to 1000(V) |  |
| Hd108 | Sync.Motor rated current, 1st-motor | 0.01 to 10000.00(A) |  |


| Code №. | Parameter Meaning | Selectable User Setting | Initial value |
| :---: | :---: | :---: | :---: |
| Hd110 | Sync.Motor constant R, 1st-motor | 0.000001 to 1000.000000 ( $\Omega$ ) | *1) |
| Hd112 | Sync.Motor constant Ld, 1st-motor | 0.000001 to $1000.000000(\mathrm{mH})$ |  |
| Hd114 | Sync.Motor constant Lq, 1st-motor |  |  |
| Hd116 | Sync.Motor constant Ke, 1st-motor | 0.1 to $100000.0(\mathrm{mVs} / \mathrm{rad})$ |  |
| Hd118 | Sync.Motor constant J, 1st-motor | 0.00001 to $10000.00000\left(\mathrm{kgm}^{2}\right)$ |  |
| Hd130 | Minimum Frequency for Sync.M, 1st-motor | 0 to 50(\%) | 8 |
| Hd131 | No-Load current for Sync. M, 1st-motor | 0 to 100(\%) | 10 |
| Hd132 | Starting Method for Sync. M, 1st-motor | 00 (Synchronous) /01 (Initial position estimate) | 00 |
| Hd133 | IMPE OV wait number for Sync.M, 1st-motor | 0 to 255 | 10 |
| Hd134 | IMPE detect wait number for Sync.M, 1st-motor |  | 10 |
| Hd135 | IMPE detect number for Sync.M, 1st-motor |  | 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(\%) | 0 |
| Hd-41 | Carrier frequency at IVMS | 0.5 to 16.0 (kHz) | 2.0 |
| Hd-42 | Filter gain of current detection at IVMS | 0 to 1000 | 100 |
| Hd-43 | Open phase voltage detection gain | 00, 01, 02, 03 | 00 |
| Hd-44 | Open phase switching threshold compensation | 00 (Disable) 01 (Enable) | 01 |
| Hd-45 | P-Gain for speed control, SM(PMM)-IVMS | 0 to 1000 | 100 |
| Hd-46 | I-Gain for speed control, SM(PMM)-IVMS | 0 to 10000 |  |
| Hd-47 | Wait time for open phase switching, SM(PMM)-IVMS | 0 to 1000 | 15 |
| Hd-48 | Limitation of decision about the drive direction, SM(PMM)-IVMS | 00 (Disable) $/ 01$ (Enable) | 01 |
| Hd-49 | Open phase voltage detection timing adjustment, SM(PMM)-IVMS | 0 to 1000 | 10 |
| Hd-50 | Minimum pulse width adjustment, SM(PMM)-IVMS |  | 100 |
| Hd-51 | IVMS threshold current limit | 0 to 255 | 100 |
| Hd-52 | IVMS threshold gain |  |  |
| Hd-58 | IVMS carrier-frequency switching start/finish point | 0 to 50(\%) | 5 |
| Hd202 | Sync.Motor capacity setting, 2nd-motor | same as Hd102 | *1) |
| Hd203 | Sync.Motor 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 |  |
| Hd230 | Minimum Frequency for Sync.M, 2nd-motor | same as Hd130 | 8 |
| Hd231 | No-Load current for Sync. M, 2nd-motor | same as Hd131 | 10 |
| Hd232 | Starting Method for Sync. M, 2nd-motor | same as Hd132 | 00 |
| Hd233 | IMPE OV wait number for Sync.M, 2nd-motor | same as Hd133 | 10 |
| Hd234 | IMPE detect wait number for Sync.M, 2nd-motor | same as Hd134 | 10 |
| Hd235 | IMPE detect number for Sync.M, 2nd-motor | same as Hd135 | 30 |
| Hd236 | IMPE voltage gain for Sync.M, 2nd-motor | same as Hd136 | 100 |
| Hd237 | IMPE Mg-pole position offset, 2nd-motor | same as Hd137 | 0 |

*1) Varies depending on inverter models and settings of duty rating.

- Parameter mode (O code)

| Code No. | Parameter Meaning | Selectable User Setting | Initial value |
| :---: | :---: | :---: | :---: |
| oA-10 | Operation mode on option card error (SLOT-1) | 00 (Error) $/ 01$ (Ignor error (keep running)) | 00 |
| oA-11 | Communication Watch Dog Timer (SLOT-1) | 0.00 to 100.00(s) | 1.00 |
| 0A-12 | Action selection at communication error (SLOT-1) | 00 (Error) /01 (Trip after Deceleration stop) $/ 02$ (Ignore) /03 (Free run stop) /04 (Deceleration stop) | 01 |
| 0A-13 | Run command selection at start up (SLOT-1) | 00 (run command disabled) /01 (run command enabled) | 00 |
| 0A-20 | Operation mode on option card error (SLOT-2) | 00 (Error) $/ 01$ (Ignor error (keep running)) | 00 |
| 0A-21 | Communication Watch Dog Timer (SLOT-2) | 0.00 to 100.00(s) | 1.00 |
| 0A-22 | Action selection at communication error (SLOT-2) | 00 (Error) /01 (Trip after Deceleration stop) $/ 02$ (Ignore) /03 (Free run stop) /04 (Deceleration stop) | 01 |
| 0A-23 | Run command selection at start up (SLOT-2) | 00 (run command disabled) /01 (run command enabled) | 00 |
| OA-30 | Operation mode on option card error (SLOT-3) | 00 (Error) $/ 01$ (lgnor 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 communication error (SLOT-3) | 00 (Error) $/ 01$ (Trip after Deceleration stop) /02 (Ignore) /03 (Free run stop) /04 (Deceleration stop) | 01 |
| 0A-33 | Run command selection at start up (SLOT-3) | 00 (run command disabled) /01 (run command enabled) | 00 |
| ob-01 | Encoder constant setting | 32 to 65535(Pls) | 1024 |
| ob-02 | Encoder position selection | 00 (Phase-A Lead) /01 (Phase-B Lead) | 00 |
| ob-03 | Motor gear ratio Numerator | 1 to 10000 | 1 |
| ob-04 | Motor gear ratio Denominator | 1 to 10000 | 1 |
| ob-10 | Pulse train detection object selection (option) | 00 (reference) /01 (Pulse train position reference) | 00 |
| ob-11 | Mode selection of pulse train input (option) | 00 ( $90^{\circ}$ shift pulse train) <br> 101 (Forward/Reverse pulse train and direction signal) <br> 102 (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 frequency High Limit (option) | 0.0 to 100.0 (\%) | 100.0 |
| ob-16 | Pulse train frequency detection low level (option) |  | 0.0 |
| OC-01 | Safety opution input display selection | 00 (Warning(with display)) 001 (Warning(without display)) | 00 |
| oc-10 | Safety opution input display selection | 0.00 to 3600.00(s) | 30.00 |
| OC-12 | SS1-A deceleration time setting |  | 30.00 |
| OC-14 | SLS-A Speed upper limit(Forward) | 0.00 to $590.00(\mathrm{~Hz})$ | 0.00 |
| oC-15 | SLS-A Speed upper limit(Reverse) |  | 0.00 |
| oC-16 | SLS-A Speed upper limit(Reverse) | 0.00 to 3600.00(s) | 30.00 |
| oc-18 | SDI-A limited direction | 00 (limit) /01 (invert) | 00 |
| oc-20 | SDI-A limited direction | 0.00 to 3600.00(s) | 30.00 |
| oc-22 | SS1-B deceleration time setting |  | 30.00 |
| OC-24 | SLS-B Speed upper limit(Forward) | 0.00 to $590.00(\mathrm{~Hz})$ | 0.00 |
| OC-25 | SLS-B Speed upper limit(Reverse) |  | 0.00 |
| oC-26 | SLS-B Speed upper limit(Reverse) | 0.00 to 3600.00(s) | 30.00 |
| OC-28 | SDI-B limited direction | 00 (limit) /01 (invert) | 00 |
| OE-01 | Filter time constant of Terminal [Ai4] | 1 to 500(ms) | 16 |
| OE-03 | Start value of Terminal [Ai4] | 0.00 to 100.00(\%) | 0.00 |
| OE-04 | End value of Terminal [Ai4] | 0.00 to 100.00(\%) | 100.00 |
| OE-05 | Start rate of Terminal [Ai4] | 0.0 to [0E-06] (\%) | 0.0 |
| OE-06 | End rate of Terminal [Ai4] | [0E-05] to 100.0(\%) | 100.0 |
| OE-07 | Start point selection of Terminal [Ai4] | 00 (Start value[0E-03]) /01 (0\%) | 01 |
| oE-11 | Filter time constant of Terminal [Ai5] | 1 to 500(ms) | 16 |
| OE-13 | Start value of Terminal [Ai5] | 0.00 to 100.00(\%) | 0.00 |
| OE-14 | End value of Terminal [Ai5] |  | 100.00 |
| OE-15 | Start rate of Terminal [Ai5] | 0.0 to [0E-16] (\%) | 0.0 |
| OE-16 | End rate of Terminal [Ai5] | [0E-15] to 100.0(\%) | 100.0 |
| 0E-17 | Start point selection of Terminal [Ai5] | 00 (Start value[0E-03] ) /01 (0\%) | 01 |
| 0E-21 | Filter time constant of Terminal [Ai6] | 1 to $500(\mathrm{~ms})$ | 16 |
| OE-23 | Start value of Terminal [Ai6] | -100.00 to 100.00(\%) | -100.00 |
| OE-24 | End value of Terminal [Ai6] |  | 100.00 |
| OE-25 | Start rate of Terminal [Ai6] | -100.0 to [0E-26] (\%) | -100.0 |
| 0E-26 | End rate of Terminal [Ai6] | [0E-25] to 100.0(\%) | 00.0 |


| Code No. | Parameter Meaning | Selectable User Setting | Initial value |
| :---: | :---: | :---: | :---: |
| oE-28 | [Ai4] Voltage/Current zero-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 zero-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 zero-bias adjustment | -100.00 to 100.00(\%) | 0.00 |
| OE-33 | [Ai6] Voltage gain adjustment | 0.00 to 200.00(\%) | 100.00 |
| oE-35 | Window compareter for [Ai4] higher level | 0 to 100(\%) | 100 |
| oE-36 | Window compareter for [Ai4] lower level |  | 0 |
| oE-37 | Window compareter for [Ai4] hysterisis width | 0 to 10(\%) | 0 |
| OE-38 | Window compareter for [Ai5] higher level | 0 to 100(\%) | 100 |
| oE-39 | Window compareter for [Ai5] lower level |  | 0 |
| oE-40 | Window compareter for [Ai5] hysterisis width | 0 to 10(\%) | 0 |
| oE-41 | Window compareter for [Ai6] higher level | -100 to 100(\%) | 100 |
| oE-42 | Window compareter for [Ai6] lower level |  | -100 |
| OE-43 | Window compareter for [Ai6] hysterisis width | 0 to 10(\%) | 0 |
| oE-44 | Operation level at [A14] disconnection | 0 to 100(\%) | 0 |
| oE-45 | Operation level selection at [Ai4] disconnection | 00 (Disable) /01 (Enable: At WC ${ }^{\star}$ is active) <br> /02 (Enable: At WC* is not active) | 00 |
| oE-46 | Operation level at [Ai5] disconnection | 0 to 100(\%) | 0 |
| OE-47 | Operation level selection at [Ai5] disconnection | 00 (Disable) /01 (Enable: At WC* is active) /02 (Enable: At WC* is not active) | 00 |
| oE-48 | Operation level at [Ai6] disconnection | -100 to 100(\%) | 0 |
| OE-49 | Operation level selection at [Ai6] disconnection | 00 (Disable) /01 (Enable: At WC* is active) /02 (Enable: At WC* is not active) | 00 |
| oE-50 | [Ao3] monitor output selection | Monitor Code to be specified | dA-01 |
| oE-51 | [Ao4] monitor output selection |  | dA-01 |
| oE-52 | [Ao5] monitor output selection |  | dA-01 |
| OE-56 | Filter time constant of [Ao3] monitor | 1 to 500(ms) | 100 |
| OE-57 | [A03] Data type selection | 00 (Absolute data) 101 (Signed data) | 00 |
| OE-58 | [Ao3] monitor bias adjustment | -100.0 to 100.0(\%) | 0.0 |
| OE-59 | [Ao3] monitor gain adjustment | -1000.0 to 1000.0(\%) | 100.0 |
| oE-60 | Output level setting at [Ao3] monitor adjust mode | -100.0 to 100.0(\%) | 100.0 |
| oE-61 | Filter time constant of [AO4] monitor | 1 to 500(ms) | 100 |
| OE-62 | [Ao4] Data type selection | 00 (Absolute data) 101 (Signed data) | 00 |
| oE-63 | [Ao4] monitor bias adjustment | -100.0 to 100.0\%) | 0.0 |
| oE-64 | [Ao4] monitor gain adjustment | -1000.0 to 1000.0(\%) | 100.0 |
| oE-65 | Output level setting at [Ao4] monitor adjust mode | -100.0 to 100.0(\%) | 100.0 |
| oE-66 | Filter time constant of [Ao5] monitor | 1 to 500(ms) | 100 |
| OE-67 | [A05] Data type selection | 00 (Absolute data) 101 (Signed data) | 00 |
| oE-68 | [Ao5] monitor bias adjustment | -100.0 to 100.0(\%) | 0.0 |
| oE-69 | [Ao5] monitor gain adjustment | -1000.0 to 1000.0(\%) | 100.0 |
| oE-70 | Output level setting at [Ao5] monitor adjust mode | -100.0 to 100.0(\%) | 100.0 |
| OH-01 | IP-Address selection | 00 (Gr.1) /01 (Gr.2) | 00 |
| OH-02 | Communication speed (port-1) | 00 (Auto Negotiation) /01 (100M/Full-duplex) /02 (100M/Haif-duplex) /03 (10M/Full-duplex) /04 (10M/Haif-duplex) | 00 |
| OH-03 | Communication speed (port-2) |  | 00 |
| oH-04 | Ethernet communication timeout | 1 to 65535(x10ms) | 3000 |
| OH-05 | Modbus TCP Port No.(IPv4) | 502,1024 to 65535 | 502 |
| oH-06 | Modbus TCP Port No.(IPv6) | 502,1024 to 65535 | 502 |
| OH-20 | Profibus Node address | 0 to 125 | 0 |
| oH-21 | Profibus clear mode selection | 00 (Clear) /01 (Keep last value) | 00 |
| OH-22 | Protibus Map selection | 00 (PPO) /01 (Comvertional) /02 (FlexibleMode) | 00 |
| oH-23 | Setting enable from Profi master | 00 (Enable)/01 (Disable) | 00 |
| OH-24 | Setpoint telegram/ Actual value telegram Gr . Selection | 00 (Gr.A) /01 (Gr.B) /02 (Gr.C) | 00 |
| OH-30 | IP-Address selection | 00 (Gr.1) /01 (Gr.2) | 00 |


| Code №. | Parameter Meaning | Selectable User Setting | Initial value |
| :---: | :---: | :---: | :---: |
| oH-31 | Communication speed (port-1) | 00 (Auto Negotiation) $/ 01$ (100M/Full-duplex) /02 (100M/Haif-duplex) /03 (10M/Full-duplex) /04 (10M/Haif-duplex) | 00 |
| OH-32 | Communication speed (port-2) |  | 00 |
| OH-33 | Ethernet communication timeout | 1 to 65535(*10ms) | 3000 |
| OH-34 | Setpoint telegram/ <br> Actual value telegram Gr. <br> Selection | 00 (Gr.A) /01 (Gr.B) /02 (Gr.C) | 00 |
| oJ-01 to oJ-10 | Flexible command registration writing register 1 to $10, \mathrm{Gr}$. | 0000 to FFFF | 0000 |
| $\begin{gathered} \text { OJ-11 to } \\ \text { OJ-20 } \end{gathered}$ | Flexible command registration Reading register 1 to 10, Gr.A |  |  |
| oJ-21 to oJ-30 | Flexible command registration writing register 1 to $10, G r . B$ |  |  |
| oJ-31 to oJ-40 | Flexible command registration Reading register 1 to 10, Gr.B |  |  |
| oJ-41 to oJ-50 | Flexible command registration writing register 1 to 10, Gr.C |  |  |
| oJ-51 to oJ-60 | Flexible command registration Reading register 1 to 10, Gr.C |  |  |
| oL-01 | IPv4 IP address (1), Gr. 1 | 0 to 255 | 192 |
| oL-02 | IPv4 IP address (2), Gr. 1 |  | 168 |
| oL-03 | IPv4 IP address (3), Gr. 1 |  | 0 |
| oL-04 | IPv4 IP address (4), Gr. 1 |  | 2 |
| oL-05 | IPv4 Sub-net mask (1), Gr. 1 |  | 255 |
| oL-06 | IPv4 Sub-net mask (2), Gr. 1 |  | 255 |
| oL-07 | IPv4 Sub-net mask (3), Gr. 1 |  | 255 |
| oL-08 | IPv4 Sub-net mask (4), Gr. 1 |  | 0 |
| oL-09 | IPv4 Default gateway (1), Gr. 1 |  | 192 |
| oL-10 | IPv4 Default gateway (2), Gr. 1 |  | 168 |
| oL-11 | IPv4 Default gateway (3), Gr. 1 |  | 0 |
| oL-12 | IPv4 Default gateway (4), Gr. 1 |  | 1 |
| $\begin{aligned} & \text { oL-20 to } \\ & \text { oL-27 } \end{aligned}$ | IPv6 IP address (1) to (8), Gr. 1 | 0000 to FFFF | 0000 |
| oL-28 | IPv6 Prefix of Sub-net, Gr. 1 | 0 to 127 | 64 |
| $\begin{gathered} \text { oL-29 to } \\ \text { oL-36 } \end{gathered}$ | IPv6 Default gateway (1) to (8), Gr. 1 | 0000 to FFFF | 0000 |
| oL-40 | IPv4 IP address (1), Gr. 2 | 0 to 255 | 192 |
| oL-41 | IPv4 IP address (2), Gr. 2 |  | 168 |
| oL-42 | IPv4 IP address (3), Gr. 2 |  | 0 |
| oL-43 | IPv4 IP address (4), Gr. 2 |  | 2 |
| oL-44 | IPv4 Sub-net mask (1), Gr. 2 |  | 255 |
| oL-45 | IPv4 Sub-net mask (2), Gr. 2 |  | 255 |
| oL-46 | IPv4 Sub-net mask (3), Gr. 2 |  | 255 |
| oL-47 | IPv4 Sub-net mask (4), Gr. 2 |  | 0 |
| oL-48 | IPv4 Default gateway (1), Gr. 2 |  | 192 |
| oL-49 | IPv4 Default gateway (2), Gr. 2 |  | 168 |
| oL-50 | IPv4 Default gateway (3), Gr. 2 |  | 0 |
| oL-51 | IPv4 Default gateway (4), Gr. 2 |  | 1 |
| $\mathrm{OL}-60 \text { to }$ | IPv6 IP address (1) to (8), Gr. 2 | 0000 to FFFF | 0000 |
| oL-68 | IPv6 Prefix of Sub-net, Gr. 2 | 0 to 127 | 64 |
| $\begin{aligned} & \text { oL-69 to } \\ & \text { oL-76 } \end{aligned}$ | IPv6 Default gateway (1) to (8), Gr. 2 | 0000 to FFFF | 0000 |

- Parameter mode (P code)

| Code No. | Parameter Meaning | Selectable User Setting | Initial value |
| :---: | :---: | :---: | :---: |
| PA-01 | Mode selection for Emergency-force drive | 00 (Disable) /01 (Enable) | 00 |
| PA-02 | Frequency reference setting at Emergencyforce drive | 0.00 to $590.00(\mathrm{~Hz})$ | 0.00 |
| PA-03 | Direction command at Emergency-force drive | 00 (Forward Rotation) /01 (Reverse Rotation) | 00 |
| PA-04 | Commercial power supply bypass function selection | 00 (Disable) /01 (Enable) | 00 |
| PA-05 | Delay time of Bypass function | 0.0 to 1000.0(s) | 5.0 |
| PA-20 | Simulation mode enable | 00 (Disable) /01 (Enable) | 00 |
| PA-21 | Error code selection for Alarm test | 000 to 255 | 000 |
| PA-22 | Output current monitor optional output enable | $\begin{aligned} & 00 \text { (Disable) /01 (Setting by Keypad) } \\ & 102 \text { (Setting by Terminal[Ai1]) /03 (Setting by Terminal[Ai2]) } \\ & 104 \text { (Setting by Terminal[Ai3]) /05 (Setting by Terminal[Ai4]) } \\ & 106 \text { (Setting by Terminal[Ai5]) /07 (Setting by Terminal[Ai6]) } \end{aligned}$ | 01 |
| PA-23 | Output current monitor optional output value setting | INV rated current $\times$ (0.00 to 3.00) | 0.0 |
| PA-24 | DC-bus voltage monitor optional output enable | 00 (Disable) /01 (Setting by Keypad) <br> /02 (Setting by Terminal[Ai1]) /03 (Setting by Terminal[Ai2]) <br> 104 (Setting by Terminal[Ai3]) /05 (Setting by Terminal[Ai4]) <br> /06 (Setting by Terminal[Ai5]) /07 (Setting by Terminal[Ai6]) | 01 |
| PA-25 | DC-bus voltage monitor optional value output | (200V class) 0.0 to 450.0 Vdc ( 400 V class) 0.0 to 900.0 Vdc | (200V class) 270.0 <br> (400V class) 540.0 |
| PA-26 | Output voltage monitor optional output enable | 00 (Disable) 01 (Setting by Keypad) <br> /02 (Setting by Terminal[Ai1]) /03 (Setting by Terminal[Ai2]) <br> /04 (Setting by Terminal[Ai3]) /05 (Setting by Terminal[Ai4]) <br> /06 (Setting by Terminal[Ai5]) /07 (Setting by Terminal[Ai6]) | 01 |
| PA-27 | Output voltage monitor optional output value setting | ( 200 V class) 0.0 to $300.0(\mathrm{~V})$ <br> ( 400 V class) 0.0 to $600.0(\mathrm{~V}$ ) | 0.0 |
| PA-28 | Output torque monitor optional output enable | 00 (Disable) $/ 01$ (Setting by Keypad) <br> 102 (Setting by Terminal[Ai1]) /03 (Setting by Terminal[Ai2]) <br> /04 (Setting by Terminal[Ai3]) /05 (Setting by Terminal[Ai4]) <br> 106 (Setting by Terminal[Ai5]) /07 (Setting by Terminal[Ai6]) | 01 |
| PA-29 | Output torque monitor optional output value setting | -500.0 to 500.0(\%) | 0.0 |
| PA-30 | Start with frequency matching optional Setting enable | 00 (Disable) /01 (Setting by Keypad) <br> /02 (Setting by Terminal[Ai1]) /03 (Setting by Terminal[Ai2]) <br> 104 (Setting by Terminal[Ai3]) /05 (Setting by Terminal[Ai4]) <br> /06 (Setting by Terminal[Ai5]) /07 (Setting by Terminal[Ai6]) | 01 |
| PA-31 | Start with frequency matching optional value setting | 0.00 to $590.00(\mathrm{~Hz})$ | 0.00 |

$\square$ Parameter mode (U code)

| Code No. | Parameter Meaning | Selectable User Setting | Initial value |
| :---: | :---: | :---: | :---: |
| UA-01 | Password for Display | 0000 to FFFF | 0000 |
| UA-02 | Password for Softlock |  | 0000 |
| UA-10 | Display restriction selection | 00 (Full display) /01 (Function-specific display) <br> /02 (User setting display) /03 (Data comparison display) <br> 104 (Monitor only) | 00 |
| UA-12 | Accumulation input power monitor clear | 00 (Disable) /01 (Clear) | 00 |
| UA-13 | Display gain for Accumulation input power monitor | 1 to 1000 | 1 |
| UA-14 | Accumulation output power monitor clear | 00 (Disable) 101 (Clear) | 00 |
| UA-15 | Display gain for Accumulation output power monitor | 1 to 1000 | 1 |
| UA-16 | Soft Lock selection | 00 (Teminal [SFT]) 01(Always effective) | 00 |
| UA-17 | Soft Lock target selection | 00 (All the data change is impossible) <br> /01 (Data change is impossible except setting Speed) | 00 |
| UA-18 | Data RN selection | 00 (Enabling R/W by operator) <br> 101 (Disabling R/W by operator) | 00 |
| UA-19 | Low battery warning enable | 00 (Disable) 101 (Warnning) 102 (Error) | 00 |
| UA-20 | Action selection at keypad disconnection | 00 (Error) /01 (Error output after Deceleration stop) 102 (Ignore) /03 (Free run stop) /04 (Decelration stop) | 02 |
| UA-21 | 2nd-motor parameter display selection | 00 (Hidden) /01 (Display) | 01 |
| UA-22 | Option parameter display selection |  | 01 |
| UA-30 | User parameter auto setting function enable | 00 (Disable) /01 (Enable) | 00 |
| $\begin{aligned} & U A-31 \text { to } \\ & U A-62 \end{aligned}$ | User parameter 1 to 32 selection | no/dA-01 to UF-32 (except UA-31 to UA-62) | no |
| UA-90 | QOP indication off waiting time | 0 to 60(min) | 0 |
| UA-91 | Initial Disply selection | (to be selectro from d, F parameters) | dA-01 |
| UA-92 | Auto-return to Initial display enable | 00 (Disable) /01 (Enable) | 00 |
| UA-93 | Setting enable at Monitor display |  | 00 |
| UA-94 | Multispeed change on the frequency reference monitor display |  | 00 |
| Ub-01 | Initialize Mode selection | 00 (Disable) /01 (Error history clear) /02 (Data initialize) /03 (Error history clear \& Data initialize) <br> /04 (Error history clear \& Data initialize \& EzSQ clear) 105 (he parameter related to the terminal is excluded) 106 (The parameter related to the comm. is excluded) 107 (The parameter related to the terminal and comm. is excluded) /08 (EzSQ only) /09 (Trace Data only) | 00 |
| Ub-02 | Initialize Data selection | 00 (MODE0) 101 (MODE1) /02 (MODE2) /03 (MODE3) | 00(*FF)/01("FEF) 102(FFUF) |
| Ub-03 | Load type selection | 00 (VLD) 101 (LD) 102 (ND) | 02 |
| Ub-05 | Initialize Enable | 00 (Disable) /01 (nitialaize start) | 00 |
| UC-01 | Debug mode enable | (Please don't change.) | 00 |
| Ud-01 | Trace function enable | 00 (Disable) /01 (Enable) | 00 |
| Ud-02 | Trace start | 00 (Stop) $/ 01$ (Start) | 00 |
| Ud-03 | Trace data number setting | 0 to 8 | 1 |
| Ud-04 | Trace signal number setting |  | 1 |
| $\begin{aligned} & \text { Ud-10 to } \\ & \text { Ud-17 } \end{aligned}$ | Trace data 0 to 7 selection | (to be selectro from d, F parameters) | 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 |


| Code No. | Parameter Meaning | Selectable User Setting | 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 | same as [CA-01] | 001 |
| Ud-40 | Trace signal 6 Output Terminal selection | same as [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 | same as [CA-01] | 001 |
| Ud-43 | Trace signal 7 Output Terminal selection | same as [CC-01] | 001 |
| Ud-50 | Trace trigger 1 selection | 00 (Trip) /01 (Trace data 0) /02 (Trace data 1) 103 (Trace data 2) 104 (Trace data 3) /05 (Trace data 4) 106 (Trace data 5) /07 (Trace data 6) /08 (Trace data 7) 109 (Trace signal 0) /10 (Trace signal 1) /11 (Trace signal 2) /12 (Trace signal 3) /13 (Trace signal 4) /14 (Trace signal 5) /15 (Trace signal 6) /16 (Trace signal 7) | 00 |
| Ud-51 | Trigger 1 action selection at trace data trigger | 00 (Action at exceeded trigger level) /02 (Action at fall trigger level) | 00 |
| Ud-52 | Trigger 1 level setting at trace data trigger | 0 to 100(\%) | 0 |
| Ud-53 | Trigger 1 action 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 (Trace data 0) /02 (Trace data 1) /03 (Trace data 2) 104 (Trace data 3) /05 (Trace data 4) 106 (Trace data 5) /07 (Trace data 6) /08 (Trace data 7) 109 (Trace signal 0) /10 (Trace signal 1) /11 (Trace signal 2) /12 (Trace signal 3) /13 (Trace signal 4) /14 (Trace signal 5) /15 (Trace signal 6) /16 (Trace signal 7) | 00 |
| Ud-55 | Trigger 2 action selection at trace data trigger | 00 (Action at exceeded trigger 2 level) /02 (Action at fall trigger 2 level) | 00 |
| Ud-56 | Trigger 2 level setting at trace data trigger | 0 to 100(\%) | 0 |
| Ud-57 | Trigger 2 action 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 formation) <br> 101 (At trace trigger 2 formation) <br> 102 (At OR condition formation of Trigger-1 and Trigger-2) <br> 103 (At AND condition formation of Trigger-1 and Trigger-2) | 00 |
| Ud-59 | Trigger point setting | 0 to 100(\%) | 0 |
| Ud-60 | Sampling time selection | 01 ( 0.2 ms ) /02 ( 0.5 ms ) /03 (1ms) /04 (2ms) /05 ( 5 ms ) /06 (10ms) /07 ( 50 ms ) /08 ( 100 ms ) /09 ( 500 ms ) /10 ( 1000 ms ) | 03 |
| UE-01 | EzSQ operation cycle | 00 (1ms) /01 (2ms : same as SJ700/L700) | 00 |
| UE-02 | EzSQ function enabl | 00 (Disable) /01 (Terminal [PRG])/02 (Always active) | 00 |
| $\begin{array}{\|l\|} \hline \text { UE-10 to } \\ \text { UE-7 } \\ \hline \end{array}$ | EzSQ User parameter $\mathrm{U}(00)$ to (63) | 0 to 65535 | 0 |
| UF-02 to UF-32 | EzSQ User parameter $\mathrm{UL}(00)$ to (15) | -2147483647 to 2147483647 | 0 |

## Input terminal function list

| Function code | Symbol | Function name |
| :---: | :---: | :---: |
| 0 | no | Not use |
| 1 | FW | Forward rotation |
| 2 | RV | Reverse rotation |
| 3 to 6 | CF1 to 4 | Multi speed selection 1 to 4 |
| 7 to 13 | SF1 to 7 | Multi speed Bit-1 to 7 |
| 14 | ADD | Trigger for frequency addition[Ab105] |
| 15 | SCHG | Speed reference change |
| 16 | STA | 3 -wire Start |
| 17 | STP | 3-wire Stop |
| 18 | FR | Forward Over Travel |
| 19 | AHD | analog command holding |
| 20 | FUP | Remote control Speed-UP function |
| 21 | FDN | Remote control Speed-DOWN function |
| 22 | UDC | Remote control data clearing |
| 23 | F-OP | Force operation |
| 24 | SET | 2nd-motor control |
| 28 | RS | Reset |
| 29 | JG | Jogging |
| 30 | DB | External Dynamic brake |
| 31 | 2 CH | 2-step Acceleration/Deceleration |
| 32 | FRS | Free run stop |
| 33 | EXT | External fault |
| 34 | USP | unattended start protection |
| 35 | CS | Commercial Supply change |
| 36 | SFT | Soft-Lock |
| 37 | BOK | Answer back from Brake |
| 38 | OLR | Overload restriction selection |
| 39 | KHC | Accumulation input power clearance |
| 40 | OKHC | Accumulation output power clearance |
| 41 | PID | Disable PID1 |
| 42 | PIDC | PID1 integration reset |
| 43 | PID2 | Disable PID2 |
| 44 | PIDC2 | PID2 integration reset |
| 45 | PID3 | Disable PID3 |
| 46 | PIDC3 | PID3 integration reset |
| 47 | PID4 | Disable PID4 |
| 48 | PIDC4 | PID4 integration reset |
| 51 to 54 | SVC1 to 4 | Multi set-point selection 1 to 4 |
| 55 | PRO | PID gain change |
| 56 | PIO1 | PID output switching 1 |
| 57 | PIO2 | PID output switching 2 |
| 58 | SLEP | SLEEP condition ativation |
| 59 | WAKE | WAKE condition ativation |
| 60 | TL | Torque limit enable |
| 61 | TRQ1 | Torque limit selection bit 1 |
| 62 | TRQ2 | Torque limit selection bit 2 |
| 63 | PPI | P/PI control mode selection |
| 64 | CAS | Control gain change |
| 65 | SON | Servo-on |
| 66 | FOC | Forcing |
| 67 | ATR | Permission of torque control |
| 68 | TBS | Torque Bias enable |
| 69 | ORT | Orientation |
| 71 | LAC | Acceleration/Deceleration cancellation |
| 72 | PCLR | Position deviation clear |
| 73 | STAT | pulse train position command input enable |
| 74 | PUP | Position bias (ADD) |
| 75 | PDN | Position bias (SUB) |
| 76 to 79 | CP1 to 4 | Multistage position settings selection 1 to 4 |
| 80 | ORL | Limit signal of Homing function |
| 81 | ORG | Start signal of Homing function |
| 82 | FOT | Forward Over Travel |
| 83 | ROT | Reserve Over Travel |
| 84 | SPD | speed / position switching |
| 85 | PSET | Position data presetting |
| 86 to 96 | M11 to 11 | General-purpose input 1 to 11 |
| 97 | PCC | Pulse counter clearing |
| 98 | ECOM | EzCOM activation |
| 99 | PRG | Program RUN |
| 100 | HLD | Acceleration/Deceleration disable |
| 101 | REN | RUN enable |
| 102 | DISP | Display lock |
| 103 | PLA | Pulse count A |
| 104 | PLB | Pulse count B |
| 105 | EmF | Emergency-Force Drive activation |
| 107 | COK | Contactor check signal |
| 108 | DTR | Data trace start |
| 109 | PLZ | Pulse train input Z |
| 110 | TCT | Teach-in signal |

Intelligent output terminal function list

| Function code | Symbol | Function name |
| :---: | :---: | :---: |
| 0 | no | Not use |
| 1 | RUN | Running |
| 2 | FA1 | Constant-speed reached |
| 3 | FA2 | Set speed overreached |
| 4 | FA3 | Set frequency reached |
| 5 | FA4 | Set speed overreached 2 |
| 6 | FA5 | Set speed reached |
| 7 | IRDY | inverter ready |
| 8 | FWR | Forward rotation |
| 9 | RVR | Reverse rotation |
| 10 | FREF | Speed referenc $=$ Keypad is selected |
| 11 | REF | Run command = Keypad is selected |
| 12 | SETM | 2nd control is selcted |
| 16 | OPO | Option output |
| 17 | AL | Alarm |
| 18 | MJA | Major failure |
| 19 | OTQ | Over-torque |
| 20 | IP | Instantaneous power failure |
| 21 | UV | Undervoltage |
| 22 | TRQ | Torque limited |
| 23 | IPS | IP-Non stop function is active |
| 24 | RNT | Accumulated operation time over |
| 25 | ONT | Accumulated power-on time over |
| 26 | THM | Electronic thermal alarm signal(MTR) |
| 27 | THC | Electronic thermal alarm signal(CTL) |
| 29 | WAC | Capacitor life warning |
| 30 | WAF | Cooling-fan speed drop |
| 31 | FR | Starting contact signal |
| 32 | OHF | Heat sink overheat warning |
| 33 | LOC | Low-current indication signal |
| 34 | LOC2 | Low-current indication signal 2 |
| 35 | OL | Overload notice advance signal (1) |
| 36 | OL2 | Overload notice advance signal (2) |
| 37 | BRK | Brake release |
| 38 | BER | Brake error |
| 39 | CON | Contactor control |
| 40 | zs | OHz detection signal |
| 41 | DSE | Excessive speed deviation |
| 42 | PDD | Position deviation over |
| 43 | POK | Positioning completed |
| 44 | PCMP | Pulse count compare match output |
| 45 | OD | Deviation over for PID control |
| 46 | FBV | PID1 feedback comparison |
| 47 | OD2 | OD:Deviation over for PID2 control |
| 48 | FBV2 | PID2 feedback comparison |
| 49 | NDc | Communication line disconnection |
| 50 | AirDc | Analog [Ail] disconnection detection |
| 51 | AizDc | Analog [Ai2] disconnection detection |
| 52 | AisDc | Analog [Ai3] disconnection detection |
| 53 | Ai4Dc | Analog [Ai4] disconnection detection |
| 54 | Ai5Dc | Analog [Ai5] disconnection detection |
| 55 | Ai6Dc | Analog [Aii6] disconnection detection |
| 56 to 61 | WCAil to 6 | Window comparator Ai1 to 6 |
| 62 to 68 | LOG1 to 7 | Logical operation result 1 to 7 |
| 69 to 75 | M01 to 7 | General-purpose output 1 to 7 |
| 76 | EMFC | Bypass mode indicator |
| 77 | EMBP | Speed deviation over |
| 78 | WFT | Trace function waiting for triger |
| 79 | TRA | Trace function data logging |
| 80 | LBK | Low-battery of keypad |
| 81 | OvS | Over-Voltage power Supply |
| 84 to 87 | AC0 to 3 | Alarm code bit-0 to 3 |
| 89 | OD3 | Deviation over for PID control |
| 90 | FBV3 | PID3 feedback comparison |
| 91 | OD4 | Deviation over for PID4 control |
| 92 | FBV4 | PID4 feedback comparison |
| 93 | SSE | PID soft start error |

## Wiring and Accessories



| Input | Motor | Model |  | Power line cable AWG(mm2) | Grounding | External braking resistor between | line cable Terminal screw size | Crimp terminal |  | $\begin{gathered} \text { Fuse } \\ (\text { UL rated,Class } \mathrm{J} \text { ot } \mathrm{T}) \end{gathered}$ |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Voltage | (kW(HP)) |  |  | R,S,T,U,V, <br> W,P,PD,N | AWG(mm2) | $P$ and RB AWG(mm2) |  |  | Tightening torque $\mathrm{N} \cdot \mathrm{m}$ | Voltage(V) | Current(A) |
| 200V | 0.4(1/2) | P1-00044-L | ND,LD,VLD | 14(2.1) | 14(2.1) | 14(2.1) | M4 | 2-4/2-4 | 1.4 | 600 | 15 |
|  | 0.75(1) | P1-00080-L | ND,LD,VLD | 14(2.1) | 14(2.1) | 14(2.1) | M4 | 2-4/2-4 | 1.4 | 600 | 30 |
|  | 1.5(2) | P1-00104-L | ND,LD,VLD | 14(2.1) | 14(2.1) | 14(2.1) | M4 | 2-4/2-4 | 1.4 | 600 | 40 |
|  | 2.2(3) | P1-00156-L | ND,LD | 14(2.1) | 14(2.1) | 14(2.1) | M4 | 2-4/2-4 | 1.4 | 600 | 40 |
|  |  |  | VLD | 10(5.3) | 10(5.3) | 10(5.3) |  | 5.5-4/5.5-4 |  |  |  |
|  | 3.7(5) | P1-00228-L | ND,LD,VLD | 10(5.3) | 10(5.3) | 10(5.3) | M4 | 5.5-4/5.5-4 | 1.4 | 600 | 50 |
|  | 5.5(7.5) | P1-00330-L | ND,LD,VLD | 8(8.4) | 8(8.4) | 8(8.4) | M5 | 8-5/8-5 | 3.0 | 600 | 100 |
|  | 7.5(10) | P1-00460-L | ND,LD | 8(8.4) | 6(13.3) | 8(8.4) | M5 | 8-5/8-5 | 3.0 | 600 | 150 |
|  |  |  | VLD | 6(13.3) |  | 6(13.3) |  | 14-5/8-5 |  |  |  |
|  | 11(15) | P1-00600-L | ND | 6(13.3) | 6(13.3) | 6(13.3) | M6 | 14-6/14-6 | 4.0 | 600 | 150 |
|  |  |  | LD,VLD | 4(21.2) |  | 4(21.2) |  | 22-6/14-6 |  |  |  |
|  | 15(20) | P1-00800-L | ND | 4(21.2) | 6(13.3) | 4(21.2) | M6 | 22-6/14-6 | 2.5 to 3.0 | 600 | 150 |
|  |  |  | LD,VLD | 3(26.7) |  | 3(26.7) |  | 38-6/14-6 |  |  |  |
|  | 18.5(25) | P1-00930-L | ND | 3(26.7) | 6(13.3) | 3(26.7) | M6 | 38-6/14-6 | 2.5 to 3.0 | 600 | 200 |
|  |  |  | LD | 2(33.6) |  | 2(33.6) |  | 60-6/14-6 |  |  |  |
|  |  |  | VLD | 1(42.4) |  | 1(42.4) |  |  |  |  |  |
|  | 22(30) | P1-01240-L | ND | 1(42.4) | 6(13.3) | 1(42.4) | M8 | 60-8/14-6 | 5.5 to 6.6 | 600 | 200 |
|  |  |  | LD | 1/0(53.5) |  | 1/0(53.5) |  |  |  |  |  |
|  |  |  | VLD | 2/0(67.4) |  | 2/0(67.4) |  | 70-8/14-6 |  |  |  |
|  | 30(40) | P1-01530-L | ND | 2/0(67.4) | 4(21.2) | - | M8 | 70-8/22-8 | 6.0 | 600 | 300 |
|  |  |  | LD,VLD | 1/0x2(53.5x2) |  |  |  | 60-8/22-8 |  |  |  |
|  | 37(50) | P1-01850-L | ND | 4/0(107.2) | 4(21.2) | - | M8 | 100-8/22-6 | 15.0 | 600 | 300 |
|  |  |  | LD,VLD | 1/0x2(53.5x2) |  |  |  | 60-8/22-6 |  |  |  |
|  | 45(60) | P1-02290-L | ND,LD | 1/0×2(53.5x2) | 4(21.2) | - | M8 | 60-8/22-6 | 6.0 to 10.0 | 600 | 400 |
|  |  |  | VLD | 2/0x2(67.4x2) |  |  |  | 70-8/22-6 |  |  |  |
|  | 55(75) | P1-02950-L | ND | 350kc(177) | 3(26.7) | - | M10 | 180-8/38-6 | 19.6 | 600 | 500 |
|  |  |  | LD,VLD | 3/0x2(85.0x2) |  |  |  | 80-8/38-6 |  |  |  |
| 400 V | 0.75(1) | P1-00041-H | ND,LD,VLD | 14(2.1) | 14(2.1) | 14(2.1) | M4 | 2-4/2-4 | 1.4 | 600 | 15 |
|  | 1.5(2) | P1-00054-H | ND,LD,VLD | 14(2.1) | 14(2.1) | 14(2.1) | M4 | 2-4/2-4 | 1.4 | 600 | 20 |
|  | 2.2(3) | P1-00083-H | ND,LD,VLD | 14(2.1) | 14(2.1) | 14(2.1) | M4 | 2-4/2-4 | 1.4 | 600 | 30 |
|  | 3.7(5) | P1-00126-H | ND,LD | 14(2.1) | 14(2.1) | 14(2.1) | M4 | 2-4/2-4 | 1.4 | 600 | 30 |
|  |  |  | VLD | 12(3.3) | 12(3.3) | 12(3.3) |  | 5.5-4/5.5-4 |  |  |  |
|  | 5.5(7.5) | P1-00175-H | ND,LD | 12(3.3) | 12(3.3) | 12(3.3) | M5 | 5.5-5/5.5-5 | 3.0 | 600 | 75 |
|  |  |  | VLD | 10(5.3) | 10(5.3) | 10(5.3) |  |  |  |  |  |
|  | 7.5(10) | P1-00250-H | ND,LD | 10(5.3) | 10(5.3) | 10(5.3) | M5 | 5.5-5/5.5-5 | 3.0 | 600 | 75 |
|  |  |  | VLD | 8(8.4) | 8(8.4) | 8(8.4) |  | 8-5/8-5 |  |  |  |
|  | 11(15) | P1-00310-L | ND,LD,VLD | 8(8.4) | 8(8.4) | 8(8.4) | M6 | 8-6/8-6 | 4.0 | 600 | 75 |
|  | 15(20) | P1-00400-H | ND,LD,VLD | 8(8.4) | 8(8.4) | 8(8.4) | M6 | 8-6/8-6 | 4.0 | 600 | 100 |
|  | 18.5(25) | P1-00470-H | ND | 8(8.4) | 8(8.4) | 8(8.4) | M6 | 8-6/8-6 | 4.0 | 600 | 100 |
|  |  |  | LD,VLD | 6(13.3) |  | 6(13.3) |  | 14-6/8-6 |  |  |  |
|  | 22(30) | P1-00620-H | ND | 6(13.3) | 8(8.4) | 6(13.3) | M6 | 14-6/8-6 | 4.0 | 600 | 100 |
|  |  |  | LD,VLD | 4(21.2) |  | 4(21.2) |  | 22-6/8-6 |  |  |  |
|  | 30(40) | P1-00770-L | ND | 3(26.7) | 6(13.3) | - | M8 | 38-8/14-8 | 6.0 | 600 | 200 |
|  |  |  | LD | 2(33.6) |  |  |  |  |  |  |  |
|  |  |  | VLD | 1(42.4) |  |  |  | 60-8/14-8 |  |  |  |
|  | 37(50) | P1-00930-H | ND,LD, VLD | 1(42.4) | 6(13.3) | - | M8 | 60-8/14-8 | 15.0 | 600 | 200 |
|  | 45(60) | P1-01160-H | ND | 1(42.4) | 6(13.3) | - | M8 | 60-8/14-8 | 6.0 to 10.0 | 600 | 200 |
|  |  |  | LD,VLD | 1/0(53.5) |  |  |  | 70-8/14-8 |  |  |  |
|  | 55(75) | P1-01800-H | ND | 1/0(53.5) | 4(21.2) | - | M8 | 70-8/22-8 | 6.0 to 10.0 | 600 | 250 |
|  |  |  | LD | 2/0(67.4) |  |  |  | 60-8/22-8 |  |  |  |
|  |  |  | VLD | 1/0x2(53.5x2) |  |  |  |  |  |  |  |
|  | 75 | P1-02160-H | ND,LD,VLD | $1 / 0 \times 2(53.5 \times 2)$ | 4(21.2) | - | M10 | 60-10 | 6.0 to 10.0 | 600 | 300 |
|  | 90 | P1-02600-H | ND,LD | $1 / 0 \times 2(53.5 \times 2)$ | 3(26.7) | - | M10 | 60-10 | 6.0 to 10.0 | 600 | 400 |
|  |  |  | VLD | 2/0×2(67.4×2) |  |  |  | 70-10 |  |  |  |
|  | 110 | P1-03250-H | ND,LD | $2 / 0 \times 2(67.4 \times 2)$ | 1(42.4) | - | M10 | 70-10 | 19.6 | 600 | 500 |
|  |  |  | VLD | $3 / 0 \times 2(85.0 \times 2)$ |  |  |  | 80-10 |  |  |  |
|  | 132 | P1-03610-H | ND | $3 / 0 \times 2(85.0 \times 2)$ | 1(42.4) | - | M10 | 80-10 | 19.6 | 600 | 500 |
|  |  |  | LD | 4/0×2(107.2×2) |  |  |  | 100-10 |  |  |  |
|  |  |  | VLD | 250kc×2(127×2) |  |  |  | 150-10 |  |  |  |

Note1: Field wiring connection must be made by a UL and c-UL listed closed-loop terminal connector sized for the wire gauge involved.
Connector must be fixed using the crimping tool specified by the connector manufacture.
Note2: Be sure to use large wire gauges for power wiring if the distance exceeds 20 m ( 66 ft )
Note3: The wire gauges in the above table shows the designed values based on HIV cables (with thermal resistance of $75^{\circ} \mathrm{C}$ ).
Note4: 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 termina block. Please put on pressure to the crimp terminals with a crimp tool that the crimp terminal maker recommends.

|  | Name | Function |
| :--- | :--- | :--- |
| 1 | Input side AC reactor | This is useful in suppressing harmonics induced on the power supply lines, or when the main power voltage imbalance exceeds $3 \%$ <br> (and power source capacity is more than 500kVA), or to smooth out line fluctuations. It also improves the power factor. |
| 2 | EMI filter | Reduces the conducted noise on the power supply wiring generated by the inverter. Connect to the inverter input side. |
| 3 | Radio noise filter | Electrical noise interference may occur on nearby equipment such as a radio receiver. This magnetic choke filter helps reduce radiated <br> noise (can also be used on output). |
| 4 | Radio noise filter <br> (Capacitor filter) | This capacitor filter reduces radiated noise from the main power wires in the inverter input side. |
| 5 | DC link choke | Suppresses harmonics generated by the inverter. |
| 6 | Braking resistor | This is useful for increasing the inverter's control torque for high duty-cycle (on-off) applications, and improving the decelerating |
| capability. |  |  |

## Option cassette

Three option cassettes can be installed in SJ-P1. Please extend according to machine and system specifications.

## - Encoder feedback option [P1-FB]

P1-FB successfully detects the rotation speed of the motor equipped with an encoder and feedbacks to the inverter. Thus, it contributes to suppressing the speed variation and helps to operate with high accuracy.
In addition, such function can be realized such as position command, synchronous operation and orientation function.
[Application example]
High precision operation of main motor for Winding machine, Wire drawing machine, Transport machine, Extruder and more.


- Field network communication option [P1-ECT, P1-EN, P1-PB]

With the field network option, the inverter can be operated, status monitor, parameter management etc from the host controller.
Since these are cassette type mounted on the front of the inverter, installation, wiring, station number setting and status check

| Item |  | Specification |
| :---: | :---: | :---: |
| EtherCAT <br> OPTION <br> EtherсАT. | Communication protocol | EtherCAT CiA402 Drive profile |
|  | Physical layer | 100BASE-TX (IEEE802.3) |
|  | Connector | RJ45 (IN / OUT) |
|  | Communication distance | Distance between nodes(between devices) : 100[m]max |
|  | Station address*1 | 1 to 99 : Set by the address setting switch, 1 to 65535 : Set by configuration (The station address setting depends on the addressing mode used by the EtherCAT master.) |
|  | Distributed clock | Free run mode (asynchronous) |
|  | Process data | PDO free mapping |
|  | Mailbox (CoE) | Emergency messages, SDO requests, SDO responses, Abort SDO |
|  | CiA402 drive profile | Velocity mode |
|  | Applicable cable | 100BX-TX support (category 5e or higher) STP(Shield twist pair) cable (Straight or Crossed). |
| Ethernet (Modbus-TCP) OPTION | Applicable standards | IEEE802.3 |
|  | Communication protocol | TCP/IP (Available for IPv4 and IPv6) |
|  | Communication protocol (application layer) | Modbus TCP |
|  | Physical layer | 10BASE-T,100BASE-TX (IEEE802.3) |
|  | Connector | RJ45 (PORT1/PORT2) |
|  | Communication distance | Distance between nodes(between devices) : 100[m]max |
|  | Communication method (transmission speed) | Fixed transmission speed : 10Mbps Full/Half-duplex or 100Mbps Full/Half-duplex Auto detection transmission speed : Auto negotiation |
|  | Auto MDI-X | According to selection of communication method (transmission speed). Selecting the auto negotiation: the function Auto MDI-X is enable. Selecting others: the function Auto MDI-X is disable. |
|  | Port number | 502 (it can be configured by the inverter parameter setting) |
|  | Maximum number of sessions | 4 (Do not connect our PC setup software(ProDriveNext) multiple at the same time) |
|  | External power supply | DC24V $\pm 10 \%$, Current consumption: 1 A to 1.5 A <br> (Current consumption fluctuates with inverter and/or other options operating and so on.) |
|  | Dielectric strength | AC500V (Between insulation circuit) |
|  | Applicable cable | 100BX-TX support (category 5e or higher) STP(Shield twist pair) cable (Straight or Crossed). |
| PROFIBUS OPTION | Communication protocol | PROFIBUS DPVO PROFIBUS DPV1 |
|  | Connector, Cable | D-sub 9 pin, PROFIBUS DP cable (EN 50170 part 8-2 as "Cable Type A") |
|  | Node address | 0 to 99 : set by rotary switches <br> 1 to 126 : set by parameters (In case of rotary switch setting is in 0 ) |
|  | Profile | PROFIdrive |
| Common environment specification | Ambient operating temperature, Ambient operating humidity, Storage temperature | -10 to $50^{\circ} \mathrm{C}, 20$ to $90 \% \mathrm{RH},-20$ to $65^{\circ} \mathrm{C}$ ( No icing or condensation conditions.) |
|  | Vibration resistance | $5.9 \mathrm{~m} / \mathrm{s} 2(0.6 \mathrm{G}), 10$ to 55 Hz |
|  | Conformance to EMC and electrical safety standards | IEC/EN61800-3 Second environment, Category C3 IEC/EN61800-5-1 SELV |
|  | Enclosure rating | IP00 |
|  | Weight | 170 g |


-PROFIBUS option cassette


SJ-P1 front surface,
View from right side of the SJ-P1

SJ-P1 Maximum Torque with Short - Time Rating (ND rating)


SJ-P1 Torque Under Continous Operation (ND rating)

|  |  |
| :---: | :---: |
|  |  |

## Compatibility Between SJ700series and SJ Series P1



Note1: It can be used Ver.2.00 or later inverter.
Note2: This is the dimension from the bottom of the inverter body including the lower mounting bracket to the center of the terminal screw.

## For Correct Operation

## Application to Motors

Application to general-purpose motors

| Operating frequency | For operation at higher than 60 Hz , it is required to examine the allowable torque of the motor, useful life of bearings, noise, vibration, <br> etc. In this case, <br> be sure to consult the motor manufacturer as the maximum allowable rpm differs depending on the motor capacity, etc. |
| :---: | :--- |
| Torque characteristics | The torque characteristics of driving a general-purpose motor with an inverter differ from those of driving it using commercial power <br> (starting torque decreases in particular). Carefully check the load torque characteristic of a connected machine and the driving torque <br> characteristic of the motor. |
| Motor loss and <br> temperature increase | An inverter-driven general-purpose motor heats up quickly at lower speeds. Consequently, the continuous torque level (output) will <br> decrease at lower motor speeds. Carefully check the torque characteristics vs speed range requirements. |
| Noise | When run by an inverter, a general-purpose motor audible slightly greater than with commercial power. |
| Vibration | When run by an inverter at variable speeds, the motor may generate vibration, especially because of (a) unbalance of the rotor <br> including a connected machine, or (b) resonance caused by the natural vibration frequency of a mechanical system. Particularly, be <br> careful of (b) when operating at variable speeds a machine previously fitted with a constant speed motor. Vibration can be minimized <br> by (1) avoiding resonance points using the frequency jump function of the inverter, (2) using a tireshaped coupling, or (3) placing a <br> rubber shock absorber beneath the motor base. |
| Power transmission |  |
| mechanism | Under continued, low-speed operation, oil lubrication can deteriorate in a power transmission mechanism with an oil-type gear box <br> (gear motor) or reducer. Check with the motor manufacturer for the permissible range of continuous speed. To operate at more than <br> 60Hz, confirm the machine's ability to withstand the centrifugal force generated. |

## Application to special motors

| Gear motor | The allowable rotation range of continuous drive varies depending on the lubrication method or motor manufacturer. <br> (Particularly in case of oil lubrication, pay attention to the low frequency range.) |
| :---: | :--- |
| Brake-equipped motor | For use of a brake-equipped motor, be sure to connect the braking power supply from the primary side of the inverter. |
| Pole-change motor | There are different kinds of pole-change motors (constant output characteristic type, constant torque characteristic type, etc.), with <br> different rated current values. In motor selection, check the maximum allowable current for each motor of a different pole count. At <br> the time of pole changing, be sure to stop the motor. Also see: Application to the 400V-class motor. |
| Submersible motor | The rated current of a submersible motor is significantly larger than that of the general-purpose motor. In inverter selection, be sure <br> to check the rated current of the motor. |
| Explosion-proof motor | Inverter drive is not suitable for a safety-enhanced explosion-proof type motor. The inverter should be used in combination with a <br> pressure-proof explosion-proof type of motor. <br> *Explosion-proof verification is not available for SJ700/SJ700D/SJ700B Series. |
| Synchronous (MS) motor | In most cases, the synchronous (MS) motor and the high-speed (HFM) motor are designed and manufactured to meet the <br> specifications suitable for a connected machine. As to proper inverter selection, consult the manufacturer. |
| High-speed (HFM) motor | A single-phase motor is not suitable for variable-speed operation by an inverter drive. Therefore, use a three-phase motor. |
| Single-phase motor | Voltage is induced at the motor power terminal during motor rotation even if the inverter power supply is cut off. <br> Therefore, please do not touch the terminals of the motor and inverter.PM motor can not be operated with commercial power supply. <br> In addition, PM motor and inverter are ""one to one"" combination. |

## Application to the 400V-class motor

A system applying a voltage-type PWM inverter with IGBT may have surge voltage at the motor terminals resulting from the cable constants including the cable length and the cable laying method. Depending on the surge current magnification, the motor coil insulation may be degraded. In particular, when a 400 V -class motor is used, a longer cable is used, and critical loss can occur, take any of the following countermeasures:
(1) install the LCR filter between the inverter and the motor,
$(2)$ install the $A C$ reactor between the inverter and the motor, or (3) enhance the insulation of the motor coil.

## Notes on Use

Drive

| Run/Stop | Run or stop of the inverter must be done with the keys on the operator panel or through the control circuit terminal. Do not operate by <br> installing a electromagnetic contactor (MC) in the main circuit. |
| :---: | :--- |
| Emergency motor stop | When the protective function is operating or the power supply stops, the motor enters the free run stop state. When an emergency <br> stop is required or when the motor should be kept stopped, use of a mechanical brake should be considered. |
| High-frequency run | A max. 400 Hz can be selected on the SJ Series P1. However, a two-pole motor can attain up to approx. 24,000 rpm, which is <br> extremely dangerous. Therefore, carefully make selection and settings by checking the mechanical strength of the motor and <br> connected machines. Consult the motor manufacturer when it is necessary to drive a standard (general-purpose) motor above 60Hz. <br> A full line of high-speed motors is available from Hitachi. |

## Repetitive operation on starting or plugging

About frequent repetition use (crane, elevator, press, washing machine), a power semiconductor (IGBT, a rectification diode, thyristor) in the inverter may come to remarkably have a short life by thermal fatigue.
The life can be prolonged by lower a load electric current. Lengthen acceleration / deceleration time. Lower carrier frequency. or increasing capacity of the inverter.

## Operation use in highlands beyond 1,000m above sea level

Due to the air density decreasing, whenever standard inverters are used for altitudes above 1000 m , the following conditions are additionally required for proper operation. In application for operation over 2500m, kindly contact your nearest sales office for assistance.

1. Reduction of inverter rated current

Current rating has to be reduced $1 \%$ for every 100 m that exceeds from an altitude of 1000 m .
For example, for inverters placed at an altitude of 2000 m , the rated current has to be reduced $10 \%$ (Rated current $x 0.9$ ) from its original amount.
$\left\{(2000 \mathrm{~m}-1000 \mathrm{~m}) / 100 \mathrm{~m}^{*}-1 \%=-10 \%\right\}$
2. Reduction of breakdown voltage

Whenever an inverter is used at altitudes beyond 1000 m , the breakdown voltage decreases as follows:
1000 m or less: $1.00 / 1500 \mathrm{~m}: 0.92 / 2000 \mathrm{~m}: 0.90 / 2500 \mathrm{~m}: 0.85$. As mentioned in the instruction manual, please avoid any pressure test.

## Installation location and operating environment

Avoid installation in areas of high temperature, excessive humidity, or where moisture can easily collect, as well as areas that are dusty, subject to corrosive gasses, mist of liquid for grinding, or salt. Install the inverter away from direct sunlight in a well-ventilated room that is free of vibration. The inverter can be operated in the ambient temperature range from SJ700/SJ700D (CT): -10 to $50^{\circ} \mathrm{C}, \mathrm{SJ} 700 \mathrm{D}$ (VT): -10 to $40^{\circ} \mathrm{C}, \mathrm{SJ} 700 \mathrm{~B}:-10$ to $45^{\circ} \mathrm{C}$. (Carrier frequency and output current must be reduced in the range of 40 to $50^{\circ} \mathrm{C}$.)

## Main power supply

Installation of an
$A C$ reactor on the input side

In the following examples involving a general-purpose inverter, a large peak current flows on the main power supply side, and is able to destroy the converter module. Where such situations are foreseen or the connected equipment must be highly reliable, install an AC reactor between the power supply and the inverter. Also, where influence of indirect lightning strike is possible, install a lightning conductor.
(A) The unbalance factor of the power supply is $3 \%$ or higher. (Note)
(B) The power supply capacity is at least 10 times greater than the inverter capacity (the power supply capacity is 500 kVA or more).
(C) Abrupt power supply changes are expected.

Examples:
(1) Several inverters are interconnected with a short bus.
(2) A thyristor converter and an inverter are interconnected with a short bus.
(3) An installed phase advance capacitor opens and closes.

In cases (A), (B) and (C), it is recommended to install an AC reactor on the main power supply side.
Note: Example calculation with $\mathrm{V}_{\mathrm{RS}}=205 \mathrm{~V}$, $\mathrm{V}_{\mathrm{St}}=201 \mathrm{~V}$, $\mathrm{V}_{\text {тR }}=200 \mathrm{~V}$
$\mathrm{V}_{\text {RS }}$ : R-S line voltage, $\mathrm{V}_{\text {St }}$ : S-T line voltage, $\mathrm{V}_{\text {тв }}$ : T -R line voltage
Unbalance factor of voltage $=\frac{\text { Max. line voltage (min.) }- \text { Mean line voltage }}{\text { Mean line voltage }}$

$$
=\frac{\mathrm{V}_{\mathrm{RS}}-\left(\mathrm{V}_{\mathrm{RS}}+\mathrm{V}_{\mathrm{ST}}+\mathrm{V}_{\text {TR }}\right) / 3}{\left(\mathrm{~V}_{\mathrm{RS}}+\mathrm{V}_{\text {ST }}+\mathrm{V}_{\text {TR }}\right) / 3} \times 100=\frac{205-202}{202} \times 100=1.5(\%)
$$

An inverter run by a private power generator may overheat the generator or suffer from a deformed output voltage waveform of the generator. Generally, the generator capacity should be five times that of the inverter (kVA) in a PWM control system, or six times greater in a PAM control system.

## Notes on Peripheral Equipment Selection

| Wiring connections |  | (1) Be sure to connect main power wires with R (L1), S (L2), and T (L3) terminals (input) and motor wires to U (T1), V (T2), and W (T3) terminals (output). (Incorrect connection will cause an immediate failure.) <br> (2) Be sure to provide a grounding connection with the ground terminal ( $\Theta$ ). |
| :---: | :---: | :---: |
|  | Electromagnetic contactor | When an electromagnetic contactor is installed between the inverter and the motor, do not perform on-off switching during running operation. |
| Wiring between inverter and motor | Thermal relay | When used with standard applicable output motors (standard three-phase squirrel-cage four-pole motors), the SJ700/SJ700D/ SJ700B Series does not need a thermal relay for motor protection due to the internal electronic protective circuit. A thermal relay, however, should be used: <br> - during continuous running outside a range of 30 to 60 Hz . <br> - for motors exceeding the range of electronic thermal adjustment (rated current). <br> - when several motors are driven by the same inverter; install a thermal relay for each motor. <br> - The RC value of the thermal relay should be more than 1.1 times the rated current of the motor. If the wiring length is 10 m or more, the thermal relay tends to turn off readily. In this case, provide an AC reactor on the output side or use a current sensor. |
| Installing a circuit breaker |  | Install a circuit breaker on the main power input side to protect inverter wiring and ensure personal safety. Choose an invertercompatible circuit breaker. The conventional type may malfunction due to harmonics from the inverter. For more information, consult the circuit breaker manufacturer. |
| Wiring distance |  | The wiring distance between the inverter and the remote operator panel should be 20 meters or less. Shielded cable should be used on thewiring. Beware of voltage drops on main circuit wires. (A large voltage drop reduces torque.) |
| Earth leakage relay |  | If the earth leakage relay (or earth leakage breaker) is used, it should have a sensitivity level of 15 mA or more (per inverter). |
| Phase advance capacitor |  | Do not use a capacitor for power factor improvement between the inverter and the motor because the high-frequency components of the inverter output may overheat or damage the capacitor. |

## High-frequency Noise and Leakage Current

(1) High-frequency components are included in the input/output of the inverter main circuit, and they may cause interference in a transmitter, radio, or sensor if used near the inverter. The interference can be minimized by attaching noise filters (option) in the inverter circuitry.
(2) The switching action of an inverter causes an increase in leakage current. Be sure to ground the inverter and the motor.

## Lifetime of Primary Parts

Because a DC bus capacitor deteriorates as it undergoes internal chemical reaction, it should normally be replaced every 10 years. Be aware, however, that its life expectancy is considerably shorter when the inverter is subjected to such adverse factors as high temperatures or heavy loads exceeding the rated current of the inverter. The approximate lifetime of the capacitor is as shown in the figure at the right when it is used 24 hours daily ( $80 \%$ load). JEMA standard is the 5 years at ambient temperature $40^{\circ} \mathrm{C}$ used in 12 hours daily. (According to the " Instructions for Periodic Inspection of General-Purpose Inverter " (JEMA).) Also, such moving parts as a cooling fan should be replaced. Maintenance inspection and parts replacement must beperformed by only specified trained personnel. Please plan to replace new inverter depends on the load, ambient condition in advance.

## Precaution for Correct Usage

- Before use, be sure to read through the Instruction Manual to insure proper use of the inverter.
- Note that the inverter requires electrical wiring; a trained specialist should carry out the wiring.
- The inverter in this catalog is designed for general industrial applications. For special applications in fields such as aircraft, outer space, nuclear power, electrical power, transport vehicles, clinics, and underwater equipment, please consult with us in advance.
- For application in a facility where human life is involved or serious injury may occur, make sure to provide safety devices to avoid any accident.
- The inverter is intended for use with a three-phase AC motor. For use with a load other than this, please consult with us.


[^0]:    *Can not be read in the case of inverter failure.

[^1]:    *Turn off this function for lifting equipment.

[^2]:    
    
    
     may be limited in the range according to the use of drive. **: The values for the sensorless vector control are assigned according to the values in the ND rating in the Hitachi standard motor table.
     attaching the braking resistor the regenerative braking unit is no longer required.

[^3]:    1) Varies depending on inverter models and settings of duty rating
