

Pursuing the Ideal Compact Inverter

# WJ200 Series

Designed for excellent performance and user friendliness

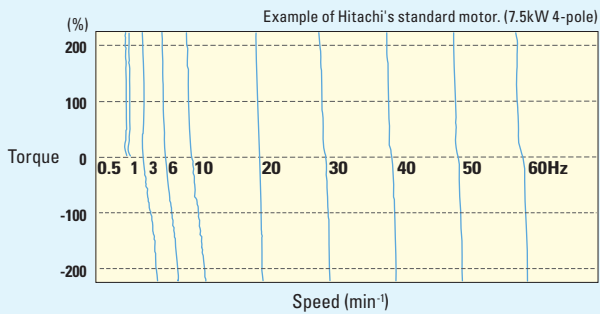


# Industry-leading Levels of Performance

## 1 High starting torque of 200% or greater achieved by sensorless vector control (when sized for heavy duty).

Integrated auto-tuning function for easy sensorless vector control realizes high torque suitable for applications requiring it such as crane hoists, lifts, elevators, etc.

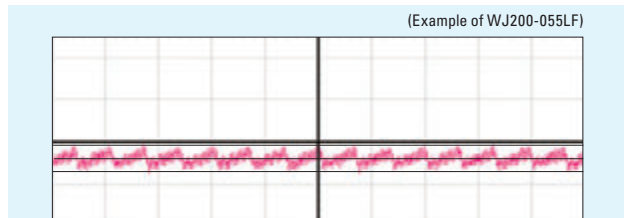
### Example of Torque Characteristics



Auto-tuning to perform sensorless vector control can now be easily done.

## 2 Speed regulation at low-speed is greatly improved. – Fluctuation is 1/2\* compared with the previous model. –

Speed regulation at low speed has been drastically improved to enhance process stability and precision.



- Frequency commanded by the inverter: 0.5Hz.
- Motor: Hitachi's standard 3-phase 5.5kW 4-pole totally enclosed type motor.

\* WJ200: 5min<sup>-1</sup>, Previous model: 13min<sup>-1</sup>

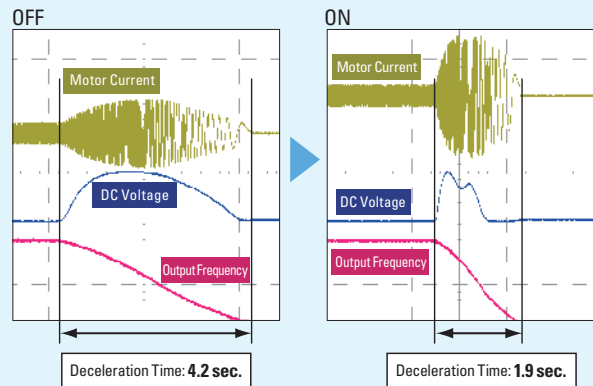
## 3 Trip avoidance functions



Minimum time deceleration function, over-current suppress function and DC bus AVR function are incorporated. The functions reduce nuisance tripping. Improved torque limiting/current limiting function enables a load limit to protect machine and equipment.

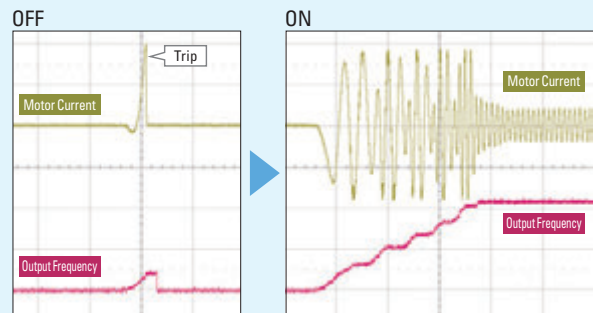
(Example of WJ200-075LF)

### Minimum time deceleration Function



2.3 sec. reduction of deceleration time without a braking resistor is achieved when the function is active.

### Over-current Suppress Function\*



\*Turn off this function for lifting equipment.

## Model Name Indication

# WJ200 – 001 L F

Series Name ————— with Digital Operator

Applied Motor Capacity  
001: 0.1kW – 150: 15kW

Power Source  
M:1-phase 100V class  
S:1-phase 200V class  
L:3-phase 200V class  
H:3-phase 400V class



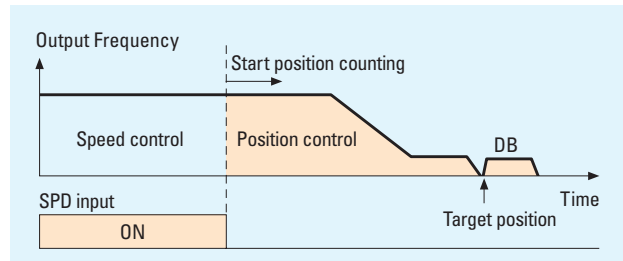
## Model Configuration

| Model Name<br>WJ200-xxx | 1-phase 100V class |      | 1-phase 200V class |      | 3-phase 200V class |      | 3-phase 400V class |  |
|-------------------------|--------------------|------|--------------------|------|--------------------|------|--------------------|--|
|                         | CT                 | VT   | CT                 | VT   | CT                 | VT   | CT                 |  |
| 001                     |                    | 0.2  | 0.1                | 0.2  | 0.1                |      |                    |  |
| 002                     |                    | 0.4  | 0.2                | 0.4  | 0.2                |      |                    |  |
| 004                     | 0.4                | 0.55 | 0.4                | 0.75 | 0.4                | 0.75 | 0.4                |  |
| 007                     | 0.75               | 1.1  | 0.75               | 1.1  | 0.75               | 1.5  | 0.75               |  |
| 015                     |                    | 2.2  | 1.5                | 2.2  | 1.5                | 2.2  | 1.5                |  |
| 022                     |                    | 3.0  | 2.2                | 3.0  | 2.2                | 3.0  | 2.2                |  |
| 030                     |                    |      |                    |      |                    | 4.0  | 3.0                |  |
| 037                     |                    |      |                    | 5.5  | 3.7                |      |                    |  |
| 040                     |                    |      |                    |      |                    | 5.5  | 4.0                |  |
| 055                     |                    |      |                    | 7.5  | 5.5                | 7.5  | 5.5                |  |
| 075                     |                    |      |                    | 11   | 7.5                | 11   | 7.5                |  |
| 110                     |                    |      |                    | 15   | 11                 | 15   | 11                 |  |
| 150                     |                    |      |                    | 18.5 | 15                 | 18.5 | 15                 |  |

## 4 Simple positioning control (when feedback signal is used.)

**NEW**

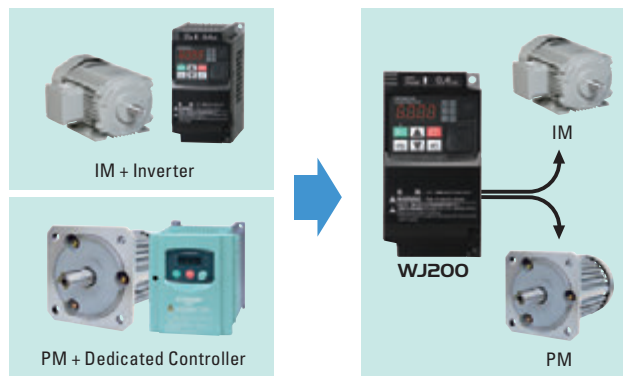
When simple positioning function is activated, speed control operation or positioning control operation is selectable via intelligent input. While the [SPD] input is ON, the current position counter is held at 0. When [SPD] is OFF, the inverter enters positioning control operation and the position counter is active.



## 5 Induction motor & Permanent magnetic motor\* control with one inverter (corresponds more than Ver.2.0)

**NEW**

The WJ200 inverter can drive both induction motors (IM) and permanent magnetic motors (PM). Energy conservation and miniaturization can be achieved using PM motors. Moreover, one inverter used for two types of motor.



\*Permanent magnet motor control function of WJ200 is for variable torque application such as fan and pump.

## Global standards

### 1 Conformity to global standards

CE, UL, c-UL, RCM approvals.  
(1-phase 100V class is for CE, UL and c-UL only)



### 2 Sink / source logic is standard

Logic input and output terminal can be configured for sink or source logic.

### 3 Wide input power voltage range

Input voltage 240V for 200V class and 480V for 400V class as standard.

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Pursuing the Ideal Compact Inverter

# WJ200

Designed for excellent performance and user friendliness



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).

# Pursuit of Ease of Use

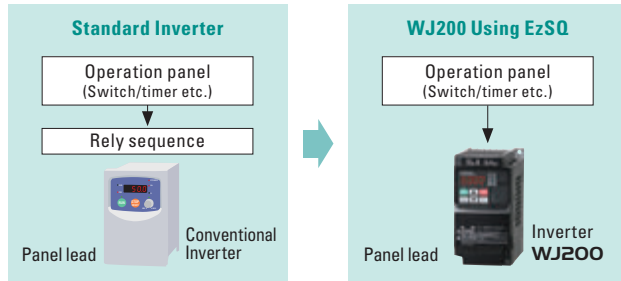
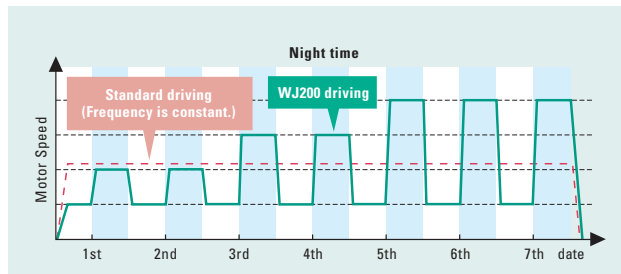
## 1 Easy sequence [EzSQ] programming function NEW

Sequence operation is realized by downloading to an inverter a program created with Hitachi's EzSQ software. User program can be compiled on EzSQ software on a PC. External components can be simplified or eliminated, resulting in cost-savings.

### ● EzSQ Example: Energy cost saving by speed reduction.

- Daytime: Motor speed is automatically reduced to reduce demand during peak hours.
- Nighttime: Motor speed is increased to take a advantage of off-peak power rates.

### Example of driving program

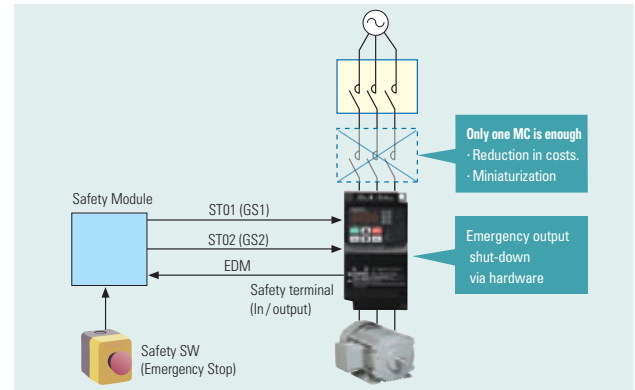


## 2 Safe stop function NEW

WJ200 conforms to the applicable safety standards and corresponds to Machinery Directive of Europe. Shuts down the inverter by hardware, bypassing the CPU, to achieve reliable safe stop function. The safety standard can be met at a low cost.

(ISO13849-1 Category 3 / IEC60204-1 Stop Category 0)

\*1-phase 100V class and C versions (SFC, LFU, HFC) are not certified.



## 3 Password function NEW

The WJ200 inverter has a password function to prevent changing parameters or to hide some or all parameters.

# Ease of Maintenance

## 1 Long life time components (Design life time 10 years or more\*) NEW

Design lifetime 10 Years or more for DC bus capacitors and cooling fan.  
Cooling fan ON/OFF control function for longer fan life.

\*Ambient temperature : Average 40°C (no corrosive gases, oil mist or dust)  
Design lifetime is calculated, and not guaranteed.

## 2 Life time warning function NEW

WJ200 diagnoses lifetime of DC bus capacitors and cooling fan(s).

## 3 Easy-removable cooling fan

The cooler fan can be exchanged without special tools.



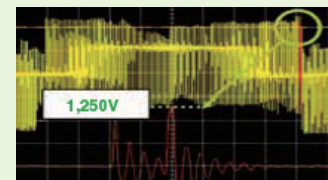
# Environmental Friendliness

## 1 Micro surge voltage suppress function

Hitachi original PWM control method limits motor terminal voltage to less than twice inverter DC bus voltage. Lower than Hitachi motor max. insulation voltage (1,250V)

(During regeneration, the motor terminal voltage may exceed the motor maximum insulation voltage (1,250V))

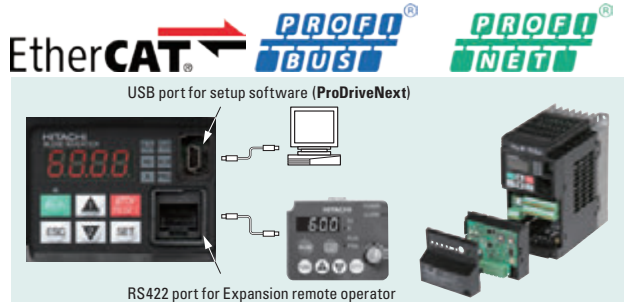
### Motor terminal voltage



E=625V cable:100m

## 4 Network compatibility & External ports NEW

**Modbus-RTU** is supported as standard.  
WJ200 can be used in various network using optional fieldbus module.  
(\*When the network option is attached, Functional safety (STO) certification becomes ineffective. However, output shutdown function is effective. In addition, standard Modbus-RTU communication is also disabled.)



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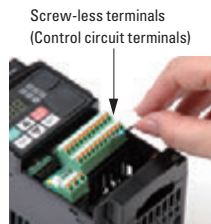
## 6 Easy to maintain NEW

### Easy selection of displayed parameters

- **Data comparison function**  
Display parameters changed from default setting.
- **Basic display**  
Display most frequently used parameters.
- **Quick display**  
Display 32 user-selected parameters.
- **User-changed parameter display**  
Store automatically and display the parameters changed by the user (Up to 32 sets); can also be used as change history.
- **Active parameter display**  
Display those parameters which are enabled.

## 5 Ease of wiring NEW

Screw-less terminals (control circuit terminals) spring-loaded, for use with solid or stranded wire with ferrules.



## 7 Side-by-side installation

Inverters can be installed with no space between them to save space in the panel.

\*Ambient temperature 40°C max., individual mounting.



## 8 Easy adjustment of frequency

Pot for frequency adjustment is available as option kit.

Pot for Frequency Adjustment



## Various Versatile Functions

### 2 EU RoHS compliant

Environment-friendly inverter meets RoHS requirements (ordered items).

### 3 Improvement of environment

Varnish coating of internal PC board is standard.  
(Logic PCB and I/F PCB are excluded.)

### 1 Dual rating NEW

WJ200 can be used for both heavy and normal duty. One-frame-size smaller WJ200 can be applicable to certain applications.  
\*1-phase 100V class is only with CT.

### 2 Watt-hour monitor NEW

Energy consumption is displayed in kwh.

### 3 Output monitoring NEW

(2 terminals)

Two monitor output terminals (Analog 0–10VDC (10-bit), pulse train (0–10VDC, max 32kHz)).

### 4 Built-in BRD circuit

Built-in BRD circuit for all models (Optional resistor).

### 5 EzCOM (Peer-to-Peer communication) NEW

WJ200 supports Peer-to-Peer communication between multiple inverters. One administrator inverter is necessary in the network, and the other inverters act as master or slave.

### 6 Flexible display functions NEW

**Automatic return to the initial display:** 10 min. after the last key operation, display returns to the initial parameter set.

**Display limitation:** Show only the contents of display parameter.

**Dual monitor:** Two arbitrary monitor items can be set. Parameters are switched by up/down keys.

# Standard Specifications

## 1-phase 100V class (only with CT)

| Models WJ200-                 |                             | 004MF  | 007MF |
|-------------------------------|-----------------------------|--|-------|
| Applicable motor size *1      | kW                          | 0.4  | 0.75  |
|                               | HP                          | 1/2  | 1     |
| Rated capacity (kVA)          | 100V                        | 1.0  | 1.7   |
|                               | 120V                        | 1.2  | 2.0   |
| Input Rating                  | Rated input voltage (V)     | 1-phase: 100V-10% to 120V +10%, 50/60Hz ±5%          |       |
|                               | Rated input current (A)     | 14   | 24    |
| Output Rating                 | Rated output voltage (V) *2 | 3-phase: 200 to 240V (proportional to input voltage) |       |
|                               | Rated output current (A)    | 3.5  | 5.0   |
| Minimum value of resistor (Ω) |                             | 100  | 50    |
| Cooling method                |                             | Self-cooling   |       |
| Weight                        | kg                          | 1.1  | 1.6   |
|                               | lb                          | 2.4  | 3.5   |

## 1-phase 200V class

| Models WJ200-                 |                             | 001SF  | 002SF | 004SF | 007SF | 015SF | 022SF             |      |
|-------------------------------|-----------------------------|--|-------|-------|-------|-------|-------------------|------|
| Applicable motor size *1      | kW                          | VT   | 0.2   | 0.4   | 0.55  | 1.1   | 2.2               | 3.0  |
|                               |                             | CT   | 0.1   | 0.2   | 0.4   | 0.75  | 1.5               | 2.2  |
|                               | HP                          | VT   | 1/4   | 1/2   | 3/4   | 1.5   | 3                 | 4    |
|                               |                             | CT   | 1/8   | 1/4   | 1/2   | 1     | 2                 | 3    |
| Rated capacity (kVA)          | 200V                        | VT   | 0.4   | 0.6   | 1.2   | 2.0   | 3.3               | 4.1  |
|                               |                             | CT   | 0.2   | 0.5   | 1.0   | 1.7   | 2.7               | 3.8  |
|                               | 240V                        | VT   | 0.4   | 0.7   | 1.4   | 2.4   | 3.9               | 4.9  |
|                               |                             | CT   | 0.3   | 0.6   | 1.2   | 2.0   | 3.3               | 4.5  |
| Input Rating                  | Rated input voltage (V)     | 1-phase: 200V-15% to 240V +10%, 50/60Hz ±5%          |       |       |       |       |                   |      |
|                               | Rated input current (A)     | VT   | 2.0   | 3.6   | 7.3   | 13.8  | 20.2              | 24.0 |
| Output Rating                 | Rated output voltage (V) *2 | 3-phase: 200 to 240V (proportional to input voltage) |       |       |       |       |                   |      |
|                               | Rated output current (A)    | VT   | 1.2   | 1.9   | 3.5   | 6.0   | 9.6               | 12.0 |
| Minimum value of resistor (Ω) |                             | 100  | 100   | 100   | 50    | 50    | 35                |      |
| Cooling method                |                             | Self-cooling   |       |       |       |       | Force ventilation |      |
| Weight                        | kg                          | 1.0  | 1.0   | 1.1   | 1.6   | 1.8   | 1.8               |      |
|                               | lb                          | 2.2  | 2.2   | 2.4   | 3.5   | 4.0   | 4.0               |      |

## 3-phase 200V class

| Models WJ200-                 |                             | 001LF  | 002LF | 004LF | 007LF | 015LF | 022LF             | 037LF | 055LF | 075LF | 110LF | 150LF |
|-------------------------------|-----------------------------|--|-------|-------|-------|-------|-------------------|-------|-------|-------|-------|-------|
| Applicable motor size *1      | kW                          | VT   | 0.2   | 0.4   | 0.75  | 1.1   | 2.2               | 3.0   | 5.5   | 7.5   | 11    | 18.5  |
|                               |                             | CT   | 0.1   | 0.2   | 0.4   | 0.75  | 1.5               | 2.2   | 3.7   | 5.5   | 7.5   | 11    |
|                               | HP                          | VT   | 1/4   | 1/2   | 1     | 1.5   | 3                 | 4     | 7.5   | 10    | 15    | 25    |
|                               |                             | CT   | 1/8   | 1/4   | 1/2   | 1     | 2                 | 3     | 5     | 7.5   | 10    | 15    |
| Rated capacity (kVA)          | 200V                        | VT   | 0.4   | 0.6   | 1.2   | 2.0   | 3.3               | 4.1   | 6.7   | 10.3  | 13.8  | 19.3  |
|                               |                             | CT   | 0.2   | 0.5   | 1.0   | 1.7   | 2.7               | 3.8   | 6.0   | 8.6   | 11.4  | 16.2  |
|                               | 240V                        | VT   | 0.4   | 0.7   | 1.4   | 2.4   | 3.9               | 4.9   | 8.1   | 12.4  | 16.6  | 23.2  |
|                               |                             | CT   | 0.3   | 0.6   | 1.2   | 2.0   | 3.3               | 4.5   | 7.2   | 10.3  | 13.7  | 19.5  |
| Input Rating                  | Rated input voltage (V)     | 3-phase: 200V-15% to 240V +10%, 50/60Hz ±5%          |       |       |       |       |                   |       |       |       |       |       |
|                               | Rated input current (A)     | VT   | 1.2   | 1.9   | 3.9   | 7.2   | 10.8              | 13.9  | 23.0  | 37.0  | 48.0  | 68.0  |
| Output Rating                 | Rated output voltage (V) *2 | 3-phase: 200 to 240V (proportional to input voltage) |       |       |       |       |                   |       |       |       |       |       |
|                               | Rated output current (A)    | VT   | 1.2   | 1.9   | 3.5   | 6.0   | 9.6               | 12.0  | 19.6  | 30.0  | 40.0  | 56.0  |
| Minimum value of resistor (Ω) |                             | 100  | 100   | 100   | 50    | 50    | 35                | 35    | 20    | 17    | 17    | 10    |
| Cooling method                |                             | Self-cooling   |       |       |       |       | Force ventilation |       |       |       |       |       |
| Weight                        | kg                          | 1.0  | 1.0   | 1.1   | 1.2   | 1.6   | 1.8               | 2.0   | 3.3   | 3.4   | 5.1   | 7.4   |
|                               | lb                          | 2.2  | 2.2   | 2.4   | 2.6   | 3.5   | 4.0               | 4.4   | 7.3   | 7.5   | 11.2  | 16.3  |

## 3-phase 400V class

| Models WJ200-                 |                             | 004HF  | 007HF | 015HF | 022HF | 030HF | 040HF             | 055HF | 075HF | 110HF | 150HF |      |
|-------------------------------|-----------------------------|--|-------|-------|-------|-------|-------------------|-------|-------|-------|-------|------|
| Applicable motor size *1      | kW                          | VT   | 0.75  | 1.5   | 2.2   | 3.0   | 4.0               | 5.5   | 7.5   | 11    | 15    | 18.5 |
|                               |                             | CT   | 0.4   | 0.75  | 1.5   | 2.2   | 3.0               | 4.0   | 5.5   | 7.5   | 11    | 15   |
|                               | HP                          | VT   | 1     | 2     | 3     | 4     | 5                 | 7.5   | 10    | 15    | 20    | 25   |
|                               |                             | CT   | 1/2   | 1     | 2     | 3     | 4                 | 5     | 7.5   | 10    | 15    | 20   |
| Rated capacity (kVA)          | 380V                        | VT   | 1.3   | 2.6   | 3.5   | 4.5   | 5.7               | 7.3   | 11.5  | 15.1  | 20.4  | 25.0 |
|                               |                             | CT   | 1.1   | 2.2   | 3.1   | 3.6   | 4.7               | 6.0   | 9.7   | 11.8  | 15.7  | 20.4 |
|                               | 480V                        | VT   | 1.7   | 3.4   | 4.4   | 5.7   | 7.3               | 9.2   | 14.5  | 19.1  | 25.7  | 31.5 |
|                               |                             | CT   | 1.4   | 2.8   | 3.9   | 4.5   | 5.9               | 7.6   | 12.3  | 14.9  | 19.9  | 25.7 |
| Input Rating                  | Rated input voltage (V)     | 3-phase: 380V-15% to 480V +10%, 50/60Hz ±5%          |       |       |       |       |                   |       |       |       |       |      |
|                               | Rated input current (A)     | VT   | 2.1   | 4.3   | 5.9   | 8.1   | 9.4               | 13.3  | 20.0  | 24.0  | 38.0  | 44.0 |
| Output Rating                 | Rated output voltage (V) *2 | 3-phase: 380 to 480V (proportional to input voltage) |       |       |       |       |                   |       |       |       |       |      |
|                               | Rated output current (A)    | VT   | 2.1   | 4.1   | 5.4   | 6.9   | 8.8               | 11.1  | 17.5  | 23.0  | 31.0  | 38.0 |
| Minimum value of resistor (Ω) |                             | 180  | 180   | 180   | 100   | 100   | 100               | 70    | 70    | 70    | 35    |      |
| Cooling method                |                             | Self-cooling   |       |       |       |       | Force ventilation |       |       |       |       |      |
| Weight                        | kg                          | 1.5  | 1.6   | 1.8   | 1.9   | 1.9   | 2.1               | 3.5   | 3.5   | 4.7   | 5.2   |      |
|                               | lb                          | 3.3  | 3.5   | 4.0   | 4.2   | 4.2   | 4.6               | 7.7   | 7.7   | 10.4  | 11.5  |      |

\*1: The applicable motor refers to Hitachi standard 3-phase motor (4p). When using other motors, care must be taken to prevent the rated motor current (50/60Hz) from exceeding the rated output current of the inverter.

\*2: The output voltage varies as the main supply voltage varies (except when using the AVR function). In any case, the output voltage cannot exceed the input power supply voltage.

## General Specifications

| Item                                       |                            | General Specifications  |  |   |
|--|----------------------------|---|--|---|
| Protective housing *3                      |                            | IP20  |  |   |
| Control method                             |                            | Sinusoidal Pulse Width Modulation (PWM) control   |  |   |
| Carrier frequency                          |                            | 2kHz to 15kHz (derating required depending on the model)  |  |   |
| Output frequency range *4                  |                            | 0.1 to 400Hz  |  |   |
| Frequency accuracy                         |                            | Digital command: $\pm 0.01\%$ of the maximum frequency<br>Analog command: $\pm 0.2\%$ of the maximum frequency (25°C $\pm 10^\circ\text{C}$ )   |  |   |
| Frequency setting resolution               |                            | Digital: 0.01Hz; Analog: max. frequency / 1000  |  |   |
| Volt. / Freq. characteristic               |                            | V/f control (constant torque, reduced torque, free-V / F): base freq. 30Hz – 400Hz adjustable, Sensorless vector control, Closed loop control with motor encoder feedback (only V/f control).   |  |   |
| Overload capacity                          |                            | Dual rating*6: CT (Heavy duty): 60 sec. @150%<br>VT (Normal duty): 60 sec. @120%  |  |   |
| Acceleration / deceleration time           |                            | 0.01 to 3600 seconds, linear and S-curve accel / decel, second accel / decel setting available  |  |   |
| Starting torque                            |                            | 200% @0.5Hz (sensorless vector control)   |  |   |
| DC braking                                 |                            | Variable operating frequency, time, and braking force   |  |   |
| Input signal                               | Freq. setting              | Operator panel  | $\Delta$ / $\nabla$ keys / Value settings  |   |
|  |                            | External signal *7  | 0 to 10 VDC (input impedance 10k $\Omega$ ), 4 to 20mA (input impedance 100 $\Omega$ ), Potentiometer (1k to 2k $\Omega$ , 2W)   |   |
|  |                            | Via network   | RS485 ModBus RTU, other network option   |   |
|  | FWD / REV run              | Operator panel  | Run / Stop (Forward / Reverse run change by command)   |   |
|  |                            | External signal *7  | Forward run / stop, Reverse run / stop   |   |
|  |                            | Via network   | RS485 ModBus RTU, other network option   |   |
|  | Intelligent input terminal | Terminals   | 7 terminals, sink / source changeable by a short bar   |   |
|  |                            | Functions   | 68 functions assignable<br>FW (forward run command), RV (reverse run command), CF1 – CF4 (multi-stage speed setting), JG (jog command), DB (external braking), SET (set second motor), 2CH (2-stage accel. / decel. command), FRS (free run stop command), EXT (external trip), USP (startup function), CS (commercial power switchover), SFT (soft lock), AT (analog input selection), RS (reset), PTC (thermistor thermal protection), STA (start), STP (stop), F / R (forward / reverse), PID (PID disable), PIDC (PID reset), UP (remote control up function), DWN (remote control down function), UDC (remote control data clear), OPE (operator control), SF1 – SF7 (multi-stage speed setting; bit operation), OLR (overload restriction), TL (torque limit enable), TRQ1 (torque limit changeover1), TRQ2 (torque limit changeover2), BOK (Braking confirmation), LAC (LAD cancellation), PCLR (position deviation clear), ADD (add frequency enable), F-TM (force terminal mode), ATR (permission of torque command input), KHC (Cumulative power clear), M11 – M17 (general purpose inputs for EzSQ), AHD (analog command hold), CP1 – CP3 (multistage-position switches), ORL (limit signal of zero-return), ORG (trigger signal of zero-return), SPD (speed/position changeover), GS1,GS2 (STO inputs, safety related signals), 485 (Starting communication signal), PRG (executing EzSQ program), HLD (retain output frequency), ROK (permission of run command), EB (rotation direction detection of B-phase), DISP (display limitation), NO (no function) |   |
|  | Output signal              | Intelligent output terminal   | Functions  | 48 functions assignable<br>RUN (run signal), FA1 – FA5 (frequency arrival signal), OL,OL2 (overload advance notice signal), OD (PID deviation error signal), AL (alarm signal), OTQ (over / under torque threshold), UV (under-voltage), TRQ (torque limit signal), RNT (run time expired), ONT (power ON time expired), THM (thermal warning), BRK (brake release), BER (brake error), ZS (0Hz detection), DSE (speed deviation excessive), POK (positioning completion), ODC (analog voltage input disconnection), OIDc (analog current input disconnection), FBV (PID second stage output), NDC (network disconnect detection), LOG1 – LOG3 (Logic output signals), WAC (capacitor life warning), WAF (cooling fan warning), FR (starting contact), OHF (heat sink overheat warning), LOC (Low load), MO1 – MO3 (general outputs for EzSQ), IRDY (inverter ready), FWR (forward operation), RVR (reverse operation), MJA (major failure), WCO (window comparator O), WCOI (window comparator OI), FREF (frequency command source), REF (run command source), SETM (second motor in operation), EDM (STO (safe torque off) performance monitor), OP (option control signal), NO (no function) |
|  |                            |   | Monitor output (analog)  | Output freq., output current, output torque, output voltage, input power, thermal load ratio, LAD freq., heat sink temperature, general output (EzSQ)   |
| Pulse train output (0 – 10VDC, 32kHz max.) |                            | [PWM output]<br>Output freq., output current, output torque, output voltage, input power, thermal load ratio, LAD freq., heat sink temperature, general output (EzSQ)<br>[Pulse train output]<br>Output frequency, output current, pulse train input monitor  |  |   |
| Alarm output contact                       |                            | ON for inverter alarm (1c contacts, both normally open or closed available.)  |  |   |
| Other functions                            |                            | Free-V/f, manual/automatic torque boost, output voltage gain adjustment, AVR function, reduced voltage start, motor data selection, auto-tuning, motor stabilization control, reverse running protection, simple position control, simple torque control, torque limiting, automatic carrier frequency reduction, energy saving operation, PID function, non-stop operation at instantaneous power failure, brake control, DC injection braking, dynamic braking (BRD), frequency upper and lower limiters, jump frequencies, curve accel and decel (S, U, inverted U,EL-S), 16-stage speed profile, fine adjustment of start frequency, accel and decel stop, process jogging, frequency calculation, frequency addition, 2-stage accel / decel, stop mode selection, start / end freq., analog input filter, window comparators, input terminal response time, output signal delay / hold function, rotation direction restriction, stop key selection, software lock, safe stop function, scaling function, display restriction, password function, user parameter, initialization, initial display selection, cooling fan control, warning, trip retry, frequency pull-in restart, frequency matching, overload restriction, over current restriction, DC bus voltage AVR |  |   |
| Protective function                        |                            | Over-current, over-voltage, under-voltage, overload, brake resistor overload, CPU error, memory error, external trip, USP error, ground fault detection at power on, temperature error, internal communication error, driver error, thermistor error, brake error, safe stop, overload at low speed, modbus communication error, option error, encoder disconnection, speed excessive, EzSQ command error, EzSQ nesting error, EzSQ execution error, EzSQ user trip   |  |   |
| Operating environment                      | Temperature                | Operating (ambient): -10 to 50°C / Storage: -20 to 65°C *8  |  |   |
|  | Humidity                   | 20 to 90% humidity (non-condensing)   |  |   |
|  | Vibration *9               | 5.9m/s <sup>2</sup> (0.6G), 10 to 55 Hz   |  |   |
|  | Location                   | Altitude 1,000m or less, indoors (no corrosive gasses or dust)  |  |   |
| Coating color                              |                            | Black   |  |   |
| Options                                    |                            | Remote operator unit, cables for the units, braking unit, braking resistor, AC reactor, DC reactor, EMC filter  |  |   |

\*3: The protection method conforms to JIS C 0920 (IEC 60529).

\*4: To operate the motor beyond 50 / 60Hz, consult the motor manufacturer for the maximum allowable rotation speed.

\*5: The braking torque via capacitive feedback is the average deceleration torque at the shortest deceleration (stopping from 50 / 60Hz as indicated). It is not continuous regenerative braking torque. The average deceleration torque varies with motor loss. This value decreases when operating beyond 50Hz. If a large regenerative torque is required, the optional regenerative braking unit and a resistor should be used.

\*6: 1-phase 100V class is only with CT.

\*7: The frequency command is the maximum frequency at 9.8V for input voltage 0 to 10VDC, or at 19.8mA for input current 4 to 20mA. If this characteristic is not satisfactory for your application, contact your Hitachi representative.

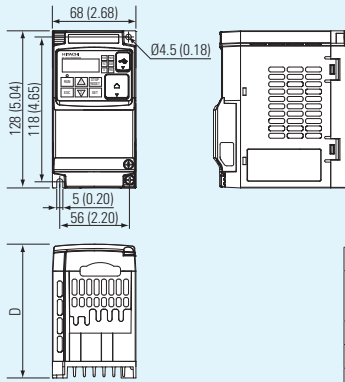
\*8: The storage temperature refers to the short-term temperature during transportation.

\*9: Conforms to the test method specified in JIS C 60068-2-6:2010 (IEC 60068-2-6:2007). For the model types excluded in the standard specifications, contact your Hitachi sales representative.

# Dimensions

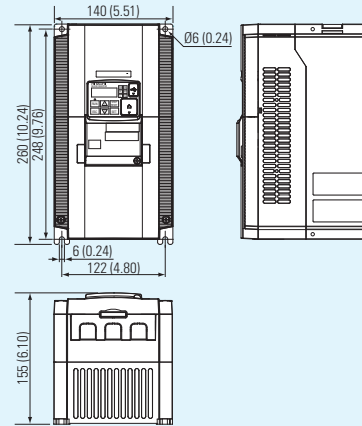
[Unit: mm(inch)]  
Inches for reference only

- WJ200-004MF
- WJ200-001SF-004SF
- WJ200-001LF-007LF

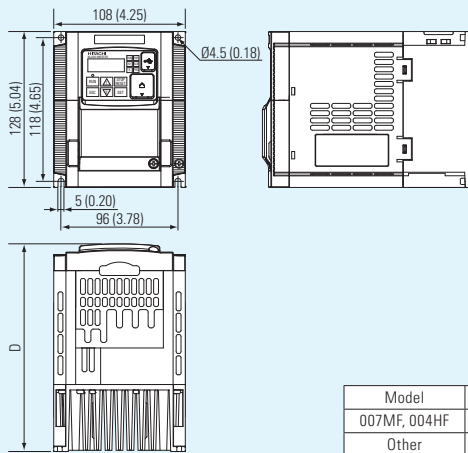


| Model                        | D            |
|------------------------------|--------------|
| 001SF, 002SF<br>001LF, 002LF | 109 (4.29)   |
| 004SF, 004LF                 | 122.5 (4.82) |
| 004MF                        | 132.5 (5.22) |
| 007LF                        | 145.5 (5.73) |

- WJ200-055LF
- WJ200-075LF
- WJ200-055HF
- WJ200-075HF

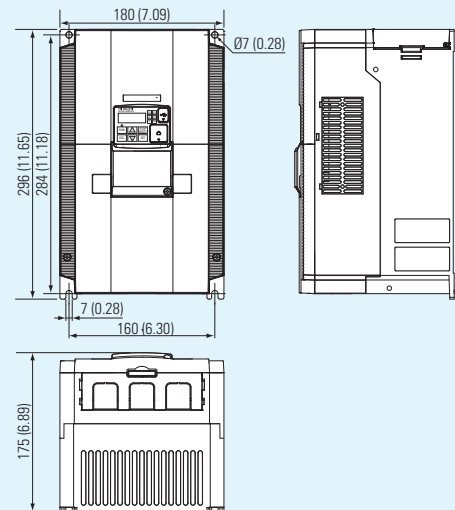


- WJ200-007MF
- WJ200-007SF-022SF
- WJ200-015LF, 022LF
- WJ200-004HF-030HF

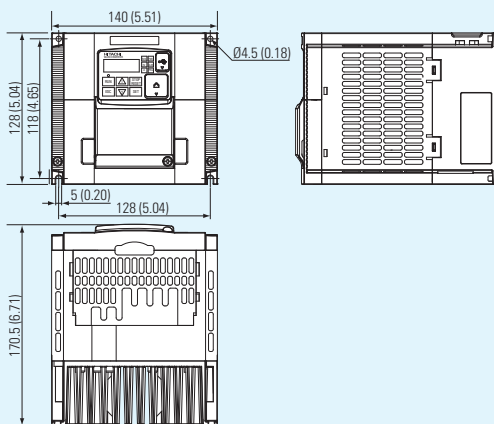


| Model        | D            |
|--------------|--------------|
| 007MF, 004HF | 143.5 (5.65) |
| Other        | 170.5 (6.71) |

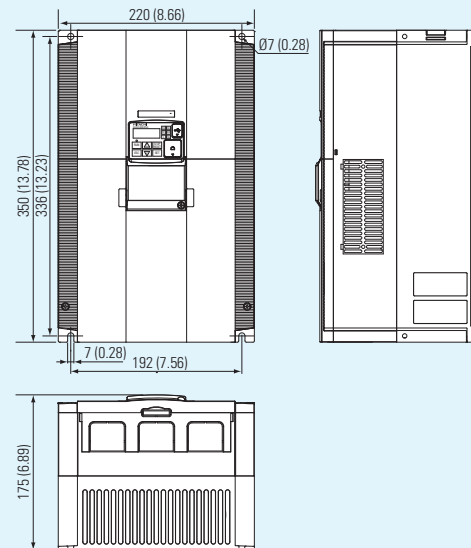
- WJ200-110LF
- WJ200-110HF
- WJ200-150HF



- WJ200-037LF
- WJ200-040HF



- WJ200-150LF

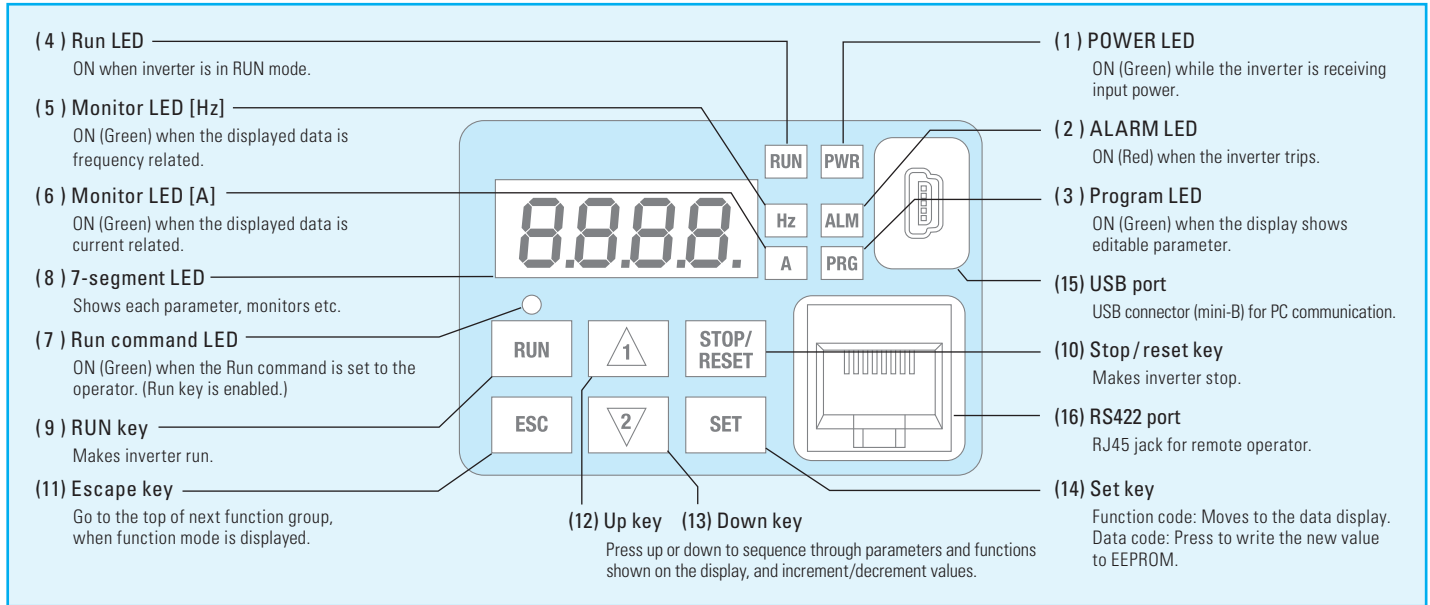




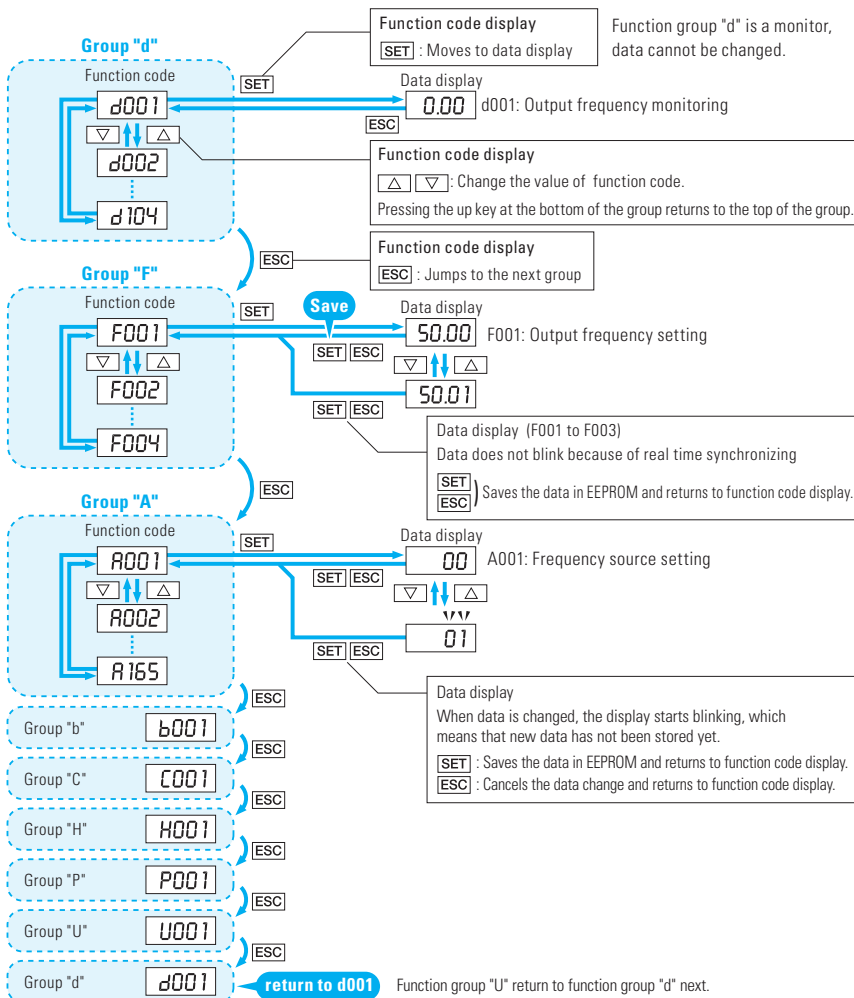
## Operation and Programming

### Operation Panel

WJ200 Series can be easily operated with the digital operator provided as standard.

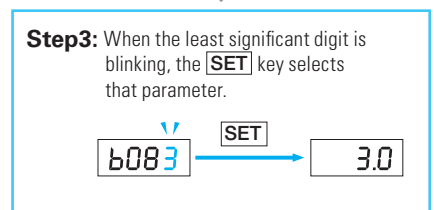
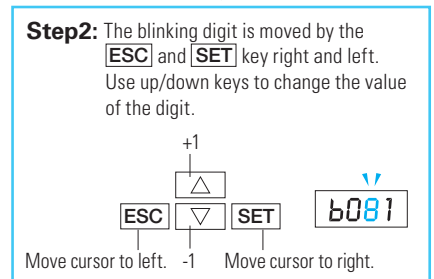
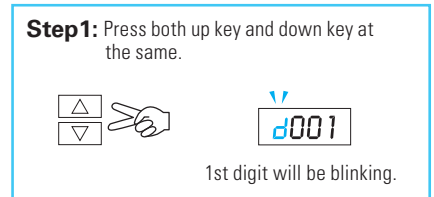


### Keypad Navigation Map



### Single-Digit Edit Mode

If a target function code or data is far from current position, using the single-digit edit mode makes it quicker to navigate there. Pressing the up key and down key at the same time brings you into the digit-by-digit navigation mode.



# Terminal (Arrangements/Functions)

## Terminal Description

| Symbol           | Terminal Name                     |
|------------------|-----------------------------------|
| R/L1, S/L2, T/L3 | Main power supply input terminals |
| U/T1, V/T2, W/T3 | Inverter output terminals         |
| PD/+1, P/+       | DC reactor connection terminals   |

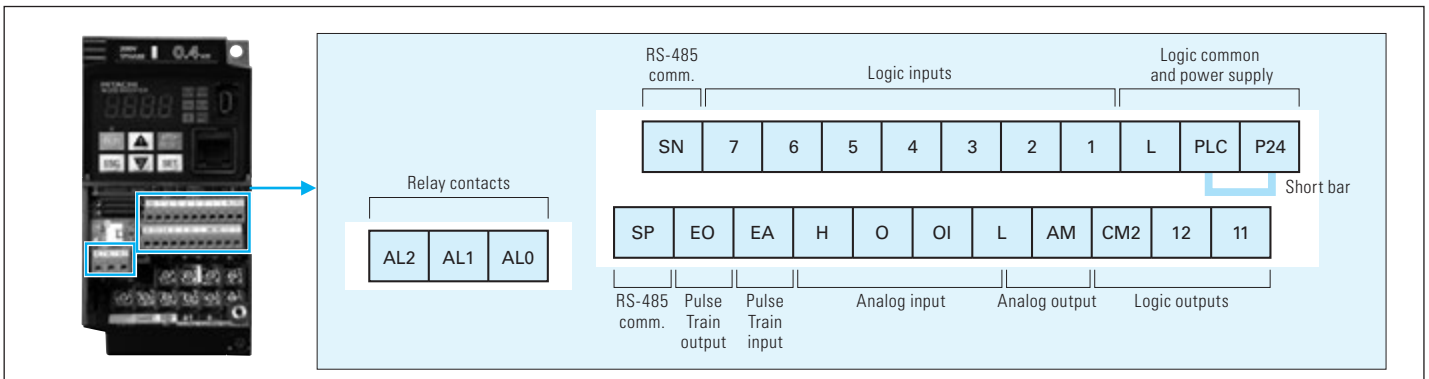
| Symbol   | Terminal Name                                  |
|----------|--|
| P/+, RB  | External braking resistor connection terminals |
| P/+, N/- | External braking unit connection terminals     |
| G        | Ground connection terminal                     |

## Terminal Arrangement and Screw Diameter

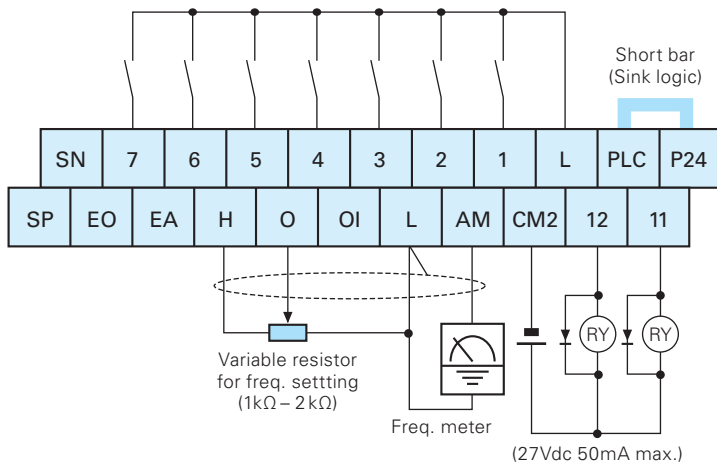
| Terminal | Model  | Screw Diameter |
|----------|--|----------------|
|          | 004MF<br>001-004SF<br>001-007LF              | M3.5           |
|          | 007MF<br>007-022SF<br>015-037LF<br>004-040HF | M4             |

| Terminal | Model                  | Screw Diameter |
|----------|------------------------|----------------|
|          | 055-075LF<br>055-075HF | M5             |
|          | 110LF<br>110-150HF     | M6             |
| 150LF    | M8                     |                |

## Terminal Arrangement of Control Circuit Terminals



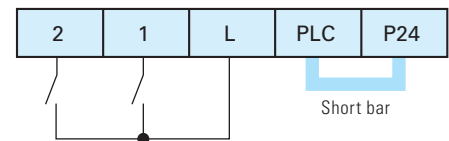
## Wiring sample of control logic terminal (Sink logic)



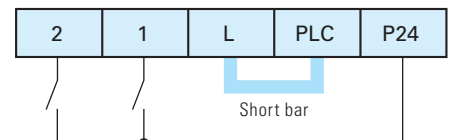
## Sink / source logic of intelligent input terminals

Sink or source logic is switched by a short bar as below.

### Sink logic



### Source logic



## Hardware Switches

① **Termination resistor selection switch**

OFF (Default) ON

② **Safe stop function selection switch**

Disabled (Default) Enabled

③ **EDM function selection switch**

Terminal 11 (Default) EDM output

| Switch Name                             | Switch Name Description   |
|---|---|
| ① Termination resistor selection switch | Termination resistor for the RS485 communication port. WJ200 has a built-in 200Ω resistor activated by a DIP switch.            |
| ② Safe stop function selection switch   | To enable the Safe stop function, set the DIP switch ON. Before operating switch, make sure that the input power supply is off. |
| ③ EDM function selection switch         | To enable the EDM function, set the DIP switch ON. Before operating switch, make sure that the input power supply is off.       |

## Terminal Functions

|                           |                   | Symbol         | Terminal Name                 | Description / Ratings   |  |
|---------------------------|-------------------|----------------|-------------------------------|---|--|
| Analog                    | Power supply      | L              | GND for analog signals        | Sum of [OI], [O], and [H] currents (return)   |  |
|                           |                   | H              | +10V analog reference         | 10VDC nominal, 10mA max.  |  |
|                           | Frequency setting | O              | Analog voltage input          | 0 to 9.8 VDC range, 10 VDC nominal, input impedance 10 kΩ   |  |
|                           |                   | OI             | Analog current input          | 4 to 19.6 mA range, 20 mA nominal, input impedance 100 Ω  |  |
|                           | Monitor Output    | AM             | Analog voltage output         | 0 to 10VDC 2mA max.   |  |
| Digital                   | Power supply      | L              | GND for logic inputs          | Sum of input [1]–[7] currents (return)  |  |
|                           |                   | P24            | +24V for logic inputs         | 24VDC, 30mA. (do not short to terminal L)   |  |
|                           |                   | PLC            | Intelligent input common      | Source type (connecting [P24] to [1]–[7] turns each input ON). Sink type (connecting [L] to [1]–[7] makes each input ON.)             |  |
|                           | Input             | Contact        | 7                             | Discrete logic inputs (Terminal [3],[4],[5] and [7] have dual function. See following description and related pages for the details.) | [Input ON condition]<br>Voltage between each terminal and PLC: 18VDC min.<br>[Input OFF condition]<br>Voltage between each terminal and PLC: 3VDC max.<br>Allowable voltage between each terminal and PLC: 27VDC max. (use PLC or an external supply referenced to terminal L) |
|                           |                   |                | 6                             |   |  |
|                           |                   |                | 5                             |   |  |
|                           |                   |                | 4                             |   |  |
|                           |                   |                | 3                             |   |  |
|                           |                   |                | 2                             |   |  |
|                           | 1                 |                |                               |   |  |
|                           | Pulse             | Pulse          | 3/GS1                         | Safe stop input GS1   | Functionality is based on ISO13849-1   |
|                           |                   |                | 4/GS2                         | Safe stop input GS2   | See appendix for the details.  |
|                           | Output            | Open collector | 11/EDM                        | Discrete logic outputs [11] (Terminal [11] has dual function. See following description and related pages for the details.)           | 50mA max. ON state current, 27 VDC max. OFF state voltage<br>Common is CM2<br>In case the EDM is selected, the functionality is based on ISO13849-1<br>4VDC max. ON state voltage depression   |
|                           |                   |                | 11<br>12                      | Discrete logic outputs [12]   | 50mA max. ON state current, 27 VDC max. OFF state voltage<br>Common is CM2.  |
|                           |                   |                | CM2                           | GND for logic output  | 100 mA: [11], [12] current return  |
| Relay                     |                   | Relay          | AL0                           | Relay common contact  | Maximum capacity of relays<br>AL1–AL0: 250VAC, 2A (R load)/0.2A (L load)<br>30VDC, 3A (R load)/0.6A (L load)   |
|                           |                   |                | AL1                           | Relay contact, normally open  | AL2–AL0: 250VAC, 1A (R load)/0.2A (L load)<br>30VDC, 1A (R load)/0.2A (L load)   |
|                           |                   |                | AL2                           | Relay contact, normally closed  | Minimum capacity of relays<br>AL1–AL0, AL2–AL0: 100VAC, 10mA / 5VDC, 100mA   |
| Pulse                     |                   | Pulse          | E0                            | Pulse train output  | 10VDC 2mA max.<br>32kHz max.   |
| Serial communication port |                   | SP, SN         | Serial communication terminal | For RS485 Modbus communication.   |  |

# Function List

If a desired parameter is not displayed, check the setting of function "b037"(function code display restriction). To display all parameters, specify "00" for "b037".

[○= Allowed ×= Not permitted]

| Code                 | Function Name                          | Setting Range                                  | Setting During Operation (allowed or not)   | Change During Operation (allowed or not) | Default Setting |       |
|----------------------|--|--|---|--|-----------------|-------|
| Monitor mode         | d001                                   | Output frequency monitoring                    | 0.00 to 99.99 / 100.0 to 400.0 [Hz]   | ○  | ○               | —     |
|                      | d002                                   | Output current monitoring                      | 0.0 to 655.3 [A]  | —  | —               | —     |
|                      | d003                                   | Rotation direction monitoring                  | F (Forward) / o (Stop) / r (Reverse)  | —  | —               | —     |
|                      | d004                                   | Process variable (PV), PID feedback monitoring | 0.00 to 99.99 in steps of 0.01/100.0 to 999.9 in steps of 0.1/1000. to 9999. in steps of 1/1000 to 9999 in steps of 10/100 to 9999 in units of 1000   | —  | —               | —     |
|                      | d005                                   | Intelligent input terminal status              | (Example)<br>7, 5, 3, 1: ON<br>6, 4, 2: OFF   | —  | —               | —     |
|                      | d006                                   | Intelligent output terminal status             | (Example)<br>11: ON<br>AL, 12: OFF  | —  | —               | —     |
|                      | d007                                   | Scaled output frequency monitoring             | 0.00 to 99.99 / 100.0 to 999.9 / 1000. to 9999. / 1000 to 3999  | ○  | ○               | —     |
|                      | d008                                   | Actual-frequency monitoring                    | -400. to -100. / -99.9 to -10.0 / -9.99 to -0.00 / 0.00 to 99.99 / 100.0 to 400.0 [Hz]  | —  | —               | —     |
|                      | d009                                   | Torque command monitoring                      | -200 to +200 [%]  | —  | —               | —     |
|                      | d010                                   | Torque bias monitoring                         | -200 to +200 [%]  | —  | —               | —     |
|                      | d012                                   | Torque monitoring                              | -200 to +200 [%]  | —  | —               | —     |
|                      | d013                                   | Output voltage monitoring                      | 0.0 to 600.0 [V]  | —  | —               | —     |
|                      | d014                                   | Power monitoring                               | 0.0 to 999.9 [kW]   | —  | —               | —     |
|                      | d015                                   | Cumulative power monitoring                    | 0.0 to 999.9 in steps of 1 kW/h, or the unit set for function "b079" / 1000 to 9999 in units of 10 kW/h, or the unit set for function "b079" / 100 to 9999 in units of 1000 kW/h, or the unit set for function "b079" | —  | —               | —     |
|                      | d016                                   | Cumulative operation RUN time monitoring       | 0. to 9999. in units of 1 hour / 1000 to 9999 in units of 10 hours / 100 to 9999 in units of 1,000 hours  | —  | —               | —     |
|                      | d017                                   | Cumulative power-on time monitoring            | 0. to 9999. in units of 1 hour / 1000 to 9999 in units of 10 hours / 100 to 9999 in units of 1,000 hours  | —  | —               | —     |
|                      | d018                                   | Heat sink temperature monitoring               | -20.0 to 150.0 [°C]   | —  | —               | —     |
|                      | d022                                   | Life-check monitoring                          | 1: Capacitor on main circuit board<br>2: cooling-fan (same as WAF signal)   | —  | —               | —     |
|                      | d023                                   | EzSQ program counter                           | 0 to 1024   | —  | —               | —     |
|                      | d024                                   | EzSQ program number                            | 0000 to 9999  | —  | —               | —     |
|                      | d025                                   | User monitor 1                                 | -2147483647 to 2147483647   | —  | —               | —     |
|                      | d026                                   | User monitor 2                                 | -2147483647 to 2147483647   | —  | —               | —     |
|                      | d027                                   | User monitor 3                                 | -2147483647 to 2147483647   | —  | —               | —     |
|                      | d029                                   | Position setting monitor                       | -268435455 to 268435455   | —  | —               | —     |
|                      | d030                                   | Position feedback monitor                      | -268435455 to 268435455   | —  | —               | —     |
|                      | d050                                   | Dual monitor                                   | Displays two different data configured in b160 and b161.  | —  | —               | —     |
|                      | d060                                   | Inverter mode monitor                          | Displays currently selected inverter mode: I-C / I-V  | —  | —               | —     |
|                      | d080                                   | Trip Counter                                   | 0. to 9999. in units of 1 trip / 1000 to 6553 in units of 10 trips  | —  | —               | —     |
|                      | d081–d086                              | Trip info. 1–6 (factor)                        | Factor code   | —  | —               | —     |
|                      | d090                                   | Warning monitor                                | Warning code  | —  | —               | —     |
|                      | d102                                   | DC voltage monitoring (across P and N)         | 0.0 to 999.9 / 1000. [V]  | —  | —               | —     |
|                      | d103                                   | BRD load factor monitoring                     | 0.0 to 100.0 [%]  | —  | —               | —     |
| d104                 | Electronic thermal overload monitoring | 0.0 to 100.0 [%]                               | —   | —  | —               |       |
| Setting mode         | F001                                   | Output frequency setting                       | 0 / "start frequency" to "maximum frequency" [Hz]   | ○  | ○               | 0.00  |
|                      | F002                                   | Acceleration (1) time setting                  | 0.01 to 99.99 / 100.0 to 999.9 / 1000. to 3600. [s]   | ○  | ○               | 10.00 |
|                      | F202                                   | Acceleration (1) time setting, 2nd motor       | 0.01 to 99.99 / 100.0 to 999.9 / 1000. to 3600. [s]   | ○  | ○               | 10.00 |
|                      | F003                                   | Deceleration (1) time setting                  | 0.01 to 99.99 / 100.0 to 999.9 / 1000. to 3600. [s]   | ○  | ○               | 10.00 |
|                      | F203                                   | Deceleration (1) time setting, 2nd motor       | 0.01 to 99.99 / 100.0 to 999.9 / 1000. to 3600. [s]   | ○  | ○               | 10.00 |
|                      | F004                                   | Keypad Run key routing                         | 00 (Forward) / 01 (Reverse)   | ×  | ×               | 00    |
| Basic settings       | A001                                   | Frequency source setting                       | 00 (keypad potentiometer) / 01 (control circuit terminal block) / 02 (digital operator) / 03 (Modbus) / 04 (option) / 06 (pulse train input) / 07 (easy sequence) / 10 (operation function result)                    | ×  | ×               | 02    |
|                      | A201                                   | Frequency source setting, 2nd motor            |   | ×  | ×               | 02    |
|                      | A002                                   | Run command source setting                     | 01 (control circuit terminal block) / 02 (digital operator) / 03 (Modbus) / 04 (option)   | ×  | ×               | 02    |
|                      | A202                                   | Run command source setting, 2nd motor          |   | ×  | ×               | 02    |
|                      | A003                                   | Base frequency setting                         | 30.0 to "maximum frequency (1st)" [Hz]  | ×  | ×               | 60    |
|                      | A203                                   | Base frequency setting, 2nd motor              | 30.0 to "maximum frequency (2nd)" [Hz]  | ×  | ×               | 60    |
|                      | A004                                   | Maximum frequency setting                      | "Base frequency (1st)" to 400.0 [Hz]  | ×  | ×               | 60    |
|                      | A204                                   | Maximum frequency setting, 2nd motor           |   | ×  | ×               | 60    |
| Analog input setting | A005                                   | [AT] selection                                 | 00 (switching between 0 and OI terminals) / 02 (switching between 0 terminal and keypad potentiometer) / 03 (switching between OI terminal and keypad potentiometer)  | ×  | ×               | 00    |
|                      | A011                                   | Pot./O-L input active range start frequency    | 0.00 to 99.99 / 100.0 to 400.0 [Hz]   | ×  | ○               | 0.00  |
|                      | A012                                   | Pot./O-L input active range end frequency      | 0.00 to 99.99 / 100.0 to 400.0 [Hz]   | ×  | ○               | 0.00  |
|                      | A013                                   | Pot./O-L input active range start voltage      | 0 to 100 [%]  | ×  | ○               | 0     |
|                      | A014                                   | Pot./O-L input active range end voltage        | 0 to 100 [%]  | ×  | ○               | 100   |
|                      | A015                                   | Pot./O-L input start frequency enable          | 00 (A011) / 01 (0Hz)  | ×  | ○               | 01    |
|                      | A016                                   | External frequency filter time constant        | 1 to 30 / 31  | ×  | ○               | 8     |
|                      | A017                                   | Easy sequence function selection               | 00 (disabled) / 01 (PRG terminal) / 02 (Always)   | ○  | ○               | 00    |

[○= Allowed ×= Not permitted]

| Code  | Function Name  | Setting Range  | Setting During Operation (allowed or not)  | Change During Operation (allowed or not) | Default Setting |           |
|---|--|--|--|--|-----------------|-----------|
| <b>Multispeed and Jogging frequency setting</b>       | <b>A019</b>  | Multi-speed operation selection  | 00 (Binary mode) / 01 (Bit mode)   | ×  | ×               | 00        |
|   | <b>A020</b>  | Multi-speed 0 setting  | 0.00 / "start frequency" to "maximum frequency (1st)" [Hz]   | ○  | ○               | 0.00      |
|   | <b>A220</b>  | Multi-speed 0 setting, 2nd motor   | 0.00 / "start frequency" to "maximum frequency (2nd)" [Hz]   | ○  | ○               | 0.00      |
|   | <b>A021 – A035</b>   | Multi-speed 1 – 15 setting   | 0.00 / "start frequency" to "maximum frequency" [Hz]   | ○  | ○               | 0.00      |
|   | <b>A038</b>  | Jog frequency setting  | "start frequency" to 9.99 [Hz]   | ○  | ○               | 6.00      |
| <b>A039</b>   | Jog stop mode  | 00 (Free-run stop [invalid during run]) /<br>01 (Controlled deceleration [invalid during run]) /<br>02 (DC braking to stop [invalid during run]) /<br>03 (Free-run stop [valid during run]) /<br>04 (Controlled deceleration [valid during run]) /<br>05 (DC braking to stop [valid during run]) | ×  | ○  | 04              |           |
| <b>V/f Characteristic</b>                             | <b>A041</b>  | Torque boost select  | 00 (manual torque boost) /<br>01 (automatic torque boost)  | ×  | ×               | 00        |
|   | <b>A241</b>  | Torque boost select, 2nd motor   | 01 (automatic torque boost)  | ×  | ×               | 00        |
|   | <b>A042</b>  | Manual torque boost value  | 0.0 to 20.0 [%]  | ○  | ○               | 1.0       |
|   | <b>A242</b>  | Manual torque boost value, 2nd motor   | 0.0 to 20.0 [%]  | ○  | ○               | 1.0       |
|   | <b>A043</b>  | Manual torque boost frequency adjustment   | 0.0 to 50.0 [%]  | ○  | ○               | 5.0       |
|   | <b>A243</b>  | Manual torque boost frequency adjustment, 2nd motor  | 0.0 to 50.0 [%]  | ○  | ○               | 5.0       |
|   | <b>A044</b>  | V/f characteristic curve selection   | 00 (VC) / 01 (VP) / 02 (free V/f) / 03 (SLV)   | ×  | ×               | 00        |
|   | <b>A244</b>  | V/f characteristic curve selection, 2nd motor  | 00 (VC) / 01 (VP) / 02 (free V/f) / 03 (SLV)   | ×  | ×               | 00        |
|   | <b>A045</b>  | V/f gain setting   | 20 to 100 [%]  | ○  | ○               | 100       |
|   | <b>A245</b>  | V/f gain setting, 2nd motor  | 20 to 100 [%]  | ○  | ○               | 100       |
|   | <b>A046</b>  | Voltage compensation gain for automatic torque boost   | 0 to 255   | ○  | ○               | 100       |
|   | <b>A246</b>  | Voltage compensation gain for automatic torque boost, 2nd motor  | 0 to 255   | ○  | ○               | 100       |
|   | <b>A047</b>  | Slip compensation gain for automatic torque boost  | 0 to 255   | ○  | ○               | 100       |
| <b>A247</b>   | Slip compensation gain for automatic torque boost, 2nd motor | 0 to 255   | ○  | ○  | 100             |           |
| <b>DC braking</b>                                     | <b>A051</b>  | DC braking enable  | 00 (disabled) / 01 (enabled) / 02 (output freq < [A052])   | ×  | ○               | 00        |
|   | <b>A052</b>  | DC braking frequency setting   | 0.00 to 60.00 [Hz]   | ×  | ○               | 0.50      |
|   | <b>A053</b>  | DC braking wait time   | 0.0 to 5.0 [s]   | ×  | ○               | 0.0       |
|   | <b>A054</b>  | DC braking force for deceleration  | 0 to 100 / 70 [%] (CT / VT)  | ×  | ○               | 50        |
|   | <b>A055</b>  | DC braking time for deceleration   | 0.0 to 60.0 [s]  | ×  | ○               | 0.5       |
|   | <b>A056</b>  | DC braking / edge or level detection for [DB] input  | 00 (edge operation) / 01 (level operation)   | ×  | ○               | 01        |
|   | <b>A057</b>  | DC braking force at start  | 0 to 100 / 70 [%] (CT / VT)  | ×  | ○               | 0         |
|   | <b>A058</b>  | DC braking time at start   | 0.0 to 60.0 [s]  | ×  | ○               | 0.0       |
|   | <b>A059</b>  | Carrier frequency during DC braking  | 2.0 to 15.0 / 10.0 [kHz] (CT / VT)   | ×  | ○               | 5.0       |
| <b>Frequency upper/lower limit and Jump frequency</b> | <b>A061</b>  | Frequency upper limit setting  | 0.00 / A062 to A004 [Hz]   | ×  | ○               | 0.00      |
|   | <b>A261</b>  | Frequency upper limit setting, 2nd motor   | 0.00 / A262 to A204 [Hz]   | ×  | ○               | 0.00      |
|   | <b>A062</b>  | Frequency lower limit setting  | 0.00 / b082 to A061 [Hz]   | ×  | ○               | 0.00      |
|   | <b>A262</b>  | Frequency lower limit setting, 2nd motor   | 0.00 / b082 to A261 [Hz]   | ×  | ○               | 0.00      |
|   | <b>A063</b>  | Jump (center) frequency setting 1  | 0.00 to 99.99 / 100.0 to 400.0 [Hz]  | ×  | ○               | 0.00      |
|   | <b>A064</b>  | Jump (hysteresis) frequency width setting 1  | 0.00 to 10.00 [Hz]   | ×  | ○               | 0.50      |
|   | <b>A065</b>  | Jump (center) frequency setting 2  | 0.00 to 99.99 / 100.0 to 400.0 [Hz]  | ×  | ○               | 0.00      |
|   | <b>A066</b>  | Jump (hysteresis) frequency width setting 2  | 0.00 to 10.00 [Hz]   | ×  | ○               | 0.50      |
|   | <b>A067</b>  | Jump (center) frequency setting 3  | 0.00 to 99.99 / 100.0 to 400.0 [Hz]  | ×  | ○               | 0.00      |
|   | <b>A068</b>  | Jump (hysteresis) frequency width setting 3  | 0.00 to 10.00 [Hz]   | ×  | ○               | 0.50      |
| <b>PID control</b>                                    | <b>A069</b>  | Acceleration stop frequency setting  | 0.00 to 99.99 / 100.0 to 400.0 [Hz]  | ×  | ○               | 0.00      |
|   | <b>A070</b>  | Acceleration stop time setting   | 0.0 to 60.0 [s]  | ×  | ○               | 0.0       |
|   | <b>A071</b>  | PID enable   | 00 (disabled) / 01 (enabled) / 02 (enabled inverted-data output)   | ×  | ○               | 00        |
|   | <b>A072</b>  | PID proportional gain  | 0.00 to 25.00  | ○  | ○               | 1.00      |
|   | <b>A073</b>  | PID integral time constant   | 0.0 to 999.9 / 1000. to 3600. [s]  | ○  | ○               | 1.0       |
|   | <b>A074</b>  | PID derivative time constant   | 0.00 to 99.99 / 100.0 [s]  | ○  | ○               | 0.00      |
|   | <b>A075</b>  | PV scale conversion  | 0.01 to 99.99  | ×  | ○               | 1.00      |
|   | <b>A076</b>  | PV source setting  | 00 (input via OI) / 01 (input via OI) / 02 (external communication) /<br>03 (pulse train frequency input) / 10 (operation result output) | ×  | ○               | 00        |
|   | <b>A077</b>  | Reverse PID action   | 00 (OFF) / 01 (ON)   | ×  | ○               | 00        |
|   | <b>A078</b>  | PID output limit   | 0.0 to 100.0 [%]   | ×  | ○               | 0.0       |
| <b>A079</b>   | PID feed forward selection                                   | 00 (disabled) / 01 (O input) / 02 (OI input)   | ×  | ○  | 00              |           |
| <b>AVR function</b>                                   | <b>A081</b>  | AVR function select  | 00 (always on) / 01 (always off) / 02 (off during deceleration)  | ×  | ×               | 02        |
|   | <b>A281</b>  | AVR function select, 2nd motor   | 00 (always on) / 01 (always off) / 02 (off during deceleration)  | ×  | ×               | 02        |
|   | <b>A082</b>  | AVR voltage select   | 200 V class : 200 / 215 / 220 / 230 / 240 (V)<br>400 V class : 380 / 400 / 415 / 440 / 460 / 480 (V)                                     | ×  | ×               | 200 / 400 |
|   | <b>A282</b>  | AVR voltage select, 2nd motor  | 200 V class : 200 / 215 / 220 / 230 / 240 (V)<br>400 V class : 380 / 400 / 415 / 440 / 460 / 480 (V)                                     | ×  | ×               | 200 / 400 |
|   | <b>A083</b>  | AVR filter time constant   | 0.000 to 9.999 / 10.00 [s]   | ×  | ○               | 0.300     |
| <b>A084</b>   | AVR deceleration gain  | 50 to 200 [%]  | ×  | ○  | 100             |           |

# Function List

[○= Allowed ×= Not permitted]

| Code                                      | Function Name                                | Setting Range   | Setting During Operation (allowed or not)  | Change During Operation (allowed or not) | Default Setting |                           |
|---|--|---|--|--|-----------------|---------------------------|
| Operation mode and Accel./Decel. function | A085   | Operation mode selection  | 00 (normal operation) / 01 (energy-saving operation)   | ×  | ×               | 00                        |
|   | A086   | Energy saving mode tuning   | 0.0 to 100.0 [%]   | ○  | ○               | 50.0                      |
|   | A092   | Acceleration (2) time setting   | 0.01 to 99.99 / 100.0 to 999.9 / 1000. to 3600. [s]  | ○  | ○               | 10.00                     |
|   | A292   | Acceleration (2) time setting, 2nd motor  | 0.01 to 99.99 / 100.0 to 999.9 / 1000. to 3600. [s]  | ○  | ○               | 10.00                     |
|   | A093   | Deceleration (2) time setting   | 0.01 to 99.99 / 100.0 to 999.9 / 1000. to 3600. [s]  | ○  | ○               | 10.00                     |
|   | A293   | Deceleration (2) time setting, 2nd motor  | 0.01 to 99.99 / 100.0 to 999.9 / 1000. to 3600. [s]  | ○  | ○               | 10.00                     |
|   | A094   | Select method to switch to Acc2/Dec2 profile  | 00 (switching by 2CH terminal) / 01 (switching by setting) / 02 (Forward and reverse)  | ×  | ×               | 00                        |
|   | A294   | Select method to switch to Acc2/Dec2 profile, 2nd motor                             |  | ×  | ×               | 00                        |
|   | A095   | Acc1 to Acc2 frequency transition point   | 0.00 to 99.99 / 100.0 to 400.0 [Hz]  | ×  | ×               | 0.00                      |
|   | A295   | Acc1 to Acc2 frequency transition point, 2nd motor                                  | 0.00 to 99.99 / 100.0 to 400.0 [Hz]  | ×  | ×               | 0.00                      |
|   | A096   | Dec1 to Dec2 frequency transition point   | 0.00 to 99.99 / 100.0 to 400.0 [Hz]  | ×  | ×               | 0.00                      |
|   | A296   | Dec1 to Dec2 frequency transition point, 2nd motor                                  | 0.00 to 99.99 / 100.0 to 400.0 [Hz]  | ×  | ×               | 0.00                      |
| A097                                      | Acceleration curve selection                 | 00 (linear) / 01 (S curve) / 02 (U curve) / 03 (inverted-U curve) / 04 (EL-S curve) | ×  | ×  | 01              |                           |
| A098                                      | Deceleration curve selection                 |   | ×  | ×  | 01              |                           |
| External frequency tuning                 | A101   | [OI]-[L] input active range start frequency   | 0.00 to 99.99 / 100.0 to 400.0 [Hz]  | ×  | ○               | 0.00                      |
|   | A102   | [OI]-[L] input active range end frequency   | 0.00 to 99.99 / 100.0 to 400.0 [Hz]  | ×  | ○               | 0.00                      |
|   | A103   | [OI]-[L] input active range start current   | 0 to 100 [%]   | ×  | ○               | 20                        |
|   | A104   | [OI]-[L] input active range end voltage   | 0 to 100 [%]   | ×  | ○               | 100                       |
|   | A105   | [OI]-[L] input start frequency enable   | 00 (A101) / 01 (0Hz)   | ×  | ○               | 00                        |
| Accel./Decel. curve                       | A131   | Acceleration curve constant setting (for S, U, Inverse U)                           | 01 to 10   | ×  | ○               | 02                        |
|   | A132   | Deceleration curve constant setting (for S, U, Inverse U)                           | 01 to 10   | ×  | ○               | 02                        |
| Operation target frequency                | A141   | A input select for calculate function   | 00 (digital operator) / 01 (keypad potentiometer) / 02 (input via O) / 03 (input via OI) / 04 (external communication) / 05 (option) / 07 (pulse train frequency input)                                  | ×  | ○               | 02                        |
|   | A142   | B input select for calculate function   |  | ×  | ○               | 03                        |
|   | A143   | Calculation symbol  | 00 (A141 + A142) / 01 (A141 - A142) / 02 (A141 × A142)   | ×  | ○               | 00                        |
|   | A145   | ADD frequency   | 0.00 to 99.99 / 100.0 to 400.0 [Hz]  | ×  | ○               | 0.00                      |
|   | A146   | ADD direction select  | 00 (frequency command + A145) / 01 (frequency command - A145)  | ×  | ○               | 00                        |
| Acceleration and deceleration             | A150   | Curvature of EL-S-curve at the start of acceleration                                | 0 to 50 [%]  | ×  | ×               | 10                        |
|   | A151   | Curvature of EL-S-curve at the end of acceleration                                  | 0 to 50 [%]  | ×  | ×               | 10                        |
|   | A152   | Curvature of EL-S-curve at the start of deceleration                                | 0 to 50 [%]  | ×  | ×               | 10                        |
|   | A153   | Curvature of EL-S-curve at the end of deceleration                                  | 0 to 50 [%]  | ×  | ×               | 10                        |
| Others                                    | A154   | Deceleration stop frequency setting   | 0.00 to 99.99 / 100.0 to 400.0 [Hz]  | ×  | ○               | 0.00                      |
|   | A155   | Deceleration stop time setting  | 0.0 to 60.0 [s]  | ×  | ○               | 0.0                       |
| PID control                               | A156   | PID sleep function action threshold   | 0.00 to 99.99 / 100.0 to 400.0 [Hz]  | ×  | ○               | 0.00                      |
|   | A157   | PID sleep function action delay time  | 0.0 to 25.5 [s]  | ×  | ○               | 0.0                       |
| Frequency trimming                        | A161   | [VR] input active range start frequency   | 0.00 to 99.99 / 100.0 to 400.0 [Hz]  | ×  | ○               | 0.00                      |
|   | A162   | [VR] input active range end frequency   | 0.00 to 99.99 / 100.0 to 400.0 [Hz]  | ×  | ○               | 0.00                      |
|   | A163   | [VR] input active range start current   | 0 to 100 [%]   | ×  | ○               | 0                         |
|   | A164   | [VR] input active range end voltage   | 0 to 100 [%]   | ×  | ○               | 100                       |
|   | A165   | [VR] input start frequency enable   | 00 (A161) / 01 (0Hz)   | ×  | ○               | 01                        |
| Restart after instantaneous power failure | b001   | Selection of automatic restart mode   | 00 (tripping) / 01 (starting with 0 Hz) / 02 (starting with matching frequency) / 03 (tripping after deceleration and stopping with matching frequency) / 04 (restarting with active matching frequency) | ×  | ○               | 00                        |
|   | b002   | Allowable under-voltage power failure time  | 0.3 to 25.0 [s]  | ×  | ○               | 1.0                       |
|   | b003   | Retry wait time before motor restart  | 0.3 to 100.0 [s]   | ×  | ○               | 1.0                       |
|   | b004   | Instantaneous power failure / under-voltage trip alarm enable                       | 00 (disabled) / 01 (enabled) / 02 (disabled during stopping and decelerating to stop)  | ×  | ○               | 00                        |
|   | b005   | Number of restarts on power failure / under-voltage trip events                     | 00 (16 times) / 01 (unlimited)   | ×  | ○               | 00                        |
|   | b007   | Restart frequency threshold   | 0.00 to 99.99 / 100.0 to 400.0 [Hz]  | ×  | ○               | 0.00                      |
|   | b008   | Selection of retry after tripping   | 00 (tripping) / 01 (starting with 0 Hz) / 02 (starting with matching frequency) / 03 (tripping after deceleration and stopping with matching frequency) / 04 (restarting with active matching frequency) | ×  | ○               | 00                        |
|   | b010   | Selection of retry count after undervoltage   | 1 to 3 [times]   | ×  | ○               | 3                         |
| Electronic Thermal                        | b011   | Start freq. to be used in case of freq. matching restart                            | 0.3 to 100.0 [s]   | ×  | ○               | 1.0                       |
|   | b012   | Level of electronic thermal setting   | Set a level between 20% and 100% for the rated inverter current [A]  | ×  | ○               | Rated current of inverter |
|   | b212   | Level of electronic thermal setting, 2nd motor                                      | Set a level between 20% and 100% for the rated inverter current [A]  | ×  | ○               | Rated current of inverter |
|   | b013   | Electronic thermal characteristic   | 00 (reduced-torque characteristic) / 01 (constant-torque characteristic) / 02 (free setting)   | ×  | ○               | 01                        |
|   | b213   | Electronic thermal characteristic, 2nd motor  |  | ×  | ○               | 01                        |
|   | b015   | Free setting, electronic thermal frequency (1)                                      | 0 to "electronic thermal frequency (2)" [Hz]   | ×  | ○               | 0                         |
|   | b016   | Free setting, electronic thermal current (1)  | Range is 0 to inverter rated current Amps [A]  | ×  | ○               | 0.00                      |
|   | b017   | Free setting, electronic thermal frequency (2)                                      | "electronic thermal frequency (1)" to "electronic thermal frequency (3)" [Hz]  | ×  | ○               | 0                         |
|   | b018   | Free setting, electronic thermal current (2)  | Range is 0 to inverter rated current Amps [A]  | ×  | ○               | 0.00                      |
|   | b019   | Free setting, electronic thermal frequency (3)                                      | "electronic thermal frequency (2)" to 400 [Hz]   | ×  | ○               | 0                         |
| b020                                      | Free setting, electronic thermal current (3) | Range is 0 to inverter rated current Amps [A]                                       | ×  | ○  | 0.00            |                           |

[○= Allowed ×= Not permitted]

| Code   |                 | Function Name   | Setting Range   | Setting During Operation (allowed or not) | Change During Operation (allowed or not) | Default Setting           |
|--|-----------------|---|---|---|--|---------------------------|
| Overload restriction                         | b021            | Overload restriction operation mode                             | 00 (disabled) / 01 (enabled during acceleration and constant-speed operation) / 02 (enabled during constant-speed operation) / 03 (enabled during acceleration and constant-speed operation [speed increase at regeneration])   | ×   | ○  | 01                        |
|  | b221            | Overload restriction operation mode, 2nd motor                  |   | ×   | ○  | 01                        |
|  | b022            | Overload restriction level setting                              | Set a level between 20% and 200% / 150% for the rated inverter current [A] (CT / VT)  | ×   | ○  | 150% of Rated current     |
|  | b222            | Overload restriction level setting, 2nd motor                   |   | ×   | ○  |                           |
|  | b023            | Deceleration rate at overload restriction                       | 0.1 to 999.9 / 1000. to 3000. [s]   | ×   | ○  | 1.0                       |
|  | b223            | Overload restriction operation mode, 2nd motor                  | 0.1 to 999.9 / 1000. to 3000. [s]   | ×   | ○  | 1.0                       |
|  | b024            | Overload restriction operation mode 2                           | 00 (disabled) / 01 (enabled during acceleration and constant-speed operation) / 02 (enabled during constant-speed operation) / 03 (enabled during acceleration and constant-speed operation [speed increase at regeneration])   | ×   | ○  | 01                        |
|  | b025            | Overload restriction level 2 setting                            | Set a level between 20% and 200% / 150% for the rated inverter current [A] (CT / VT)  | ×   | ○  | 150% of Rated current     |
|  | b026            | Deceleration rate 2 at overload restriction                     | 0.1 to 999.9 / 1000. to 3000. [s]   | ×   | ○  | 1.0                       |
|  | b027            | OC suppression selection  | 00 (disabled) / 01 (enabled)  | ×   | ○  | 01                        |
|  | b028            | Current level of active freq. matching restart setting          | Set a level between 20% and 200% / 150% for the rated inverter current [A] (CT / VT)  | ×   | ○  | Rated current of inverter |
|  | b029            | Deceleration rate of frequency matching restart setting         | 0.1 to 999.9 / 1000. to 3000. [s]   | ×   | ○  | 0.5                       |
|  | b030            | Start freq. to be used in case of active freq. Matching restart | 00 (frequency at the last shutoff) / 01 (maximum frequency) / 02 (set frequency)  | ×   | ○  | 00                        |
| Lock   | b031            | Software lock mode selection                                    | 00 (all parameters except b031 are locked when [SFT] terminal is ON) / 01 (all parameters except b031 and output frequency F001 are locked when [SFT] terminal is ON) / 02 (all parameters except b031 are locked) / 03 (all parameters except b031 and output frequency F001 are locked) / 10 (High level access including b031) | ×   | ○  | 01                        |
| Others                                       | b033            | Motor cable length parameter                                    | 5 to 20   | ○   | ○  | 10                        |
|  | b034            | Run / power ON warning time                                     | 0. (Warning disabled) / 1. to 9999. in units of 10 hours / 1000 to 6553 in units of 100 hours   | ×   | ○  | 0                         |
|  | b035            | Rotation direction restriction                                  | 00 (Enable for both dir) / 01 (Enable for forward only) / 02 (Enable for reverse only)  | ×   | ×  | 00                        |
|  | b036            | Reduced voltage start selection                                 | 0 (minimum reduced voltage start time) to 255 (maximum reduced voltage start time)  | ×   | ○  | 2                         |
|  | b037            | Function code display restriction                               | 0 (full display) / 1 (function-specific display) / 2 (user setting) / 3 (data comparison display) / 4 (basic display) / 5 (monitor display)   | ×   | ○  | 04                        |
|  | b038            | Initial-screen selection  | 000 (Func. code that SET key pressed last displayed) / 001 to 060 (d001 to d060) / 201 (F001) / 202 (Screen displayed when the STR key was pressed last)  | ×   | ○  | 001                       |
|  | b039            | Automatic user parameter setting                                | 00 (disabled) / 01 (enabled)  | ×   | ○  | 00                        |
| Torque limit                                 | b040            | Torque limit selection  | 00 (quadrant-specific setting) / 01 (switching by terminal) / 02 (0 input)  | ×   | ○  | 00                        |
|  | b041–b044       | Torque limit (1)–(4)  | 0 to 200 [%] / no   | ×   | ○  | 200                       |
|  | b045            | Torque LAD STOP selection                                       | 00 (disabled) / 01 (enabled)  | ×   | ○  | 00                        |
|  | b046            | Reverse run protection  | 00 (disabled) / 01 (enabled)  | ×   | ○  | 01                        |
| Others                                       | b049            | Dual Rating Selection   | 00 (CT mode) / 01 (VT mode)<br>[1-phase 100V class is only with CT]   | ×   | ×  | 00                        |
| Nonstop operation at momentary power failure | b050            | Selection of the nonstop operation                              | 00 (disabled) / 01 (enabled) / 02 (nonstop operation at momentary power failure [no restoration]) / 03 (nonstop operation at momentary power failure [restoration to be done])  | ×   | ×  | 00                        |
|  | b051            | Nonstop operation start voltage setting                         | 0.0 to 999.9 / 1000. [V]  | ×   | ×  | 220 / 440                 |
|  | b052            | OV-LAD Stop level of nonstop operation setting                  | 0.0 to 999.9 / 1000. [V]  | ×   | ×  | 360 / 720                 |
|  | b053            | Deceleration time of nonstop operation setting                  | 0.1 to 999.9 / 1000. to 3600. [s]   | ×   | ×  | 1.00                      |
|  | b054            | Frequency width of quick deceleration setting                   | 0.00 to 10.00 [Hz]  | ×   | ×  | 0.00                      |
| Window comparator                            | b060            | Maximum-limit level of window comparators O                     | 0 to 100 [%]  | ○   | ○  | 100                       |
|  | b061            | Minimum-limit level of window comparators O                     | 0 to 100 [%]  | ○   | ○  | 0                         |
|  | b062            | Hysteresis width of window comparators O                        | 0 to 10 [%]   | ○   | ○  | 0                         |
|  | b063            | Maximum-limit level of window comparators OI                    | 0 to 100 [%]  | ○   | ○  | 100                       |
|  | b064            | Minimum-limit level of window comparators OI                    | 0 to 100 [%]  | ○   | ○  | 0                         |
|  | b065            | Hysteresis width of window comparator (OI)                      | 0 to 10 [%]   | ○   | ○  | 0                         |
| Others                                       | b070            | Operation level at O disconnection                              | 0 to 100 [%] / no   | ×   | ○  | no                        |
|  | b071            | Operation level at OI disconnection                             | 0 to 100 [%] / no   | ×   | ○  | no                        |
|  | b075            | Ambient temperature   | -10 to 50 [°C]  | ○   | ○  | 40                        |
|  | b078            | Watt-hour reset   | 00 (OFF) / 01 (ON)  | ○   | ○  | 00                        |
|  | b079            | Watt-hour display gain setting                                  | 1 to 1000   | ○   | ○  | 1                         |
|  | b082            | Start frequency adjustment                                      | 0.10 to 9.99 [Hz] (to 200Hz)  | ×   | ○  | 0.50                      |
|  | b083            | Carrier frequency setting                                       | 2.0 to 15.0 [kHz]   | ×   | ○  | 2.0                       |
|  | b084            | Initialization mode (parameters or trip history)                | 00 (disabled) / 01 (clearing the trip history) / 02 (initializing the data) / 03 (clearing the trip history and initializing the data) / 04 (clearing the trip history and initializing the data and EzSQ program)  | ×   | ×  | 00                        |
|  | b085            | Country for initialization                                      | 00 / 01   | ×   | ×  | 00                        |
|  | b086            | Frequency scaling conversion factor                             | 0.01 to 99.99   | ○   | ○  | 1.00                      |
| b087   | STOP key enable | 00 (enabled) / 01 (disabled) / 02 (disabled only stop)          | ×   | ○   | 00                                       |                           |

# Function List

[○= Allowed ×= Not permitted]

| Code                     | Function Name                           | Setting Range   | Setting During Operation (allowed or not)  | Change During Operation (allowed or not) | Default Setting |                              |      |
|--------------------------|---|---|--|--|-----------------|------------------------------|------|
| Others                   | <b>b088</b>                             | Restart mode after FRS                                      | 00 (starting with 0 Hz) /<br>01 (starting with matching frequency) /<br>02 (starting with active matching frequency)   | ×  | ○               | 00                           |      |
|                          | <b>b089</b>                             | Automatic carrier frequency reduction                       | 00 (disabled) /<br>01 (enabled [output current controlled]) /<br>02 (enabled [fin temperature controlled])   | ×  | ×               | 01                           |      |
|                          | <b>b090</b>                             | Dynamic braking usage ratio                                 | 0.0 to 100.0 [%]   | ×  | ○               | 0.0                          |      |
|                          | <b>b091</b>                             | Stop mode selection   | 00 (deceleration until stop) /<br>01 (free-run stop)   | ×  | ○               | 00                           |      |
|                          | <b>b092</b>                             | Cooling fan control   | 00 (fan always ON) /<br>01 (ON fan only during inverter operation [including 5 minutes after power-on and power-off]) /<br>02 (fan temperature controlled)                                   | ×  | ○               | 01                           |      |
|                          | <b>b093</b>                             | Accumulated time clear of the cooling fan                   | 00 (count) / 01 (clear)  | ×  | ×               | 00                           |      |
|                          | <b>b094</b>                             | Initialization target data setting                          | 00 (All parameters) /<br>01 (All parameters except in/output terminals and communication) /<br>02 (Uxxx) / 03 (expect Uxxx)  | ×  | ×               | 00                           |      |
|                          | <b>b095</b>                             | Dynamic braking control (BRD) selection                     | 00 (disabled) /<br>01 (enabled [disabled while the inverter is stopped]) /<br>02 (enabled [enabled also while the inverter is stopped])  | ×  | ○               | 01                           |      |
|                          | <b>b096</b>                             | BRD activation level  | 330 to 380 / 660 to 760 [V]  | ×  | ○               | 360 / 720                    |      |
|                          | <b>b097</b>                             | BRD register  | Set range : minimum connectable register<br>Rbmin to 600.0 [Ω]   | ×  | ○               | Min.<br>resistance           |      |
| Free-setting V/f pattern | <b>b100</b>                             | Free-setting V/ F freq. (1)                                 | 0. to b102 [Hz]  | ×  | ×               | 0.                           |      |
|                          | <b>b101</b>                             | Free-setting V/ F volt. (1)                                 | 0.0 to 800.0 [V]   | ×  | ×               | 0.0                          |      |
|                          | <b>b102</b>                             | Free-setting V/ F freq. (2)                                 | 0. to b104 [Hz]  | ×  | ×               | 0.                           |      |
|                          | <b>b103</b>                             | Free-setting V/ F volt. (2)                                 | 0.0 to 800.0 [V]   | ×  | ×               | 0.0                          |      |
|                          | <b>b104</b>                             | Free-setting V/ F freq. (3)                                 | 0. to b106 [Hz]  | ×  | ×               | 0.                           |      |
|                          | <b>b105</b>                             | Free-setting V/ F volt. (3)                                 | 0.0 to 800.0 [V]   | ×  | ×               | 0.0                          |      |
|                          | <b>b106</b>                             | Free-setting V/ F freq. (4)                                 | 0. to b108 [Hz]  | ×  | ×               | 0.                           |      |
|                          | <b>b107</b>                             | Free-setting V/ F volt. (4)                                 | 0.0 to 800.0 [V]   | ×  | ×               | 0.0                          |      |
|                          | <b>b108</b>                             | Free-setting V/ F freq. (5)                                 | 0. to b110 [Hz]  | ×  | ×               | 0.                           |      |
|                          | <b>b109</b>                             | Free-setting V/ F volt. (5)                                 | 0.0 to 800.0 [V]   | ×  | ×               | 0.0                          |      |
|                          | <b>b110</b>                             | Free-setting V/ F freq. (6)                                 | 0. to b112 [Hz]  | ×  | ×               | 0.                           |      |
|                          | <b>b111</b>                             | Free-setting V/ F volt. (6)                                 | 0.0 to 800.0 [V]   | ×  | ×               | 0.0                          |      |
|                          | <b>b112</b>                             | Free-setting V/ F freq. (7)                                 | 0. to 400 ( to 1000) [Hz]  | ×  | ×               | 0.                           |      |
| <b>b113</b>              | Free-setting V/ F volt. (7)             | 0.0 to 800.0 [V]  | ×  | ×  | 0.0             |                              |      |
| Others                   | <b>b120</b>                             | Brake control enable  | 00 (disabled) / 01 (enabled)   | ×  | ○               | 00                           |      |
|                          | <b>b121</b>                             | Brake Wait Time for Release                                 | 0.00 to 5.00 [s]   | ×  | ○               | 0.00                         |      |
|                          | <b>b122</b>                             | Brake Wait Time for Acceleration                            | 0.00 to 5.00 [s]   | ×  | ○               | 0.00                         |      |
|                          | <b>b123</b>                             | Brake Wait Time for Stopping                                | 0.00 to 5.00 [s]   | ×  | ○               | 0.00                         |      |
|                          | <b>b124</b>                             | Brake Wait Time for Confirmation                            | 0.00 to 5.00 [s]   | ×  | ○               | 0.00                         |      |
|                          | <b>b125</b>                             | Brake release freq. setting                                 | 0.00 to 99.99 / 100.0 to 400.0 [Hz]  | ×  | ○               | 0.00                         |      |
|                          | <b>b126</b>                             | Brake release current setting                               | Set range: 0 to 200% of inverter rated current [A]   | ×  | ○               | Rated current<br>of inverter |      |
|                          | <b>b127</b>                             | Braking frequency   | 0.00 to 99.99 / 100.0 to 400.0 [Hz]  | ×  | ○               | 0.00                         |      |
|                          | <b>b130</b>                             | Over-voltage LADSTOP enable                                 | 00 (disabled) / 01 (enabled) / 02 (enabled with acceleration)  | ×  | ○               | 00                           |      |
|                          | <b>b131</b>                             | Over-voltage LADSTOP level                                  | 330 to 395 / 660 to 790 [V]  | ×  | ○               | 380 / 760                    |      |
|                          | <b>b132</b>                             | DC bus AVR constant setting                                 | 0.10 to 30.00 [s]  | ×  | ○               | 1.00                         |      |
|                          | <b>b133</b>                             | DC bus AVR for decel. Proportional-gain                     | 0.00 to 5.00   | ○  | ○               | 0.20                         |      |
|                          | <b>b134</b>                             | DC bus AVR for decel. Integral-time                         | 0.0 to 150.0 [s]   | ○  | ○               | 1.0                          |      |
|                          | <b>b145</b>                             | GS input performance selection                              | 00 (non Trip) / 01 (Trip)  | ×  | ○               | 00                           |      |
|                          | <b>b150</b>                             | Panel Display selection                                     | d001 to d060   | ○  | ○               | 001                          |      |
|                          | <b>b160</b>                             | 1st parameter of Double Monitor                             | d001 to d030   | ○  | ○               | 001                          |      |
|                          | <b>b161</b>                             | 2nd parameter of Double Monitor                             | d001 to d030   | ○  | ○               | 002                          |      |
|                          | <b>b163</b>                             | Data change mode selection of d001 and d007                 | 00 (disabled) / 01 (enabled)   | ○  | ○               | 00                           |      |
| <b>b164</b>              | Automatic return to the initial display | 00 (disabled) / 01 (enabled)                                | ○  | ○  | 00              |                              |      |
| Others                   | <b>b165</b>                             | Action selection in case of external operator disconnection | 00 (tripping) / 01 (tripping after decelerating and stopping the motor) /<br>02 (ignoring errors) / 03 (stopping the motor after free-running) /<br>04 (decelerating and stopping the motor) | ○  | ○               | 02                           |      |
|                          | <b>b166</b>                             | Data Read / Write selection                                 | 00 (read / write enable) / 01 (both read, write disable)   | ×  | ○               | 00                           |      |
|                          | <b>b171</b>                             | Inverter mode selection                                     | 00 (disabled) / 01 (IM enabled) / 03 (Permanent Magnet Motor)  | ×  | ×               | 00                           |      |
|                          | <b>b180</b>                             | Initialization trigger                                      | 00 (disabled) / 01 (enabled)   | ×  | ×               | 00                           |      |
|                          | Password                                | <b>b190</b>   | Password A setting   | 0 (disabled) / 0001 to FFFF (enabled)    | ×               | ×                            | 0000 |
|                          |   | <b>b191</b>   | Password A for authentication  | 0000 to FFFF                             | ×               | ×                            | 0000 |
| <b>b192</b>              |   | Password B setting  | 0 (disabled) / 0001 to FFFF (enabled)  | ×  | ×               | 0000                         |      |
| <b>b193</b>              |   | Password B for authentication                               | 0000 to FFFF   | ×  | ×               | 0000                         |      |



[○ = Allowed × = Not permitted]

| Code                                | Function Name | Setting Range                            | Setting During Operation (allowed or not)   | Change During Operation (allowed or not) | Default Setting |                           |
|-------------------------------------|---------------|--|---|--|-----------------|---------------------------|
| Intelligent input terminal setting  | C001          | Terminal [1] function                    | 00 (FW: Forward Run) / 01 (RV: Reverse RUN) / 02 (CF1: Multispeed 1 setting) / 03 (CF2: Multispeed 2 setting) / 04 (CF3: Multispeed 3 setting) / 05 (CF4: Multispeed 4 setting) / 06 (JG: Jogging) / 07 (DB: external DC braking) / 08 (SET: Set 2nd motor data) / 09 (2CH: 2-stage acceleration/deceleration) / 11 (FRS: free-run stop) / 12 (EXT: external trip) / 13 (USP: unattended start protection) / 14 (CS: commercial power source enable) / 15 (SFT: software lock) / 16 (AT: analog input voltage/current select) / 18 (RS: reset) / 19 (PTC (only C005): Thermistor input) / 20 (STA: starting by 3-wire input) / 21 (STP: stopping by 3-wire input) / 22 (F/R: forward/reverse switching by 3-wire input) / 23 (PID: PID disable) / 24 (PIDC: PID reset) / 27 (UP: remote control UP function) / 28 (DWN: remote control DOWN function) / 29 (UDC: remote control data clearing) / 31 (OPE: forcible operation) / 32 (SF1: multispeed bit 1) / 33 (SF2: multispeed bit 2) / 34 (SF3: multispeed bit 3) / 35 (SF4: multispeed bit 4) / 36 (SF5: multispeed bit 5) / 37 (SF6: multispeed bit 6) / 38 (SF7: multispeed bit 7) / 39 (OLR: overload restriction selection) / 40 (TL: torque limit enable) / 41 (TRQ1: torque limit selection bit 1) / 42 (TRQ2: torque limit selection bit 2) / 44 (BOK: braking confirmation) / 46 (LAC: LAD cancellation) / 47 (PCLR: clearance of position deviation) / 50 (ADD: trigger for frequency addition [A145]) / 51 (F-TM: forcible-terminal operation) / 52 (ATR: permission of torque command input) / 53 (KHC: cumulative power clearance) / 56 (MI1: general-purpose input 1) / 57 (MI2: general-purpose input 2) / 58 (MI3: general-purpose input 3) / 59 (MI4: general-purpose input 4) / 60 (MI5: general-purpose input 5) / 61 (MI6: general-purpose input 6) / 62 (MI7: general-purpose input 7) / 65 (AHD: analog command holding) / 66 (CP1: multistage position settings selection 1) / 67 (CP2: multistage position settings selection 2) / 68 (CP3: multistage position settings selection 3) / 69 (ORL: Zero-return limit function) / 70 (ORG: Zero-return trigger function) / 73 (SPD: speed / position switching) / 77 (GS1: safety input 1) / 78 (GS2: safety input 2) / 81 (485: EzCOM) / 82 (PRG: executing EzSQ program) / 83 (HLD: retain output frequency) / 84 (ROK: permission of run command) / 85 (EB: Rotation direction detection for V/f with ENC) / 86 (DISP: Display limitation) / 255 (no: no assignment) | ×  | ○               | 00 (FW)                   |
|                                     | C002          | Terminal [2] function                    |   | ×  | ○               | 01 (RV)                   |
|                                     | C003          | Terminal [3] function                    |   | ×  | ○               | 02 (CF1)                  |
|                                     | C004          | Terminal [4] function                    |   | ×  | ○               | 03 (CF2)                  |
|                                     | C005          | Terminal [5] function                    |   | ×  | ○               | 09 (2CH)                  |
|                                     | C006          | Terminal [6] function                    |   | ×  | ○               | 18 (RS)                   |
|                                     | C007          | Terminal [7] function                    |   | ×  | ○               | 13 (USP)                  |
|                                     | C011 - C017   | Terminal [1] - [7] active state          | 00 (NO) / 01 (NC)   | ×  | ○               | 00                        |
| Intelligent output terminal setting | C021          | Terminal [11] function                   | 00 (RUN: running) / 01 (FA1: constant-speed reached) / 02 (FA2: set frequency overreached) / 03 (OL: overload notice advance signal [1]) / 04 (OD: output deviation for PID control) / 05 (AL: alarm signal) / 06 (FA3: set frequency reached) / 07 (OTQ: over-torque) / 09 (UV: undervoltage) / 10 (TRQ: torque limited) / 11 (RNT: operation time over) / 12 (ONT: plug-in time over) / 13 (THM: thermal alarm signal) / 19 (BRK: brake release) / 20 (BER: braking error) / 21 (ZS: 0 Hz detection signal) / 22 (DSE: speed deviation maximum) / 23 (POK: positioning completed) / 24 (FA4: set frequency overreached 2) / 25 (FA5: set frequency reached 2) / 26 (DL2: overload notice advance signal [2]) / 27 (ODC: analog 0 input disconnection) / 28 (OIODC: analog 0 input disconnection) / 31 (FBV: PID feedback comparison) / 32 (NDC: communication line disconnection) / 33 (LOG1: logical operation result 1) / 34 (LOG2: logical operation result 2) / 35 (LOG3: logical operation result 3) / 39 (WAC: capacitor life warning) / 40 (WAF: cooling-fan) / 41 (FR: starting contact signal) / 42 (OHF: heat sink overheat warning) / 43 (LOC: low-current indication signal) / 44 (MO1: general-purpose output 1) / 45 (MO2: general-purpose output 2) / 46 (MO3: general-purpose output 3) / 50 (IRDY: inverter ready) / 51 (FWR: forward rotation) / 52 (RVR: reverse rotation) / 53 (MJA: major failure) / 54 (WCO: window comparator 0) / 55 (WCO1: window comparator 01) / 58 (FREF) / 59 (REF) / 60 (SETM) / 62 (EDM) / 63 (OPO: Option) / 255 (no: no assignment)  | ×  | ○               | 01 (FA1)                  |
|                                     | C022          | Terminal [12] function                   |   | ×  | ○               | 00 (RUN)                  |
|                                     | C026          | Alarm relay terminal function            |   | ×  | ○               | 05 (AL)                   |
| Analog monitoring                   | C027          | EO signal selection (Pulse / PWM output) | 00 (output frequency) / 01 (output current) / 02 (output torque) / 03 (digital output frequency) / 04 (output voltage) / 05 (input power) / 06 (electronic thermal overload) / 07 (LAD frequency) / 08 (digital current monitoring) / 10 (heat sink temperature) / 12 (general-purpose output YA0) / 15 (Pulse train input monitor) / 16 (option)   | ×  | ○               | 07                        |
|                                     | C028          | [AM] signal selection                    | 00 (output frequency) / 01 (output current) / 02 (output torque) / 04 (output voltage) / 05 (input power) / 06 (electronic thermal overload) / 07 (LAD frequency) / 10 (heat sink temperature) / 11 (output torque [signed value]) / 13 (general-purpose output YA1) / 16 (option)  | ×  | ○               | 07                        |
|                                     | C030          | Digital current monitor reference value  | Set a level between 20% and 200% for the rated inverter current [A]   | ○  | ○               | Rated current of inverter |
| Intelligent output terminal setting | C031          | Terminal [11] active state               | 00 (NO) / 01 (NC)   | ×  | ○               | 00                        |
|                                     | C032          | Terminal [12] active state               | 00 (NO) / 01 (NC)   | ×  | ○               | 00                        |
|                                     | C036          | Alarm relay active state                 | 00 (NO) / 01 (NC)   | ×  | ○               | 01                        |
| Levels and output terminal status   | C038          | Output mode of low load detection signal | 00 (output during acceleration/deceleration and constant-speed operation) / 01 (output only during constant-speed operation)  | ×  | ○               | 01                        |
|                                     | C039          | Low load detection level                 | Set range: 0 to 200% of inverter rated current [A]  | ○  | ○               | Rated current of inverter |
|                                     | C040          | Output mode of overload warning          | 00 (output during acceleration / deceleration and constant-speed operation) / 01 (output only during constant-speed operation)  | ×  | ○               | 01                        |

# Function List

[○= Allowed ×= Not permitted]

| Code                              | Function Name                                   | Setting Range                                     | Setting During Operation (allowed or not)  | Change During Operation (allowed or not)   | Default Setting |                       |
|-----------------------------------|---|---|--|--|-----------------|-----------------------|
| Levels and output terminal status | C041  | Overload level setting                            | Set range: 0 to 200% of inverter rated current [A]   | ○  | ○               | 115% of Rated current |
|                                   | C241  | Overload level setting, 2nd motor                 | Set range: 0 to 200% of inverter rated current [A]   | ○  | ○               | 115% of Rated current |
|                                   | C042  | Frequency arrival setting for acceleration        | 0.00 to 99.99 / 100.0 to 400.0 [Hz]  | ×  | ○               | 0.00                  |
|                                   | C043  | Frequency arrival setting for deceleration        | 0.00 to 99.99 / 100.0 to 400.0 [Hz]  | ×  | ○               | 0.00                  |
|                                   | C044  | PID deviation level setting                       | 0.0 to 100.0 [%]   | ×  | ○               | 3.0                   |
|                                   | C045  | Frequency arrival signal for acceleration (2)     | 0.00 to 99.99 / 100.0 to 400.0 [Hz]  | ×  | ○               | 0.00                  |
|                                   | C046  | Frequency arrival signal for deceleration (2)     | 0.00 to 99.99 / 100.0 to 400.0 [Hz]  | ×  | ○               | 0.00                  |
|                                   | C047  | Pulse train input scale conversion for EO output  | 0.01 to 99.99  | ○  | ○               | 1.00                  |
|                                   | C052  | PID FBV function high limit                       | 0.0 to 100.0 [%]   | ×  | ○               | 100.0                 |
|                                   | C053  | PID FBV function variable low limit               | 0.0 to 100.0 [%]   | ×  | ○               | 0.0                   |
|                                   | C054  | Over-torque / under-torque selection              | 00 (Over torque) / 01 (under torque)   | ×  | ○               | 00                    |
|                                   | C055  | Over / under-torque level (Forward powering mode) | 0 to 200 [%]   | ×  | ○               | 100                   |
|                                   | C056  | Over / under-torque (Reverse regen. mode)         | 0 to 200 [%]   | ×  | ○               | 100                   |
|                                   | C057  | Over / under-torque (Reverse powering mode)       | 0 to 200 [%]   | ×  | ○               | 100                   |
|                                   | C058  | Over / under-torque level (Forward regen. mode)   | 0 to 200 [%]   | ×  | ○               | 100                   |
|                                   | Communication function                          | C059  | Signal output mode of Over / under torque  | 00 (output during acceleration / deceleration and constant-speed operation) / 01 (output only during constant-speed operation) | ×               | ○                     |
| C061                              |   | Electronic thermal warning level setting          | 0 to 100 [%]   | ×  | ○               | 90                    |
| C063                              |   | Zero speed detection level setting                | 0.00 to 99.99 / 100.0 [Hz]   | ×  | ○               | 0.00                  |
| C064                              |   | Heat sink overheat warning                        | 0. to 110. [°C]  | ×  | ○               | 100                   |
| C071                              |   | Communication speed selection                     | 03 (2400bps) / 04 (4800bps) / 05 (9600bps) / 06 (19200bps) / 07 (38400bps) / 08 (57600bps) / 09 (76800bps) / 10 (115200bps)  | ×  | ○               | 05                    |
| C072                              |   | Node allocation                                   | 1 to 247   | ×  | ○               | 1                     |
| C074                              |   | Communication parity selection                    | 00 (no parity) / 01 (even parity) / 02 (odd parity)  | ×  | ○               | 00                    |
| C075                              |   | Communication stop bit selection                  | 1 (1bit) / 2 (2bit)  | ×  | ○               | 1                     |
| Adjustment                        | C076  | Communication error select                        | 00 (tripping) / 01 (tripping after decelerating and stopping the motor) / 02 (ignoring errors) / 03 (stopping the motor after free-running) / 04 (decelerating and stopping the motor) | ×  | ○               | 02                    |
|                                   | C077  | Communication error time-out                      | 0.00 to 99.99 [s]  | ×  | ○               | 0.00                  |
|                                   | C078  | Communication wait time                           | 0 to 1000 [ms]   | ×  | ○               | 0                     |
|                                   | C081  | 0 input span calibration                          | 0. to 200.0 [%]  | ○  | ○               | 100.0                 |
| Communication function            | C082  | 01 input span calibration                         | 0. to 200.0 [%]  | ○  | ○               | 100.0                 |
|                                   | C085  | Thermistor input (PTC) span calibration           | 0. to 200.0 [%]  | ○  | ○               | 100.0                 |
|                                   | C091  | 00 (Disable) / 01 (Enable)                        | 00   | ○  | ○               | 00                    |
|                                   | C096  | Communication selection                           | 00 (Modbus-RTU) / 01 (EzCOM) / 02 (EzCOM [administrator])  | ×  | ×               | 00                    |
|                                   | C098  | EzCOM start adr. of master                        | 01 to 08   | ×  | ×               | 01                    |
|                                   | C099  | EzCOM end adr. of master                          | 01 to 08   | ×  | ×               | 01                    |
|                                   | C100  | EzCOM starting trigger                            | 00 (Input terminal) / 01 (Always)  | ×  | ×               | 00                    |
|                                   | C101  | UP / DWN memory mode selection                    | 00 (not storing the frequency data) / 01 (storing the frequency data)  | ×  | ○               | 00                    |
| Others                            | C102  | Reset selection                                   | 00 (resetting the trip when RS is on) / 01 (resetting the trip when RS is off) / 02 (enabled resetting only upon tripping [resetting when RS is on]) / 03 (resetting only trip)        | ○  | ○               | 00                    |
|                                   | C103  | Restart mode after reset                          | 00 (starting with 0 Hz) / 01 (starting with matching frequency) / 02 (restarting with active matching frequency)   | ×  | ○               | 00                    |
|                                   | C104  | UP / DWN clear: terminal input mode selection     | 00 (0Hz) / 01 (EEPROM data when power supply is turned on)   | ×  | ○               | 00                    |
|                                   | C105  | EO gain adjustment                                | 50 to 200 [%]  | ○  | ○               | 100                   |
|                                   | C106  | AM gain adjustment                                | 50 to 200 [%]  | ○  | ○               | 100                   |
|                                   | C109  | AM bias adjustment                                | 0 to 100 [%]   | ○  | ○               | 0                     |
|                                   | C111  | Overload setting (2)                              | Set range: 0 to 200% of inverter rated current [A]   | ○  | ○               | 115% of Rated current |
|                                   | Input / Output terminal operation function      | C130  | Output 11 on-delay time  | 0.0 to 100.0 [s]   | ×               | ○                     |
| C131                              |   | Output 11 off-delay time                          | 0.0 to 100.0 [s]   | ×  | ○               | 0.0                   |
| C132                              |   | Output 12 on-delay time                           | 0.0 to 100.0 [s]   | ×  | ○               | 0.0                   |
| C133                              |   | Output 12 off-delay time                          | 0.0 to 100.0 [s]   | ×  | ○               | 0.0                   |
| C140                              |   | Output RY on-delay time                           | 0.0 to 100.0 [s]   | ×  | ○               | 0.0                   |
| C141                              |   | Output RY off-delay time                          | 0.0 to 100.0 [s]   | ×  | ○               | 0.0                   |
| C142                              |   | Logical output signal 1 selection 1               | Same as the settings of C021 to C026 (except those of LOG1 to LOG3 & OPO, no)  | ×  | ○               | 00                    |
| C143                              |   | Logical output signal 1 selection 2               |  | ×  | ○               | 00                    |
| C144                              |   | Logical output signal 1 operator selection        | 00 (AND) / 01 (OR) / 02 (XOR)  | ×  | ○               | 00                    |
| C145                              |   | Logical output signal 2 selection 1               | Same as the settings of C021 to C026 (except those of LOG1 to LOG3 & OPO, no)  | ×  | ○               | 00                    |
| C146                              |   | Logical output signal 2 selection 2               |  | ×  | ○               | 00                    |
| C147                              |   | Logical output signal 2 operator selection        | 00 (AND) / 01 (OR) / 02 (XOR)  | ×  | ○               | 00                    |
| C148                              |   | Logical output signal 3 selection 1               | Same as the settings of C021 to C026 (except those of LOG1 to LOG3 & OPO, no)  | ×  | ○               | 00                    |
| C149                              |   | Logical output signal 3 selection 2               |  | ×  | ○               | 00                    |
| C150                              |   | Logical output signal 3 operator selection        | 00 (AND) / 01 (OR) / 02 (XOR)  | ×  | ○               | 00                    |
| C160-C166                         | Response time of intelligent input terminal 1-7 | 0 to 200 (× 2ms)                                  | ×  | ○  | 1.              |                       |
| C169                              | Multistage speed / position determination time  | 0. to 200. (× 10ms)                               | ×  | ○  | 0.              |                       |

[○= Allowed ×= Not permitted]

| Code                             | Function Name   | Setting Range   | Setting During Operation (allowed or not)  | Change During Operation (allowed or not) | Default Setting |                             |
|----------------------------------|---|---|--|--|-----------------|-----------------------------|
| Motor constants and gain setting | H001  | Auto-tuning Setting                                     | 00 (disabled auto-tuning)/01 (auto-tuning without rotation)/02 (auto-tuning with rotation)   | ×  | ×               | 00                          |
|                                  | H002  | Motor data selection                                    | 00 (Hitachi standard data)/02 (auto-tuned data)  | ×  | ×               | 00                          |
|                                  | H202  | Motor data selection, 2nd motor                         | 00 (Hitachi standard data)/02 (auto-tuned data)  | ×  | ×               | 00                          |
|                                  | H003  | Motor capacity  | 0.1/0.2/0.4/0.55/0.75/1.1/1.5/2.2/3.0/3.7/4.0/5.5/7.5/11.0/15.0/18.5 [kW]  | ×  | ×               | Factory set                 |
|                                  | H203  | Motor capacity, 2nd motor                               | 0.1/0.2/0.4/0.55/0.75/1.1/1.5/2.2/3.0/3.7/4.0/5.5/7.5/11.0/15.0/18.5 [kW]  | ×  | ×               | Factory set                 |
|                                  | H004  | Motor poles setting                                     | 2/4/6/8/10 [pole]  | ×  | ×               | 4                           |
|                                  | H204  | Motor poles setting, 2nd motor                          | 2/4/6/8/10 [pole]  | ×  | ×               | 4                           |
|                                  | H005  | Motor speed response constant                           | 1 to 1000  | ○  | ○               | 100.                        |
|                                  | H205  | Motor speed response constant, 2nd motor                | 1 to 1000  | ○  | ○               | 100.                        |
|                                  | H006  | Motor stabilization constant                            | 0 to 255   | ○  | ○               | 100.                        |
|                                  | H206  | Motor stabilization constant, 2nd motor                 | 0 to 255   | ○  | ○               | 100.                        |
|                                  | H020  | Motor constant R1                                       | 0.001 to 9.999/10.00 to 65.53 [Ω]  | ×  | ×               | Depending on motor capacity |
|                                  | H220  | Motor constant R1, 2nd motor                            | 0.001 to 9.999/10.00 to 65.53 [Ω]  | ×  | ×               |                             |
|                                  | H021  | Motor constant R2                                       | 0.001 to 9.999/10.00 to 65.53 [Ω]  | ×  | ×               |                             |
|                                  | H221  | Motor constant R2, 2nd motor                            | 0.001 to 9.999/10.00 to 65.53 [Ω]  | ×  | ×               |                             |
|                                  | H022  | Motor constant L  | 0.01 to 99.99/100.0 to 655.3 [mH]  | ×  | ×               |                             |
|                                  | H222  | Motor constant L, 2nd motor                             | 0.01 to 99.99/100.0 to 655.3 [mH]  | ×  | ×               |                             |
|                                  | H023  | Motor constant I0                                       | 0.01 to 99.99/100.0 to 655.3 [A]   | ×  | ×               |                             |
|                                  | H223  | Motor constant I0, 2nd motor                            | 0.01 to 99.99/100.0 to 655.3 [A]   | ×  | ×               |                             |
|                                  | H024  | Motor constant J  | 0.001 to 9.999/10.00 to 99.99/100.0 to 999.9/1000. to 9999. [kgm <sup>2</sup> ]  | ×  | ×               |                             |
|                                  | H224  | Motor constant J, 2nd motor                             | 0.001 to 9.999/10.00 to 99.99/100.0 to 999.9/1000. to 9999. [kgm <sup>2</sup> ]  | ×  | ×               |                             |
|                                  | H030  | Auto constant R1  | 0.001 to 9.999/10.00 to 65.53 [Ω]  | ×  | ×               |                             |
|                                  | H230  | Auto constant R1, 2nd motor                             | 0.001 to 9.999/10.00 to 65.53 [Ω]  | ×  | ×               |                             |
|                                  | H031  | Auto constant R2  | 0.001 to 9.999/10.00 to 65.53 [Ω]  | ×  | ×               |                             |
|                                  | H231  | Auto constant R2, 2nd motor                             | 0.001 to 9.999/10.00 to 65.53 [Ω]  | ×  | ×               |                             |
|                                  | H032  | Auto constant R1  | 0.01 to 99.99/100.0 to 655.3 [mH]  | ×  | ×               |                             |
|                                  | H232  | Auto constant R1, 2nd motor                             | 0.01 to 99.99/100.0 to 655.3 [mH]  | ×  | ×               |                             |
|                                  | H033  | Auto constant R1  | 0.01 to 99.99/100.0 to 655.3 [A]   | ×  | ×               |                             |
|                                  | H233  | Auto constant R1, 2nd motor                             | 0.01 to 99.99/100.0 to 655.3 [A]   | ×  | ×               |                             |
|                                  | H034  | Auto constant R1  | 0.001 to 9.999/10.00 to 99.99/100.0 to 999.9/1000. to 9999. [kgm <sup>2</sup> ]  | ×  | ×               |                             |
|                                  | H234  | Auto constant R1, 2nd motor                             | 0.001 to 9.999/10.00 to 99.99/100.0 to 999.9/1000. to 9999. [kgm <sup>2</sup> ]  | ×  | ×               |                             |
|                                  | H050  | ASR P-Gain for FB control                               | 0.00 to 10.00  | ○  | ○               | 0.20                        |
|                                  | H051  | ASR I-Gain for FB control                               | 0 to 1000  | ○  | ○               | 2                           |
| PM motor control                 | H102  | PM motor code setting                                   | 00 (Hitachi standard data)/01 (auto-tuned data)  | ×  | ×               | 00                          |
|                                  | H103  | PM motor capacity                                       | 0.1/0.2/0.4/0.55/0.75/1.1/1.5/2.2/3.0/3.7/4.0/5.5/7.5/11.0/15.0/18.5 [kW]  | ×  | ×               | Depending on motor capacity |
|                                  | H104  | PM motor poles setting                                  | 2/4/6/8/10/12/14/16/18/20/22/24/26/28/30/32/34/36/38/40/42/44/46/48 [pole]   | ×  | ×               |                             |
|                                  | H105  | PM rated current  | Range is 0 to inverter rated current Amps [A]  | ×  | ×               |                             |
|                                  | H106  | PM const R (resistance)                                 | 0.001 to 9.999/10.00 to 65.53 [Ω]  | ×  | ×               |                             |
|                                  | H107  | PM const Ld (d-axis inductance)                         | 0.01 to 99.99/100.0 to 655.3 [mH]  | ×  | ×               |                             |
|                                  | H108  | PM const Lq (q-axis inductance)                         | 0.01 to 99.99/100.0 to 655.3 [mH]  | ×  | ×               |                             |
|                                  | H109  | PM const Ke (induction voltage constant)                | 0.0001 to 6.5535 [V/(rad/s)]   | ×  | ×               |                             |
|                                  | H110  | Pm const J (moment of inertia)                          | 0.001 to 9.999/10.00 to 99.99/100.0 to 999.9/1000. to 9999. [kgm <sup>2</sup> ]  | ×  | ×               |                             |
|                                  | H111  | Auto PM const R (resistance)                            | 0.001 to 9.999/10.00 to 65.53 [Ω]  | ×  | ×               |                             |
|                                  | H112  | Auto PM const Ld (d-axis inductance)                    | 0.01 to 99.99/100.0 to 655.3 [mH]  | ×  | ×               |                             |
|                                  | H113  | Auto PM const Lq (q-axis inductance)                    | 0.01 to 99.99/100.0 to 655.3 [mH]  | ×  | ×               |                             |
|                                  | H116  | PM speed response                                       | 1 to 1000  | ○  | ○               | 100                         |
|                                  | H117  | PM starting current                                     | 20.0 to 100.0 [%]  | ×  | ×               | 70.00                       |
|                                  | H118  | PM starting time  | 0.01 to 60.00 [s]  | ×  | ×               | 1.00                        |
|                                  | H119  | PM stabilization constant                               | 0.0 to 120.0 [%]   | ×  | ×               | 100                         |
|                                  | H121  | PM minimum frequency                                    | 0.0 to 25.5 [%]  | ○  | ○               | 8.0                         |
|                                  | H122  | PM No-Load current                                      | 0.00 to 100.0 [%]  | ×  | ×               | 10.00                       |
|                                  | H123  | PM starting method                                      | 00 (disabling)/01 (enabling)   | ×  | ×               | 00                          |
| H131                             | PM initial magnet position estimation 0V wait times     | 0 to 255  | ×  | ×  | 10              |                             |
| H132                             | PM initial magnet position estimation detect wait times | 0 to 255  | ×  | ×  | 10              |                             |
| H133                             | PM initial magnet position estimation detect times      | 0 to 255  | ×  | ×  | 30              |                             |
| H134                             | PM initial magnet position estimation voltage gain      | 0 to 200  | ×  | ×  | 100             |                             |
| Others                           | P001  | Operation mode on expansion card 1 error                | 00 (tripping)/01 (continuing operation)  | ×  | ○               | 00                          |
|                                  | P003  | Pulse train input terminal [EA] mode determination      | 00 (Speed reference, incl. PID)/01 (control for encoder feedback [1st only])/02 (Extended terminal for EzSQ)   | ×  | ×               | 00                          |
| Control with FB                  | P004  | Pulse train input mode selection for simple Positioning | 00 (Single-phase pulse input)/01 (2-phase pulse [90° difference] input 1 with EB input)/02 (2-phase pulse [90° difference] input 2 with EB input)/03 (Single-phase pulse and direction signal with EB input) | ×  | ×               | 00                          |
|                                  | P011  | Encoder pulse-per-revolution (PPR) setting              | 32 to 1024 [pulse]   | ×  | ×               | 512                         |
|                                  | P012  | Control pulse setting                                   | 00 (simple positioning deactivated)/02 (simple positioning activated)  | ×  | ×               | 00                          |
|                                  | P015  | Creep speed setting                                     | "start frequency" to 10.00Hz   | ×  | ○               | 5.00                        |
|                                  | P026  | Over-speed error detection level setting                | 0.0 to 150.0 [%]   | ×  | ○               | 115.0                       |
|                                  | P027  | Speed deviation error detection level setting           | 0.00 to 99.99/100.0 to 120.0 [Hz]  | ×  | ○               | 10.00                       |

# Function List

[○= Allowed ×= Not permitted]

| Code                               |                               | Function Name  | Setting Range  | Setting During Operation (allowed or not) | Change During Operation (allowed or not) | Default Setting |
|------------------------------------|-------------------------------|--|--|---|--|-----------------|
| Others                             | P031                          | Accel /decel time input selection                              | 00 (digital operator)/<br>03 (easy sequence)   | ×   | ×  | 00              |
|                                    | P033                          | Torque command input selection                                 | 00 (0 terminal) / 01 (01 terminal) / 03 (digital operator) / 06 (Option)   | ×   | ×  | 00              |
| Torque control                     | P034                          | Torque command setting   | 0 to 200 [%]   | ○   | ○  | 0               |
|                                    | P036                          | Torque bias mode   | 00 (disabled the mode) / 01 (digital operator) / 05 (Option)   | ×   | ×  | 00              |
|                                    | P037                          | Torque bias value  | -200 to 200 [%]  | ○   | ○  | 0               |
|                                    | P038                          | Torque bias polarity selection                                 | 00 (as indicated by the sign) / 01 (depending on the operation direction)  | ×   | ×  | 00              |
|                                    | P039                          | Speed limit for torque-controlled operation (forward rotation) | 0.00 to 99.99 / 100.0 to 120.0 [Hz]  | ×   | ×  | 0.00            |
|                                    | P040                          | Speed limit for torque-controlled operation (reverse rotation) | 0.00 to 99.99 / 100.0 to 120.0 [Hz]  | ×   | ×  | 0.00            |
|                                    | P041                          | Speed / torque change time                                     | 0. to 1000. [ms]   | ×   | ×  | 0.              |
| Option                             | P044                          | Network comm. Watchdog timer                                   | 0.00 to 99.99 [s]  | ×   | ×  | 1.00            |
| Communication option setting       | P045                          | Inverter action on network comm error                          | 00 (tripping) / 01 (tripping after decelerating and stopping the motor) / 02 (ignoring errors) / 03 (stopping the motor after free-running) / 04 (decelerating and stopping the motor) | ×   | ×  | 01              |
|                                    | P046                          | Polled I/O output instance number                              | 00 to 20   | ×   | ×  | 00              |
|                                    | P048                          | Inverter action on network idle mode                           | 00 (tripping) / 01 (tripping after decelerating and stopping the motor) / 02 (ignoring errors) / 03 (stopping the motor after free-running) / 04 (decelerating and stopping the motor) | ×   | ×  | 01              |
|                                    | P049                          | Network motor poles setting for RPM                            | 0 / 2 / 4 / 6 / 8 / 10 / 12 / 14 / 16 / 18 / 20 / 22 / 24 / 26 / 28 / 30 / 32 / 34 / 36 / 38   | ×   | ×  | 0               |
| Pulse train input                  | P055                          | Pulse train frequency scale                                    | 1.0 to 32.0 [kHz]  | ×   | ○  | 25.0            |
|                                    | P056                          | Time constant of pulse train frequency filter                  | 0.01 to 2.00 [s]   | ×   | ○  | 0.10            |
|                                    | P057                          | Pulse train frequency bias                                     | -100 to 100 [%]  | ×   | ○  | 0               |
|                                    | P058                          | Pulse train frequency limit                                    | 0 to 100 [%]   | ×   | ○  | 100             |
| Simple positional control          | P060 - P067                   | Multistage position setting 0 - 7                              | "Position range specification (reverse)" to "Position range specification (forward)"   | ○   | ○  | 0               |
|                                    | P068                          | Zero-return mode selection                                     | 00 (Low) / 01 (High)   | ○   | ○  | 00              |
|                                    | P069                          | Zero-return direction selection                                | 00 (FW) / 01 (RV)  | ○   | ○  | 01              |
|                                    | P070                          | Low-speed zero-return frequency                                | 0.00 to 10.00 [Hz]   | ○   | ○  | 5.00            |
|                                    | P071                          | High-speed zero-return frequency                               | 0.00 to 99.99 / 100.0 to 400.0 [Hz]  | ○   | ○  | 5.00            |
|                                    | P072                          | Position range specification (forward)                         | 0 to +268435455  | ○   | ○  | 268435455       |
|                                    | P073                          | Position range specification (reverse)                         | -268435455 to 0  | ○   | ○  | -268435455      |
|                                    | P075                          | Positioning mode selection                                     | 00 (With limitation) / 01 (No limitation)  | ×   | ×  | 00              |
| P077                               | Encoder disconnection timeout | 0.0 to 10.0 [s]  | ○  | ○   | 1.0                                      |                 |
| Easy sequence programming function | P100 - P131                   | Easy sequence user parameter U (00) - (31)                     | 0. to 9999. in units of 1 /<br>1000 to 6553 in units of 10   | ○   | ○  | 0.              |
|                                    | P140                          | EzCOM number of data   | 1 to 5   | ○   | ○  | 5               |
| Peer-to-Peer communication         | P141                          | EzCOM destination 1 address                                    | 1 to 247   | ○   | ○  | 1               |
|                                    | P142                          | EzCOM destination 1 register                                   | 0000h to FFFFh   | ○   | ○  | 0000            |
|                                    | P143                          | EzCOM source 1 register  | 0000h to FFFFh   | ○   | ○  | 0000            |
|                                    | P144                          | EzCOM destination 2 address                                    | 1 to 247   | ○   | ○  | 2               |
|                                    | P145                          | EzCOM destination 2 register                                   | 0000h to FFFFh   | ○   | ○  | 0000            |
|                                    | P146                          | EzCOM source 2 register  | 0000h to FFFFh   | ○   | ○  | 0000            |
|                                    | P147                          | EzCOM destination 3 address                                    | 1 to 247   | ○   | ○  | 3               |
|                                    | P148                          | EzCOM destination 3 register                                   | 0000h to FFFFh   | ○   | ○  | 0000            |
|                                    | P149                          | EzCOM source 3 register  | 0000h to FFFFh   | ○   | ○  | 0000            |
|                                    | P150                          | EzCOM destination 4 address                                    | 1 to 247   | ○   | ○  | 4               |
|                                    | P151                          | EzCOM destination 4 register                                   | 0000h to FFFFh   | ○   | ○  | 0000            |
|                                    | P152                          | EzCOM source 4 register  | 0000h to FFFFh   | ○   | ○  | 0000            |
|                                    | P153                          | EzCOM destination 5 address                                    | 1 to 247   | ○   | ○  | 5               |
|                                    | P154                          | EzCOM destination 5 register                                   | 0000h to FFFFh   | ○   | ○  | 0000            |
|                                    | P155                          | EzCOM source 5 register  | 0000h to FFFFh   | ○   | ○  | 0000            |
| Communication option setting       | P160 - P169                   | Option I / F command register to write 1 - 10                  | 0000h to FFFFh   | ○   | ○  | 0000            |
|                                    | P170 - P179                   | Option I / F command register to read 1 - 10                   | 0000h to FFFFh   | ○   | ○  | 0000            |
|                                    | P180                          | Profibus Node address  | 0 to 125   | ×   | ×  | 0.              |
|                                    | P181                          | Profibus Clear Node address                                    | 00 (clear) / 01 (not clear)  | ×   | ×  | 00              |
|                                    | P182                          | Profibus Map selection   | 00 (PPO) / 01 (Conventional)   | ×   | ×  | 00              |
|                                    | P185                          | CANOpen Node address   | 0 to 127   | ×   | ×  | 0               |
|                                    | P186                          | CANOpen speed selection  | 00 to 08   | ×   | ×  | 06              |
|                                    | P190                          | CompoNet Node address  | 00 to 63   | ×   | ×  | 0               |
|                                    | P192                          | DeviceNet MAC ID   | 00 to 63   | ×   | ×  | 63              |
|                                    | P195                          | ML2 frame length   | 0 (32bytes) / 1 (17bytes)  | ×   | ×  | 00              |
| P196                               | ML2 Node address              | 21h to 3Eh   | ×  | ×   | 21h                                      |                 |
| User parameter                     | U001 - U032                   | User-selected function 1 - 32                                  | no / d001 to P186  | ○   | ○  | no              |

## Protective Functions

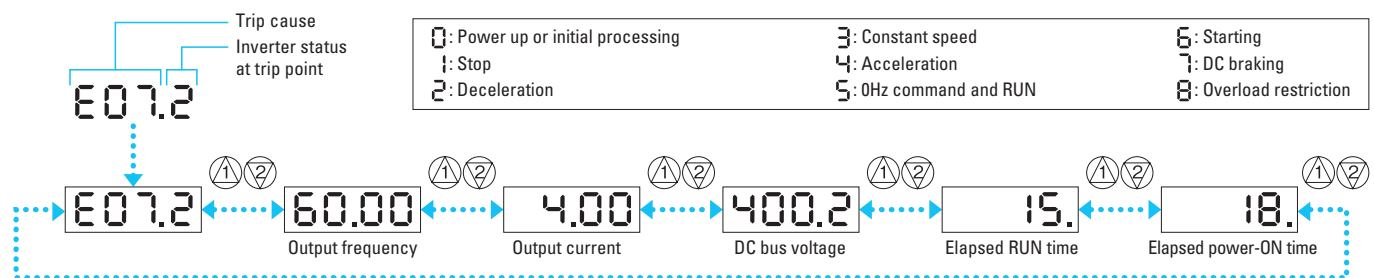
| Name                                       | Cause(s)  | Error Code |
|--|---|------------|
| Over-current event while at constant speed | The inverter output was short-circuited, or the motor shaft is locked or has a heavy load. These conditions cause excessive current for the inverter, so the inverter output is turned OFF. The dual-voltage motor is wired incorrectly.                | E01        |
| Over-current event during deceleration     |   | E02        |
| Over-current event during acceleration     |   | E03        |
| Over-current event during other conditions |   | E04        |
| Overload protection *1                     | When a motor overload is detected by the electronic thermal function, the inverter trips and turns OFF its output.  | E05        |
| Braking resistor overload protection       | When the BRD operation rate exceeds the setting of "b090", this protective function shuts off the inverter output and displays the error code.  | E06        |
| Over-voltage protection                    | When the DC bus voltage exceeds a threshold, due to regenerative energy from the motor.   | E07        |
| EEPROM error *2                            | When the built-in EEPROM memory has problems due to noise or excessive temperature, the inverter trips and turns OFF its output to the motor.   | E08        |
| Under-voltage error                        | 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.                                     | E09        |
| Current detection error                    | If an error occurs in the internal current detection system, the inverter will shut off its output and display the error code.  | E10        |
| CPU error *2                               | A malfunction in the built-in CPU has occurred, so the inverter trips and turns OFF its output to the motor.  | E11        |
| External trip                              | A signal on an intelligent input terminal configured as EXT has occurred. The inverter trips and turns OFF the output to the motor.   | E12        |
| USP  | When the Unattended Start Protection (USP) is enabled, an error occurred when power is applied while a Run signal is present. The inverter trips and does not go into Run Mode until the error is cleared.  | E13        |
| Ground fault *2                            | The inverter is protected by the detection of ground faults between the inverter output and the motor upon during powerup tests. This feature protects the inverter, and does not protect humans.   | E14        |
| Input over-voltage                         | The inverter tests for input over-voltage after the inverter has been in Stop Mode for 100 seconds. If an over-voltage condition exists, the inverter enters a fault state. After the fault is cleared, the inverter can enter Run Mode again.          | E15        |
| Inverter thermal trip                      | When the inverter internal temperature is above the threshold, the thermal sensor in the inverter module detects the excessive temperature of the power devices and trips, turning the inverter output OFF.   | E21        |
| CPU communication error                    | When communication between two CPU fails, inverter trips and displays the error code.   | E22        |
| Main circuit error *3                      | The inverter will trip if the power supply establishment is not recognized because of a malfunction due to noise or damage to the main circuit element.   | E25        |
| Driver error *2                            | An internal inverter error has occurred at the safety protection circuit between the CPU and main driver unit. Excessive electrical noise may be the cause. The inverter has turned OFF the IGBT module output.   | E30        |
| Thermistor                                 | When a thermistor is connected to terminals [5] and [L] and the inverter has sensed the temperature is too high, the inverter trips and turns OFF the output.   | E35        |
| Braking error                              | When "01" has been specified for the Brake Control Enable (b120), the inverter will trip if it cannot receive the braking confirmation signal within the Brake Wait Time for Confirmation (b124) after the output of the brake release signal.          | E36        |
| Safe stop                                  | Safe stop signal is given.  | E37        |
| Low-speed overload protection              | If overload occurs during the motor operation at a very low speed, the inverter will detect the overload and shut off the inverter output.  | E38        |
| Operator connection                        | When the connection between inverter and operator keypad failed, inverter trips and displays the error code.  | E40        |
| Modbus communication error                 | When "trip" is selected (C076=00) as a behavior in case of communication error, inverter trips when timeout happens.  | E41        |
| EzSQ invalid instruction                   | The program stored in inverter memory has been destroyed, or the PRG terminal was turned on without a program downloaded to the inverter.   | E43        |
| EzSQ nesting count error                   | Subroutines, if-statement, or for-next loop are nested in more than eight layers  | E44        |
| EzSQ instruction error                     | Inverter found the command which cannot be executed.  | E45        |
| EzSQ user trip (0 to 9)                    | When user-defined trip happens, inverter trips and displays the error code.   | E50 to E59 |
| Option error                               | The inverter detects errors in the option board mounted in the optional slot. For details, refer to the instruction manual for the mounted option board.  | E60 to E69 |
| Encoder disconnection                      | If the encoder wiring is disconnected, an encoder connection error is detected, the encoder fails, or an encoder that does not support line driver output is used, the inverter will shut off its output and display the error code shown on the right. | E80        |
| Excessive speed                            | If the motor speed rises to "maximum frequency (A004) x over-speed error detection level (P026)" or more, the inverter will shut off its output and display the error code shown on the right.  | E81        |
| Positioning range error                    | If current position exceeds the position range (P072-P073), the inverter will shut off its output and display the error code.   | E83        |

\*1: Reset operations acceptable 10 seconds after the trip.

\*2: The inverter will not accept any reset command after an EEPROM error (E08), CPU error (E11), Ground fault (E14) or Driver error (E30) occurs with error code displayed. Turn off the inverter power once. If error is displayed when the inverter power is turned on subsequently, the internal memory device may have failed or parameters may have not been stored correctly. In such cases, initialize the inverter, and then re-set the parameters.

\*3: Reset cannot be released with the STOP/RESET key. Please reset it with the inverter power or reset terminal (18-RS).

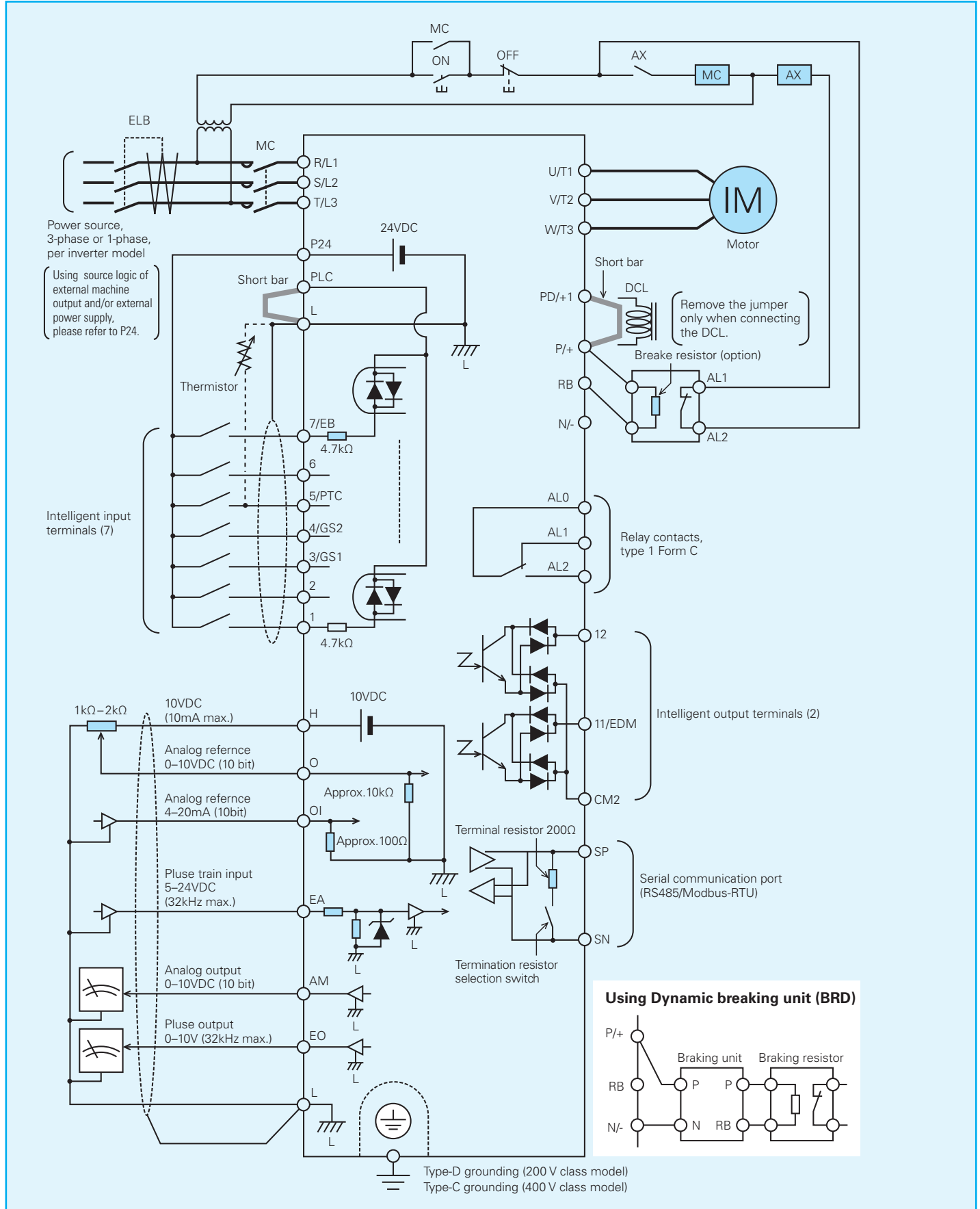
### How to access the details about the present fault



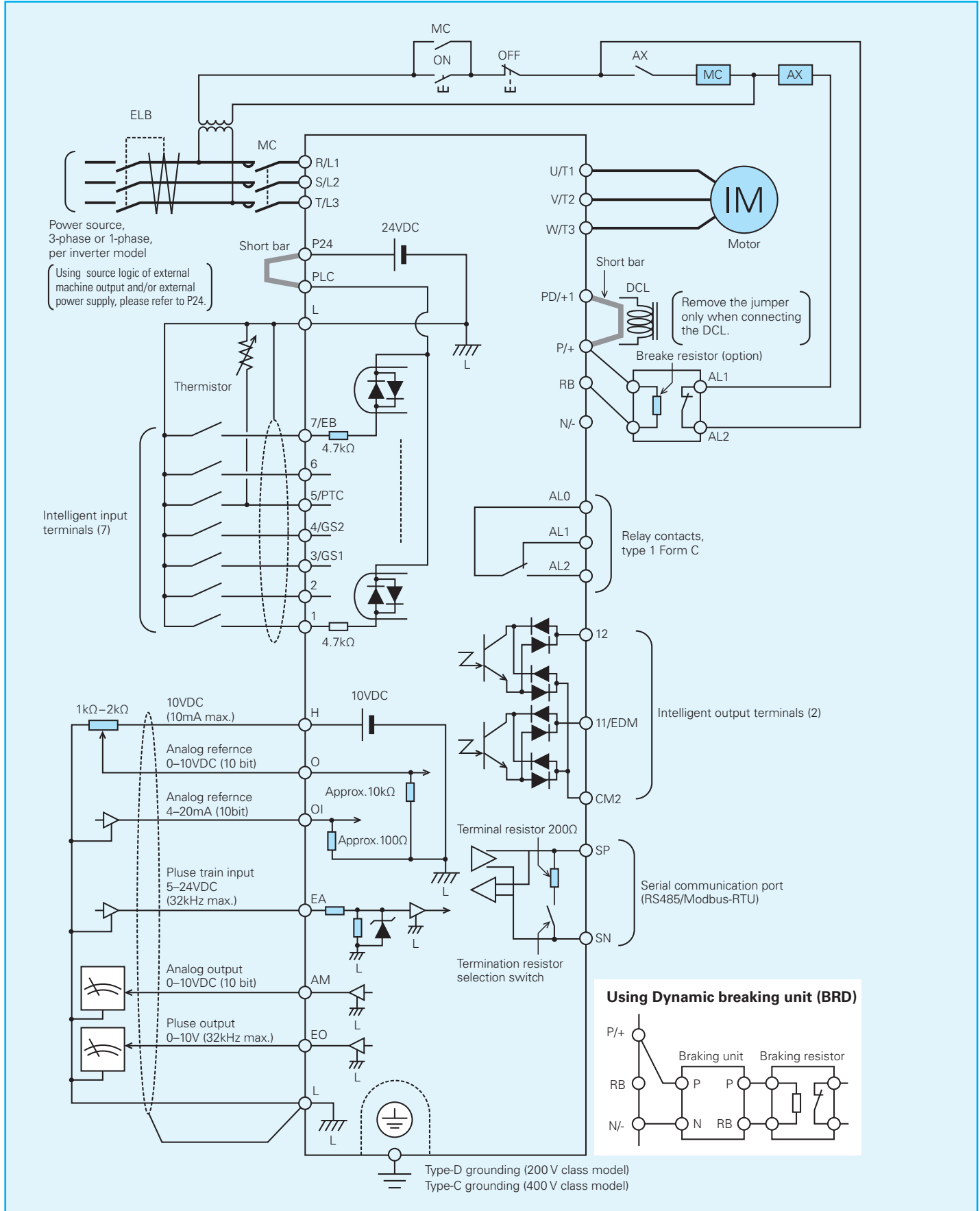
Note: Indicated inverter status could be different from actual inverter behavior. (e.g. When PID operation or frequency given by analog signal, although it seems constant speed, acceleration and deceleration could be repeated in very short cycle.)

# Connecting Diagram

## Source Type Logic



## Sink Type Logic



# Connecting to PLC

## Connection with Input Terminals

|                    | Using Internal Power Supply of the Inverter            | Using External Power Supply (Please remove the short bar.) |
|--------------------|--|--|
| Sink type logic    | <p>Hitachi EH-150 series PLC Output Module EH-YT16</p> | <p>Hitachi EH-150 series PLC Output Module EH-YTP16</p>    |
| Source type logic  | <p>Hitachi EH-150 series PLC Output Module EH-YT16</p> | <p>Hitachi EH-150 series PLC Output Module EH-YTP16</p>    |
| Non-voltage switch |  |  |

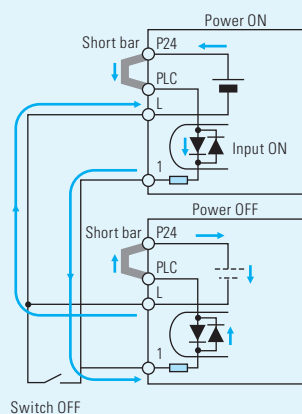
## Connection with Output Terminals

| Sink type logic                                       | Source type logic                                     |
|---|---|
| <p>Hitachi EH-150 series PLC Input Module EH-XD16</p> | <p>Hitachi EH-150 series PLC Input Module EH-XD16</p> |

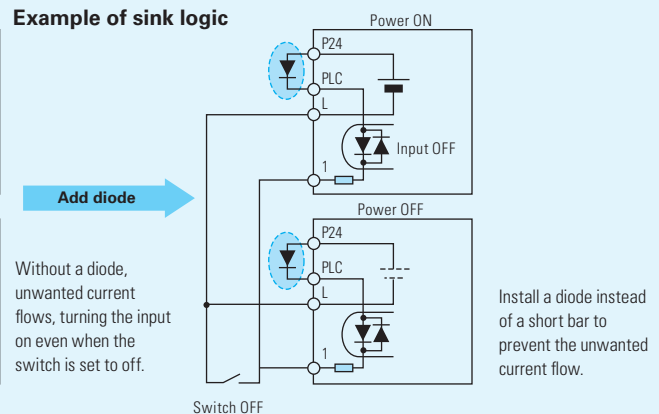
## Attention when inverter plurals is used

When two or more inverters connected to common I/O wiring as shown in the figure at the right are turned on at a different timing, unwanted current flows, establishing a closed circuit, and the inverter is judged to be ON, even though its switch is set to OFF.

To prevent the unwanted current flow, install diodes rated at 50 V/0.1 A at the specified locations.

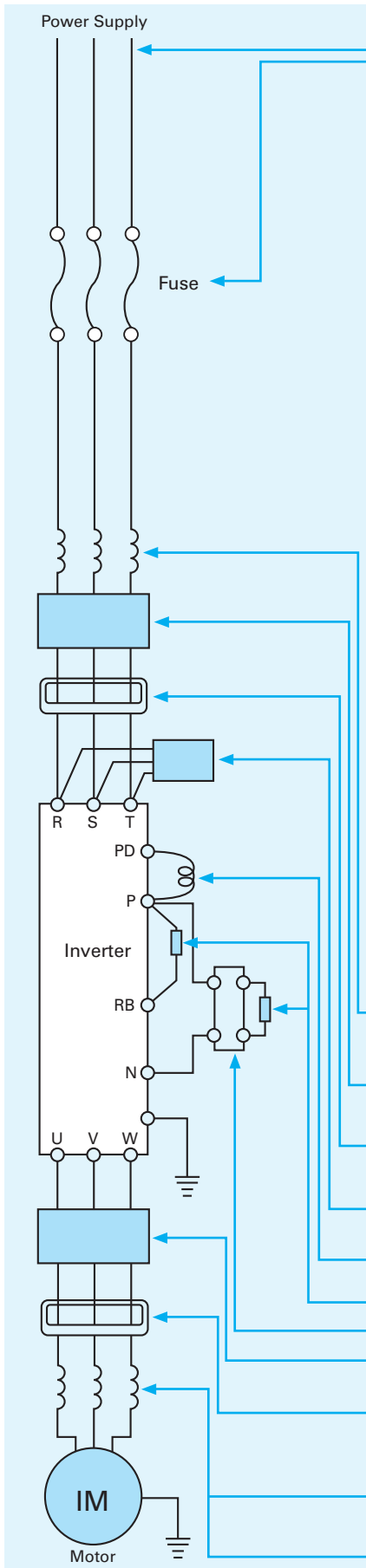


### Example of sink logic





## Wiring and Accessories



| Input Voltage | Motor Output |      |     |             | Inverter Model                       | Wiring                                 |  | Fuse (UL-rated, class J, 600V) | Circuit Breaker (Inverse Time) |
|---------------|--------------|------|-----|-------------|--------------------------------------|--|--|--------------------------------|--------------------------------|
|               | kW           |      | HP  |             |                                      | Power Lines                            | Signal Lines   |                                |                                |
|               | VT           | CT   | VT  | CT          |                                      |  |  |                                |                                |
| 1-phase 100V  | —            | 0.4  | —   | 1/2         | WJ200-004MF                          | AWG12/3.3mm <sup>2</sup> (75°C only)   | 18 to 28 AWG / 0.14 to 0.75 mm <sup>2</sup> shielded wire (see Note 4) | 50A                            | 30A                            |
|               | —            | 0.75 | —   | 1           | WJ200-007MF                          | AWG10/5.3mm <sup>2</sup> (75°C only)   |  |                                |                                |
| 1-phase 200V  | 0.2          | 0.1  | 1/4 | 1/8         | WJ200-001SF                          | AWG16 / 1.3mm <sup>2</sup> (75°C only) |  | 10A                            | 30A                            |
|               | 0.4          | 0.2  | 1/2 | 1/4         | WJ200-002SF                          |  |  |                                |                                |
|               | 0.55         | 0.4  | 3/4 | 1/2         | WJ200-004SF                          |  |  |                                |                                |
|               | 1.1          | 0.75 | 1.5 | 1           | WJ200-007SF                          | AWG12 / 3.3mm <sup>2</sup> (75°C only) |  | 20A                            |                                |
|               | 2.2          | 1.5  | 3   | 2           | WJ200-015SF                          | AWG10 / 5.3mm <sup>2</sup>             |  |                                |                                |
|               | 3.0          | 2.2  | 4   | 3           | WJ200-022SF                          |  |  |                                |                                |
| 3-phase 200V  | 0.2          | 0.1  | 1/4 | 1/8         | WJ200-001LF                          | AWG16 / 1.3mm <sup>2</sup>             |  | 10A                            | 30A                            |
|               | 0.4          | 0.2  | 1/2 | 1/4         | WJ200-002LF                          |  |  |                                |                                |
|               | 0.75         | 0.4  | 1   | 1/2         | WJ200-004LF                          |  |  |                                |                                |
|               | 1.1          | 0.75 | 1.5 | 1           | WJ200-007LF                          | AWG14 / 2.1mm <sup>2</sup> (75°C only) | 15A  |                                |                                |
|               | 2.2          | 1.5  | 3   | 2           | WJ200-015LF                          |  |  |                                |                                |
|               | 3.0          | 2.2  | 4   | 3           | WJ200-022LF                          | AWG12 / 3.3mm <sup>2</sup> (75°C only) | 20A  |                                |                                |
|               | 5.5          | 3.7  | 7.5 | 5           | WJ200-037LF                          | AWG10 / 5.3mm <sup>2</sup> (75°C only) |  |                                |                                |
|               | 7.5          | 5.5  | 10  | 7.5         | WJ200-055LF                          | AWG6 / 13mm <sup>2</sup> (75°C only)   | 30A  |                                |                                |
|               | 11           | 7.5  | 15  | 10          | WJ200-075LF                          |  |  |                                |                                |
|               | 15           | 11   | 20  | 15          | WJ200-110LF                          | AWG4 / 21mm <sup>2</sup> (75°C only)   | 80A  |                                |                                |
| 18.5          | 15           | 25   | 20  | WJ200-150LF | AWG2 / 34mm <sup>2</sup> (75°C only) |  |  |                                |                                |
| 3-phase 400V  | 0.75         | 0.4  | 1   | 1/2         | WJ200-004HF                          | AWG16 / 1.3mm <sup>2</sup>             | 10A  | 20A                            |                                |
|               | 1.5          | 0.75 | 2   | 1           | WJ200-007HF                          |  |  |                                |                                |
|               | 2.2          | 1.5  | 3   | 2           | WJ200-015HF                          |  |  |                                |                                |
|               | 3.0          | 2.2  | 4   | 3           | WJ200-022HF                          | AWG14 / 2.1mm <sup>2</sup>             | 15A  |                                |                                |
|               | 4.0          | 3.0  | 5   | 4           | WJ200-030HF                          |  |  |                                |                                |
|               | 5.5          | 4.0  | 7.5 | 5           | WJ200-040HF                          | AWG12 / 3.3mm <sup>2</sup> (75°C only) | 30A  |                                |                                |
|               | 7.5          | 5.5  | 10  | 7.5         | WJ200-055HF                          |  |  |                                |                                |
|               | 11           | 7.5  | 15  | 10          | WJ200-075HF                          | AWG10 / 5.3mm <sup>2</sup> (75°C only) | 40A  |                                |                                |
|               | 15           | 11   | 20  | 15          | WJ200-110HF                          | AWG6 / 13mm <sup>2</sup> (75°C only)   |  |                                |                                |
|               | 18.5         | 15   | 25  | 20          | WJ200-150HF                          | AWG6 / 13mm <sup>2</sup> (75°C only)   |  |                                |                                |

Note 1: Field wiring must be made by a UL-Listed and CSA-certified closed-loop terminal connector sized for the wire gauge involved.

Connector must be fixed by using the crimping tool specified by the connector manufacturer.

Note 2: Be sure to consider the capacity of the circuit breaker to be used.

Note 3: Be sure to use a larger wire gauge if power line length exceeds 66ft. (20 m).

Note 4: Use 18 AWG / 0.75mm<sup>2</sup> wire for the alarm signal wire ([AL0], [AL1], [AL2] terminals).

| Name   | Function   |
|--|--|
| Input-side AC Reactor                            | This is useful in suppressing harmonics induced on the power supply lines and for improving the power factor.<br><b>WARNING:</b> Some applications must use an input-side AC Reactor to prevent inverter damage. See Warning on next page.                                     |
| EMC filter (for CE applications, see Appendix D) | Reduces the conducted noise on the power supply wiring between the inverter and the power distribution system. Connect to the inverter primary (input) side.   |
| Radio noise filter                               | Electrical noise interference may occur on nearby equipment such as a radio receiver. This magnetic choke filter helps reduce radiated noise (can also be used on output).   |
| Radio noise filter (use in non-CE applications)  | This capacitive filter reduces radiated noise from the main power wires in the inverter (input) side.  |
| DC link choke                                    | Suppress harmonics generated by the inverter. However, it will not protect the input diode bridge rectifier.   |
| Braking register                                 | This is useful for increasing the inverter's control torque for high duty-cycle (on-off) applications, and improving the decelerating capability.  |
| Braking unit                                     |  |
| Output side nose filter                          | Reduces radiated noise from wiring in the inverter output side.  |
| Radio noise filter                               | Electrical noise interference may occur on nearby equipment such as a radio receiver. This magnetic choke filter helps reduce radiated noise (can also be used on input).  |
| Output-side AC Reactor                           | This reactor reduces the vibration in the motor caused by the inverter's switching waveforms, by smoothing the waveform to approximate commercial power quality. It is also useful to reduce harmonics when wiring from the inverter to the motor is more than 10 m in length. |
| LCR filter                                       | Sine wave shaping filter for output side.  |

# Wiring and Accessories

## Recommended Reactor & Filter Selection \*1

| Input Power     | Capacity (kW) | Inverter Model | DC reactor | Input side AC reactor | Input side noise filter *2 | Radio noise filter<br><Zero-phase reactor> | Radio noise filter<br><Capacitor filter> |
|-----------------|---------------|----------------|------------|-----------------------|----------------------------|--|--|
| 1-phase<br>100V | 0.4           | WJ200-004MF    | —          | —                     | —                          | ZCL-B40<br>ZCL-A                           | —  |
|                 | 0.75          | WJ200-007MF    |            |                       |                            |  |  |
| 1-phase<br>200V | 0.1           | WJ200-001SF    | DCL-L-0.2  | —                     | —                          | ZCL-B40<br>ZCL-A                           | —  |
|                 | 0.2           | WJ200-002SF    |            |                       |                            |  |  |
|                 | 0.4           | WJ200-004SF    | DCL-L-0.4  |                       |                            |  |  |
|                 | 0.75          | WJ200-007SF    | DCL-L-0.7  |                       |                            |  |  |
|                 | 1.5           | WJ200-015SF    | DCL-L-1.5  |                       |                            |  |  |
|                 | 2.2           | WJ200-022SF    | DCL-L-2.2  |                       |                            |  |  |
| 3-phase<br>200V | 0.1           | WJ200-001LF    | DCL-L-0.2  | ALI-2.5L2             | NF-L6                      | ZCL-B40<br>ZCL-A                           | CFI-L                                    |
|                 | 0.2           | WJ200-002LF    |            |                       |                            |  |  |
|                 | 0.4           | WJ200-004LF    | DCL-L-0.4  |                       |                            |  |  |
|                 | 0.75          | WJ200-007LF    | DCL-L-0.7  |                       | NF-L10                     |  |  |
|                 | 1.5           | WJ200-015LF    | DCL-L-1.5  |                       |                            |  |  |
|                 | 2.2           | WJ200-022LF    | DCL-L-2.2  |                       | ALI-5.5L2                  |  |  |
|                 | 3.7           | WJ200-037LF    | DCL-L-3.7  | ALI-11L2              | NF-L30                     |  |  |
|                 | 5.5           | WJ200-055LF    | DCL-L-5.5  |                       | NF-L40                     |  |  |
|                 | 7.5           | WJ200-075LF    | DCL-L-7.5  |                       | NF-L60                     |  |  |
|                 | 11            | WJ200-110LF    | DCL-L-11   |                       | NF-L80                     |  |  |
| 15              | WJ200-150LF   | DCL-L-15       | ALI-22L2   |                       |                            |  |  |
| 3-phase<br>400V | 0.4           | WJ200-004HF    | DCL-H-0.4  | ALI-2.5H2             | NF-H7                      | ZCL-B40<br>ZCL-A                           | CFI-H                                    |
|                 | 0.75          | WJ200-007HF    | DCL-H-0.7  |                       |                            |  |  |
|                 | 1.5           | WJ200-015HF    | DCL-H-1.5  |                       |                            |  |  |
|                 | 2.2           | WJ200-022HF    | DCL-H-2.2  | ALI-5.5H2             | NF-H10                     |  |  |
|                 | 3.0           | WJ200-030HF    | DCL-H-3.7  |                       |                            |  |  |
|                 | 4.0           | WJ200-040HF    | DCL-H-5.5  | ALI-11H2              | NF-H20                     |  |  |
|                 | 5.5           | WJ200-055HF    |            |                       |                            |  |  |
|                 | 7.5           | WJ200-075HF    |            |                       |                            |  |  |
|                 | 11            | WJ200-110HF    | DCL-H-11   | ALI-22H2              | NF-H30                     |  |  |
| 15              | WJ200-150HF   | DCL-H-15       | NF-H40     |                       |                            |  |  |

\*1: The above table is a selection example for the case of heavy duty (CT) model.

\*2: These NF filter is not applied for oversea markings such as CE etc.  
Please contact your nearest sales office for selection EMC filter.

## Recommended Regenerative Braking Unit & Resistance Selection \*5

| Input Power | Required torque for brake | Capacity (kW) | Selection of dynamic brake unit | Allowable resistance value (Ω) | Resistance selection (Ω) | Braking resistor      | Dynamic braking usage ratio (=b090setting) *4 | Specification of resistor |
|-------------|---------------------------|---------------|---------------------------------|--------------------------------|--------------------------|-----------------------|---|---------------------------|
| 100V        | 150%                      | 0.4           | Built-in                        | 100                            | 180                      | SRB200-1              | 10  | 180Ω 200W                 |
|             |                           | 0.75          |                                 | 50                             | 100                      | SRB200-2              | 7.5   | 100Ω 200W                 |
|             |                           |               |                                 | 50                             | 50                       | RB1                   | 10  | 50Ω 400W                  |
| 200V        | 150%                      | 0.1           | Built-in                        | 100                            | 180                      | SRB200-1              | 10  | 180Ω 200W                 |
|             |                           | 0.2           |                                 | 100                            | 180                      | SRB200-1              | 10  | 180Ω 200W                 |
|             |                           | 0.4           |                                 | 100                            | 180                      | SRB200-1              | 10  | 180Ω 200W                 |
|             |                           | 0.75          |                                 | 50                             | 100                      | SRB200-2              | 7.5   | 100Ω 200W                 |
|             |                           |               |                                 | 50                             | 50                       | RB1                   | 10  | 50Ω 400W                  |
|             |                           |               |                                 | 50                             | 50                       | SRB300-1              | 7.5   | 50Ω 300W                  |
|             |                           | 1.5           |                                 | 50                             | 50                       | RB1                   | 10  | 50Ω 400W                  |
|             |                           |               |                                 | 2.2                            | 35                       | 35                    | SRB400-1                                      | 7.5                       |
|             |                           | 35            |                                 |                                | 35                       | RB2                   | 10  | 35Ω 600W                  |
|             |                           | 17            |                                 |                                | 17                       | RB3                   | —   | 17Ω 1200W                 |
|             |                           | BRD-E3        |                                 | 17                             | 17                       | RB3                   | —   | 17Ω 1200W                 |
|             |                           |               |                                 | 7.5                            | 4                        | 8.5                   | 2parallel RB3                                 | —                         |
|             | 11                        |               | 4                               |                                | 8.5                      | 2parallel RB3         | —   | 17Ω 1200W                 |
|             |                           | 4             | 5.7                             |                                | 3parallel RB3            | —                     | 17Ω 1200W                                     |                           |
|             | 100%                      | 0.1           | Built-in                        | 100                            | 180                      | SRB200-1              | 10  | 180Ω 200W                 |
|             |                           | 0.2           |                                 | 100                            | 180                      | SRB200-1              | 10  | 180Ω 200W                 |
|             |                           | 0.4           |                                 | 100                            | 180                      | SRB200-1              | 10  | 180Ω 200W                 |
|             |                           | 0.75          |                                 | 50                             | 180                      | SRB200-1              | 10  | 180Ω 200W                 |
|             |                           | 1.5           |                                 | 50                             | 100                      | SRB200-2              | 7.5   | 100Ω 200W                 |
|             |                           |               |                                 | 50                             | 50                       | RB1                   | 10  | 50Ω 400W                  |
|             |                           | 2.2           |                                 | 35                             | 50                       | SRB300-1              | 7.5   | 50Ω 300W                  |
|             |                           |               |                                 | 35                             | 50                       | RB1                   | 10  | 50Ω 400W                  |
|             |                           | 3.7           |                                 | 35                             | 35                       | SRB400-1              | 7.5   | 35Ω 400W                  |
|             |                           |               |                                 | 35                             | 35                       | RB2                   | 10  | 35Ω 600W                  |
| 20          |                           |               |                                 | 25                             | 2parallel RB1            | 10                    | 35Ω 400W                                      |                           |
| 5.5         |                           | 17            |                                 | 17                             | RB3                      | 10                    | 17Ω 1200W                                     |                           |
|             | 7.5                       | 17            | 17                              | RB3                            | 10                       | 17Ω 1200W             |   |                           |
|             |                           | 11 *1         | 17                              | RB3                            | 10                       | 17Ω 1200W             |   |                           |
| 15 *2       | 10                        | 11.7          | 3parallel RB2                   | 10                             | 35Ω 600W                 |                       |   |                           |
|             | 400V                      | 150%          | Built-in                        | 180                            | 360                      | 2direct SRB200-1      | 10  | 180Ω 200W                 |
| 180         |                           |               |                                 | 360                            | 2direct SRB200-1         | 10                    | 180Ω 200W                                     |                           |
| 180         |                           |               |                                 | 360                            | 2direct SRB200-1         | 10                    | 180Ω 200W                                     |                           |
| 100         |                           |               |                                 | 100                            | 2direct SRB300-1         | 7.5                   | 50Ω 300W                                      |                           |
| 100         |                           |               |                                 | 100                            | 2direct RB1              | 10                    | 50Ω 400W                                      |                           |
| 100         |                           |               |                                 | 100                            | 2direct SRB300-1         | 7.5                   | 50Ω 300W                                      |                           |
| 100         |                           |               |                                 | 100                            | 2direct RB1              | 10                    | 50Ω 400W                                      |                           |
| 70          |                           |               |                                 | 70                             | 2direct RB2              | 10                    | 35Ω 600W                                      |                           |
| BRD-EZ3     |                           |               |                                 | 34                             | 50                       | 2direct 2parallel RB1 | —   | 50Ω 400W                  |
|             |                           |               |                                 | 34                             | 35                       | 2direct 2parallel RB2 | —   | 35Ω 600W                  |
|             |                           |               |                                 | 15                             | 25                       | 2direct 4parallel RB1 | —   | 50Ω 400W                  |
| 100%        |                           |               |                                 | Built-in                       | 0.4                      | 180                   | 360   | 2direct SRB200-1          |
|             | 0.75                      | 180           | 360                             |                                | 2direct SRB200-1         | 10                    | 180Ω 200W                                     |                           |
|             | 1.5                       | 180           | 360                             |                                | 2direct SRB200-1         | 10                    | 180Ω 200W                                     |                           |
|             | 2.2                       | 100           | 100                             |                                | 2direct SRB300-1         | 7.5                   | 50Ω 300W                                      |                           |
|             |                           | 100           | 100                             |                                | 2direct RB1              | 10                    | 50Ω 400W                                      |                           |
|             | 3.7                       | 100           | 100                             |                                | 2direct SRB300-1         | 7.5                   | 50Ω 300W                                      |                           |
|             |                           | 100           | 100                             |                                | 2direct RB1              | 10                    | 50Ω 400W                                      |                           |
|             | 5.5                       | 70            | 100                             |                                | 2direct RB1              | 10                    | 50Ω 400W                                      |                           |
|             |                           | 70            | 100                             |                                | 2direct RB1              | 10                    | 50Ω 400W                                      |                           |
|             | 7.5                       | 70            | 70                              |                                | 2direct RB2              | 10                    | 35Ω 600W                                      |                           |
|             |                           | 11 *3         | 70                              |                                | 70                       | 2direct RB2           | 10  | 35Ω 600W                  |
|             |                           |               | 35                              |                                | 35                       | 2direct 2parallel RB2 | 10  | 35Ω 600W                  |

\*1: Braking torque is set as 76%.

\*2: Braking torque is set as 80%.

\*3: Braking torque is set as 74%.

\*4: Above examples are based on rotating condition with Hitachi three phase induction motors (4poles) under frequency condition of 60Hz.

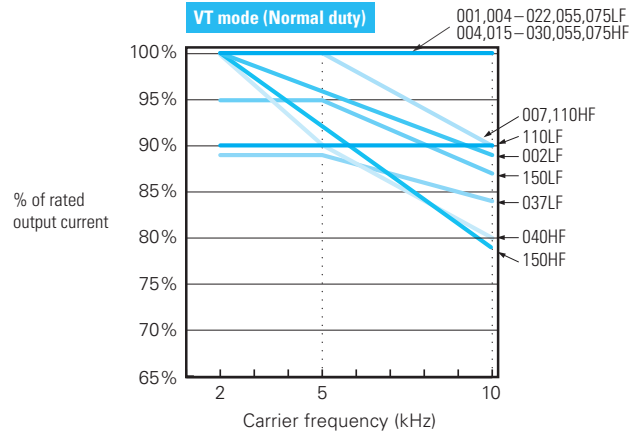
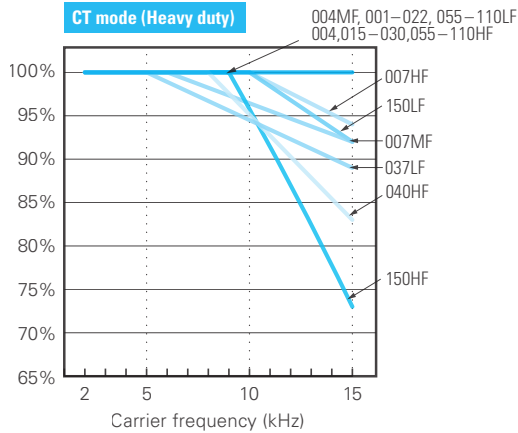
%ED = T1/T0 T1: Breaking time, T0: Repeating time.

\*5: The above table is a selection example for the case of heavy duty (CT) model.

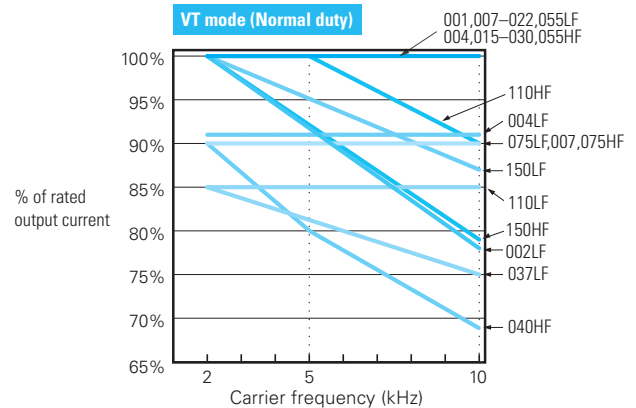
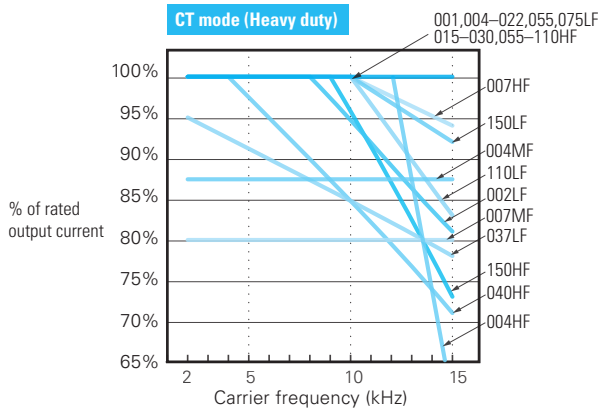
# De-rating Curves

The maximum available inverter current output is limited by the carrier frequency and ambient temperature as shown below. Choosing a higher carrier frequency tends to decrease audible noise, but it also increases the internal heating of the inverter, thus decreasing the maximum current output capability. WJ200 Series may be mounted side-by-side with other inverter(s). It is necessary to De-rating also in this case.

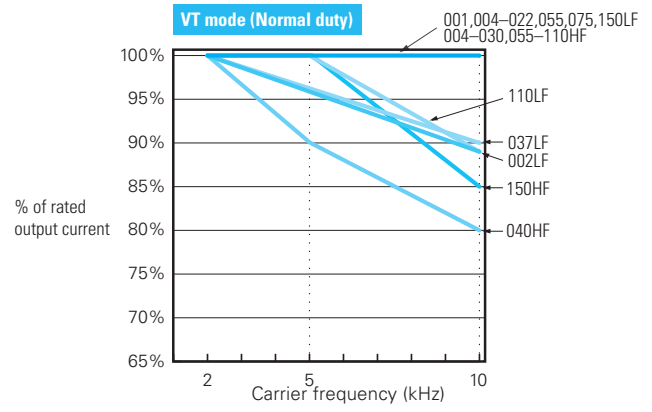
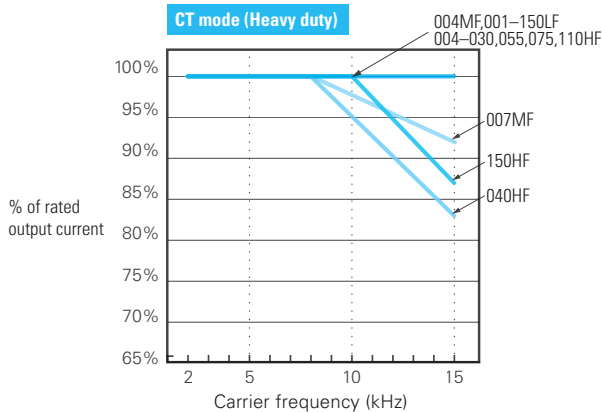
## Side-by-side mounting, ambient temperature 40°C max.



## Ambient temperature 50°C max.



## Ambient temperature 40°C max.





# For Correct Operation

## 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 losses may occur, make sure to provide safety devices to avoid a serious 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.

## Application to Motors

### [Application to general-purpose motors]

|                                     |   |
|-------------------------------------|---|
| Operating frequency                 | The overspeed endurance of a general-purpose motor is 120% of the rated speed for 2 minutes (JIS C4,004). For operation at higher than 60Hz, it is required to examine the allowable torque of the motor, useful life of bearings, noise, vibration, etc. In this case, 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 (starting torque decreases in particular). Carefully check the load torque characteristic of a connected machine and the driving torque characteristic of the motor.  |
| Motor loss and temperature increase | An inverter-driven general-purpose motor heats up quickly at lower speeds. Consequently, the continuous torque level (output) will decrease at lower motor speeds. Carefully check the torque characteristics vs speed range requirements.  |
| Noise                               | When run by an inverter, a general-purpose motor generates noise 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 including a connected machine, or (b) resonance caused by the natural vibration frequency of a mechanical system. Particularly, be careful of (b) when operating at variable speeds a machine previously fitted with a constant speed motor. Vibration can be minimized by (1) avoiding resonance points using the frequency jump function of the inverter, (2) using a tire-shaped coupling, or (3) placing a 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 (gear motor) or reducer. Check with the motor manufacturer for the permissible range of continuous speed. To operate at more than 60 Hz, 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. (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 different rated current values. In motor selection, check the maximum allowable current for each motor of a different pole count. At 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 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 pressure-proof explosion-proof type of motor. *Explosion-proof verification is not available for WJ200 Series.  |
| Synchronous (MS) motor<br>High-speed (HFM) motor | In most cases, the synchronous (MS) motor and the high-speed (HFM) motor are designed and manufactured to meet the specifications suitable for a connected machine. As to proper inverter selection, consult the manufacturer.   |
| Single-phase motor                               | A single-phase motor is not suitable for variable-speed operation by an inverter drive. Therefore, use a three-phase motor.  |

### [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 400V-class motor is used, a longer cable is used, and critical loss can occur, take the following countermeasures: (1) install the LCR filter between the inverter and the motor, (2) install the AC 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 terminals. Do not operate by installing an electromagnetic contactor (Mg) 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 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 WJ200 Series. However, a two-pole motor can attain up to approx. 24,000 rpm, which is extremely dangerous. Therefore, carefully make selection and settings by checking the mechanical strength of the motor and connected machines. Consult the motor manufacturer when it is necessary to drive a standard (general-purpose) motor above 60 Hz. A full line of high-speed motors is available from Hitachi. |

### [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 -10 to 50°C. (Carrier frequency and output current must be reduced in the range of 40 to 50°C.)

### [About the load of frequent repetition use]

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

## [About the use in highlands beyond 1,000m above sea level]

When the standard inverter is used at a place beyond 1,000m above sea level because it cool heating element with air, please be careful as follows, But please inquire for the highlands more than 2,500m separately.

### 1. Reduction of the inverter rating current

The density of air decreases by 1% whenever rising by 100m when the altitude exceeds 1,000m. For example, in the case of 2,000m above sea level, it is {2,000(m)- because it becomes 1,000(m)}/100(m)X{-1(%)}=-10(%), please use with 10(%) reduction (0.9 inverter rating electric current) of a rating current of the inverter.

### 2. Reduction of the breakdown voltage

When using inverter at a place beyond 1,000m, the breakdown voltage decreases as follows.

1,000m or less: 1.00 / 1,500m: 0.95 / 2,000m: 0.90 / 2,500m: 0.85

But please do not perform the withstand pressure test as mention of the instruction manual.

## [Main power supply]

|   |   |
|---|---|
| <p><b>Installation of an AC reactor on the input side</b></p> | <p>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.</p> <p>(A) The unbalance factor of the power supply is 3% or higher. (Note)<br/>                 (B) The power supply capacity is at least 10 times greater than the inverter capacity (the power supply capacity is 500 kVA or more).<br/>                 (C) Abrupt power supply changes are expected.</p> <p>Examples: (1) Several inverters are interconnected with a short bus.<br/>                 (2) A thyristor converter and an inverter are interconnected with a short bus.<br/>                 (3) An installed phase advance capacitor opens and closes.</p> <p>In cases (A), (B) and (C), it is recommended to install an AC reactor on the main power supply side.</p> <p>Note: Example calculation with <math>V_{RS} = 205V</math>, <math>V_{ST} = 201V</math>, <math>V_{TR} = 200V</math> (<math>V_{RS}</math> : R-S line voltage, <math>V_{ST}</math> : S-T line voltage, <math>V_{TR}</math> : T-R line voltage)</p> <p>Unbalance factor of voltage = <math display="block">\frac{\text{Max. line voltage (min.)} - \text{Mean line voltage}}{\text{Mean line voltage}} \times 100</math></p> $= \frac{V_{RS} - (V_{RS} + V_{ST} + V_{TR})/3}{(V_{RS} + V_{ST} + V_{TR})/3} \times 100 = \frac{205 - 202}{202} \times 100 = 1.5 (\%)$ |
| <p><b>Using a private power generator</b></p>                 | <p>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.</p>   |

## Notes on Peripheral Equipment Selection

|   |   |
|---|---|
| <p><b>Wiring connections</b></p>                | <p>(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 (⊕).</p>   |
| <p><b>Wiring between inverter and motor</b></p> | <p><b>Electro-magnetic contactor</b></p> <p>When an electromagnetic contactor is installed between the inverter and the motor, do not perform on-off switching during running operation.</p> <p><b>Thermal relay</b></p> <p>When used with standard applicable output motors (standard three-phase squirrel-cage four-pole motors), the WJ200 Series does not need a thermal relay for motor protection due to the internal electronic protective circuit. A thermal relay, however, should be used:</p> <ul style="list-style-type: none"> <li>during continuous running outside a range of 30 to 60 Hz.</li> <li>for motors exceeding the range of electronic thermal adjustment (rated current).</li> <li>when several motors are driven by the same inverter; install a thermal relay for each motor.</li> <li>The RC value of the thermal relay should be more than 1.1 times the rated current of the motor. Where 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.</li> </ul> |
| <p><b>Installing a circuit breaker</b></p>      | <p>Install a circuit breaker on the main power input side to protect inverter wiring and ensure personal safety. Choose an inverter-compatible circuit breaker. The conventional type may malfunction due to harmonics from the inverter. For more information, consult the circuit breaker manufacturer.</p>   |
| <p><b>Wiring distance</b></p>                   | <p>The wiring distance between the inverter and the remote operator panel should be 20 meters or less. Shielded cable should be used on the wiring. Beware of voltage drops on main circuit wires. (A large voltage drop reduces torque.)</p>   |
| <p><b>Earth leakage relay</b></p>               | <p>If the earth leakage relay (or earth leakage breaker) is used, it should have a sensitivity level of 15 mA or more (per inverter).</p>   |
| <p><b>Phase advance capacitor</b></p>           | <p>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.</p>  |

## High-frequency Noise and Leakage Current

- 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.
- 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. (10 years is not the guaranteed lifespan but rather, the expected design lifeplan.) 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.

JEMA standard is the 5 years at ambient temperature 40°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 be performed by only specified trained personnel. Please plan to replace new INV depends on the load, ambient condition in advance.

