TOYODENKI C E



INSTRUCTION MANUAL

Preface

We thank you very much for your adoption of our Inverter.

This Manual was prepared for customers to understand correct installation, wiring method, operation method, etc. at the time of use of TOYO VF64 Intelligent Inverter.

For proper handling of the equipment, please read this Manual carefully before operation.

TOYO VF64 Intelligent Inverter has many characteristic functions in addition to the standard ones. Complying with many application, the most suitable system can be structured using kinds of functions.

In such case, please prefer the values written in the relevant instruction manual and test report, to the values shown in this Manual.



Please read surely the following precautions.

Safety precautions

Be sure to read carefully and thoroughly this Manual with other attached documents before installation, operation, maintenance and inspection of the Inverter so as to use it correctly. Please use the Inverter after the acquirement of all of knowledge on the equipment, safety information and the matters to be attended. In this Manual, the rank of safety precautions are classified into DANGER and CAUTION.



: Misoperation could result in dangerous situation and in death or heavy injury.



: Misoperation could result in dangerous situation and in medium/minor injuries, and in damage to the materials only but there is a possibility that misoperation may cause serious result depending on the condition.

As all cautions include important contents, be sure to follow them thoroughly.

| | CAUTION [as to installation] |
|---|---|
| • | Mount the Inverter on the noninflammable material such as metal, etc. There is a fear of fire. |
| • | Don't put the inflammable material near to the Inverter. There is a fear of fire. |
| • | Don't take front cover at the time of carrying. There is a fear of injury by dropping. |
| • | Install the Inverter at endurable place against weight. There is a fear of injury by dropping. |
| • | Don't install and operate damaged Inverter, or Inverter of which parts are omitted. There is a fear of injury. |

| | DANGER [as to wiring] | | | |
|---|---|--|--|--|
| • | Make wiring after confirmation of OFF of input power source. | | | |
| | There is a fear of electric shock and fire. | | | |
| • | Connect earth wire surely. | | | |
| | There is a fear of electric shock and fire. | | | |
| • | Wiring work should be done by persons specialized in electric engineering work. | | | |
| | There is a fear of electric shock and fire. | | | |
| • | Make wiring surely after installation of main body. | | | |





- Never connect AC power source to output terminals (U, V, W). There is a fear of injury and fire.
- Confirm the coincidence of rated voltage of the product and voltage of AC power source. There is a fear of injury and fire.
- Never connect resistor directly to between ⊕ 1~⊙and ⊕ 2~⊙ or ⊕ 1~⊕ 2 of DC terminals. There is a fear of fire.

DANGER [as to operation] Surely after fitting the front cover, turn ON input power source. Also, don't remove the cover during power supply. There is a fear of electric shock. Don't operate the switch by wet hand. There is a fear of electric shock. Don't touch Inverter terminals even if Inverter is stopped, during power supply to Inverter. There is a fear of electric shock. As stop button is effective for the signal only which designated operation point, please prepare emergency stop switch separately. There is a fear of injury. If alarm is reset keeping the input of operation signal, Inverter restart suddenly and therefore, reset the alarm after confirming of no operation signal.

There is a fear of injury.



- Don't touch radiation fin and radiation resistor since they become hot much. There is a fear of burn.
- Since operation of Inverter can be set from low speed until high speed, operate Inverter confirming enough the permissible range of motor and machine.
 There is a fear of injury.
- In case of need of hold-brake, please prepare it separately.
 - There is a fear of injury.

 $\langle ! \rangle$ DANGER [as to maintenance/inspection, exchange of parts]

- Make inspection after passing of 10 minutes or more from turning off of input power source. Also, check DC voltage between ⊕ 1~⊙ or ⊕ 2~⊙ and confirm that it is less than 30V.
 There is a fear of electric shock, injury and fire.
- Confirm the coincidence of rated voltage of product and voltage of AC power source. There is a fear of electric shock.
- Maintenance/inspection and exchange of parts should be done by designated persons only. Use insulated tools at the time of maintenance/inspection. There is a fear of electric shock and injury.

| | DANGER [others] | |
|---|---|--|
| • | Never remodel the Inverter. | |
| | There is a fear of electric shock and injury. | |

General Cautions

Since there are cases that illustrations in this Manual are shown in the state of removing the safety cover or shield for the purpose of explanation of the details, please restore such safety materials to the state as before and operate in accordance with the Manual, at the time of operation of product.

Safety precautions and specifications written in the Manual are subject to change for improvement without notification in advance, for which please understand.

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Chapter 1 Guides before use

1. Handling method

1-1. Acceptance inspection

Upon receipt of the product, please confirm the following points.

(1) Whether specifications and accessories, spare parts, options are properly in accordance with your order. Please check the type of Inverter unit by Series Mark on the surface of cover.

Surface of cover Indication example of the type



- (2) Whether any damages during transportation are found in the received Inverter.
- (3) Whether looseness or drop out of screw is found.If any problem is found, please contact us or our distributor.



 $\underline{/}$ SAFETY PRECAUTIONS

Please read [Instruction Manual] carefully before use and operate Inverter correctly.

Our Inverter is not designed and manufactured for use in any equipment or system that is applied in an environment affecting human life. If you intend to use the product for specific applications such as passenger mobile, medical, aerospace, nuclear control or submarine relay equipment or system, please contact us. Our product is manufactured under strict quality control however, a safety device or system must be used with the product when applied to any facility in which failure of the Inverter to perform can be reasonably expected to cause a problem critical to human life or its loss. When using the Inverter with any load other than 3-phase AC motor, please contact us.

This product requires electrical work, which must be done by specialists.

1-2. Opening of front cover

In case of operation of DIP Switch SW1 on P.C.Board by maintenance inspection and auto-tuning, open front cover by the following order.

- 1-2-1. In case of VF64 of 7.5kW or less using resin panel and cover.
 - (1) Remove the fixing screws at the lower part of front cover.
 - (2) When the lower part of front cover is pulled to this side, cover opens to about 90 degrees.
 - (3) When front cover is pushed to the inside in the state of fully opened, cover can be fixed.
- 1-2-2. In case of VF64 of 11kW or over using metallic panel and cover.
 - (1) Remove the fixing screws at the lower part of front cover.

(2) When front cover is opened to about 45 degrees, remove the insertion at the hitching of upper part of cover. Then, front cover can be removed.

CAUTION [as to drive operation] In case of opening of cover just after operation, please wait until going off of [CHG] lamp on main circuit printed board. Housing of VF64 of 7.5kW or less is resin panel. Pay attention since giving an excessive force could result in breakage.

1-3. Name of each part (example of VF64 of 7.5kW or less)



CAUTIONS at the exchange of parts
Don't disassemble immoderately.
After reassembage, confirm that each units were correctly assembled.
If assembly is not correct, there is a fear of fire.
Specially if flat cable was not correctly inserted, control circuit may not work normally, for which please pay attention.
As to tightening of screws, please do it surely.

1-4. Installation place of the unit

- Conditions of installation place affect much the service life and reliability of the Inverter unit. Avoiding the places shown below, please use Inverter in the operating conditions written in the catalog.
- (1). Moist or dusty place. Place exposed to water or oil drips. Uses of Inverter at such places make circuit insulation deteriorate and service life of parts shorten.
- (2). If service temperature is too high, life of condenser and fan motor is shortened.
- (3). When Inverter is used at the place exposed to corrosive gas, mal-contact of connectors, disconnection of wires, breakage of parts will occur.
- (4). When Inverter is used at the vibrative place, mal-contact of connectors, disconnection of wires, breakage of parts will occur.
- (5). In case that Inverter is used at the place of ambient temperature of less than 0 °C, warm it by heater, etc. up to 0 °C or more at starting. If it is warmed to 0 °C or more after starting by its own generation of heat, there is no problem.

CAUTION [as to installation]

- Install the Inverter on the noninflammable material such as metal, etc. There is a fear of fire.
- Don't put the inflammable material near to the Inverter. There is a fear of fire.
- Don't take front cover of the Inverter at the time of carrying. There is a fear of injury by dropping.
- Install the Inverter at an endurable place against weight. There is a fear of injury by dropping.
- Don't install and operate damaged Inverter, or Inverter of which parts are omitted. There is a fear of injury.

1-5. Installation method of the unit

In case of use of VF64 Inverter installing in the control panel, etc., install it as stated below.

(1) Installation direction

Install VF64 Inverter vertically with the series mark VF64 set at the upper side. If it is installed laterally, ventilation is prevented and there may be a case of rising of temperature. Route of suction/exhaust must be considered enough. Cooling fan in the unit sucks air from the lower side and exhaust it to the upper side.

Please provide enough space so that ventilation is not prevented by wiring duct, etc.

(2) In case of installation of Inverter placing its fin-part at the rear outside of control panel

VF64-3744, 3722 or less can be installed placing their fin-part at the rear outside of control panel.

VF64-4544, 4522 or over also can be installed as stated above but air of inside and outside cannot be insulated enough.

As to heat generation amount of other than fin part, please consult with us.

(3) Ventilation

Example of energy loss of Inverter.

Energy loss of VF64 Inverter is 2.5~5% of the capacity of motor load.

EXAMPLE $3.7kW \times 5\% = 185W$ In case that motor load is 3.7kW, loss is 185W.

Percentage of energy loss to Inverter capacity is as shown below.

2.2~37kW : 5% 45~55kW : 4%

75~90kW : 3% 110~315kW : 2.5%

Exhaust amount of heat generated from VF64 Inverter in case of forced exhaust to the outside of panel by cooling fan fitted to control panel can be calculated by equation shown below.

- $Q = q / \{\rho.C.(To-TA)\}$
- Whereas, Q : Exhaust amount (m³/s)
- q : Generated heat amount of VF64 (kW)
- ρ : Density (1.057~1.251kg/m³)
- C : Specific heat $(1.0kj/kg \cdot C)$ TA : Control panel suction hole temperature (C)

To : Exhaust fan outlet temperature (°C) TA : Control panel suction hole temperature (°C) In case that ambient temperature of control panel is 40°C, it is necessary to make exhaust temperature to less than 50°C. Since temperature difference between suction and exhaust is 10°C, exhaust capacity of about 0.1m³/s is needed in order to exhaust the loss of 1kW.

(4) To secure cooling space

As to installation of VF64 Inverter main body and DCL (DC Reactor), secure the cooling space making the figures below as criterion (The figures are example of VF64 of less than 7.5kW. Secure double of space for VF64 of more than 11kW).

Also, if peripheral devices generate heat, install them making no influence to the cooling of the unit.

In case that VF64 Inverter is installed in the control panel, ventilate to make the temperature in panel to less than 50 C (If ambient temperature is high, reliability falls).



(5) Matters to be attended

- •As DC Reactor (DCL) becomes hot (there is a case to exceed 100 $^{\circ}$ C), secure enough space between DCL and other devices.
- •Exhaust generated heat of Inverter and DCL to the outside of panel surely. Also, arrange not to circulate the exhaust air of Inverter in panel.
- ·In case of use of dynamic brake unit, install brake resistor at outside of panel to the utmost.
- ·Avoid use of Inverter unit at the place of extremely bad environment.

1–6. Cautions on wiring

- (1) Input the specified voltage to the input terminal of Inverter.
 - If 400V is inputted to the Inverter of 200V class, Inverter is broken.
- (2) Since Inverter is operated by high frequency using IGBT as its element, it generates noise much.

Pay attention on the following points at wiring work.

Make wiring of main circuit wires and control signal line separately. In case of parallel wiring, apart them more than 30cm each other. In case of crossing, cross them at right angles.



- (3) In order to prevent entering of noise, use shield wire or twisted wire for control signal line.
- (4) In case that frequency (speed) is set at outside of control panel, lay signal line containing in the conduit pipes or metallic pipes.
- (5) When wiring length between Inverter and motor is over 10m in case of 400V class Inverter, surge may be added to input voltage of motor by inductance of wiring. In case of use of existing motor of poor insulation reinforcement, there is a possibility of breakage of motor caused by deterioration of insulation. At the time of such application, please consult with us.
- (6) As to wire size of main circuit wiring, see [Input/Output devices and wiring] of Chapter 4, item 2.
- (7) In case that shield wire is used for output wiring or wiring length is over 300m and when VF64 Inverter is operated by its DC excitation function, there may be a case that Inverter is broken or it does not work normally caused by leakage capacitance to earth of output wiring of Inverter and resonance phenomenon of input power source inductance. In such case please contact us.

(If wiring length is over 100m when Inverter is operated by its DC excitation function using DCL of option in the capacity of $1.1 \sim 3.7$ kW, please contact us)

As to earth leakage circuit breaker

IGBT is used for main circuit element of VF64 Inverter. Since leak current increases caused by high carrier frequency, use earth leakage circuit breaker of exclusive use for Inverter.

2. Circuit composition



- (Note 1) Control input terminals (ST-F RESET) and multifunction input terminals (MI1 MI6) can also be arranged to GND common input (sink input). In this case, remove jumper pin on VFC2001 P.C.Board from [CN SO] and fit to [CN SI]. (Standard factory default setting is PS common input (source input).)
- (Note 2) PG is used VF64V(vector control with speed sensor) mode only.
- (Note 3) Never connect GND, COM terminal of control circuit with earth.
- (Note 4) AC power source terminal (MR,MT) for control circuit is equipped in the Inverter of 1122, 1144 or over. (It is unnecessary to connect with power source ordinary. It is connected only when control circuit power source is required to turn on, such as execution of protection display)
- (Note 5) Terminals ⊕ 1 and ⊕ 2 of Inverters of less than 1122 in 200V class and 1544 in 400V class are shorted. (in case of without DCL)
- (Note 6) When thermal relay of dynamic resistor (DBR) tripped, break Inverter input.
- (Note 7) Mount main circuit connector (52M) in accordance with use condition of customer.
- (Note 8) Please wait from turning off to the re-turning on for ten minutes or more when you set up the main circuit contactor(52M) on the input side of the inverter.

3. Terminal specification

| Kind | Terminal number | Application | Explanation of content | |
|--------------------|-----------------|---|--|--|
| | R·S·T | AC input | Connect with AC power source | |
| | U•V•W | Inverter output | Connect with 3-phase motor | |
| | ⊕1 | For connection of DCL +side | Short between $\oplus1{\sim}\oplus2$ in case of no use of DCL in Types of less than VF64-1122 and VF64-1544 | |
| Main circuit | ⊕2 | For connection of DCL -side and of dynamic brake resistor (thermal relay) or for +side input when sine wave converter is used. | Terminal for connection of dynamic brake resistor (thermal relay) ⊕side terminal of DC power source when sine wave converter is used | |
| | В | For connection of dynamic brake resistor (thermal relay) | Terminal of Types of less than VF64-1122 and VF64-1544. Collector terminal of built-in transistor for dynamic brake | |
| | Θ | For connectioin of dynamic brake unit or for +side input when sine wave converter is used. | Terminal to connect with N terminal of dynamic brake unit (DB-UNIT) Oside terminal of DC power source when sine wave converter is used | |
| | ÷ | Earth | Surely connect with earth. Connect with earth terminal of NF when noise filter(NF)is used | |
| Control circuit | MR∙MT | Control circuit power source input (AC input) | Equipped with Types of VF64-1122,VF64-1144(Inverter can be operated without connection of this circuit. It is used in case of execution of protection display, etc. in status of close of main circuit input) | |
| | PS | Power source (+15V side) for external signal | | |
| VFC 2001 | ST-F | Forward run signal | | |
| lerminal | ST-R | Reverse run signal | | |
| TB2 | JOG-F | Jog forward run signal | To be used as terminal for input (input current 3mA) of Inverter operation | |
| | JOG-R | Jog reverse run signal | signal or as input signal terminal for sequence function | |
| | EMG | Emergency stop(output is OFF by[close]) | | |
| | RESET | Reset | | |
| | GND | Power source for external signal (0V side) | | |
| | P12 | Power source for PG(+12V side) | Connect with speed sensor PG | |
| | GND | Power source for PG (0V side) | Recommendable cable: Twist pair shield wire | |
| | PGA | A-phase signal of PG | 00-3FLV(0.3Sp~3F) | |
| | PGB | B-phase signal of PG | | |
| | Z/U | U-phase signal of PG(No use) | No use(de not connect with this terminal) | |
| | V | V-phase signal of PG(No use) | | |
| | W | W-phase signal of PG(No use) | | |
| VFC 2001 | 1-2 | Contact output during running of Inverter | Output during running of Inverter (52MA contact 1A, AC230V 0.5A) | |
| block TB1 | 3、4、5 | Contact output of protective operation of Inverter | Output of protective operation of Inverter (86A contact, 1C, AC230V 0.5A) [Close] between 4-3 and [Open] between 4-5 by protective operation | |
| | 1 | Power source (+10V) for speed setting | Use dial of $10k\Omega$ for speed command | |
| VFC64TB | 0-10 | Speed command voltage input | Input impedance 150kΩ | |
| block | GND | Power source (0V) for speed setting | Never connect with earth | |
| TB1 | 4-20 | 4-20mA speed command input | Input resistance 250Ω | |
| | PS | Multifunction input terminal (+15V) | Max. output current (18mA) | |
| | GND | Multifunction input terminal (0V) | Never connect with earth | |
| | MI1 MI2 | - | | |
| | MI3 | For input signal of multifunction input | Max, input voltage DC24V | |
| | MI4 | and sequence function | Input current 3mA | |
| | MI5 | | | |
| | MI6 | | | |
| | Р | | | |
| VFC64TB | MO1 | | P terminal is connected with external power source(DC) | |
| Terminal | MO2 | For output signal of multifunction output | MO1 \sim MO4 terminals are of open collector output. | |
| TB2 | MO3 | and sequence function | iviax. voitage DC24V / Max. current 20mA | |
| | MO4 | | (Recommendable relay for multifunction output : OMRON G7T-112S-DC24V) | |
| | COM | | · · · · · · · · · · · · · · · · · · · | |
| | F | For output frequency meter or speed meter (Measure by DC voltmeter or digital counter) | Output wave form \rightarrow 1ms 10V \downarrow 1/(6·f) F is frequency conversion value of rotation speed. DC voltage is DC3.6V/60Hz(at TopF \leq 120Hz) At PG output selection:1/2 or 1/4 pulse output. Output current is Max 5mA (See Chapter 3, setting item G-09) | |
| | А | Analog output voltage | Output voltage $0 \sim \pm 10V$, Output current Max. 1mA | |
| | GND | For 0V terminal of terminals F, A | Never connect 0V terminal of above F, A terminals with earth | |

Chapter 2 For operation of VF64

1. Confirmation before operation

1 - 1. As to control mode

VF64 has following 3 kinds of control mode. Conforming to the application, select and use the most suitable control mode. Control mode of our factory set is [VF64] of V/f control mode.

- In case of speed sensorless vector control mode
- : [VF64S] is displayed
- In case of vector control mode with speed sensor In case of V/f control mode
- : [VF64V] is displayed
 - : [VF64] is displayed

1-2. As to auto-tuning

VF64S mode and VF64V mode are to be operated after execution of auto-tuning. VF64 mode can be operated without execution of auto-tuning however, if auto-tuning including wiring length between Inverter and motor is executed, Inverter can deliver its performance fully.

1-3. As to replacement of control P.C.Board VFC64 with spare

In order to adapt VFC64 to the Inverter of present use, it is necessary to set Inverter capacity, control mode, auto-tuning data and adjustment of analog value of DC voltage of intermediate part, etc.



2. As to DIP Switch on the control P.C.Board (VFC64)

2-1. Function of DIP Switch SW1

- (1) It is necessary to operate DIP Switch SW1 at the times of changeover of control mode and execution of auto-tuning.(2) Functions of DIP Switch SW1 are as per table below.
 - Table of functions of DIP Switch SW1

| DIP Switch | When SW1 is set at ON | When SW1 is set at OFF |
|---------------|---|---|
| SW1-1 | Inhibition of data writing | Possible to write the data |
| SW1-2 | Clear the protection history, 1 point trace back data, trace back data | Setting at the time of ordinary operation |
| SW1-3 | Possible to rewrite setting data from communication option | Not possible to rewrite setting data from communication option |
| SW1-4 | Possible to change Inverter control mode | Setting at the time of ordinary operation |
| SW1-5 | If both SW1-5 and SW1-6 are set at ON, execution of DC mode auto-tuning is possible in any control modes(VF64S, VF64V, VF64) | Setting at the time of ordinary operation |
| SW1-6 | Ordinary, set SW1-6 only at ON and execute. In case of VF64S, VF64V modes: Possible to execute full mode auto-tuning. In case of VF64 mode: Possible to execute DC mode auto-tuning. | Setting at the time of ordinary operation |
| SW1-7 | Initializing of set data | Setting at the time of ordinary operation |
| SW1-8 | Transfer to monitor mode for our adjustment (Don't turn to ON ordinary) | Setting at the time of ordinary operation |

In case that control mode was changed from VF64 mode to VF64S or VF64V mode, it is necessary to execute full mode auto-tuning.

2-2. Mounting position of DIP Switch SW1

SW1 is mounted on control P.C.Board VFC64 of standard console (SET64), which is placed under front cover of VF64 Inverter.



3. Function of console panel (SET64)

Using console panel (SET64) of standard equipment, function of VF64 Inverter can be utilized effectively. SET64 consists of LED display window (with 4 kinds of unit indication LED) of 7 segments 5 digits and 6 kindsof LED to indicate the selected status and 8 kinds of key switch for making kinds of operation. in addition to selection of kinds of function and indication/setting of data and monitor diaplay of output voltage/current, etc. during operation, SET64 displays content at the time of protective operation and protection history. Also, run/stop operation as well as changeover of control system and auto-tuning are performed using console panel.

Front surface of panel



LED display window : 7 segments 5 digits display

Display of letter and numerical value.

Display of function symbol (No.)/selection of function • setting data/ protective operation/ protection history, etc.

•Unit display (LED display)

Status display (LED display)

FNC:LED is on when FUNCTION mode (function setting mode) is selected.

- DIR: LED is on when [START], [JOG] keys are selected in console panel operation.
- REV : LED is on when REV (reverse) is selected.
- MRH : LED is on when function of MRH is selected. (MRH function operates accel/decel during running by $\oplus\, \&$ keys or external contact.
- RUN: LED is on when Inverter is running. (LED blinks during decel stop, at initial excitation and during DC braking)
- JOG : LED is on when Inverter is jog-running. (LED of RUN is on simultaneously)

Operation keys

| Shifting of function from basic setting selection mode (No.0~9) to extended setting selection mode, and to return to basic setting selection mode. Monitoring of set data. | | By pressing of this key, setting item and setting data are increased by 1,In case of MRH mode, speed increases if this key is pressed. |
|---|---|---|
| Changing of kind of monitor. Monitoring of data at the time of protective operation. Changeover monitor operation mode and function | | By pressing of this key, setting item and setting data are decreased by 1, In case of MRH mode, speed decreases if this key is pressed. |
| mode. LED of [FNC] goes on in function mode. This is the mode to make VF64 function selection and parameter setting. LED of [FNC] goes off in monitor operation mode. This is the mode to monitor each data of VF64 and to make drive operation by console. | | When jog command place is selected in console and if this key is pressed in monitor operation mode, jog run starts (jog run stops if finger is detached). When figure to be set by function mode at display part is indicated, shift 1 digit of operating digit to the right by pressing this key. |
| : Select command of for. run / rev. run (FORWARD/REVERSE) of motor. (At the time of reverse run command,status display | | Press this key for starting of auto-tuning mode. |
| this LED does not go on.) | STOP | During drive by console [START] key, drive command is turned to off by this key. |
| In case that drive command place is selected in console operation and at the time of monitor operation mode, drive starts by pressing of this key. | RESET | When console makes protection display, protective operation is reset. |
| | Shifting of function from basic setting selection mode (No.0~9) to extended setting selection mode, and to return to basic setting selection mode. Monitoring of set data. Fixing of changed set data. Changing of kind of monitor. Monitoring of data at the time of protective operation. Changeover monitor operation mode and function mode. LED of [FNC] goes on in function mode. This is the mode to make VF64 function selection and parameter setting. LED of [FNC] goes off in monitor operation mode. This is the mode to make VF64 function selection and parameter setting. LED of [FNC] goes off in monitor operation mode. This is the mode to monitor each data of VF64 and to make drive operation by console. Select command of for. run / rev. run (FORWARD/REVERSE) of motor. (At the time of reverse run command, status display LED [REV] goes on and of forward run command, this LED does not go on.) In case that drive command place is selected in console operation and at the time of monitor operation mode, drive starts by pressing of this key. | Shifting of function from basic setting selection mode, (No.0~9) to extended setting selection mode, and to return to basic setting selection mode. Monitoring of set data. Fixing of changed set data. Changing of kind of monitor. Monitoring of data at the time of protective operation. Changeover monitor operation mode and function mode. LED of [FNC] goes on in function mode. This is the mode to make VF64 function selection and parameter setting. LED of [FNC] goes off in monitor operation mode. This is the mode to monitor each data of VF64 and to make drive operation by console. Select command of for. run / rev. run (FORWARD/REVERSE) of motor. In case that drive command place is selected in console operation and at the time of monitor operation mode, drive starts by pressing of this key. |

4. Changeover of Inverter control mode

4-1. Changeover operation of control mode

Operation method of changeover of control mode from VF64 to VF64S is as shown below.

In case of changeover to other control mode, select necessary control mode from the Table below.



At the time of changeover of control mode, it is necessary to operate DIP Switch SW1 of control P.C.Board of VFC64.

As it is dangerous, surely turn off the power when remove the front cover.

| Or/min OHz OA | | Content of operation | Display window | Operation of console key | DIP Switch of VFC64 P.C. Board |
|--|----|---|--|--------------------------|--------------------------------------|
| | 1 | Turn Inverter power source to OFF | | | |
| | 2 | Remove the cover | | | Set No.4 of |
| SET (MONU) FOR START | 3 | Close the cover and turn Inverter power | VF64 7r544 | | |
| | | source to ON | After display of [CHAnGE inVErtEr Control], | | |
| $\left \left(\bigcirc \right) \left(\bigcirc \left(\bigcirc \right) \left(\bigcirc \right) \left(\bigcirc \right) \left(\bigcirc \right) \left(\bigcirc \left(\bigcirc \right) \left(\bigcirc \right) \left(\bigcirc \left(\bigcirc \right) \left(\bigcirc \right) \left(\bigcirc \left(\bigcirc \left(\bigcirc \right) \left(\bigcirc \left($ | | of VF64 mode | SurE blinks | - | |
| | 4 | Display of control mode | VF 6 4 | Press [SET] key | |
| No.5 of the Table right | 5 | Selection of control mode | V F 6 4 S | Select by [↑][↓] keys | |
| Display when VF64S is selected by [↑][↓] keys | 6 | Decision of control mode | V F 6 4 S | Press [SET] key | |
| | 7 | Recognition of changeover | CHAnG | | |
| | 8 | End of changeover | End | After about 20sec | |
| | 9 | Turn Inverter power source to OFF | | | |
| | 10 | Remove the cover | | | Return No.4 of SW-1 to OFF |
| | 11 | Close the cover | | | |
| | 12 | Confirm display by turning of Inverter power source to ON | V F 6 4 S | | |

- (Note 1) When Inverter control mode is changed over, setting item of VF64 becomes initial value of each control mode. In case of operation by data of "before changeover", surely record the setting data and reset the data after changeover.
- (Note 2) In case of operation of VF64 Inverter by vector control mode (VF64S, VF64V), it is necessary to do auto-tuning once, using the motor to be connected. See Auto-tuning of next item.

5. As to auto-tuning

5-1. Method of auto-tuning by control mode

- (1) In case of operation by control modes VF64S and VF64V,connect the motor to be used and execute full mode auto-tuning.
- (2) In case of V/f control of control mode VF64, tuning data have been set by standard motor at our factory. Therefore, Inverter can be operated without DC mode auto- tuning however, performance of VF64 Inverter can be delivered enough more by execution of DC mode auto-tuning including wiring length between Inverter and motor.
- (3) In case that PWM carrier frequency is changed, please redo auto-tuning.

(4) Auto-tuning by control mode

Kind of auto-tuning method

| Content | Full mode auto-tuning | DC mode auto-tuning | | |
|--|--|---|--|--|
| Control mode to be applied | VF64S · VF64V | VF64 VF64S · VF64 | | |
| Application method | To be executed surely before operation. Execute auto-tuning including wiring length between Inverter and motor. | Initial values have been set conforming to each capacity however, execute auto-tuning by motor to be used and wiring route. (between Inverter and motor) | In case that data of A18~ A25 have been set, tuning can be executed without running of motor. (Data of A18~A25 do not vanish) | |
| Condition | Execute testing by motor alone. (disconnecting from loaded machine side) Increase the speed of motor up to about rated speed. Auto-tuning time ends within several minutes.(differs depending on capacity) | Tuning can be executed without disconnection of motor from loaded machine.(for prevention of danger, execute tuning in the state that loaded machine side is braked) Motor does not run. Auto-tuning time ends in about 2~3 minute. (differs depending on capacity) | | |
| Set rated value of motor to be used | Set the setting item of [common to VF64 | 4S, VF64V, VF64 modes] of th | ne item 5-2 stated below. | |
| DIP Switch of control P.C.Board VFC64 | SW1-6 ON | SW1-6 ON VF64 mode is changed over to DC mode auto-tuning automatically. | SW1-5, SW1-6: ON | |
| Automatic setting range of data | A11~A17~A25 | A11~ A17 | A11~ A17 | |
| In case that Inverter was | as Execute again surely. | | | |
| initialized | (Not necessary if setting copy is executed using SET64OP of option) | | | |
| In case that carrier frequency was changed | Execute again surely. | | | |

5-2. Setting items of motor rated values required for execution of auto-tuning

In case of execution of auto-tuning, it is not necessary to set the rated values (values shown in the motor rating plate) of motor to be connected with Inverter.

Execute after setting of under-mentioned setting items.

 \Rightarrow As to setting method of the setting items of the table below, see item 5-3.

Common to VF64S, VF64V, VF64 modes

| Display | Content of setting | Setting range | Unit | Remarks |
|---------|-----------------------|---|-------|------------------------------|
| A-00 | Max. speed | 300~14700 | r/min | VF64S,VF64V modes |
| | Max. frequency | 15.0~400.0 | Hz | VF64 mode |
| A-01 | Min. drive speed | 12~Max. speed | r/min | VF64S mode |
| | | 0~Max. speed | | VF64V mode |
| | Min. drive frequency | 0.0~10.0 | Hz | VF64 mode |
| A-02 | Motor rated capacity | VF64S, VF64V: | k W | VF64S,VF64V modes |
| | | Inverter capacity of 3 ranks lower | _ | |
| | | VF64: 0~Inverter rated capacity | | VF64 mode |
| A-03 | Motor rated voltage | 140~230V (200V class) | V | |
| | | 280~460V (400V class) | | |
| A-04 | Motor rated current | 40~150% of Inverter rated current | А | VF64S,VF64V modes |
| | | 0~150% of Inverter rated current | | VF64 mode |
| A-05 | Motor rated speed | 25~100% of Max. speed | r/min | |
| A-06 | No. of motor pole | 2,4,6,8,10,12 | Pole | |
| A-07 | Motor rated frequency | Frequency at the time of motor rated speed | Hz | |
| A-08 | Motor cooling fan | 0: self cooling type 1: forced cooling type | | VF64S mode only is effective |
| A-09 | No. of motor PG pulse | 60~3600 | P/R | VF64V mode only is effective |
| A-10 | PWM carrier frequency | 1.0~15.0 | kHz | |

5-3. Setting method of motor rated values

- (1) As to motor rated values, set the values written in the rating plate of motor.
- (2) See explanation of Chapter 3, Function Setting Items.

Chapter 3, item 1 is A area items of the table of speed sensorless control mode (VF64S) setting items. Chapter 3, item 2 is A area items of the table of control mode with speed sensor (VF64V) setting items. Chapter 3, item 3 is A area items of the table of V/f control mode (VF64) setting items.

(3) Explanation of the following operations is in case of VF64S mode.



No.6 of the Table right when [SET] key is pressed, 1800 of No.7 is displayed



No.8 of the Table right Transfer blinking to the 3rd digit by [JOG/→] key

| No | Content of operation | Display window | Indication | Operation of console key |
|-----|-----------------------------|------------------------|------------------|---|
| 1 | Turn on the power source | , | of status | |
| | of Inverter | | ENC doos | |
| 2 | | Monitor mode | off | |
| 3 | Selection of [Func] of | Display example of | FNC goes | Press [MONI,OPR] |
| | Dasic setting items | setting speed items | on | key |
| | setting items via [Func] | of basic setting items | (FNC mode) | |
| | | 0.SrEF | | |
| 4 | Selection of [Func] | Func | Same as | When [SET] is pressed |
| | | | above | after selection by $[\uparrow][\downarrow]$ |
| _ | | | Como oo | keys, Fund is displayed |
| 5 | Display of extended | Fund | Same as | Select A-00 by [T][↓] |
| 0 | setting area | . Athe digit blights | above | keys |
| 6 | Display of extended setting | | Same as | when [SET] key is |
| 7 | Items A area functions | | above Some co | pressed, 1800 is displayed |
| / | Display setting data of | | above | |
| 0 | max. speed AUU | 1 8 0 0 | | |
| 8 | when max. speed is | * | Same as | By [JOG/→] Key, transfer |
| | changed to 1500 | 1 8 0 0 | | Dilinking to 3rd digit |
| 9 | Change of setting data of | * | Same as | |
| 10 | max. speed AUU | 1 5 0 0 | | |
| 10 | Decision of max. | * | Same as | when [SET] key is |
| 11 | speed setting data | 1 5 0 0 | | pressed, A-UUIs displayed |
| | Display of max. | * | Same as | By [JOG/→] Key, transfer |
| 1.0 | Speed Setting items | A — 0 0 | above | |
| IZ | itama | * | Same as | Pressing [] key, change |
| | liems | A — 0 I | above | Ist digit to 1. when [SE1] |
| 10 | Diaplay of min_apood | -1- | Samo ac | key is pressed, 12 is displayed |
| 15 | (initial value 10) | * 1 0 | above | hinking by $[IOC/\rightarrow]$ kov |
| 1/ | (Initial Value 12) | Ι <u>Ζ</u> | Samo as | After 10 sec. of no |
| 14 | Use 12 of Initial value | * 1 0 | above | operation or when |
| | without change | ΙZ | 40070 | [SET] key is pressed, |
| 15 | Min speed setting | Ψ | Same as | A-01 IS displayed |
| 15 | items | ↑ | above | 1st digit by [IOG/] key |
| 16 | Change to motor rated | A — U I | Same as | Pressing [1] key change |
| 10 | capacity setting items | $\wedge - \circ 2$ | above | 1st digit to 2. When [SET] |
| | capacity setting items | A U Z | 40010 | key is pressed,_0.00 is |
| 17 | Display of motor rated | y 5th diait blinks | Same as | displayed |
| 17 | capacity initial value | | above | |
| 18 | Motor rated capacity | | Same as | Transfer blinking to the |
| 10 | motor rated capacity | 0 0 0 | above | 3rd digit by $[JOG/\rightarrow]$ kev |
| 19 | Setting example of motor | <u> </u> | Same as | 7 is set by [1] keys |
| | rated capacity 7 5kW | 7 0 0 | above | |
| 20 | Motor rated capacity | ,. 0 0 | Same as | Blinking transfers to 2nd |
| | inter rates oupdoily | 7. 0 0 | above | digit by [JOG/→1 kev |
| 21 | Motor rated capacity | * | Same as | Set at 5 by [1] 1 keys |
| | data sotting | 7 5 0 | above | When [SFT] kev is |
| | uala selling | ,. 0 0 | | pressed, A-02 is displayed |
| 22 | Decision of motor | * | Same as | |
| | rated canacity data | $\Delta - 02$ | above | |



5-4. Operation method of full mode auto-tuning

CAUTION /! Motor does not run, just after starting of auto-tuning, owing to auto-tuning of DC mode however, motor speed increases to near the rated speed after passing of about 1 minute (time differs depending on the motor capacity), for which please pay attention.

(1) Explanation of the following operation is in case of VF64S mode (common operation to VF64V mode).



| • | | · · | | , |
|----|--|------------------------|---|----------------------------------|
| No | Content of operation | Display window | Console key operation | DIP switch of VFC64 P.C.Board |
| 1 | Turn off Inverter power source | | | |
| 2 | Remove the cover | | | Set No.6 of SW-1 at ON |
| 3 | Close the cover and turn on Inverter power source EXAMPLE in case of VF64S mode | V F 6 4 S 7 r 5 4 4 | | |
| 4 | Auto-tuning mode | t u n (♠) | When [JOG/→] key is pressed, tunSt is displayed | |
| 5 | Auto-tuning starts | tunSt | | |
| 6 | Auto-tuning ends | tunEd | After several min. | |
| 7 | Data(Table 4) of A11~A25 | of under-mention | oned auto-tuning se | etting items are set |
| | automatically | | | |
| 8 | Turn off Inverter power source | | | |
| 9 | Remove the cover | | | Return No.6 of |
| | | | | SW-1 to OFF |
| 10 | Close the cover | | | |
| 11 | Turn on Inverter power source | | | |
| 12 | Confirm that each setting of | data of A11~A2 | 5 have been set | |
| | | | | |

Display of console panel differs depending on the kind of auto-tuning.

In case of tun : Shows full mode auto-tuning.
 In case of tund : Shows DC mode auto-tuning.
 In case of tun_2 : Shows full mode auto-tuning of the 2nd motor.
 In case of tund2 : Shows DC mode auto-tuning of the 2nd motor.

5-5. Operation method of DC mode auto-tuning

(1) Explanation of the following operation is in case of VF64 mode (common to VF64S, VF64V modes).

| | No | Content of operation | Display window | Console key operation | DIP switch of VFC64 P.C.Board |
|--|----|---|----------------------|---|---|
| | 1 | Turn off Inverter power source | | | |
| ○ r/min ○ Hz ○ A ○ V | 2 | Remove the cover | | | Set No.6 of SW-1 at ON. In case of VF64S, VF64V, modes, set Nos.5, 6 |
| | | | | | at ON |
| | 3 | Close the cover and turn on Inverter power source EXAMPLE in case of VF64 mode | V F 6 4 7 r 5 4 4 | | |
| SET (OPPR) (FOR START) | 4 | Auto-tuning mode | tund | When [JOG/→] key is pressed, tunSt is displayed | |
| $\left(\left(\begin{array}{c} \\ \\ \end{array} \right) \left(\begin{array}{c} \\ \\ \end{array} \right) \left(\begin{array}{c} \\ \\ \\ \end{array} \right) \left(\begin{array}{c} \\ \\ \\ \\ \end{array} \right) \left(\begin{array}{c} \\ \\ \\ \\ \end{array} \right) \left(\begin{array}{c} \\ \\ \\ \\ \\ \end{array} \right) \left(\begin{array}{c} \\ \\ \\ \\ \\ \end{array} \right) \left(\begin{array}{c} \\ \\ \\ \\ \\ \\ \end{array} \right) \left(\begin{array}{c} \\ \\ \\ \\ \\ \\ \end{array} \right) \left(\begin{array}{c} \\ \\ \\ \\ \\ \\ \\ \end{array} \right) \left(\begin{array}{c} \\ \\ \\ \\ \\ \\ \\ \\ \\ \end{array} \right) \left(\begin{array}{c} \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \end{array} \right) \left(\begin{array}{c} \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\$ | 5 | Auto-tuning starts | tunSt | | |
| | 6 | Auto-tuning ends | tunEd | after about 60 sec. | |
| | 7 | Data (Table of item 5-7) of | i A11∼A17 of u | inder-mentioned a | uto-tuning setting |
| | | items are set automatically | / | | |
| No.6 of Table right | 8 | Turn off Inverter power source | | | |
| Auto-tuning ends | 9 | Remove the cover | | | Return No.6 (or Nos.5,6) of SW-1 to OFF |
| | 10 | Close the cover | | | |
| | 11 | Turn on Inverter power source | | | |
| | 12 | Confirm that each setting d | ata of A11~A1 | 7 have been set | |

5-6. Fault during auto-tuning

When fault occurred during auto-tuning, under-mentioned marks are displayed on console panel and Inverter stops.

- When [SEtO] was displayed, setting error of A-00~A-10 can be considered. Revise the setting and redo from the beginning.
- When [tun- -] was displayed, it means that there is an error in the result of auto-tuning. Confirm whether A-00~A-10 were erroneously set or wiring between Inverter and motor was disconnected, and redo from the beginning.
- Other protection diaplay: It means that protection operated during auto-tuning. Eliminate individual cause and redo from the beginning.

5-7. Setting items by auto-tuning

Setting items by atuo-tuning (A area setting numbers)

| Extended Full mode auto-tuning | | DC mode auto-tuning | | | | |
|--------------------------------|---|---|---|--|--|--|
| Nos. | VF64S VF64V modes | VF64mode | VF64S·VF64V modes | | | |
| A-11 | Dead time compensation quantity (U phase +side) | Dead time compensation quantity (U phase +side) | Dead time compensation quantity (U phase +side) | | | |
| A-12 | Dead time compensation quantity (U phase -side) | Dead time compensation quantity (U phase -side) | Dead time compensation quantity (U phase -side) | | | |
| A-13 | Dead time compensation quantity (V phase +side) | Dead time compensation quantity (V phase +side) | Dead time compensation quantity (V phase +side) | | | |
| A-14 | Dead time compensation quantity (V phase -side) | Dead time compensation quantity (V phase -side) | Dead time compensation quantity (V phase -side) | | | |
| A-15 | Dead time compensation quantity (W phase +side) | Dead time compensation quantity (W phase +side) | Dead time compensation quantity (W phase +side) | | | |
| A-16 | Dead time compensation quantity (W phase -side) | Dead time compensation quantity (W phase -side) | Dead time compensation quantity (W phase -side) | | | |
| A-17 | Motor, primary resistance | Motor, primary resistance | Motor, primary resistance | | | |
| A-18 | Motor, secondary resistance | | | | | |
| A-19 | Motor leakage inductance | Items in column of full mode | Items in column of full mode | | | |
| A-20 | Motor inductance | auto-tuning are not set | auto-tuning are not set | | | |
| A-21 | Motor inductance saturation compensation 1 | | (Values, at the time when full mode auto-tuning was executed, are held) | | | |
| A-22 | Motor inductance saturation compensation 2 | | | | | |
| A-23 | Motor iron loss conductance | | | | | |
| A-24 | Motor loss factor 1 | | | | | |
| A-25 | Motor loss factor 2 | | | | | |

$5\!-\!8$. Method of auto-tuning of the 2nd motor

- (1) VF64 Inverter can drive 2 motors changing over.Factory default setting is for use of only 1 motor (the first motor).(2) For use of the 2nd motor, execute under-mentioned setting.
 - Set function setting item L-00 of the Table below at ON.

Assign the 2nd motor selection (P.56) of "Setting Item C, Relative of multifunction input/output" to multifunction input terminal for enabling of supply of voltage from terminal PS.

(3) Before execution, set the rated values (values written in the motor rating plate) of the 2nd motor connected with Inverter, to the under-mentioned setting items (L-01~L-08). As to the method, please set by similar operation to that of aforesaid [5-3, Setting method of motor rated value].

| Common to VF64S, | VF64V, VF64 modes |
|------------------|-------------------|
|------------------|-------------------|

| Setting item No. | Content of setting | Setting range | | Remarks |
|------------------|------------------------------|--|-------|-------------------------------|
| L-00 | Selection of use of 2nd | Usually: OFF At use : ON | _ | Select ON when 2nd motor |
| | motor function | | | is drived |
| L-01 | 2nd motor capacity | VF64S,VF64V: Inverter capacity of | k W | In case of VF64S, VF64V |
| | | 3 ranks down \sim Inverter capacity | | modes |
| | | VF64: 0~Inverter rated capacity | | In case of VF64 mode |
| L-02 | 2nd motor rated voltage | 140~230V (200V class) | V | |
| | | 280~460V (400V class) | | |
| L-03 | 2nd motor rated current | 40~150% of Inverter rated current | | In case of VF64S, VF64v modes |
| | | 0~150% of Inverter rated current | | n case of VF64 mode |
| L-04 | 2nd motor rated speed | 25~100% of max. speed | r/min | |
| L-05 | 2nd motor pole | 2,4,6,8,10,12 | Pole | |
| L-06 | 2nd motor rated frequency | Frequency at the time of motor rated speed | Hz | |
| L-07 | 2nd motor cooling fan | 0 : self cooling type | _ | VF64S mode only is effective |
| | | 1 : forced cooling type | | |
| L-08 | No. of PG pulse of 2nd motor | 60~3600 | P/R | VF64V mode only is effective |

(4) Even though auto-tuning only of the 2nd motor is executed, 2nd motor cannot be driven in case that data of A-11~A-16 of the aforesaid [Setting items (A area setting Nos.) by auto-tuning], which to be set by the first motor, were not set. Execute auto-tuning of the first motor.

(5) Operation of full mode auto-tuning of the 2nd motor Operate similarly to the aforesaid [operation method of Item 5-4 full mode auto-tuning]. Display of auto-tuning mode will be [tun 2].

(6) Operation of DC mode auto-tuning of the 2nd motor Operate similarly to the aforesaid [operation method of Item 5-5 DC mode auto-tuning]. Display of auto-tuning will be [tund 2].

5-9. Setting items by auto-tuning of the 2nd motor

| | · · · · · · · · · · · · · · · · · · · | | | | |
|--------------|---|------------------------------------|-------------------------------------|--|--|
| Extended | Full mode auto-tuning | DC mode auto-tuning | | | |
| setting item | VF64S, VF64V modes | VF64 mode | VF64S, VF64V modes | | |
| L-09 | 2nd motor, primary resistance | 2nd motor, primary resistance | 2nd motor, primary resistance | | |
| L-10 | 2nd motor, 2ndary resistance | Items in column of full mode auto- | Items in column of full mode auto- | | |
| L-11 | 2nd motor leakage inductance | tuning are not set | tuning are not set | | |
| L-12 | 2nd motor inductance | | (Values, at the time when full mode | | |
| L-13 | 2nd motor inductance saturation compensation1 | | auto-tuning was executed are held) | | |
| L-14 | 2nd motor inductance saturation compensation2 | | | | |
| L-15 | 2nd motor iron loss conductance | | | | |
| L-16 | 2nd motor loss factor 1 | | | | |
| L-17 | 2nd motor loss factor 2 | | | | |

Setting items by auto-tuning of the 2nd motor

6. Test operation method of Inverter

At first, confirm operation of Inverter with no load (connected with motor alone). After that, confirm operation connecting with load (machine). Under-mentioned is for confirmation test of Inverter with motor alone.

6-1. Conditions of test operation method

- (1) Load is motor alone (status of no load).
- (2) Control mode is V/f control VF64 mode.
- (3) Without auto-tuning (or auto-tuning has already been executed).
- (4) Execute run/stop by console panel.
- (5) Method is explained by the case of motor capacity 7.5kW, voltage 400V class.
- (6) Output frequency is set at 60Hz (in case that rated frequency of motor is 60Hz).

6-2. Setting item

Rewriting during operation 0 mark: Possible, X mark: Impossible

| Standard Setting item console LED | ing Setting range Setting range (selection item) | | Initializing data at default | Unit | Rewriting during operation |
|--------------------------------------|---|---|---------------------------------|------|-------------------------------|
| (Basic setting | g item) | • | · · · · · · · | | ·] |
| 0. ErEF | Setting frequency | -Max.frequency~Max.frequency | 0.5 | Hz | 0 |
| 1. FJoG | For. jog frequency | Min.frequency~30.0 | 1.0 | Hz | 0 |
| 2. RJoG | Rev. jog frequency | -30.0~-Min.frequency | -1.0 | Hz | 0 |
| 3. Acc1 | Accel time (1) | 0.0~3600.0 | 30.0 | Sec | 0 |
| 4. dEc1 | Decel time (1) | 0.0~3600.0 | 30.0 | Sec | 0 |
| 5. Acc2 | Accel time (2) | 0.0~3600.0 | 0.3 | Sec | 0 |
| 6. dEc2 | Decel time (2) | 0.0~3600.0 | 0.3 | Sec | 0 |
| 7. tbSt | Torque boost level | 0.0~20.0 | 0.0 | % | 0 |
| 8. dcbr | DC brake voltage | 0.0~20.0 | 0.0 | % | 0 |
| 9. Stb | Stabilizer quantity | 0.0~100.0 | 0.0 | % | 0 |
| Func | Selection of extended function | Transfer to extended function by [SET] key | | _ | 0 |
| (b area) Se | election of operation mode, operation | tion sequence | | | |
| b-15 | Select setting position at the time of interlocking | 0: Terminal block 1: Console (SET64 and SET64OP) 2: Digital communication option | 1 | _ | × |
| b-16 | Select setting position of frequency command | 0: Interlocking 1: Terminal block 2: Console (SET64 and SET64OP) 3: Digital communication option 4: Isolation analog input option | 0 | _ | × |
| b-17 | Select setting position of operation command | 0: Interlocking 1: Terminal block 2: Console (SET64 and SET64OP) 3: Digital communication option | 0 | | × |
| b-18 | Select setting position of jog command | 0: Interlocking 1: Terminal block 2: Console (SET64 and SET64OP) 3: Digital communication option | 0 | _ | × |

6-3. Operation of setting by console panel

(1) When FNC, which display the status, goes on by pressing of FNC key, console turns to FNC mode and setting item is displayed.

| No | Content of operation | Display window | Indication of status | Operation of console key |
|----|-----------------------------|----------------|-------------------------|--------------------------|
| 1 | Install motor at safe place | | | |
| 2 | Finish wiring of motor | | | |
| 3 | Turn on Inverter power | | | |
| | source. Confirm control | VF64 | Each displays | |
| | mode, capacity, | 7 r 5 4 4 | about 1 | |
| | | | Sec. | |
| 4 | | | FNC goes off | |



| No | Content of operation | Display window | Indication of status | Operation of console key |
|----|----------------------------|---------------------------|-------------------------|---------------------------|
| 29 | Establish data of b-16 | Digit display data blinks | Same as | |
| | Selection of frequency | * | above | |
| | command setting position. | b — 1 6 | | |
| 30 | Select frequency | Digit display data blinks | FNC goes on | Transfer blinking to 1st |
| | command setting position. | * | | digit by [JOG/→] key |
| | 3, | b — 1 6 | | |
| 31 | Display b-17 Selection of | Digit display data blinks | Same as | Change 1st digit to 7 |
| | operation command | * | above | by [↑][↓] keys |
| | setting position. | b — 1 7 | | |
| 32 | Display data of b-17 | | Same as | When [SET] key is |
| | Selection of operation | | above | pressed,data are fixed |
| | command setting position. | 0 | | displayed |
| 33 | Select data of b-17 at | | Same as | Display 0 by [↑][↓] keys. |
| 00 | interlocking of 0 | | above | When [SET] key is |
| | (interlocks with selection | | | pressed, data are fixed |
| | position of b-15) | 0 | | and b-17 is displayed |
| 34 | Fix data of b-17 Selection | Digit display data blinks | Same as | |
| 04 | of frequency command | * | above | |
| | input position. | b — 1 7 | | |

(Note) Setting method of -(minus) data



| | increa | ase | s b | у | { | } | ł | key | | | | | |
|----------------------|--------|-----|-----|---|---|---|---|-----|---|---|---|-----------|--|
| Numerical value data | | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | — (minus) | |
| | decrea | ase | s b | у | Ł | ļ | ł | key | | | | | |

| 1 | When frequency command | Digit display data blinks | |
|---|--------------------------------|---------------------------|--|
| | data display 60Hz is set | * | |
| | at -(minus) | 6 0.0 | |
| 2 | -(minus) indication is | Digit display data blinks | Transfer blinks to 5th |
| | done at 5th digit only | * | digit by [JOG/→] key |
| | | 6 0.0 | |
| 3 | | Digit display data blinks | Display -(minus) by [\uparrow][\downarrow] |
| | | * | keys. When [SET] key is |
| | | - 6 0.0 | pressed, data are fixed |
| | | | and O.FrEF is displayed |
| 4 | Display frequency command item | O.FrEF | |

6-4. Run/stop operation by console panel





- (1) Confirm that installatiton place of motor, and wiring between Inverter and motor are safe.
- (2) Turn on the power to Inverter.
- (3) Since Inverter is set in the status to be operated by console panel, LED of status display [DIR] goes on. Please confirm.
- (4) When operation key [MONI.OPR/FNC] of console panel is pressed, LED of status display [FNC] goes off. As the mode turns to [MONI.OPR] at this time, run/stop operations become possible.
- (5) When [START] key is pressed, LED of status display [RUN] goes on. At the same time, motor starts and rotation speed increases up to that of 60Hz. Please confirm that rotation is normal.
- (6) When [SET] key is pressed during running, kinds of indications such as output frequency/ output voltage/ output current, etc. during running can be confirmed. (As to content of indication, see next Item 7).
- (7) In case of change of operation frequency, press [FNC] key during running.
 LED of status display [FNC] goes on. By this mode, data of [O.FrEF] of frequency command can be changed from 60Hz to 30Hz, etc.
 (Don't set at frequency of more than 60Hz).
- (8) When [STOP] key is pressed, motor decelerates and stops. When stopped, LED of status display [RUN] goes off.

7. Display of console panel

7-1. Content of monitoring

Content of indicatiion by VF64S, VF64V modes and VF64 mode is as per Table below.

| VF64S·VF6 | 64∨ modes | | |
|--|------------------|-------|----------|
| | | | |
| Content | SET64 display | Unit | |
| Motor speed | SPd | r/min | O |
| Speed command (set speed) | SrEF | r/min | Fr (s |
| Output current | lout | А | Οι |
| Torque command | t r E F | % | Οι |
| DC voltage | Vdc | V | D |
| Output voltage | Vout | V | Οι |
| Output frequency | Fout | Hz | M |
| Overload counter | oLcnt | % | 0 |
| Line speed | L_SP | m/min | Li |
| Motor temperature | t E n P | °C | M |
| Input terminal check 1 | i1 cH | bit | In |
| Input terminal check 2 | i2 cH | bit | In |
| Input terminal check 3 | i3 cH | bit | In |
| Output terminal check 1 | o 1 cH | bit | 0 |
| Output terminal check 2 | o 2 cH | bit | 0 |
| Main body program version | VEr | — | M |
| Sequence version | VErSq | — | Se |
| Super block version | VErSb | — | Su |
| Monitor for analog gain adjustment | G_AdJ | — | Мо |
| (For our adjustment and unused ordinary) | SPdSP | - | (Fo |
| Display of protection history | trbLE | — | Di |

| Content | SET64 display | Unit |
|------------------------------------|---------------|-------|
| Output frequency | Fout | Hz |
| Frequency command | FrEF | Hz |
| (set frequency) | | |
| Output current | iout | А |
| Output torque (torque current) | tout | % |
| DC voltage | Vdc | V |
| Output voltage | Vout | V |
| Motor speed | SPd | r/min |
| Overload counter | oLcnt | % |
| Line speed | L_SP | m/min |
| Motor temperature | t E n P | °C |
| Input terminal check 1 | i1 cH | bit |
| Input terminal check 2 | i 2 cH | bit |
| Input terminal check 3 | i 3 cH | bit |
| Output terminal check 1 | o 1 cH | bit |
| Output terminal check 2 | o 2 cH | bit |
| Main body program version | VEr | — |
| Sequence version | VErSq | — |
| Super block version | VErSb | — |
| Monitor for analog gain adjustment | G_AdJ | |
| (For our adjustment and | SPdSP | — |
| unused ordinary) | | |
| Display of protection history | trbLE | — |

VF64 mode

(Note 1) Console panel SET64 has not Unit indications of %, m/min,°C, bit.

7-2. Operation

Turn on the power and after display of control mode and capacity, mode of Inverter turns to monitor mode automatically. If [SET] key is pressed within 1 sec., content of monitor can be changed endlessly.

Data changes about 1 sec. after display of content mark of monitor.

| | | | , | | |
|------------------------------|----|--|----------------------|-------------------------|----------------------------|
| | No | Content of operation | Display window | Indication of status | Operation of console key |
| | 1 | Basic setting item of FNC | 3. A c c 1 | FNC goes | |
| | | mode: Example that accel | | on | |
| | | time is displayed | | | |
| | 2 | Transfer to monitor mode. | i ou t | FNC goes off | Press [MONI,OPR/FNC] |
| | | Display output current | | (monitor mode) | key |
| | 3 | Display example of output current value | 120 | Same as above | Display after 1 sec. |
| MONIC | 4 | Change to display of output voltage | Vout | Same as above | Press [SET] key |
| (SET) (OPR FNC) (START) | 5 | Display example of | 540 | Same as above | Display after 1 sec. |
| | | output voltage value | (example of 400V. | | |
| | | | 270 in case of 200V) | | |
| RESET | 6 | Display change of | trbLE | Same as above | Press [SET] key |
| | | protection history | 1 o c | Same as above | Overcurrent after 1 sec. |
| | | If [SET] key is pressed, | 2 i G t I | Same as above | U phase IGBT error |
| No.6 of Table right | | display the content of | | | after 1 sec. |
| Display of trbLE | | monitor endlessly | ▼ | Same as above | |
| When [SET] key is | | | 5 o V | Same as above | After 1 sec., intermediate |
| pressed history is selected | | | | | DC part overvoltage |
| pressed, mistory is selected | 7 | Display output current | iout | Same as above | Press [SET] key |



8. Display of protective operation and protection history

8-1. Display of protective operation

| LED display | Content of protection | Explanation of protection |
|-------------|---|---|
| ос | Overcurrent protection | Operates when output current became 3.6 times or more of Inverter rating |
| iGbt | IGBT protective operation | Protective operation by overcurrent of IGBT, Fin overheat, etc. (22kW or less, 75kW or over) |
| iGt 1 | IGBT(U) protective operation | Protective operation by overcurrent of U-phase IGBT, Fin overheat, etc. (30 \sim 55kW) |
| iGt 2 | IGBT(V) protective operation | Protective operation by overcurrent of V-phase IGBT, Fin overheat, etc. ($30 \sim 55 \text{kW}$) |
| iGt 3 | IGBT(W) protective operation | Protective operation by overcurrent of W-phase IGBT, Fin overheat, etc. (30 \sim 55kW) |
| oV | DC part overvoltage | Operates when DC part voltage exceeded 400V (200V class) / 800V(400V class) |
| oL | Overload protection | Operates when output current effective value exceeded 150% of motor rating for 1 min. |
| Fu | DC fuse blown | Operates when fuse of DC part was blown |
| StrF | Start stall | Operates when Inverter is inactive even 10 sec. passed after input of run/jog command |
| oS | Overspeed protection | Operates when motor speed exceeded overspeed setting (for.or rev.) (vector control mode) |
| oF | Overfrequency protection | Operates when output frequency exceeded overfrequency setting (for. or rev.) (V/f control mode) |
| uV | Undervoltage | Operates when DC voltage lowered to 180V (200V class) / 360V (400V class) or less during running |
| ot | Overtorque protection | Operates when output torque exceeded 150%/1min. of the rated torque (when overtorque protection is ON only) |
| оН | Unit overheat | Operates when fin at output part overheated, etc (75kW or over) |
| cS2 | Storage memory error | Operates when sum value of set data of EEPROM storage does not correspond (check at the time of turning on the power) |
| oPEr | Option error | Operates in case of improper activation of digital option at ON time of use of digital option (J-00) |
| tS | Digital option communication time out error | Operates when communication abnormal between communication option and communication master station |
| SPdE | Speed control error | Operates in case that deviation between motor speed and command value exceeded set value (console setting) when function of speed control error detection (F-08) was at ON time (Vector control mode only) |
| inoH | Motor overheat | Operates in case that motor temperature exceeded 150 $^\circ C$ at ON time of motor overheat selection (F-12) under use of T/V61V $$ option. |
| SLF | Slave unit error of parallel units | Operates by occurrence of error (overcurrent, etc.) at slave unit of parallel units |
| FcL | FCL operation | Operates when instantaneous current limit continued for 10 sec.(2 sec. at near 0Hz) |
| SEt 0 | Setting error 0 | Operates when run/jog command or auto-tuning start command is inputted in the state that setting of motor rating plate values and carrier setting are improper |
| SEt 1 | Setting error 1 | Operates at turning to ON of run/jog command when PG pulse setting (vector control with sensor only) and settings of relatives of vector control and current control are improper. |
| SEt 2 | Setting error 2 | Operates at turning to ON of run/jog command when setting of each limit value is improper |
| SEt 3 | Setting error 3 | Operates at turning to ON of run/jog command when analog input/output gain setting is abnormal |
| EF 1 | External failure 1 | Operates when external failure 1 of multifunction input is inputted |
| EF 2 | External failure 2 | Operates when external failure 2 of multifunction input is inputted |
| EF 3 | External failure 3 | Operates when external failure 3 of multifunction input is inputted |
| EF 4 | External failure 4 | Operates when external failure 4 of multifunction input is inputted |
| ccEr 1 | Console communication time out error | Operates when console cannot communicate with main body |
| ccEr 2 | Console communication sum check error | Operates when sum of data in communication between console and main body is not same |
| ccEr 3 | Reception error | Operates when VFC64 received erroneous communication data |
| EnGon | Emergency stop contact ON | Displays when drive is tried at ON time of input contact of emergency stop (not protection display) |

8-2. Protective action and operation

- (1) When protective function in Inverter actuates, Inverter stops immediately and displays content of protective action.
- (2) When plural protective functions actuate simultaneously, content of protective action is displayed blinking in order (max. 8 actions).
- (3) Display the data at the time of actuation of protective function in 6 kinds of display as per under-mentioned item 8-3 as 1 point trace back indication. When [SET] key is pressed while content of protection is being displayed, 6 kinds of data at the time of protective action are indicated endlessly (with interval of 1 sec.).
- (4) Display of protective action, and operation



8-3. Kind of 1 point trace back display

| VF | F64S·VF64V modes | | | V | F64 mode | |
|---------------------------|------------------|-------|---|-----------------------------------|----------------|------|
| Content of display | Display window | Unit | 7 | Content of display | Display window | Unit |
| Speed command (set speed) | SrEF | r/min | | Frequency command (set frequency) | FrEF | Hz |
| motor speed | SPd | r/min | 1 | Output frequency | Fout | Hz |
| Output current | iout | А | | Output current | iout | A |
| Output voltage | Vout | V | | Output voltage | Vout | V |
| DC voltage | Vdc | V | 1 | DC voltage | Vdc | V |
| Torque command | t r E F | _ | | Output torque (torque current) | tout | _ |

Note) output current of 1 point trace back is the largest value in 3 phase currents in a moment. Electric current (r.m.s) is almost $1/\sqrt{2}$ times as large as a displayed value.

8-4. By elimination of cause of protective action and making the RESET operation, mode returns to MONI,OPR mode or FNC mode.

However, if protection relay (86A)-Inactive is selected and in case of protective action only of "protection relay-Inactive", protective action display goes off by stop of operation command.

8-5. When MONI,OPR/FNC key is pressed, it is possible to transfer to MONI or FNC mode, avoiding display of protective action for a time.

9. Operation at the time of exchange of P.C.Board

When control P.C.Board (VFC64) is replaced, under-mentioned operation (9-1) is needed.

VFC64 of spares, etc. is of initial value of default. Please set/adjust it before use on the 4 points stated below, conforming to the Inverter of present use.

- (1) Set VFC64 at Inverter capacity of present use.
- (2) Set VFC64 at control mode of present use.
- (3) Adjust intermediate part DC voltage.
- (4) Adjust other analog values to be inputted from external.
- 9-1. Setting operation of adjustment of Inverter capacity, control mode and intermediate part DC voltage Execute adjustment, operating the switch of DIP Switch SW1-7 of the aforesaid item 2-1 "Function of DIP Switch SW1".

| | No | Content of operation | Display window | Operation of console key | DIP Switch on VFC64 P.C. Board |
|---|--|--|-------------------------------|---|--------------------------------------|
| | 1 | Turn off Inverter power source | | | |
| | 2 | Remove the cover | | | Set SW1-7 at ON |
| | 3 Close the cover and turn on Inverter power | | Return to FActory SEttingG | | |
| OFNC OREV ORUN ODIR OMRH OJOG | | source | SurE | Display after several sec. When [SET] key is pressed, VF64S is displayed | |
| SET (MONIL OPR LICE) (FOR DELLO (START) | 4 | Select control mode | Example of VF64S | Select control mode by [↑][↓] keys | |
| | 5 | Select control mode | V F 6 4 S | After selection pressing [SET] key, display 7r544 | |
| | 6 | Select Inverter capacity | Example of 7r544 | Select Inverter capacity by [↑][↓] keys | |
| | 7 | Select Inverter capacity | 7 r 5 4 4 | Select by [SET] key | |
| No.8 of Table right Adjustment example | 8 | Adjustment of VDC detection gain | * 560.0 | After several sec | |
| of VDC detection voltage (example of 566.0V) Transfer the digit by [JOG/-] key Adjust by [1][] keys Select by [SET] key | | (Fig. left is in case of 400V)Measure and adjust VDC voltage (terminal ⊕2~⊙) by voltmeter | * 5 6 6. 0 | •Transfer the digit by [JOG/-] key •Adjust by [↑][↓] keys •Select by [SET] key | |
| | 9 | Initializing of set data | init | | |
| | 10 | End of default | End | After about 30 sec. | |
| | 11 | Turn off Inverter power source | | | |
| | 12 | Fit the cover | | | Set SW1-7 at OFF |
| | 13 | Close the cover | | | |

9-2. Adjustment of analog values to be inputted from external.

Adjust following setting items. As to adjustment method, see setting item G of explanation of Chapter 3, Item 4-8 Setting Items.

| Display | Content | Setting range(selection item) | Setting resolution | Initializing data | Unit |
|---------|------------------------------------|-------------------------------|--------------------|----------------------|------|
| G-00 | Analog input +side adjustment gain | 50.00~150.00 | 0.01 | 100.00 | % |
| G-01 | Analog input -side adjustment gain | 50.00~150.00 | 0.01 | 100.00 | % |

Chapter 3 Explanation of function setting items

VF64 Inverter can set undermentioned standard functions by standard console panel SET64. Functions of VF64 are classified by control system to [speed sensorless vector control], [vector control with speed sensor] and [V/f control]. Kinds of function are classified to [basic setting item] and [extended function setting]. [extended function setting] is further classified to the areas shown below in order to make calling of function easily.

| Kind of function | Area | Speed sensorless vector control mode | Vector control with speed sensor mode | V/f control mode |
|---------------------------|------|--|--|---|
| Basic setting | | Set speed | | Set frequency |
| item | | Forward jog speed | | Forward jog frequency |
| | | Reverse jog speed | | Reverse jog frequency |
| | | Accel. time (1) | | |
| | | Decel. time (1) | | |
| | | Accel. time (2) | | |
| | | Decel. time (2) | | |
| | | Speed control (ASR) proportional gain (| 1) | Torque boost level |
| | | Speed control (ASR) integration time co | nstant | DC brake voltage |
| | | Speed control (ASR) system inertia mon | nent | Stabilizer amount |
| | | (extended function selection) | | |
| Extended function setting | A | Max. speed, rated value and parameter | setting area of motor | Setting of Max. frequency , rated value ,parameter of motor |
| | b | Selection area of drive mode, drive sequ | lence | |
| | С | Setting area of relatives of multifunction | input/output | |
| | d | Selection area of accel/decel setting, sp MRH function | eed setting, jump function, | Selection area of accel/decel setting, Frequency jump func- tion, MRH function |
| | Е | Setting area of relatives of torque limiter characteristics, speed control, vector con | , torque command ntrol, V/f control | Setting area of relatives of torque limit, V/f pattern |
| | F | Built-in DB activation setting, protective fund | | |
| | G | Analog input / output setting, gain adjust | ment area | |
| | Н | Setting area of relatives of programmed | drive, preset drive | |
| | i | Setting area of droop control, machine lo | oss compensation | |
| | J | Communication option setting area | | |
| | L | Setting area of 2nd motor parameter, sp | eed control gain | |
| | n | Monitor setting area | | |
| | Р | Super block constant setting area | | |
| | S | Setting of control mode, Inverter capacity | y (for reading only) | |

1. Table of setting items of speed sensorless vector control system (VF64S mode)

Mark of rewriting during operation O: Possible X: Impossible

| LED display Control operation data by default on operation | Standard console LED display Setting items | Setting range (selection items) | Initializing data by default | Unit | Rewriting during operation |
|--|---|---------------------------------|---------------------------------|------|-------------------------------|
|--|---|---------------------------------|---------------------------------|------|-------------------------------|

| | (Basic setting items) | | | | |
|--------|--|--|------|-------|---|
| 0.SrEF | Ref (set). SPD. | -Max. speed~max. speed | 12 | r/min | 0 |
| 1.FJoG | For. jog speed | Min. speed~300 | 24 | r/min | 0 |
| 2.rJoG | Rev. jog speed | -300~-min. speed | -24 | r/min | 0 |
| 3.Acc1 | Accel time 1 | 0.0~3600.0 | 30.0 | sec | 0 |
| 4.dEc1 | Decel time 1 | 0.0~3600.0 | 30.0 | sec | 0 |
| 5.Acc2 | Accel time 2 | 0.0~3600.0 | 0.3 | sec | 0 |
| 6.dEc2 | Decel time 2 | 0.0~3600.0 | 0.3 | sec | 0 |
| 7.ASrP | Speed control proportional gain 1 | 3~50 | 15 | — | 0 |
| 8.ASri | Speed control integrated time constant | 20~10000 | 40 | ms | 0 |
| 9.ASrJ | Speed control inertia moment | 0~32767 | 10 | gm | 0 |
| Func | Selection of extended setting area | Transfer to extended setting area by [SET] key | _ | _ | 0 |

(A area) Setting of max. speed, rated value, parameter of motor

| - | | | | | |
|------|---|---|------|-------|---|
| Fund | Selection of basic setting items | I ranster to basic setting items by [SET] key | _ | — | |
| A-00 | Max. speed | 300~14700 | 1800 | r/min | × |
| A-01 | Min. speed | 12~Max. speed | 12 | r/min | |
| A-02 | Motor capacity | Rated capacity~capacity of 3 ranks down | 0.0 | kW | × |
| A_03 | Motor roted voltage | 200V class: 140~230 | ٥ | V | ~ |
| A-00 | Niolof Taled Vollage | 400V class: 280~460 | 0 | v | ^ |
| A-04 | Motor rated current | 40~150% of rated current | 0.0 | A | × |
| A-05 | Motor rated speed | 25~100% of max. speed | 0 | r/min | × |
| A-06 | Motor pole selection | 2~12[Pole] | 4 | Pole | × |
| A-07 | Motor rated frequency | Rated speed x pole/120~rated speed x pole | 0.0 | Hz | × |
| | | /120+7.0 | | | |
| A-08 | Motor cooling fan | 0: self cooling fan 1: forced cooling fan | 0 | - | × |
| A-09 | | | | | |
| A-10 | PWM carrier frequency | 1.0~15.0 | 6 | kHz | × |
| A-11 | Dead time compensation amount (U phase +side) | 0~400 | 0 | - | × |
| A-12 | Dead time compensation amount (U phase -side) | 0~400 | 0 | — | × |
| A-13 | Dead time compensation amount (V phase +side) | 0~400 | 0 | — | × |
| A-14 | Dead time compensation amount (V phase -side) | 0~400 | 0 | — | × |
| A-15 | Dead time compensation amount (W phase +side) | 0~400 | 0 | — | × |
| A-16 | Dead time compensation amount (W phase -side) | 0~400 | 0 | — | × |
| A-17 | Motor, primary resistance | | 0 | mΩ | × |
| A-18 | Motor, 2ndary resistance | Setting range differs, depending on Inverter | 0 | mΩ | × |
| A-19 | Motor leakage inductance | capacity | 0 | mH | × |
| A-20 | Motor mutual inductance | | 0 | mΗ | × |
| A-21 | Motor inductance saturation compensation 1 | | 0 | % | × |
| A-22 | Motor inductance saturation compensation 2 |] | 0 | % | × |
| A-23 | Motor iron loss conductance | 0.0~600.0 | 0.0 | mho | × |
| A-24 | Motor loss factor 1 | 0.0~200.0 | 0.0 | % | × |
| A-25 | Motor loss factor 2 | 0.0~200.0 | 0.0 | % | × |

(b area) Selection of operation mode, operation sequence

| b-00 | Selection of HC(super block) function | 0 : OFF (unused) 1: ON (use) | OFF - | - | × |
|------|---|---|-------|-----|---|
| b-01 | Selection of operation (control) mode | 0 : Speed control (ASR) mode | 0 - | - | × |
| | | 1 : Minus(-) direction of torque command has priority | | | |
| | | 2 : Plus(+) direction of torque command has priority | | | |
| | | 3 : Torque control (ATR) mode | | | |
| | | 4 : Contact changeover of speed/torque control | | | |
| b-02 | Selection of highly efficient operation | 0 : OFF (unused) 1 : ON (use) | OFF - | - | × |
| b-03 | Selection of stop mode | 0 : Free stop | 1 - | - | |
| | | 1 : Decel stop | | | 0 |
| | | 2 : Decel stop with DC brake | | | |
| b-04 | Stop frequency | 0.0~30.0 | 1.0 H | Ηz | 0 |
| b-05 | DC brake actuation time | 0.0~10.0 | 0.0 s | sec | 0 |
| b-06 | DC brake current | $20\sim500$ (rated excitation current = 100%) | 100 % | 6 | 0 |

Mark of rewriting during operation \bigcirc : Possible \times : Impossible

| Standard console LED display | Setting items | Setting range (selection items) | Initializing data by default | Unit | Rewriting during operation |
|---------------------------------|--|--|---------------------------------|------|-------------------------------|
| b-07 | Selection of jog stop mode | 0: Free stop 1: Decel stop 2: Decel stop with DC brake | 0 | - | 0 |
| b-08 | Jog stop frequency | 0.0~10.0 | 1.0 | Hz | 0 |
| b-09 | Speed control proportional gain 2 | 3~100 | 15 | — | 0 |
| b-10 | Selection of jog proportional gain | 0: Speed control proportional gain 1 1: Speed control proportional gain 2 | 0 | - | 0 |
| b-11 | Selection of restart function at instantaneous power failure | 0: ON (use) 1: OFF (unused) | OFF | — | × |
| b-12 | Selection of reverse run inhibition | 0: OFF(ordinary) 1: Inhibition of rotation to reverse direction against command 2: Inhibition of reverse rotation | 0 | _ | × |
| b-13 | Selection of regeneration stall prevention function | 0: OFF (unused) 1: ON (use) | OFF | — | × |
| b-14 | Selection of sequence (PLC) function | 0: OFF (unused) 1: ON (use) | OFF | — | × |
| b-15 | Selection of setting position at interlocking | 0: Terminal block 1: Console (SET64 or SET64OP) 2: Digital communication option (RSH64) | 1 | _ | × |
| b-16 | Selection of speed command setting position | 0: Interlocking 1: Terminal block 2: Console (SET64 or SET64OP) 3: Digital communication option 4: Isolated analog input option | 0 | — | × |
| b-17 | Selection of operation command setting position | 0: Interlocking 1: Terminal block 2: Console (SET64 or SET64OP) 3: Digital communication option | 0 | - | × |
| b-18 | Selection of jog command setting position | 0: Interlocking 1: Terminal block 2: Console (SET64 or SET64OP) 3: Digital communication option | 0 | _ | × |
| b-19 | Selection of torque command setting position | 0: Terminal block 1: Analog option 2: Digital communication option | 1 | — | × |
| b-20 | Selection of initial excitation | 0: AC initial excitation (cannot select) 1: DC initial excitation | 1 | — | × |

(c area) Relevance of multifunction input/output

| c-00 | Selectioin of multifuntion input position | 0: Terminal block 1: Digital communication option | 0 | _ | × |
|------|---|---|----|---|---|
| c-01 | Function-selection of terminaL block MI1 (multi-function input 1) | 0: Preset speed command selection 1 | 0 | - | × |
| c-02 | Function-selection of terminal block MI2 (multi-function input 2) | 1: Preset speed command selection 2 | 1 | - | × |
| c-03 | Function-selection of terminal block MI3 (multi-function input 3) | 2: Preset speed command selection 3 | 3 | - | × |
| c-04 | Function-selection of terminal block MI4 (multi-function input 4) | 3: Accel/decel time selection 1 | 4 | - | × |
| c-05 | Function-selection of terminal block MI5 (multi-function input 5) | 4: Accel/decel time selection 2 | 7 | _ | × |
| c-06 | Function-selection of terminal block MI6 (multi-function input 6) | 5: Speed up command (MRH mode) | 14 | - | × |
| | | 6: Speed down command (MRH mode) | | | |
| | | 7: Speed hold | | | |
| | | 8: Inhibition of S pattern accel/decel | | | |
| | | 9: Max. revolution reduction | | | |
| | | 10: Droop control inactive | | | |
| | | 11: Torque control selection | | | |
| | | 12: For/Rev changeover command | | | |
| | | 13: DC brake command | | | |
| | | 14: Initial excitation command | | | |
| | | 15: External failure signal 1 (protect. relay 86A active) | | | |
| | | 16: External failure signal 2 (protect. relay 86A active) | | | |
| | | 17: External failure signal 3 (protect. relay 86A active) | | | |
| | | 18: External failure signal 4 (protect. relay 86A active) | | | |
| | | 19: External failure signal 1 (protect. relay 86A inactive) | | | |
| | | 20: External failure signal 2 (protect. relay 86A inactive) | | | |
| | | 21: External failure signal 3 (protect. relay 86A inactive) | | | |
| | | 22: External failure signal 4 (protect. relay 86A inactive) | | | |
| | | 23: Trace back external trigger | | | |
| | | 24: Selection of 2nd motor | | | |
| | | 25: Emergency stop (B contact) | | | |
| | | 26: Advance of programed operation | | | |
| | | 27: Selection of speed command terminal block | | | |

Mark of rewriting during operation \bigcirc : Possible \times : Impossible

| Standard console LED display | Setting items | Setting range (selection items) | Initializing data by default | Unit | Rewriting during operation | |
|---------------------------------|--|---|---------------------------------|-------|-------------------------------|--|
| c-07 | Function-selection of terminal block MO1 (multi-function output 1) | 0: End of programed operation | 7 | — | × | |
| c-08 | Function-selection of terminal block MO2 (multi-function output 2) | 1: Speed detection (1) (speed = detection setting) | 1 | — | × | |
| c-09 | Function-selection of terminal block MO3 (multi-function output 3) | 2: Speed detection (1) (speed \geq = detection setting) | 0 | — | × | |
| c-10 | Function-selection of terminal block MO4 (multi-function output 4) | 3: Speed detection (1) (speed <= detection setting) | 8 | — | × | |
| | | 4: Speed detection (2) (speed = detection setting) | | | | |
| | | 5: Speed detection (2) (speed \geq = detection setting) | | | | |
| | | 6: Speed detection (2) (speed <= detection setting) | | | | |
| | | 7: Setting reach | | | | |
| | | 8: Torque detection | | | | |
| | | 9: Absolute value torque detection | | | | |
| | | 10: During power interruption | | | | |
| | | 11: Overload pre-alarm | | | | |
| | | 12: During retry | | | | |
| | | 13: During reverse run | | | | |
| | | 14: Protective operation code | | | | |
| | | 15: Sum check error | | | | |
| c-11 | Detection speed (1) | -max. speed~+max. speed | 0 | r/min | 0 | |
| c-12 | Detection speed (2) | -max. speed~+max. speed | 0 | r/min | 0 | |
| c-13 | Speed detection range | 0~600 | 0 | r/min | 0 | |
| c-14 | Detection torque command (with polarity) | -205~205 | 0 | % | 0 | |
| c-15 | Detection torque command (absolute value) | 0~205 | 0 | % | 0 | |
| c-16 | Overload pre-alarm operation level | 0~100 | 50 | % | 0 | |
| c-17 | Speed command reduction rate | 50.0~100.0 | 90.0 | % | 0 | |

(d area) Accel/decel setting, speed jump function, MRH function selection

| d-00 | Ordinary operation accel-selection | 0: Accel/decel time 1 | 0 - | - | × |
|------|---|--|--------|-------|---|
| d-01 | Jog operation accel-selection | 1: Accel/decel time 2 | 1 | _ | × |
| | | 2: Accel/decel time 3 | | | |
| | | 3: Accel/decel time 4 | | | |
| d-02 | Accel time 3 | 0.0~3600.0 | 30.0 s | sec | 0 |
| d-03 | Decel time 3 | 0.0~3600.0 | 30.0 s | sec | 0 |
| d-04 | Accel time 4 | 0.0~3600.0 | 30.0 s | sec | 0 |
| d-05 | Decel time 4 | 0.0~3600.0 | 30.0 s | sec | 0 |
| d-06 | S pattern accel/decel time selection | 0:OFF (unused) 1: ON (use) | OFF · | _ | × |
| d-07 | S pattern rise time 1 | 0.0~60.0 | 0.1 s | sec | 0 |
| d-08 | S pattern accel reach time 1 | 0.0~60.0 | 0.1 s | sec | 0 |
| d-09 | S pattern fall time 1 | 0.0~60.0 | 0.1 s | sec | 0 |
| d-10 | S pattern decel reach time 1 | 0.0~60.0 | 0.1 s | sec | 0 |
| d-11 | S pattern rise time 2 | 0.0~60.0 | 0.1 s | sec | 0 |
| d-12 | S pattern accel reach time 2 | 0.0~60.0 | 0.1 s | sec | 0 |
| d-13 | S pattern fall time 2 | 0.0~60.0 | 0.1 s | sec | 0 |
| d-14 | S pattern decel reach time 2 | 0.0~60.0 | 0.1 s | sec | 0 |
| d-15 | Speed deviation limit command selection | 0:OFF (unused) 1: ON (use) | OFF - | _ | 0 |
| d-16 | Plus-direction deviation max. value | 0.0 ~ 100 | 5.0 | % | 0 |
| d-17 | Minus-direction deviation max. value | $-100.0 \sim 0.0$ | -5.0 | % | 0 |
| d-18 | Jump (1) speed | 0~max. speed | 0 r | r/min | 0 |
| d-19 | Jump (2) speed | 0~max. speed | 0 r | r/min | 0 |
| d-20 | Jump (3) speed | 0~max. speed | 0 r | r/min | 0 |
| d-21 | Jump (4) speed | 0~max. speed | 0 r | r/min | 0 |
| d-22 | Jump speed range | 0 ~300 | 0 r | r/min | 0 |
| d-23 | MRH function selection | 0:OFF (unused) 1: ON (use) | OFF | - | × |
| d-24 | MRH upper limit speed | MRH lower limit speed (d-25)~max. speed | 300 r | r/min | 0 |
| d-25 | MRH lower limit speed | -max. speed~MRH upper limit speed (d-24) | 0 r | r/min | 0 |

(E area) Relevance of torque limit value, torque command characteristics, speed control, vector control

| E-00 | For. powering torque limit value | 0~200 | 150 | % | 0 |
|------|--------------------------------------|--|------|---|---|
| E-01 | For. regeneration torque limit value | -200~0 | -150 | % | 0 |
| E-02 | Rev. powering torque limit value | -200~0 | -150 | % | 0 |
| E-03 | Rev. regeneration torque limit value | 0~200 | 150 | % | 0 |
| E-04 | Unused | - | _ | — | _ |
| E-05 | Torque command mode selection | 0: % command 1: Absolute value command | 0 | — | × |

Mark of rewriting during operation O: Possible X: Impossible

| Standard console LED display | Setting items | Setting range (selection items) | Initializing data by default | Unit | Rewriting during operation |
|---------------------------------|---|---------------------------------|---------------------------------|------|-------------------------------|
| E-06 | ASR cancelation selection | 0 : OFF (unused) 1: ON (use) | 1 | — | × |
| E-07 | ASR feedforward selection | 0 : OFF (unused) 1: ON (use) | 1 | | × |
| E-08 | Variable proportional gain variation start speed | 0.01~100.00 | 5.00 | % | 0 |
| E-09 | Ratio of variable proportional minimum gain | 0~100 | 20 | % | 0 |
| E-10 | Flux command | 20.0~150.0 | 100.0 | % | × |
| E-11 | Intensification rate of flux at starting | 100.0~150.0 | 100.0 | % | × |
| E-12 | Current control proportional gain | 0.0~9.9 | 3.0 | — | 0 |
| E-13 | Current control integrated time constant | 0.0~9.9 | 1.5 | ms | 0 |
| E-14 | Gain of Current control feedforward component | 0~200 | 70 | - | 0 |
| E-15 | Use selection of motor temperature detection option temperature compensation function | 0 : OFF (unused) 1: ON (use) | OFF | _ | × |

(F area) Built-in DB operation setting, protective function, trace back setting

| F-00 | Built-in DB operation level | 200V class: 320~360V | 340 V | / | 0 |
|------|--|------------------------------|---------|------|---|
| | | 400V class: 640~720V | 680 V | / | 0 |
| F-01 | For. run side overspeed setting | 0~max. speed (A-00) x 1.5 | 1900 r | /min | × |
| F-02 | Rev. run side overspeed setting | -max. speed (A-00) X 1.5~0 | –1900 r | /min | × |
| F-03 | Overload protection setting | 20~110 | 100 % | % | 0 |
| F-04 | FCL level adjustment | 80~125 | 100 % | % | 0 |
| F-05 | Selection of overtorque protective function | 0 : OFF (unused) 1: ON (use) | ON - | - | × |
| F-06 | Overtorque protective operation level setting | 110~205 | 150 % | % | 0 |
| F-07 | Overtorque protective operation standard torque | 50~105 | 105 % | % | 0 |
| F-08 | Use-selection of speed control error | 0 : OFF (unused) 1: ON (use) | OFF - | - | × |
| F-09 | Speed control error plus side detection range | 50~500 | 100 r | /min | 0 |
| F-10 | Speed control error minus side detection range | -500~-50 | –100 r | /min | 0 |
| F-11 | | | | | |
| F-12 | Selection of motor over-heat protective operation | 0:OFF (unused) 1: ON (use) | OFF - | - | × |
| F-13 | Selection of protection relay (86A) operation at power failare | 0 : OFF (unused) 1: ON (use) | OFF - | - | × |
| F-14 | Times of protection retry | 0~5 | 0 - | - | 0 |
| F-15 | Trace back pitch | 1~100 | 1 m | ns | 0 |
| F-16 | Trace back trigger point | 1~99 | 80 - | - | 0 |
| F-17 | Trace back CH1 selection | 0~64 | 0 - | - | 0 |
| F-18 | Trace back CH2 selection | 0~64 | 0 - | - | 0 |
| F-19 | Trace back CH3 selection | 0~64 | 0 - | - | 0 |
| F-20 | Trace back CH4 selection | 0~64 | 0 - | - | 0 |
| F-21 | Trace back CH5 selection | 0~64 | 0 - | - | 0 |
| F-22 | Trace back CH6 selection | 0~64 | 0 - | - | 0 |
| F-23 | Trace back CH7 selection | 0~64 | 0 - | - | 0 |
| F-24 | Trace back CH8 selection | 0~64 | 0 - | - | 0 |
| F-25 | Trace back CH9 selection | 0~64 | 0 - | - | 0 |
| F-26 | Trace back CH10 selection | 0~64 | 0 - | - | 0 |
| F-27 | Trace back CH11 selection | 0~64 | 0 - | - | 0 |
| F-28 | Trace back CH12 selection | 0~64 | 0 - | - | 0 |

| | (G area) Analog input/output setting, gain | adjustment | | | |
|------|--|-----------------------------------|----------|---|---|
| G-00 | Analog input +side adjustment gain | 50.00~150.00 | 100.00 % | % | 0 |
| G-01 | Analog input -side adjustment gain | 50.00~150.00 | 100.00 % | % | 0 |
| G-02 | Analog input setting characteristics selection | 0 : $0 \sim \pm 10V$ (bipolarity) | 1 - | - | × |
| | | 1 : $0 \sim 10V$ (unipolarity) | | | |
| | | 2:4~20mA | | | |
| | | 3 : Pulse train | | | |
| G-03 | Analog input speed command upper limit speed | Absolute value of (G-04)~100.00 | 100.00 % | % | 0 |
| G-04 | Analog input speed command lower limit speed | -(G-03)~(G-3) | 0.00 % | % | 0 |
| G-05 | Analog input 0 limit voltage | 0.000~1.000 | 0 V | / | 0 |
| G-06 | Analog output selection | 0 : Output voltage | 1 - | - | × |
| | | 1 : Output current | | | |
| | | 2 : Torque command | | | |
| | | 3: Motor speed | | | |
| | | 4 : Speed command | | | |
| | | 5 : Super block output | | | |
| | | 6 : Calibration | | | |
| | | 7 : Internal monitor | | | |

| Mark of rewriting | during | operation | ○ : Possible | \times : Impossible |
|-------------------|--------|-----------|--------------|-----------------------|
| | | | | |

| Standard console LED display | Setting items | Setting range(selection items) | Initializing data by default | Unit | Rewriting during operation |
|---------------------------------|--|------------------------------------|---------------------------------|------|----------------------------------|
| G-07 | Analog output adjustment gain | 50.0~150.0 | 100.0 | % | 0 |
| G-08 | Analog output adjustment offset | -50.0~50.0 | 0.0 | % | 0 |
| G-09 | Speed (frequency) meter output selection | 0 : | 2 | - | × |
| | | 1: Output frequency(6F output) | | | |
| | | 2: Motor speed(6F output) | | | |
| | | 3: Calibration (6F output) | | | |
| G-10 | Isolated analog input setting adjustment gain | 50.00~150.00 | 100.00 | % | 0 |
| G-11 | Isolated analog input setting | 0 : 0~10V | 0 | — | × |
| | characteristics selection | 1 : 4~20mA | | | |
| G-12 | Isolated analog setting upper limit speed | Absolute value of (G-13)~100.00 | 100.00 | % | 0 |
| G-13 | Isolated analog setting lower limit speed | $-(G \sim 12) \sim (G \sim 12)$ | 0.00 | % | 0 |
| G-14 | Isolated torque command input adjustment gain | 50.0~150.0 | 100.0 | % | 0 |
| G-15 | Isolated torque command input offset adjustment quantity | -50.0~50.0 | 0.0 | % | 0 |
| G-16 | Isolated analog output selection | 0: Output voltage | 1 | — | × |
| | | 1: Output current |] | | |
| | | 2: Torque command |] | | |
| | | 3: Motor speed | | | |
| | | 4: Speed command |] | | |
| | | 5: Super block output |] | | |
| | | 6: Calibration | | | |
| | | 7: Internal monitor (for our test) | | | |
| | | 8: Output voltage (4~20mA) | | | |
| | | 9: Output current (4~20mA) | | | |
| | | 10: Torque command (4~20mA) | | | |
| | | 11: Motor speed (4~20mA) |] | | |
| | | 12: Speed command (4~20mA) |] | | |
| | | 13: Super block output (4~20mA) | | | |
| | | 14: Calibration (4~20mA) |] | | |
| G-17 | Isolated analog output adjustment gain | 50.0~150.0 | 100.0 | % | 0 |
| G-18 | Isolated analog output offset adjustment quantity | -50.0~50.0 | 0.0 | % | 0 |
| G-19 | Temperature correction option offset adjustment quantity | -20.0~20.0 | 0.0 | % | 0 |
| G-20 | Temperature correction option gain adjustment quantity | 50.0~150.0 | 10.0 | % | 0 |

(H area) Setting of relevance of programed operation / preset operation

| H-00 | Preset speed command 1 | | 0 r/min | 0 |
|------|---|--|---------|---|
| H-01 | Preset speed command 2 | -max. speed~max. speed | 0 r/min | 0 |
| H-02 | Preset speed command 3 | | 0 r/min | 0 |
| H-03 | Preset speed command 4 | | 0 r/min | 0 |
| H-04 | Preset speed command 5 | | 0 r/min | 0 |
| H-05 | Preset speed command 6 | | 0 r/min | 0 |
| H-06 | Preset speed command 7 | | 0 r/min | 0 |
| H-07 | Preset speed command 8 | | 0 r/min | 0 |
| H-08 | Programed operation mode selection | 0: OFF(unused) 1: One-Time 2: End-less | 0 — | × |
| H-09 | Programed operation time unit selection | 0: sec 1: min 2: hour | 0 — | × |
| H-10 | Programed operation time 1 | | 0.0 — | 0 |
| H-11 | Programed operation time 2 | 0.0~3600.0 | 0.0 — | 0 |
| H-12 | Programed operation time 3 | | 0.0 — | 0 |
| H-13 | Programed operation time 4 | | 0.0 — | 0 |
| H-14 | Programed operation time 5 | | 0.0 — | 0 |
| H-15 | Programed operation time 6 | | 0.0 — | 0 |
| H-16 | Programed operation time 7 | | 0.0 — | 0 |
| H-17 | Programed operation time 8 | | 0.0 — | 0 |
| H-18 | Programed operation accel/decel selection 1 | | 0 — | × |
| H-19 | Programed operation accel/decel selection 2 | 0: Accel/decel time 1 | 0 — | × |
| H-20 | Programed operation accel/decel selection 3 | 1: Accel/decel time 2 | 0 — | × |
| H-21 | Programed operation accel/decel selection 4 | 2: Accel/decel time 3 | 0 — | × |
| H-22 | Programed operation accel/decel selection 5 | 3: Accel/decel time 4 | 0 — | × |
| H-23 | Programed operation accel/decel selection 6 | | 0 — | × |
| H-24 | Programed operation accel/decel selection 7 | | 0 — | × |
| H-25 | Programed operation accel/decel selection 8 | | 0 — | × |

| VF648 | S mode | | | | |
|---------------------------------|---------------|---|---------------------------------|---------|----------------------------------|
| | | Mark of rewriting during operation \bigcirc : | Possible | × : Imp | ossible |
| Standard console LED display | Setting items | Setting range(selection items) | Initializing data by default | Unit | Rewriting during operation |

| (i area) Droop | control | machine | 1099 | compensation | |
|----------------|---------|---------|------|--------------|--|

| | | F | | | |
|------|-------------------------------------|---------------------------|-------|---|---|
| i-00 | Droop control selection | 0: OFF(unused) 1: ON(use) | OFF | — | × |
| i-01 | Droop start speed | 0.0~100.0 | 0.0 | % | 0 |
| i-02 | Droop ratio changeover speed | 0.0~100.0 | 0.0 | % | 0 |
| i-03 | Droop ratio | 0.0~50.0 | 0.0 | % | 0 |
| i-04 | Droop start torque | 0.0~90.0 | 0.0 | % | 0 |
| i-05 | Machine loss compensation selection | 0: OFF(unused) 1: ON(use) | OFF | — | × |
| i-06 | Machine loss offset | 0.0~100.0 | 0.0 | % | 0 |
| i-07 | Machine loss inclination | 0.000~32.767 | 0.000 | % | 0 |

| (J are | a) C | omn | nunication | ı opti | on se | etting | |
|--------|------|-----|------------|--------|-------|--------|--|
| | | | | | | | |

| J-00 | Use-selection of communication option | 0: OFF(unused) 1: ON(use) | OFF | — | × |
|------|---|---------------------------|-----|---|---|
| J-01 | ASYC64 communication speed | 0 : 1200bps | 2 | - | × |
| | | 1 : 2400bps | | | |
| | | 2 : 4800bps | | | |
| | | 3 : 9600bps | | | |
| | | 4 : 19200bps | | | |
| | | 5 : 38400bps | | | |
| J-02 | RSH64 Communication speed | 0 : 125kbps | 3 | — | × |
| | | 1 : 250kbps | | | |
| | | 2 : 500kbps | | | |
| | | 3 : 1Mbps | | | |
| J-03 | | | | | |
| J-04 | Number of frame of commu-nication option in- put (Inverter communication master office) | 3~19 | 14 | - | × |
| J-05 | Number of frame of commu-nication option out- put (Inverter communication master office) | 2~12 | 6 | _ | × |

L area) 2nd motor parameter setting, 2nd speed control gain

| L-00 | Use-selection of 2nd motor function | 0: OFF(unused) 1: ON(use) | OFF | — | × |
|------|--|---|-----|-----------------|---|
| L-01 | 2nd motor capacity | Rated capacity~3 ranks lower capacity | 0 | kW | × |
| L-02 | 2nd motor rated voltage | 200V class: 140~230 400V class: 280~460 | 0 | V | × |
| L-03 | 2nd motor rated current | 40~150% of rated current | 0.0 | А | × |
| L-04 | 2nd motor rated speed | 400~12000 | 0 | r/min | × |
| L-05 | 2nd motor pole selection | 2~12[Pole] | 4 | | × |
| L-06 | 2nd motor rated frequency | Rated speed x pole/120~rated speed x pole/ 120+7.0 | 0.0 | Hz | × |
| L-07 | 2nd motor cooling fan | 0: Self cooling fan 1: Forced cooling fan | 0 | | × |
| L-08 | | | | | |
| L-09 | 2nd motor,primary resistance | | 0 | mΩ | × |
| L-10 | 2nd motor, secondary resistance | Setting range differs, depending on | 0 | mΩ | × |
| L-11 | 2nd motor leakage inductance | Inverter capacity | 0 | mН | × |
| L-12 | 2nd motor mutual inductance | | 0 | mH | × |
| L-13 | 2nd motor inductance maturity correction 1 | | 0 | % | × |
| L-14 | 2nd motor inductance maturity correction 2 | | 0 | % | × |
| L-15 | 2nd motor iron loss conductance | 0.0~600.0 | 0 | mΩ | × |
| L-16 | 2nd motor loss factor 1 | 0.0~200.0 | 0 | % | × |
| L-17 | 2nd motor loss factor 2 | 0.0~200.0 | 0 | % | × |
| L-18 | 2nd speed control proportional gain | 3~100 | 15 | — | 0 |
| L-19 | 2nd speed control integrated time constant | 20~10000 | 40 | ms | 0 |
| L-20 | 2nd speed control inertia moment | 0.0~32767 | 10 | gm ² | 0 |

| | (n area) Monitor setting | | | |
|------|-------------------------------|---------|-----|---|
| n-00 | Line speed monitor adjustment | 0~20000 | 0 — | 0 |
| | | | | |

| (P area) Super block constant setting area | a | | | |
|--|---|---|---|---|
| P-00~259 Super block constant setting area | _ | _ | — | 0 |

9.ASrJ

Func

| | | Mark of rewriting during operation C |) : Possible | imes : In | npossible |
|---------------------------------|---------------|--------------------------------------|---------------------------------|-----------|----------------------------------|
| Standard console LED display | Setting items | Setting range(selection items) | Initializing data by default | Unit | Rewriting during operation |

(S area) Special setting items

Speed control inertia moment

Selection of extended setting area

| S-00 | VDC detection gain | 0.0 \sim 200.0 (adjusted at the time of delivery) | _ | % | × |
|------|---------------------------------|---|---|---|---|
| S-01 | Inverter control mode | VF64S · VF64V · VF64 | _ | — | × |
| S-02 | Inverter capacity,voltage class | 1r122~18022 | _ | — | × |
| | | 1r144~100044 | | | |

VF64V mode

10 gm²

_ _

Ο

0

2. Table of setting items of vector control system with speed sensor (VF64V mode)

| | | Mark of rewriting during operation C | : Possible | \times : Im | possible |
|---------------------------------|--|--------------------------------------|---------------------------------|---------------|----------------------------------|
| Standard console LED display | Setting items | Setting range(selection items) | Initializing data by default | Unit | Rewriting during operation |
| | (Basic setting items) | | | | |
| 0.SrEF | Ref(set).SPD. | -Max. speed~max. speed | 0 | r/min | 0 |
| 1.FJoG | For. jog speed | Min. speed~300 | 24 | r/min | 0 |
| 2.rJoG | Rev. jog speed | -300~-min. speed | -24 | r/min | 0 |
| 3.Acc1 | Accel time (1) | 0.0~3600.0 | 30.0 | sec | 0 |
| 4.dEc1 | Decel time (1) | 0.0~3600.0 | 30.0 | sec | 0 |
| 5.Acc2 | Accel time (2) | 0.0~3600.0 | 0.3 | sec | 0 |
| 6.dEc2 | Decel time (2) | 0.0~3600.0 | 0.3 | sec | 0 |
| 7.ASrP | Speed control proportional gain (1) | 3~50 | 1.5 | - | 0 |
| 8.ASri | Speed control integrated time constant | 20~10000 | 4.0 | ms | 0 |

Transfer to extended setting area by [SET] key

0~32767

(A area) Setting of max. speed, rated value, parameter of motor

| | (| | | | |
|------|---|---|------|-------|---|
| Fund | Selection of basic setting items | Transfer to basic setting items by [SET] key | _ | - | |
| A-00 | Max. speed | 300~14700 | 1800 | r/min | × |
| A-01 | Min. speed | 0~max. speed | 0 | r/min | 0 |
| A-02 | Motor capacity | Rated capacity~capacity of 3 ranks down | 0.0 | kW | × |
| A-03 | Motor rated voltage | 200V class: 140~230 400V class: 280~460 | 0 | V | × |
| A-04 | Motor rated current | 40~150% of rated current | 0.0 | А | × |
| A-05 | Motor rated speed | 25~100% of max. speed | 0 | r/min | × |
| A-06 | Motor pole selection | 2~12[Pole] | 4 | Pole | × |
| A-07 | Motor rated frequency | Rated speed x pole/120~rated speed x pole /120+7.0 | 0.0 | Hz | × |
| A-08 | | | | | |
| A-09 | Number of PG(speed sensor) pulse | 60~3600 | 600 | P/R | × |
| A-10 | PWM carrier frequency | 1.0~15.0 | 6 | kHz | × |
| A-11 | Dead time compensation amount (U phase +side) | 0~400 | _ | - | × |
| A-12 | Dead time compensation amount (U phase -side) | 0~400 | _ | - | × |
| A-13 | Dead time compensation amount (V phase +side) | 0~400 | _ | - | × |
| A-14 | Dead time compensation amount (V phase -side) | 0~400 | _ | - | × |
| A-15 | Dead time compensation amount (W phase +side) | 0~400 | _ | — | × |
| A-16 | Dead time compensation amount (W phase +side | 0~400 | _ | - | × |
| A-17 | Motor, primary resistance | | 0 | mΩ | × |
| A-18 | Motor, 2ndary resistance | Setting range differs, depending on | 0 | mΩ | × |
| A-19 | Motor leakage inductance | Inverter capacity | 0 | mH | × |
| A-20 | Motor mutual inductance | | 0 | mH | × |
| A-21 | Motor inductance saturation compensation1 | | 0 | % | × |
| A-22 | Motor inductance saturation compensation2 | | 0 | % | × |
| A-23 | Motor iron loss conductance | 0.0~600.0 | 0.0 | mho | × |
| A-24 | Motor loss factor 1 | 0.0~200.0 | 0.0 | % | × |
| A-25 | Motor loss factor 2 | 0.0~200.0 | 0.0 | % | × |

VF64V mode

| | | Mark of rewriting during operation \odot | : Possible | \times : Im | possible |
|---------------------------------|---------------|--|------------------------------|---------------|----------------------------------|
| Standard console LED display | Setting items | Setting range(selection items) | Initializing data by default | Unit | Rewriting during operation |

| b-00 Selection of HC(super block) function 0: OFF(unused) 1: ON(use) OFF × b-01 Selection of operation (control) mode 0: Speed control (ASR) mode 0 - × b-01 Selection of operation (control) mode 0: OFF(Inused) 0 - × b-02 Selection of highly efficient operation 0: OFF(Inused) 1: ON(use) OFF - × b-03 Stop mode selection 0: OFF(unused) 1: ON(use) OFF - × b-04 Stop speed 0 -200 30 Ir/min O b-05 DC brake operation time 0.0 -10.0 0.0 96 O b-06 DC brake ourent 20.0~500.0 (rated excitation current = 100%) 100.0 % O O b-08 Jog stop mode selection 0: Free stop 100.0 % O | | (b area) Selection of operation mode, op | eration sequence | | | |
|---|------|---|---|-------|------------|---|
| b-01 Selection of operation (control) mode 1: Minus(-) direction of torque command has priority 2: Plus(+) direction of torque command has priority 3: Torque control (ATR) mode 4: Contact changeover of speed/torque control 0 - × b-02 Selection of highly efficient operation 0: OFF(unused) 1: ON(use) 0: Decel stop 2: Decel stop with DC brake 0 0 OFF 2: Decel stop 2: Decel stop with DC brake 0 0 0 - × b-03 Stop mode selection 0: Dree stop 2: Decel stop with DC brake 0 0.0 sec 0 b-04 Stop speed 0 0.0 sec 0 0 sec 0 b-05 DC brake operation time 0.0 0.0 sec 0 0 0 sec 0 b-06 DC brake ourrent 0: Speed control proportional gain (2) 0-0 3 0 - 0 0 0 0 0 - 0 0 0 0 0 0 0 0 0 - 0 | b-00 | Selection of HC(super block) function | 0: OFF(unused) 1: ON(use) | OFF | - | × |
| b-02 Selection of highly efficient operation 0: OFFE unused) 1: N(use) OFF - × b-03 Stop mode selection 0: Free stop 1 - O b-04 Stop speed 0: -760 stop 1 - O b-04 Stop speed 0: -300 0.0 sec O b-05 DC brake operation time 0.0 -10.0 0.0 sec O b-06 DC brake operation time 0.0 -10.0 0.0 sec O b-07 Jog stop mode selection 0: Free stop 1: Decel stop with DC brake O - b-08 Jog stop speed 0: -300 30 r/min O - O b-09 Speed control proportional gain (2) 3: -100 1: Speed control proportional gain (2) - - b-10 Jog proportional gain selection 0: Speed control proportional gain (2) - - × b-11 Selection of reverse run inhibition 0: OFF (unused) 1: OFF (unused) 0 - × b-13 | b-01 | Selection of operation (control) mode | 0: Speed control (ASR) mode 1: Minus(-) direction of torque command has priority 2: Plus(+) direction of torque command has priority 3: Torque control (ATR) mode 4: Contact changeover of speed/torque control | 0 | _ | × |
| b-03 Stop mode selection 0: Free stop 1: Decel stop 2: Decel stop with DC brake 1 O b-04 Stop speed 0300 30 r/min O b-05 DC brake operation time 0.0~10.0 0.0 sec O b-06 DC brake ourrent 20.0~50.0 (rated excitation current = 100%) 00.0 % O b-07 Jog stop mode selection 0: Free stop 1: Decel stop 0 - O b-08 Jog stop speed 0~300 7/min O O - O b-09 Speed control proportional gain (2) 3~100 15 - O O b-10 Jog proportional gain selection 0: OFF cordinary) 0 - X b-11 Selection of reverse run inhibition 0: OFF (ordinary) 0 - × b-13 Selection of sequence (PLC) function 0: OFF (unused) 1: OFF - × × b-14 Selection of sequence (PLC) function 0: OFF (unused) 1: ON(use) 0FF - × b-15 Selection of speed command setting position 0 | b-02 | Selection of highly efficient operation | 0: OFF(unused) 1: ON(use) | OFF | _ | × |
| b-04 Stop speed 0~300 30 r/min O b-05 DC brake operation time 0.0~10.0 0.0 sec O b-06 DC brake operation time 0.0~10.0 100.0% O b-07 Jog stop mode selection 0: Free stop 1: Decel stop 0 - O b-08 Jog stop speed 0~300 7/min O - O b-09 Speed control proportional gain (2) 3~100 0.5 Speed control proportional gain (1) 0 - O b-10 Jog proportional gain selection 0: Speed control proportional gain (2) - N - O b-11 Selection of restart function at instantaneous power failure 0: ON(use) 1: OFF (unused) OFF - × b-12 Selection of reverse run inhibition 0: OFF (unused) 1: ON(use) OFF - × b-13 Selection of sequence (PLC) function 0: OFF (unused) 1: ON(use) OFF - × b-14 Selection of speed command setting position 0: Interlocking | b-03 | Stop mode selection | 0: Free stop 1: Decel stop 2: Decel stop with DC brake | 1 | - | 0 |
| b-05 DC brake operation time 0.0~10.0 0.0 9.cc O b-06 DC brake current 20.0~500.0 (rated excitation current = 100%) 100.0 % O b-07 Jog stop mode selection 0: Free stop 1: Decel stop 0 - O b-08 Jog stop speed 0~30 30 r/min O b-09 Speed control proportional gain (2) 3~100 15 - O b-10 Jog proportional gain selection 0: Speed control proportional gain (2) 0 - O b-11 Selection of restart function at instantaneous power failure 0: OFF (ordinary) 0 - × b-12 Selection of regeneration stall preventive function 0: OFF (ordinary) 0 - × b-13 Selection of sequence (PLC) function 0: OFF (unused) 1: ON(use) OFF - × b-14 Selection of sequence (PLC) function 0: OFF (unused) 1: ON(use) OFF - × b-15 Selection of speed command setting position 0: Interlocking | b-04 | Stop speed | 0~300 | 30 | r/min | 0 |
| b-06 DC brake current 20.0~500.0 (rated excitation current = 100%) 100.0 % O b-07 Jog stop mode selection 0: Free stop 1: Decel stop 0 - O b-08 Jog stop speed 0~300 30 r/min O b-08 Jog stop speed 0~300 15 O b-09 Speed control proportional gain (2) 3~100 15 O b-10 Jog proportional gain selection 0: Speed control proportional gain (2) 0 - O b-11 Selection of restart function at instantaneous power failure 0: ON(use) 1: DFI(unused) OFF - × b-12 Selection of reverse run inhibition 0: OFF (ordinary) 0 - × b-13 Selection of sequence (PLC) function 0: OFF (unused) 1: ON(use) OFF - × b-14 Selection of setting position at interlocking 0: OFF (unused) 1: ON(use) 0 - × b-16 Selection of speed command setting position 0: Interlocking 0 - × | b-05 | DC brake operation time | 0.0~10.0 | 0.0 | sec | 0 |
| b-07 Jog stop mode selection 0: Free stop 1: Decel stop 0 - O b-08 Jog stop speed 0~300 30 r/min O b-09 Speed control proportional gain (2) 3~100 15 - O b-10 Jog proportional gain selection 0: Speed control proportional gain (2) - O b-11 Selection of restart function at instantaneous power failure 0: OFF (unused) OFF - × b-12 Selection of reverse run inhibition 0: OFF (ordinary) 1: Inhibition of reverse rotation 0 - × b-13 Selection of sequence (PLC) function 0: OFF (unused) 1: ON(use) OFF - × b-14 Selection of sequence (PLC) function 0: OFF (unused) 1: ON(use) OFF - × b-15 Selection of sequence (PLC) function 0: OFF (unused) 1: ON(use) 0 - × b-16 Selection of speed command setting position 0: Interlocking 1 - × b-17 Selection of operation command setting position 0: Interlocking 0 - × | b-06 | DC brake current | $20.0 \sim 500.0$ (rated excitation current = 100%) | 100.0 | % | 0 |
| b-08 Jog stop speed 0~300 30 r/min O b-09 Speed control proportional gain (2) 3~100 15 - O b-10 Jog proportional gain selection 0: Speed control proportional gain (2) 0 - O b-11 Selection of restart function at instantaneous power failure 0: ON(use) 1: OF(unused) OFF - × b-12 Selection of reverse run inhibition 0: OFF (ordinary) 0 - × b-13 Selection of regeneration stall preventive function 0: OFF (unused) 1: ON(use) OFF - × b-14 Selection of sequence (PLC) function 0: OFF (unused) 1: ON(use) OFF - × b-15 Selection of setting position at interlocking 0: Terminal block 1 - × 1: Console (SET64 or SET64 OP) 1 - × 1 - × b-16 Selection of speed command setting position 0: Interlocking 1 - × b-17 Selection of operation comma | b-07 | Jog stop mode selection | 0: Free stop 1: Decel stop 2: Decel stop with DC brake | 0 | - | 0 |
| b-09 Speed control proportional gain (2) 3~100 15 - O b-10 Jog proportional gain selection 0: Speed control proportional gain (2) 0 - O b-11 Selection of restar function at instantaneous power failue 0: ON(use) 1: OFF(unused) OFF - × b-12 Selection of reverse run inhibition 0: OFF (ordinary) 0 - × b-13 Selection of regeneration stall preventive function 0: OFF (unused) 1: ON(use) 0 - × b-14 Selection of sequence (PLC) function 0: OFF (unused) 1: ON(use) 0 - × b-15 Selection of setting position at interlocking 0: Terminal block 1 - × 1: Console (SET64 or SET64OP) 1: Terminal block 1 - × b-16 Selection of operation command setting position 0: Interlocking 0 - × b-17 Selection of operation command setting position 0: Interlocking 0 - × 1: Terminal block 2 | b-08 | Jog stop speed | 0~300 | 30 | r/min | 0 |
| b-10 Jog proportional gain selection 0: Speed control proportional gain (1) 0 - O b-11 Selection of restart function at instantaneous power failure 0: ON(use) 1: OFF(unused) OFF - × b-12 Selection of reverse run inhibition 0: OFF (ordinary) 0 - × b-13 Selection of regeneration stall preventive function 0: OFF(unused) 1: ON(use) OFF - × b-14 Selection of sequence (PLC) function 0: OFF(unused) 1: ON(use) OFF - × b-15 Selection of setting position at interlocking 0: Terminal block 1 - × b-16 Selection of speed command setting position 0: Interlocking 0 - × b-17 Selection of operation command setting position 0: Interlocking 0 - × b-18 Selection of jog command setting position 0: Interlocking 0 - × 1: Terminal block 2: Console (SET64 or SET64OP) 0 - × b-17 Selection of operation command setting position 0: Interlocking 0 - | b-09 | Speed control proportional gain (2) | 3~100 | 15 | <u> </u> | 0 |
| b-11 Selection of restart function at instantaneous power failure 0: ON(use) 1: OFF(unused) OFF - × b-12 Selection of reverse run inhibition 0: OFF (ordinary) 0 - × b-13 Selection of regeneration stall preventive function 0: OFF (ordinary) 0 - × b-14 Selection of sequence (PLC) function 0: OFF(unused) 1: ON(use) OFF - × b-15 Selection of sequence (PLC) function 0: OFF(unused) 1: ON(use) OFF - × b-16 Selection of speed command setting position 0: Interlocking 1 - × 1: Terminal block 2: Console (SET64 or SET64OP) 0 - × b-17 Selection of operation command setting position 0: Interlocking 0 - × b-18 Selection of jog command setting position 0: Interlocking 0 - × b-17 Selection of operation command setting position 0: Interlocking 0 - × b-18 Selection of jo | b-10 | Jog proportional gain selection | 0: Speed control proportiona gain (1) 1: Speed control proportional gain (2) | 0 | - | 0 |
| b-12 Selection of reverse run inhibition 0 : OFF (ordinary) 1 : Inhibition of rotation to reverse direction against command 2 : Inhibition of rotation to reverse direction against command 2 : Inhibition of reverse rotation 0 - × b-13 Selection of regeneration stall preventive function 0: OFF (unused) 1: ON(use) OFF - × b-14 Selection of sequence (PLC) function 0: OFF (unused) 1: ON(use) OFF - × b-15 Selection of setting position at interlocking 0: Terminal block 1: Console (SET64 or SET64OP) 2: Digital communication option (RSH64) 1 - × b-16 Selection of speed command setting position 0: Interlocking 1: Terminal block 2: Console (SET64 and SET64OP) 3: Digital communication option 4: Isolated analog input option 4: Isolated analog input option 4: Isolated analog input option 4: Isolated analog input option 5: Interlocking 1: Terminal block 2: Console (SET64 or SET64OP) 3: Digital communication option 4: Iterminal block 2: Console (SET64 or SET64OP) 3: Digital communication option 5: Interlocking 1: Terminal block 2: Console (SET64 or SET64OP) 3: Digital communication option 5: Digital communication option 5: Interlocking 1: Terminal block 2: Console (SET64 or SET64OP) 3: Digital communication option 5: Digital communication | b-11 | Selection of re-start function at instantaneous power failure | 0: ON(use) 1: OFF(unused) | OFF | — | × |
| b-13 Selection of regeneration stall preventive function 0: OFF (unused) 1: ON(use) OFF - × b-14 Selection of sequence (PLC) function 0: OFF (unused) 1: ON(use) OFF - × b-15 Selection of setting position at interlocking 0: Terminal block 1 - × b-16 Selection of speed command setting position 0: Interlocking 0 - × b-16 Selection of operation command setting position 0: Interlocking 0 - × b-16 Selection of operation command setting position 0: Interlocking 0 - × b-17 Selection of operation command setting position 0: Interlocking 0 - × b-18 Selection of jog command setting position 0: Interlocking 0 - × b-18 Selection of jog command setting position 0: Interlocking 0 - × b-19 Selection of torque command setting position 0: Interlocking 1 - × b-20 Selection of initial excitation 0: AC initial excitation 1: DC initial excitation <t< td=""><td>b-12</td><td>Selection of reverse run inhibition</td><td> 0 : OFF (ordinary) 1 : Inhibition of rotation to reverse direction against command 2 : Inhibition of reverse rotation </td><td>0</td><td>-</td><td>×</td></t<> | b-12 | Selection of reverse run inhibition | 0 : OFF (ordinary) 1 : Inhibition of rotation to reverse direction against command 2 : Inhibition of reverse rotation | 0 | - | × |
| b-14 Selection of sequence (PLC) function 0: OFF(unused) 1: ON(use) OFF × b-15 Selection of setting position at interlocking 0: Terminal block 1 - × 1: Console (SET64 or SET64OP) 2: Digital communication option (RSH64) 1 - × b-16 Selection of speed command setting position 0: Interlocking 0 - × 1: Terminal block 2: Console (SET64 and SET64OP) 0 - × b-16 Selection of speed command setting position 0: Interlocking 0 - × 1: Terminal block 2: Console (SET64 and SET64OP) 0 - × b-17 Selection of operation command setting position 0: Interlocking 0 - × 1: Terminal block 2: Console (SET64 or SET64OP) 0 - × b-18 Selection of jog command setting position 0: Interlocking 0 - × 1: Terminal block 2: Console (SET64 or SET64OP) 3: Digital communication option 0 - × <td< td=""><td>b-13</td><td>Selection of regeneration stall preventive function</td><td>0: OFF(unused) 1: ON(use)</td><td>OFF</td><td>—</td><td>×</td></td<> | b-13 | Selection of regeneration stall preventive function | 0: OFF(unused) 1: ON(use) | OFF | — | × |
| b-15 Selection of setting position at interlocking 2: Digital communication option (RSH64) 1 - × b-16 Selection of speed command setting position 2: Digital communication option (RSH64) 0 - × b-16 Selection of speed command setting position 2: Console (SET64 and SET64OP) 3: Digital communication option 4: Isolated analog input option 0 - × b-17 Selection of operation command setting position 2: Console (SET64 or SET64OP) 3: Digital communication option 4: Isolated analog input option 0 - × b-17 Selection of operation command setting position 2: Console (SET64 or SET64OP) 3: Digital communication option 3: Digital communication option 0 - × b-18 Selection of jog command setting position 2: Console (SET64 or SET64OP) 3: Digital communication option 0 - × b-19 Selection of torque command setting position 2: Digital communication option 0: Terminal block 2: Console (SET64 or SET64OP) 3: Digital communication option 1 - × b-19 Selection of torque command setting position 2: Digital communication option 0: AC initial excitation 1: DC initial excitation 1 - × | b-14 | Selection of sequence (PLC) function | 0: OFF(unused) 1: ON(use) | OFF | — | × |
| b-16 Selection of speed command setting position 0: Interlocking 0 - × 1: Terminal block 2: Console (SET64 and SET64OP) 3: Digital communication option - × b-17 Selection of operation command setting position 0: Interlocking 0 - × b-17 Selection of operation command setting position 0: Interlocking 0 - × b-18 Selection of jog command setting position 0: Interlocking 0 - × b-18 Selection of jog command setting position 0: Interlocking 0 - × b-19 Selection of torque command setting position 0: Terminal block 2: Console (SET64 or SET64OP) 1 - × b-19 Selection of torque command setting position 0: Terminal block 1: Analog option 1 - × b-20 Selection of initial excitation 0: AC initial excitation 1: DC initial excitation 1 - × | b-15 | Selection of setting position at interlocking | 0: Terminal block 1: Console (SET64 or SET64OP) 2: Digital communication option (RSH64) | 1 | - | × |
| b-17 Selection of operation command setting position 1: Terminal block 2: Console (SET64 or SET64OP) 3: Digital communication option 0 - × b-18 Selection of jog command setting position 0: Interlocking 1: Terminal block 2: Console (SET64 or SET64OP) 3: Digital communication option 0 - × b-18 Selection of jog command setting position 1: Terminal block 2: Console (SET64 or SET64OP) 3: Digital communication option 0 - × b-19 Selection of torque command setting position 2: Digital communication option 0: Terminal block 1: Analog option 2: Digital communication option 1 - × b-20 Selection of initial excitation 0: AC initial excitation 1: DC initial excitation 1 - × | b-16 | Selection of speed command setting position | 0: Interlocking 1: Terminal block 2: Console (SET64 and SET64OP) 3: Digital communication option 4: Isolated analog input option | 0 | _ | × |
| b-18 Selection of jog command setting position 0: Interlocking 0 - × 1: Terminal block 2: Console (SET64 or SET64OP) 3: Digital communication option 0 - × b-19 Selection of torque command setting position 0: Terminal block 0: Terminal block 1 - × b-19 Selection of torque command setting position 0: Terminal block 1: Analog option 1 - × b-20 Selection of initial excitation 0: AC initial excitation 1: DC initial excitation 1 - × | b-17 | Selection of operation command setting position | 0: Interlocking 1: Terminal block 2: Console (SET64 or SET64OP) 3: Digital communication option | 0 | _ | × |
| b-19 Selection of torque command setting position 0: Terminal block 1 - × 1: Analog option 2: Digital communication option 1 - × b-20 Selection of initial excitation 0: AC initial excitation 1: DC initial excitation 1 - × | b-18 | Selection of jog command setting position | 0: Interlocking 1: Terminal block 2: Console (SET64 or SET64OP) 3: Digital communication option | 0 | - | × |
| b-20 Selection of initial excitation 0: AC initial excitation 1: DC initial excitation 1 - × | b-19 | Selection of torque command setting position | 0: Terminal block 1: Analog option 2: Digital communication option | 1 | - | × |
| | b-20 | Selection of initial excitation | 0: AC initial excitation 1: DC initial excitation | 1 | - | × |

(c area) Relatives of multifunction input / output

| c-00 | Selection of multifunction input position | 0: Terminal block | 0 | — | × |
|------|---|---------------------------------|---|---|---|
| | | 1: Digital communication option | | | |
Mark of rewriting during operation O: Possible X: Impossible

| Standard console LED display | Setting items | Setting range (selection items) | Initializing data by default | Unit | Rewriting during operation |
|---------------------------------|--|---|---------------------------------|-------|-------------------------------|
| c-01 | Function-selection of terminal block MI1 (multi-function input 1) | 0 : Preset speed command selection 1 | 0 | _ | × |
| c-02 | Function-selection of terminal block MI2 (multi-function input 2) | 1 : Preset speed command selection 2 | 1 | _ | × |
| c-03 | Function-selection of terminal block MI3 (multi-function input 3) | 2 : Preset speed command selection 3 | 3 | _ | × |
| c-04 | Function-selection of terminal block MI4 (multi-function input 4) | 3 : Accel/decel time selection 1 | 4 | _ | × |
| c-05 | Function-selection of terminal block MI5 (multi-function input 5) | 4 : Accel/decel time selection 2 | 7 | _ | × |
| c-06 | Function-selection of terminal block MI6 (multi-function input 6) | 5 : Speed up command (MRH mode) | 14 | _ | × |
| | (| 6 : Speed down ommand (MRH mode) | | | |
| | | 7 : Speed hold | | | |
| | | 8 · Inhibition of S pattern accel/decel | | | |
| | | 9 · Max revolution reduction | | | |
| | | 10: Droop control inactive | | | |
| | | 11: Torque control selection | | | |
| | | 12: For/Bey changeover command | | | |
| | | 13: DC brake command | | | |
| | | 14: Initial excitation command | | | |
| | | 15. External failure signal 1 (protect relay 86A active) | | | |
| | | 16: External failure signal 2 (protect, relay 66A active) | | | |
| | | 17. External failure signal 2 (protect, relay 60A active) | | | |
| | | 19. External failure signal 4 (protect, relay 86A active) | | | |
| | | 10. External failure signal 1 (protect, relay 60A active) | | | |
| | | 19. External failure signal 2 (protect, relay 60A inactive) | | | |
| | | 21. External failure signal 2 (protect, relay 60A inactive) | | | |
| | | 22: External failure signal 4 (protect, relay 60A inactive) | | | |
| | | 22: Trace back external trigger | | | |
| | | 24: 2nd motor selection | | | |
| | | 25: Emergency stop (B contact) | | | |
| | | 26: Advance of programed operation | | | |
| | | 27: Selection of speed command terminal block | | | |
| 0-07 | Function-selection of terminal block MO1 (multi-function output 1) | 0 : End of programed operation | 7 | _ | × |
| c-08 | Function-selection of terminal block MO2 (multi-function output 2) | 1 : Speed detection (1) (speed – detection setting) | , 1 | _ | × |
| c-09 | Function-selection of terminal block MO3 (multi-function output 3) | 2 : Speed detection (1) (speed >= detection setting) | 0 | _ | × |
| c-10 | Function-selection of terminal block MO4 (multi-function output 4) | 3 : Speed detection (1) (speed < = detection setting) | 8 | _ | × |
| | | 4 : Speed detection (2) (speed = detection setting) | | | |
| | | 5 : Speed detection (2) (speed \geq = detection setting) | | | |
| | | 6 : Speed detection (2) (speed \leq = detection setting) | | | |
| | | 7 : Setting reach | | | |
| | | 8 : Torque detection | | | |
| | | 9 : Absolute value torque detection | | | |
| | | 10: During power interruption | | | |
| | | 11: Overload prealarm | | | |
| | | 12: During retry | | | |
| | | 13: During reverse run | | | |
| | | 14: Protective operation code | | | |
| | | 15: Sum check error | | | |
| c-11 | Detection speed (1) | -max. speed~+max. speed | 0 | r/min | 0 |
| c-12 | Detection speed (2) | -max. speed~+max. speed | 0 | r/min | 0 |
| c-13 | Speed detection range | 0~600 | 0 | r/min | 0 |
| c-14 | Detection torque command (with polarity) | -205~205 | 0 | % | 0 |
| c-15 | Detection torque command (absolute value) | 0~205 | 0 | % | 0 |
| c-16 | Overload pre-alarm operation level | 0~100 | 50 | % | 0 |
| c-17 | Speed command reduction rate | 50.0~100.0 | 90.0 | % | 0 |

(d area) Accel/decel setting, speed jump function, MRH function selection

| d-00 | Ordinary operation accel/decel selection | 0 : Accel/decel time 1 | 0 | — | × |
|------|--|------------------------|------|-----|---|
| d-01 | Jog operation accel/decel selection | 1 : Accel/decel time 2 | 1 | — | × |
| | | 2 : Accel/decel time 3 | | | |
| | | 3 : Accel/decel time 4 | | | |
| d-02 | Accel time 3 | 0.0~3600.0 | 30.0 | sec | 0 |
| d-03 | Decel time 3 | 0.0~3600.0 | 30.0 | sec | 0 |
| d-04 | Accel time 4 | 0.0~3600.0 | 30.0 | sec | 0 |
| d-05 | Decel time 4 | 0.0~3600.0 | 30.0 | sec | 0 |

Mark of rewriting during operation \bigcirc : Possible \times : Impossible

| Standard console LED display | Setting items | Setting range (selection items) | Initializing data by default | Unit | Rewriting during operation |
|---------------------------------|---|--|---------------------------------|-------|-------------------------------|
| d-06 | S pattern accel/decel time selection | 0 : OFF (unused) 1: ON (use) | OFF | - | × |
| d-07 | S pattern rise time 1 | 0.0~60.0 | 0.1 | sec | 0 |
| d-08 | S pattern accel reach time 1 | 0.0~60.0 | 0.1 | sec | 0 |
| d-09 | S pattern fall time 1 | 0.0~60.0 | 0.1 | sec | 0 |
| d-10 | S pattern decel reach time 1 | 0.0~60.0 | 0.1 | sec | 0 |
| d-11 | S pattern rise time 2 | 0.0~60.0 | 0.1 | sec | 0 |
| d-12 | S pattern accel reach time 2 | 0.0~60.0 | 0.1 | sec | 0 |
| d-13 | S pattern fall time 2 | 0.0~60.0 | 0.1 | sec | 0 |
| d-14 | S pattern decel reach time 2 | 0.0~60.0 | 0.1 | sec | 0 |
| d-15 | Speed deviation limit command selection | 0 : OFF (unused) 1: ON (use) | OFF | - | 0 |
| d-16 | Plus direction deviation max. value | 0.0 ~ 100.0 | 5.0 | % | 0 |
| d-17 | Minus direction deviation max. value | $-100.0 \sim 0.0$ | -5.0 | % | 0 |
| d-18 | Jump (1) speed | 0~max. speed | 0 | r/min | 0 |
| d-19 | Jump (2) speed | 0~max. speed | 0 | r/min | 0 |
| d-20 | Jump (3) speed | 0~max. speed | 0 | r/min | 0 |
| d-21 | Jump (4) speed | 0~max. speed | 0 | r/min | 0 |
| d-22 | Jump speed range | 0~300 | 0 | r/min | 0 |
| d-23 | MRH function selection | 0 : OFF (unused) 1: ON (use) | OFF | — | × |
| d-24 | MRH upper limit speed | MRH lower limit speed (d-25) ~max. speed | 300 | r/min | 0 |
| d-25 | MRH lower limit speed | -max. speed~MRH upper limit speed (d-24) | 0 | r/min | 0 |

(E area) Torque limit value, torque command characteristics, speed control, relatives of vector control

| | | · · · | | | |
|------|---|--|-------|----|---|
| E-00 | For. powering torque limit value | 0~200 | 150 | % | 0 |
| E-01 | For. regeneration torque limit value | -200~0 | -150 | % | 0 |
| E-02 | Rev. powering torque limit value | -200~0 | -150 | % | 0 |
| E-03 | Rev. regeneration torque limit value | 0~200 | 150 | % | 0 |
| E-04 | Unused | — | _ | — | — |
| E-05 | Torque command mode selection | 0: % command 1: absolute value command | 0 | — | × |
| E-06 | ASR cancelation selection | 0 : OFF (unused) 1: ON (use) | ON | — | × |
| E-07 | ASR feedforward selection | 0 : OFF (unused) 1: ON (use) | ON | - | × |
| E-08 | Variable proportional gain variation start speed | 0.01~100.00 | 5.00 | % | 0 |
| E-09 | Variable proportional min. gain ratio | 0~100 | 100 | % | 0 |
| E-10 | Flux command | 20.0~150.0 | 100.0 | % | × |
| E-11 | Intensification rate of flux at starting | 100.0~150.0 | 100.0 | % | × |
| E-12 | Current control proportional gain | 0.0~9.9 | 3.0 | — | 0 |
| E-13 | Current control integrated time constant | 0.0~9.9 | 1.5 | ms | 0 |
| E-14 | Gain of current control feedforward component | 0~200 | 70 | — | 0 |
| E-15 | Use selection of motor temperature detection option temperature compensation function | 0 : OFF (unused) 1: ON (use) | OFF | _ | × |

(F area) Built-in DB operation setting, protective function, trace back setting

| F-00 | Built-in DB operation level | 200V class: 320~360V | 340 V | 0 |
|------|--|------------------------------|--------------------|---|
| | | 400V class: 640~720V | 680 V | 0 |
| F-01 | For. run side overspeed setting | 0~max. speed (A-00) X 1.5 | 1900 r/min | × |
| F-02 | Rev. run side overspeed setting | -max. speed (A-00) X 1.5~0 | -1900 r/min | × |
| F-03 | Overload protection setting | 20~110 | 100 % | 0 |
| F-04 | FCL level adjustment | 80~125 | 100 % | 0 |
| F-05 | Selection of overtorque protective function | 0 : OFF (unused) 1: ON (use) | ON — | × |
| F-06 | Overtorque protective operation level setting | 110~205 | 150 % | 0 |
| F-07 | Overtorque protective operation standard torque | 50~105 | 105 % | 0 |
| F-08 | Use-selection of speed control error | 0 : OFF (unused) 1: ON (use) | OFF — | × |
| F-09 | Speed control error plus side detection range | 50~500 | 100 r /min | 0 |
| F-10 | Speed control error minus side detection range | -500~-50 | -100 r /min | 0 |
| F-11 | | | | |
| F-12 | selection of motor overheat protective operation | 0 : OFF (unused) 1: ON (use) | OFF — | × |
| F-13 | Selection of protection relay (86A) operation at power failure | 0 : OFF (unused) 1: ON (use) | OFF — | × |
| F-14 | No. of time of protective retry | 0~5 | 0 — | 0 |
| F-15 | Trace back pitch | 1~100 | 1 ms | 0 |
| F-16 | Trace back trigger point | 1~99 | 80 — | 0 |
| F-17 | Trace back CH1 selection | 0~64 | 0 — | 0 |
| F-18 | Trace back CH2 selection | 0~64 | 0 — | 0 |

Mark of rewriting during operation O: Possible X: Impossible

| Standard console LED display | Setting items | Setting range (selection items) | Initializing data by default | Unit | Rewriting during operation |
|---------------------------------|--|------------------------------------|---------------------------------|------|-------------------------------|
| F-19 | Trace back CH3 selection | 0~64 | . 0 | — | 0 |
| F-20 | Trace back CH4 selection | 0~64 | 0 | — | 0 |
| F-21 | Trace back CH5 selection | 0~64 | 0 | — | 0 |
| F-22 | Trace back CH6 selection | 0~64 | 0 | — | 0 |
| F-23 | Trace back CH7 selection | 0~64 | 0 | — | 0 |
| F-24 | Trace back CH8 selection | 0~64 | 0 | — | 0 |
| F-25 | Trace back CH9 selection | 0~64 | 0 | — | 0 |
| F-26 | Trace back CH10 selection | 0~64 | 0 | — | 0 |
| F-27 | Trace back CH11 selection | 0~64 | 0 | — | 0 |
| F-28 | Trace back CH12 selection | 0~64 | 0 | — | 0 |
| | (G area) Analog input/output setting, gain | adjustment | | | |
| G-00 | Analog input +side adjustment gain | 50.00~150.00 | 100.00 | % | 0 |
| G-01 | Analog input -side adjustment gain | 50.00~150.00 | 100.00 | % | 0 |
| G-02 | Analog input setting characteristics selection | 0: $0 \sim \pm 10V$ (bipolarity) | 1 | — | × |
| | | 1: 0~10V (unipolarity) | 1 | | |
| | | 2: 4~20mA | | | |
| | | 3: Pulse train | | | |
| G-03 | Analog input speed command upper limit speed | Absolute value of (G-04)~100.0 | 100.0 | % | 0 |
| G-04 | Analog input speed command lower limit speed | -(G-03)~(G-03) | 0.0 | % | 0 |
| G-05 | Analog input 0 limit voltage | 0.000~1.000 | 0.000 | V | 0 |
| G-06 | Analog output selection | 0: Output voltage | 1 | — | × |
| | | 1: Output current | | | |
| | | 2: Torque command | | | |
| | | 3: Motor speed | - | | |
| | | 4: Speed command | | | |
| | | 5: Super block output | | | |
| | | 6: Calibration | | | |
| | | 7: Internal monitor (for our test) | | | |
| G-07 | Analog output adjustment gain | 50.0~150.0 | 100.0 | % | 0 |
| G-08 | Analog output adjustment offset | -50.0~50.0 | 0.0 | % | 0 |
| G-09 | Speed (frequency) meter output selection | 0: PG output (Duty 1:1) | 2 | — | × |
| | | 1: Output frequency (6F output) | | | |
| | | 2: Motor speed (6F output) | | | |
| | | 3: Calibration (6F output) | | | |
| G-10 | Isolated analog input setting adjustment gain | 50.00~150.00 | 100.00 | % | 0 |
| G-11 | Isolated analog input setting characteristics | 0: 0~10V | 0 | — | × |
| | selection | 1:4~20mA | | | |
| G-12 | Isolated analog setting upper limit speed | Absolute value of (G-13)~100.0 | 100.0 | % | 0 |
| G-13 | Isolated analog setting lower limit speed | -(G-12)~(G-12) | 0.0 | % | 0 |
| G-14 | Isolated torque command input adjustment gain | 50.0~150.0 | 100.0 | % | 0 |
| G-15 | Isolated torque command input offset adjustment quantity | -50.0~50.0 | 0.0 | % | 0 |
| G-16 | Isolated analog output selection | 0: Output voltage | 1 | — | × |
| | | 1: Output current | | | |
| | | 2: Torque command | | | |
| | | 3: Motor speed | ļ | | |
| | | 4: Speed command | - | | |
| | | 5: Super block output | - | | |
| | | 6: Calibration | | | |
| | | 7: Internal monitor (for our test) | - | | |
| | | 8: Output voltage (4~20mA) | | | |
| | | 9: Output current (4~20mA) | ļ | | |
| | | 10: Torque command (4~20mA) | | | |
| | | 11: Motor speed (4 \sim 20mA) | | | |
| | | 12: Speed command (4~20mA) | ļ | | |
| | | 13: Super block output (4~20mA) | | | |
| | | 14: Calibration (4~20mA) | | | |
| G-17 | Isolated analog output adjustment gain | 50.0~150.0 | 100.0 | % | 0 |
| G-18 | Isolated analog output offset adjustment quantity | -50.0~50.0 | 0.0 | % | 0 |
| G-19 | remperature correction option ottset adjustment quantity | -20.0~20.0 | 0.0 | % | 0 |
| G-20 | remperature correction option gain adjustment quantity | 50.0~150.0 | 100.0 | % | 0 |

Mark of rewriting during operation \bigcirc : Possible \times : Impossible

| Standard console LED display | Setting items | Setting range (selection items) | Initializing data by default | Unit | Rewriting during operation |
|---------------------------------|---------------|---------------------------------|------------------------------|------|-------------------------------|
|---------------------------------|---------------|---------------------------------|------------------------------|------|-------------------------------|

(H area) Setting of relatives of programed operation/ preset operation

| | (i · a · ca) · c · a · c · p · c g · a · c · | | | |
|-------|--|---|---------|---|
| H-00 | Preset speed command 1 | | 0 r/min | 0 |
| H-01 | Preset speed command 2 | -max. speed~max. speed | 0 r/min | 0 |
| H-02 | Preset speed command 3 | | 0 r/min | 0 |
| H-03 | Preset speed command 4 | | 0 r/min | 0 |
| H-04 | Preset speed command 5 | | 0 r/min | 0 |
| H-05 | Preset speed command 6 | | 0 r/min | 0 |
| H-06 | Preset speed command 7 | | 0 r/min | 0 |
| H-07 | Preset speed command 8 | | 0 r/min | 0 |
| H-08 | Selection of programed operation mode | 0 : OFF(unused) 1: One-Time 2: End-less | 0 — | × |
| H-09 | Selection of programed operation time unit | 0 : sec 1: min 2: hour | 0 — | × |
| H-10 | Programed operation time 1 | | 0.0 — | 0 |
| H-11 | Programed operation time 2 | 0.0~3600.0 | 0.0 — | 0 |
| H-12 | Programed operation time 3 | | 0.0 — | 0 |
| H-13 | Programed operation time 4 | | 0.0 — | 0 |
| H-14 | Programed operation time 5 | | 0.0 — | 0 |
| H-15 | Programed operation time 6 | | 0.0 — | 0 |
| H-16 | Programed operation time 7 | | 0.0 — | 0 |
| H-17 | Programed operation time 8 | | 0.0 — | 0 |
| H-18 | Programed operation accel/decel selection 1 | | 0 — | × |
| H-19 | Programed operation accel/decel selection 2 | 0 : Accel/decel time 1 | 0 — | × |
| H-20 | Programed operation accel/decel selection 3 | 1 : Accel/decel time 2 | 0 — | × |
| H-21 | Programed operation accel/decel selection 4 | 2 : Accel/decel time 3 | 0 — | × |
| H-22 | Programed operation accel/decel selection 5 | 3 : Accel/decel time 4 | 0 — | × |
| H-23 | Programed operation accel/decel selection 6 | | 0 — | × |
| H-24 | Programed operation accel/decel selection 7 | | 0 — | × |
| H-25 | Programed operation accel/decel selection 8 | | 0 — | × |
| | (i area) Droop control, machine loss com | pensation | | |
| i-00 | Droop control selection | 0:OFF (unused) 1: ON (use) | OFF — | × |
| i-01 | Droop start speed | 0.0~100.0 | 0.0 % | 0 |
| i-02 | Droop ratio changeover speed | 0.0~100.0 | 0.0 % | 0 |
| i-03 | Droop ratio | 0.0~50.0 | 0.0 % | 0 |
| i-04 | Droop start torque | 0.0~90.0 | 0.0 % | 0 |
| i-05 | Selection of machine loss compensation | 0:OFF (unused) 1: ON (use) | OFF — | × |
| i-06 | Machine loss offset | 0~100 | 0 % | 0 |
| i-07 | Machine loss inclination | 0~100 | 0 % | 0 |
| | (J area) Communication option setting | | · · · | • |
| .1-00 | Use-selection of communication option | 0 · OFF (unused) 1 · ON (use) | OFF - | × |
| J-01 | ASYC64 communication speed | 0 · 1200bps | 2 - | × |
| • • • | | 1 : 2400bps | | |
| | | 2 : 4800bps | | |
| | | 3 · 9600bps | | |
| | | 4 : 19200bps | | |
| | | 5 · 38400bps | | |
| .1-02 | BSH64 communication speed | 0 · 125kbps | 3 – | × |
| 0 02 | literio- communication speed | 1 : 250kbps | Ŭ | |
| | | 2 : 500kbps | | |
| | | 3 · 1Mbps | | |
| | 1 | | | I |

| J-03 | | | | | |
|------|---|------|----|---|---|
| J-04 | Number of frame of communication input (Inverter~communication master office) | 3~19 | 14 | I | × |
| J-05 | Number of frame of communication output (Inverter~communication master office) | 2~12 | 6 | | × |

(L area) 2nd motor parameter setting, 2nd speed control gain

| L-00 | Use-selection of 2nd motor function | 0 : OFF (unused) 1: ON (use) | OFF — | × |
|------|-------------------------------------|--|-------|---|
| L-01 | 2nd motor capacity | Rated capacity~capacity of 3 ranks down | 0 kW | × |
| L-02 | 2nd motor rated voltage | 200V class: 140~230 400V class: 280~460 | 0 V | × |

| Mark of rewriting during operation \bigcirc | : Possible | \times : Impossible |
|---|------------|-----------------------|
|---|------------|-----------------------|

| S ALLINA LIAINE | Setting range(selection items) | Initializing | Lloit | Rewriting |
|---|---|---|--|---|
| Setting items | Setting range(selection items) | data by default | Unit | operation |
| 2nd motor rated current | $40{\sim}150\%$ of rated current | 0.0 | A | × |
| 2nd motor rated speed | 400~12000 | 0 | r/min | × |
| 2nd motor pole selection | 2~12[Pole] | 4 | | × |
| 2nd motor rated frequency | Rated speed x pole/120 rated speed x pole /120+7.0 | 0.0 | Hz | × |
| | | | | |
| Number of 2nd motor PG (speed sensor) pulse | 60~3600 | 600 | P/R | × |
| 2nd motor, primary resistance | | 0 | mΩ | × |
| 2nd motor, secondary resistance | Setting range differs, depending on Inverter capacity | 0 | mΩ | × |
| 2nd motor leakage inductance | | 0 | mН | × |
| 2nd motor mutual inductance | | 0 | mΗ | × |
| 2nd motor inductance maturity correction 1 | | 0 | % | × |
| 2nd motor inductance maturity correction 2 | | 0 | % | × |
| 2nd motor iron loss conductance | 0.0~600.0 | 0 | mΩ | × |
| 2nd motor loss factor 1 | 0.0~200.0 | 0 | % | × |
| 2nd motor loss factor 2 | 0.0~200.0 | 0 | % | × |
| 2nd speed control proportional gain | 3~100 | 15 | — | 0 |
| 2nd speed control integrated time constant | 20~10000 | 40 | ms | 0 |
| 2nd speed control inertia moment | 0~32767 | 10 | gm ² | 0 |
| | 2nd motor rated current 2nd motor rated speed 2nd motor pole selection 2nd motor pole selection 2nd motor rated frequency 2nd motor rated frequency 2nd motor rated frequency 2nd motor, primary resistance 2nd motor, primary resistance 2nd motor, secondary resistance 2nd motor leakage inductance 2nd motor leakage inductance 2nd motor inductance maturity correction 1 2nd motor inductance maturity correction 2 2nd motor inductance maturity correction 2 2nd motor inon loss conductance 2nd motor loss factor 1 2nd motor loss factor 1 2nd motor loss factor 2 2nd speed control proportional gain 2nd speed control integrated time constant 2nd speed control inertia moment | 2nd motor rated current 40~150% of rated current 2nd motor rated speed 400~12000 2nd motor pole selection 2~12[Pole] 2nd motor rated frequency Rated speed x pole/120 rated speed x pole /120+7.0 Number of 2nd motor PG (speed sensor) pulse 60~3600 2nd motor, primary resistance 8 2nd motor inductance maturity correction 1 2 2nd motor inductance maturity correction 2 2 2nd motor loss conductance 0.0~600.0 2nd motor loss factor 1 0.0~200.0 2nd motor loss factor 2 0.0~200.0 2nd motor loss factor 2 0.0~200.0 2nd motor loss factor 1 0.0~200.0 2nd speed control proportional gain 3~100 2nd speed control integrated time constant 20~10000 | 2nd motor rated current $40 \sim 150\%$ of rated current 0.0 2nd motor rated speed $400 \sim 12000$ 0 2nd motor pole selection $2 \sim 12[Pole]$ 4 2nd motor rated frequencyRated speed x pole/120 rated speed x pole /120+7.0 0.0 Number of 2nd motor PG (speed sensor) pulse 2nd motor, primary resistance $60 \sim 3600$ 6000 2nd motor, secondary resistance 0.0 0.0 2nd motor leakage inductanceSetting range differs, depending on Inverter capacity 0 2nd motor inductance maturity correction 1 $0.0 \sim 600.0$ 0 2nd motor loss conductance $0.0 \sim 600.0$ 0 2nd motor loss factor 1 $0.0 \sim 200.0$ 0 2nd motor loss factor 2 $0.0 \sim 200.0$ 0 2nd motor loss factor 2 $0.0 \sim 200.0$ 0 2nd speed control proportional gain $3 \sim 100$ 15 2nd speed control integrated time constant $0 \sim 32767$ 10 | 2nd motor rated current $40 \sim 150\%$ of rated current 0.0 Å2nd motor rated speed $400 \sim 12000$ 0 r/min2nd motor pole selection $2 \sim 12[Pole]$ 4 2nd motor rated frequencyRated speed x pole/120 rated speed x pole (120+7.0 0.0 HzNumber of 2nd motor PG (speed sensor) pulse $60 \sim 3600$ 600 P/R2nd motor, primary resistance 0 m Ω 2nd motor, secondary resistance 0 m Ω 2nd motor inductance maturity correction 1 0 mH2nd motor inductance maturity correction 1 0% 2nd motor loss factor 1 $0.0 \sim 200.0$ 0% 2nd motor loss factor 2 $0.0 \sim 200.0$ 0% 2nd motor loss factor 2 $0.0 \sim 200.0$ 0% 2nd motor loss factor 1 $0.0 \sim 200.0$ 0% 2nd motor loss factor 1 $0.0 \sim 200.0$ 0% 2nd speed control proportional gain $3 \sim 100$ $15 -$ 2nd speed control integrated time constant $0 \sim 32767$ 10 gm² |

(n area) monitor setting

Func

| n-00 | Line speed monitor adjustment | 0~20000 |
|------|-------------------------------|---------|
| | | |

(P area) Super block constant setting area

P-00~259 Super block constant setting area

(S area) Special setting items

Selection of extended function

| S-00 | VDC detection gain | 0.0~200.00 (adjusted before delivery) | _ | % | × |
|------|----------------------------------|---------------------------------------|---|---|---|
| S-01 | Inverter control mode | VF64S · VF64V · VF64 | - | _ | × |
| S-02 | Inverter capacity, voltage class | 1r122~18022 | _ | _ | × |
| | | 1r144~100044 | | | |

3. Table of setting items of V/f control system (VF64 mode)

VF64 mode

0 —

_

0

0

| | J | ····/ | | | |
|---------------------------------|------------------------|---|---------------------------------|---------|----------------------------------|
| | | Mark of rewriting during operation \bigcirc : | Possible > | < : Imp | ossible |
| Standard console LED display | Setting items | Setting range(selection items) | Initializing data by default | Unit | Rewriting during operation |
| | (Basic setting items) | | | | |
| 0.FrEF | Ref(set).Frq | -max. frequency~max. fre-quency | 0.5 | Ηz | 0 |
| 1.FJoG | For. run jog frequency | Min. frequency~30.0 | 1.0 | Ηz | 0 |
| 2.rJoG | Rev. run jog frequency | -30.0~-min. frequency | -1.0 | Ηz | 0 |
| 3.Acc1 | Accel time (1) | 0.0~3600.0 | 30.0 s | sec | 0 |
| 4.dEc1 | Decel time (1) | 0.0~3600.0 | 30.0 s | sec | 0 |
| 5.Acc2 | Accel time (2) | 0.0~3600.0 | 0.3 s | sec | 0 |
| 6.dEc2 | Decel time (2) | 0.0~3600.0 | 0.3 s | sec | 0 |
| 7tbSt | Torque boost level | 0.0~20.0 | 0.0 | % | 0 |
| 8.dcbr | DC brake voltage | 0.0~20.0 | 0.0 | % | 0 |
| 9.Stb | Stabilizer quantity | 0.0~100.0 | 0.0 | % | 0 |

(A area) Setting of max. speed, rated value, parameter of motor

| Fund | Selection of basic setting items | Transfer to basic setting items by [SET] key | — — | |
|------|----------------------------------|--|--------------------|---|
| A-00 | Max. frequency | 15.0~400.0 | 60.0 Hz | × |
| A-01 | Min. frequency | 0.0~10.0 | 0.5 Hz | 0 |
| A-02 | Motor capacity | 0~Inverter rated capacity | Inverter rating kW | × |
| 1-02 | Motor rated voltage | 200V class: 140~230 | 200 | ~ |
| A-03 | Notor rated voltage | 400V class: 280~460 | 400 ^v | ^ |

Transfer to extended function by [SET] key

Ο

| | | Mark of rewriting during operation \bigcirc | Possible | \times : Im | possible |
|---------------------------------|--|---|---------------------------------|---------------|----------------------------------|
| Standard console LED display | Setting items | Setting range(selection items) | Initializing data by default | Unit | Rewriting during operation |
| A-04 | Motor rated current | 0~150% of Inverter rated current | Inverter rating | А | × |
| A-05 | Motor rated speed | 400~24000 | 1760 | r/min | × |
| A-06 | Motor pole selection | 2~12[Pole] | 4 | Pole | × |
| A-07 | Motor rated frequency | 15.0~max. frequency (A-00) | 60.0 | Hz | × |
| A-08 | | | | | |
| A-09 | | | | | |
| A-10 | PWM carrier frequency | 1.0~15.0 37KW or less | 15.0 | kHz | × |
| | | 1.0~15.0 45kW or over | 10.0 | kHz | × |
| A-11 | Dead time compensation (U phase +side) | 0~400 | Differs -depen | — | × |
| A-12 | Dead time compensation (U phase -side) | 0~400 | ding on Inverter | — | × |
| A-13 | Dead time compensation (V phase +side) | 0~400 | capacity | — | × |
| A-14 | Dead time compensation (V phase -side) | 0~400 | | — | × |
| A-15 | Dead time compensation (W phase +side) | 0~400 | | — | × |
| A-16 | Dead time compensation (W phase -side) | 0~400 | | — | × |
| A-17 | Motor, primary resistance | Setting range differs, depending on Inverter capacity | 0 | mΩ | × |

b-17 (b area) Selection of operation mode, operation sequence

| b-00 | Selection of HC(super block) function | 0: OFF(unused) 1: ON(use) | OFF | - | × |
|------|---|---|-------|-----|---|
| b-01 | | | | | |
| b-02 | Start mode selection | 0: Free start 1: min. frequency start | 1 | - | × |
| b-03 | Stop mode selection | 0: Free stop | 1 | - | 0 |
| | | 1: Decel stop | | | |
| | | 2: Decel stop with DC brake | | | |
| b-04 | Operation stop frequency | 0.0~30.0 | 1.0 | Hz | 0 |
| b-05 | DC brake operation time | 0.0~10.0 | 0.0 | sec | 0 |
| b-06 | Re-start time | 0.100~10.000 | 0.100 | sec | 0 |
| b-07 | Jog stop mode selection | 0: Free stop 1: Decel stop | 0 | - | 0 |
| | | 2: Decel stop with DC brake | | | |
| b-08 | Stop frequency at jogging | 0.0~10.0 | 1.0 | Hz | 0 |
| h-09 | Boost mode selection | 0: Manual boost | 0 | _ | × |
| 0 00 | Boost mode selection | 1: Auto boost | 0 | | ^ |
| b-10 | | | | | |
| b-11 | Selection of re-start func-tion after instantaneous power failure | 0: ON(use) 1: OFF(unused) | OFF | - | × |
| b-12 | Selection of reverse run inhibition | 0 : OFF (ordinary) | 0 | - | × |
| | | 1 : Inhibition of rotation to reverse direction against command | | | |
| | | 2 : Inhibition of reverse rotation | | | |
| b-13 | Selection of regeneration stall preventive function | 0: OFF(unused) 1: ON(use) | OFF | - | × |
| b-14 | Selection of sequence (PLC) function | 0: OFF(unused) 1: ON(use) | OFF | - | × |
| b-15 | Selection of setting position at interlocking | 0: Terminal block | 1 | - | × |
| | | 1: Console (SET64 and SET64OP) | | | |
| | | 2: Digital communication option | | | |
| b-16 | Selection of frequency command | 0: Interlocking | 0 | - | × |
| | setting position | 1: Terminal block | | | |
| | | 2: Console (SET64 and SET64OP) | | | |
| | | 3: Digital communication option | | | |
| | | 4: Isolated analog input option | | | |
| b-17 | Selection of operation command | 0: Interlocking | 0 | - | × |
| | setting position | 1: Terminal block | | | |
| | | 2: Console (SET64 and SET64OP) | | | |
| | | 3: Digital communication option | | | |
| b-18 | Selection of jog command setting position | 0: Interlocking | 0 | - | × |
| | | 1: Terminal block | | | |
| | | 2: Console (SET64 and SET64OP) | | | |
| | | Digital communication option | | | |

(c area) Relatives of multifunction input/output

| | | . ' | | - | - |
|------|---|---------------------------------|---|---|---|
| c-00 | Selection of multifunction input position | 0: Terminal block | 0 | — | × |
| | | 1: Digital communication option | | | |

Mark of rewriting during operation \bigcirc : Possible \times : Impossible

| Standard console LED display | Setting items | Setting range (selection items) | Initializing data by default | Unit | Rewriting during operation |
|---------------------------------|--|---|---------------------------------|------|-------------------------------|
| c-01 | Function-selection of terminal block MI1 (multi-function input 1) | 0: Preset frequency command selection 1 | 0 | — | × |
| c-02 | Function-selection of terminal block MI2 (multi-function input 2) | 1: Preset frequency command selection 2 | 1 | — | × |
| c-03 | Function-selection of terminal block MI3 (multi-function input 3) | 2: Preset frequency command selection 3 | 3 | — | × |
| c-04 | Function-selection of terminal block MI4 (multi-function input4) | 3: Accel/decel time selection 1 | 4 | — | × |
| c-05 | Function-selection of terminal block MI5 (multi-function input 5) | 4: Accel/decel time selection 2 | 7 | — | × |
| c-06 | Function-selection of terminal block MI6 (multi-function input 6) | 5: Frequency up command (MRH mode) | 14 | — | × |
| | | 6: Frequency down command (MRH mode) | | | |
| | | 7: Frequency hold | | | |
| | | 8: S pattern accel/decel inhibition | | | |
| | | 9: Max. frequency reduction | | | |
| | | 10: Droop control inactive | | | |
| | | 11: | | | |
| | | 12: For/Rev changeover command | | | |
| | | 13: DC brake command | | | |
| | | 14: | | | |
| | | 15: External failure signal 1 (protect. relay 86A active) | | | |
| | | 16: External failure signal 2 (protect. relay 86A active) | | | |
| | | 17: External failure signal 3 (protect. relay 86A active) | | | |
| | | 18: External failure signal 4 (protect. relay 86A active) | | | |
| | | 19: External failure signal 1 (protect. relay 86A inactive) | | | |
| | | 20: External failure signal 2 (protect. relay 86A inactive) | | | |
| | | 21: External failure signal 3 (protect. relay 86A inactive) | | | |
| | | 22: External failure signal 4 (protect. relay 86A inactive) | | | |
| | | 23: Trace back external trigger | | | |
| | | 24: 2nd motor selection | | | |
| | | 25: Emergency stop (B contact) | | | |
| | | 26: Advance of programed operation | | | |
| | | 27: Frequency command terminal block selection | | | |
| c-07 | Function-selection of terminal block MO1 (multi-function output 1) | 0: End of programed operation | 7 | — | × |
| c-08 | Function-selection of terminal block MO2 (multi-function output 2) | 1: Frequency detection (1) (frequency = detection setting) | 1 | _ | × |
| c-09 | Function-selection of terminal block MO3 (mult-ifunction output 3) | 2: Frequency detection (1) (frequency \geq = detection setting) | 0 | — | × |
| c-10 | Function-selection of terminal block MO4 (multi-function output 4) | 3: Frequency detection (1) (frequency \leq = detection setting) | 8 | — | × |
| | | 4: Frequency detection (2) (frequency = detection setting) | | | |
| | | 5: Frequency detection (2) (frequency \geq = detection setting) | | | |
| | | 6: Frequency detection (2) (frequency < = detection setting) | | | |
| | | 7: Setting reach | | | |
| | | 8: Torque detection | | | |
| | | 9: Absolute value torque detection | | | |
| | | 10: During power interruption | | | |
| | | 11: Overload pre-alarm | | | |
| | | 12: During retry | | | |
| | | 13: During reverse run | | | |
| | | 14: Protective operation code | | | |
| | | 15: Sum check error | | | |
| c-11 | Detection frequency (1) | -max. frequency~+max. frequency | 0.0 | Hz | 0 |
| c-12 | Detection frequency (2) | -max. frequency~+max. frequency | 0.0 | Hz | 0 |
| c-13 | Frequency detection range | 0.0~10.0 | 0.0 | Hz | 0 |
| c-14 | Detection torque (with polarity) | -205~205 | 0 | % | 0 |
| c-15 | Detection torque (absolute value) | 0~205 | 0 | % | 0 |
| c-16 | Overload pre-alarm actuation level | 0~100 | 50 | % | 0 |
| c-17 | Speed command reduction rate | 50.0~100.0 | 90.0 | % | 0 |

(d area) Accel/decel setting, speed jump function, MRH function selection

| d-00 | Ordinary operation accel/desel selection | 0: Accel/decel time 1 | 0 | — | × |
|------|--|-----------------------|------|-----|---|
| d-01 | Jog operation accel/desel selection | 1: Accel/decel time 2 | 1 | — | × |
| | | 2: Accel/decel time 3 | | | |
| | | 3: Accel/decel time 4 | | | |
| d-02 | Accel time 3 | 0.1~3600.0 | 30.0 | sec | 0 |
| d-03 | Decel time 3 | 0.1~3600.0 | 30.0 | sec | 0 |
| d-04 | Accel time 4 | 0.1~3600.0 | 30.0 | sec | 0 |

Mark of rewriting during operation \bigcirc : Possible \times : Impossible

| Standard console LED display | Setting items | Setting range (selection items) | Initializing data by default | Unit | Rewriting during operation |
|---------------------------------|--------------------------------------|--|---------------------------------|------|-------------------------------|
| d-05 | Decel time 4 | 0.1~3600.0 | 30.0 | sec | 0 |
| d-06 | S pattern accel/decel time selection | 0: OFF (unused) 1: ON (use) | OFF | — | × |
| d-07 | S pattern rise time 1 | 0.0~60.0 | 0.1 | sec | 0 |
| d-08 | S pattern accel reach time 1 | 0.0~60.0 | 0.1 | sec | 0 |
| d-09 | S pattern fall time 1 | 0.0~60.0 | 0.1 | sec | 0 |
| d-10 | S pattern decel reach time 1 | 0.0~60.0 | 0.1 | sec | 0 |
| d-11 | S pattern rise time 2 | 0.0~60.0 | 0.1 | sec | 0 |
| d-12 | S pattern accel reach time 2 | 0.0~60.0 | 0.1 | sec | 0 |
| d-13 | S pattern fall time 2 | 0.0~60.0 | 0.1 | sec | 0 |
| d-14 | S pattern decel reach time 2 | 0.0~60.0 | 0.1 | sec | 0 |
| d-15 | | | | | |
| d-16 | | | | | |
| d-17 | | | | | |
| d-18 | Jump (1) frequency | 0~max. frequency | 0.0 | Hz | 0 |
| d-19 | Jump (2) frequency | 0~max. frequency | 0.0 | Hz | 0 |
| d-20 | Jump (3) frequency | 0~max. frequency | 0.0 | Hz | 0 |
| d-21 | Jump (4) frequency | 0~max. frequency | 0.0 | Hz | 0 |
| d-22 | Jump frequency range | 0 ~10.0 | 0.0 | Hz | 0 |
| d-23 | MRH function selection | 0: OFF (unused) 1: ON (use) | OFF | — | × |
| d-24 | MRH upper limit frequency | MRH lower limit frequency (d-25)~max. frequency | 5.0 | Hz | 0 |
| d-25 | MRH lower limit frequency | -max. frequency~MRH upper limit frequency (d-24) | 0.0 | Hz | 0 |

(E area) Torque limit value, torque command characteristics, speed control, relatives of vector control

| E-00 | Powering side torque limit | 0~200 | 150 | % | 0 |
|------|--|-----------------------------|------|----|---|
| E-01 | Regeneration side torque limit | -200~0 | -150 | % | 0 |
| E-02 | Use-selection of powering side torque limit | 0: OFF (unused) 1: ON (use) | ON | — | × |
| E-03 | Use-selection of regeneration side torque limit | 0: OFF (unused) 1: ON (use) | ON | — | × |
| E-04 | V/f pattern selection | 0: Straight | 0 | — | × |
| | | 1: Square reduction | | | |
| | | 2: Bend line | | | |
| E_05 | Bend point voltage of bend line in V/f pattern | 200V class: 0~230V | 0 | V | ~ |
| E-05 | | 400V class: 0~460V | 0 | v | ^ |
| E-06 | Bend point frequency of bend line in V/f pattern | 0.0~max. frequency(A-00) | 0.0 | Hz | × |
| E-07 | | | | | |
| E-08 | | | | | |
| E-09 | | | | | |
| E-10 | | | | | |
| E-11 | | | | | |
| E-12 | Current control proportional gain | 0.0~9.9 | 3.0 | — | 0 |
| E-13 | Current control integrated time constant | 0.0~9.9 | 1.5 | ms | 0 |
| E-14 | Gain of current control feedforward component | 0~200 | 70 | — | 0 |
| E-15 | | | | | |

(F area) Built-in DB operation setting, protective function, trace back setting

| F-00 | Built-in DB operation level | 200V class: 320~360V | 340 | V | 0 |
|------|--|------------------------------|-------|----|---|
| | | 400V class: 640~720V | 680 | V | 0 |
| F-01 | For. run side overfrequency setting | 0~max. frequency (A-00)x1.5 | 65.0 | Hz | × |
| F-02 | Rev. run side overfrequency setting | -max. frequency (A-00)x1.5~0 | -65.0 | Hz | × |
| F-03 | Overload protection setting | 20~110 | 100 | % | 0 |
| F-04 | FCL level adjustment | 80~125 | 100 | % | 0 |
| F-05 | | | | | |
| F-06 | | | | | |
| F-07 | | | | | |
| F-08 | | | | | |
| F-09 | | | | | |
| F-10 | | | | | |
| F-11 | | | | | |
| F-12 | Selection of motor overheat protective operation | 0: OFF (unused) 1: ON (use) | OFF | — | × |
| F-13 | Selection of protection relay (86A) operation at power failure | 0: OFF (unused) 1: ON (use) | OFF | — | × |
| F-14 | Number of time of protective retry | 0~5 | 0 | — | 0 |
| F-15 | Trace back pitch | 1~100 | 1 | ms | 0 |

| Mark of rewriting during operation | ○ : Possible | imes : Impossible |
|------------------------------------|--------------|-------------------|
|------------------------------------|--------------|-------------------|

| Standard console LED display | Setting items | Setting range(selection items) | Initializing data by default | Unit | Rewriting during operation |
|---------------------------------|---------------------------|--------------------------------|---------------------------------|------|----------------------------------|
| F-16 | Trace back trigger point | 1~99 | 80 | — | 0 |
| F-17 | Trace back CH1 selection | 0~64 | 0 | — | 0 |
| F-18 | Trace back CH2 selection | 0~64 | 0 | — | 0 |
| F-19 | Trace back CH3 selection | 0~64 | 0 | — | 0 |
| F-20 | Trace back CH4 selection | 0~64 | 0 | — | 0 |
| F-21 | Trace back CH5 selection | 0~64 | 0 | — | 0 |
| F-22 | Trace back CH6 selection | 0~64 | 0 | — | 0 |
| F-23 | Trace back CH7 selection | 0~64 | 0 | — | 0 |
| F-24 | Trace back CH8 selection | 0~64 | 0 | — | 0 |
| F-25 | Trace back CH9 selection | 0~64 | 0 | — | 0 |
| F-26 | Trace back CH10 selection | 0~64 | 0 | — | 0 |
| F-27 | Trace back CH11 selection | 0~64 | 0 | — | 0 |
| F-28 | Trace back CH12 selection | 0~64 | 0 | — | 0 |

(G area) Analog input output setting, gain adjustment

| G-00 | Analog input +side adjustment gain | 50.00~150.00 | 100.00 % | 0 |
|------|--|--|----------|---------|
| G-01 | Analog input -side adjustment gain | 50.00~150.00 | 100.00 % | 0 |
| G-02 | Selection of analog input frequency | $0: 0 \sim \pm 10 V$ (bipolarity) | 1 – | × |
| | setting characteristics | 1 : 0~10V(unipolarity) | | |
| | | 2 : 4~20mA | | |
| | | 3 : Pulse train (0~150kHz) | | |
| G-03 | Analog input frequency command upper limit frequency | Absolute value of (G-04)~100.0 | 100.0 % | 0 |
| G-04 | Analog input frequency command lower limit frequency | $-(G-03) \sim (G-03)$ | 0.0 % | 0 |
| G-05 | Analog input 0 limit voltage | 0.000~1.000 | 0.000 V | 0 |
| G-06 | Analog output selection | 0: Output voltage | 1 – | × |
| | | 1: Output current | | |
| | | 2: Operation torque | | |
| | | 3: Output frequency | | |
| | | 4: Frequency command | | |
| | | 5: Super block output | | |
| | | 6: Calibration | | |
| | | 7: Internal monitor | | |
| G-07 | Analog output adjustment gain | 50.0~150.0 | 100.0 % | 0 |
| G-08 | Analog output adjustment offset | -50.0~50.0 | 0.0 % | 0 |
| G-09 | Speed (frequency) meter output selection | 0: | 1 – | × |
| | | 1: Output frequency (6F output) | | |
| | | 2: Motor speed (6F output) | | |
| | | 3: Calibration (6F output) | | |
| G-10 | Isolated analog input adjustment gain | 50.00~150.00 | 100.00 % | 0 |
| G-11 | Isolated analog input setting | 0 : 0~10V | 0 — | × |
| | characteristics selection | 1 : 4~20mA | | |
| G-12 | Isolated analog input upper limit frequency | Absolute value of (G-13)~100.0 | 100.0 % | 0 |
| G-13 | Isolated analog input lower limit frequency | $-(G-12) \sim (G-12)$ | 0.00 % | 0 |
| G-14 | Isolated torque command input adjustment gain | 50.0~150.0 | 100.0 % | 0 |
| G-15 | Isolated torque command input offset adjustment quantity | / -50.0~50.0 | 0.0 % | 0 |
| G-16 | Isolated analog output selection | 0: Output voltage | 1 – | × |
| | | 1: Output current | | |
| | | 2: Operation torque | | |
| | | 3: Output frequency | | |
| | | 4: Frequency command | | |
| | | 5: Super block output | | |
| | | 6: Calibration | | |
| | | 7: (for our test) | | |
| | | 8: Output voltage (4~20mA) | | |
| | | 9: Output current (4~20mA) | | |
| | | 10: Operation torque (4~20mA) | | |
| | | 11: Output frequency (4~20mA) | | |
| | | 12: Frequency command (4~20mA) | | |
| | | 13: Super block output $(4 \sim 20 \text{mA})$ | | |
| | | 14: Calibration $(4 \sim 20 \text{mA})$ | | |
| G-17 | Isolated analog output adjustment gain | 50.0~150.0 | 100.0 % | 0 |
| | | | | · · · · |

Mark of rewriting during operation \bigcirc : Possible \times : Impossible

| Standard console LED display | Setting items | Setting range(selection items) | Initializing data by default | Unit | during operation |
|---------------------------------|--|--------------------------------|------------------------------|------|---------------------|
| G-18 | Isolated analog output offset adjustment quantity | -50.0~50.0 | 0.0 | % | 0 |
| G-19 | Temperature correction option offset adjustment quantity | -20.0~20.0 | 0.0 | % | 0 |
| G-20 | Temperature correction option gain adjustment guantity | 50.0~150.0 | 10.0 | % | 0 |

(H area) Setting of relatives of programed operation/ preset operation

| H-00 | Preset frequency command 1 | | 0.0 Hz | 0 |
|------|---|--|--------|---|
| H-01 | Preset frequency command 2 | -max. frequency max. frequency | 0.0 Hz | 0 |
| H-02 | Preset frequency command 3 | | 0.0 Hz | 0 |
| H-03 | Preset frequency command 4 | | 0.0 Hz | 0 |
| H-04 | Preset frequency command 5 | | 0.0 Hz | 0 |
| H-05 | Preset frequency command 6 | | 0.0 Hz | 0 |
| H-06 | Preset frequency command 7 | | 0.0 Hz | 0 |
| H-07 | Preset frequency command 8 | | 0.0 Hz | 0 |
| H-08 | Selection of programed operation mode | 0: OFF(unused) 1: One-Time 2: End-less | 0 — | × |
| H-09 | Selection of programed operation time unit | 0 : sec 1 : min 2 : hour | 0 — | × |
| H-10 | Programed operation time 1 | | 0.0 — | 0 |
| H-11 | Programed operation time 2 | 0.0~3600.0 | 0.0 — | 0 |
| H-12 | Programed operation time 3 | | 0.0 — | 0 |
| H-13 | Programed operation time 4 | | 0.0 — | 0 |
| H-14 | Programed operation time 5 | | 0.0 — | 0 |
| H-15 | Programed operation time 6 | | 0.0 — | 0 |
| H-16 | Programed operation time 7 | | 0.0 — | 0 |
| H-17 | Programed operation time 8 | | 0.0 — | 0 |
| H-18 | Programed operation accel/decel selection 1 | | 0 — | × |
| H-19 | Programed operation accel/decel selection 2 | 0: Accel/decel time 1 | 0 — | × |
| H-20 | Programed operation accel/decel selection 3 | 1: Accel/decel time 2 | 0 — | × |
| H-21 | Programed operation accel/decel selection 4 | 2: Accel/decel time 3 | 0 — | × |
| H-22 | Programed operation accel/decel selection 5 | 3: Accel/decel time 4 | 0 — | × |
| H-23 | Programed operation accel/decel selection 6 | | 0 — | × |
| H-24 | Programed operation accel/decel selection 7 | | 0 — | × |
| H-25 | Programed operation accel/decel selection 8 | | 0 — | × |

(i area) Droop control, machine loss compensation

| | (| | | |
|------|----------------------------------|---------------------------|-------|---|
| i-00 | Droop control selection | 0: OFF(unused) 1: ON(use) | OFF — | × |
| i-01 | Droop start frequency | 0.0~100.0 | 0.0 % | 0 |
| i-02 | Droop ratio changeover frequency | 0.0~100.0 | 0.0 % | 0 |
| i-03 | Droop ratio | 0.0~50.0 | 0.0 % | 0 |
| i-04 | Droop start torque | 0.0~90.0 | 0.0 % | 0 |
| i-05 | | | | |
| i-06 | | | | |
| i-07 | | | | |

| | (J area) Communication option setting | | | |
|------|--|---------------------------|-------|---|
| J-00 | Use-selection of communication option | 0: OFF(unused) 1: ON(use) | OFF - | × |
| J-01 | ASYC communication speed | 0 : 1200bps | 2 — | × |
| | | 1 : 2400bps | | |
| | | 2 : 4800bps | | |
| | | 3 : 9600bps | | |
| | | 4 : 19200bps | | |
| | | 5 : 38400bps | | |
| J-02 | RSH64 communication speed | 0 : 125kbps | 3 — | × |
| | | 1 : 250kbps | | |
| | | 2 : 500kbps | | |
| | | 3 : 1Mbps | | |
| J-03 | | | | |
| J-04 | Number of frame of communication input (Inverter~communication master office) | 3~19 | 14 — | × |
| J-05 | Number of frame of communication out- put(Inverter~communication master office) | 2~12 | 6 — | × |
| | (Larea) and motor parameter setting and | d speed control gain | | • |

| L-00 Use-selection of 2nd motor function 0: OFF(unused) 1: ON(use) OFF - × | | (E area) 2nd motor parameter setting, 2nd | speed control gain | | |
|--|------|---|---------------------------|-------|---|
| | L-00 | Use-selection of 2nd motor function | 0: OFF(unused) 1: ON(use) | OFF - | × |

| Mark of rewriting | during operation | ○ : Possible | × : Impossible |
|-------------------|------------------|--------------|----------------|
|-------------------|------------------|--------------|----------------|

| | | <u> </u> | | | |
|---------------------------------|-------------------------------|---|---------------------------------|-------|----------------------------------|
| Standard console LED display | Setting items | Setting range(selection items) | Initializing data by default | Unit | Rewriting during operation |
| L-01 | 2nd motor capacity | 0~Inverter rated capacity | Inverter rating | kW | × |
| L-02 | 2nd motor rated voltage | 200V class: 140~230 400V class: 280~460 | 200 400 | V | × |
| L-03 | 2nd motor rated current | 0~150% of rated current | Inverter rating | A | × |
| L-04 | 2nd motor rated speed | 400~24000 | 1760 | r/min | × |
| L-05 | 2nd motor pole selection | 2~12[Pole] | 4 | | × |
| L-06 | 2nd motor rated frequency | 15.0~max. frequency (A-00) | 60.0 | Hz | × |
| L-07 | | | | | |
| L-08 | | | | | |
| L-09 | 2nd motor, primary resistance | Setting range differs, depending on Inverter capacity | - | mΩ | × |
| L-10 | | | | | |
| L-11 | | | | | |
| L-12 | | | | | |
| L-13 | | | | | |
| L-14 | | | | | |
| L-15 | | | | | |
| L-16 | | | | | |
| L-17 | | | | | |
| L-18 | | | | | |
| L-19 | | | | | |
| L-20 | | | | | |

| | (n area) Monitor setting | | | |
|------|-------------------------------|---------|-----|---|
| n-00 | Line speed monitor adjustment | 0~20000 | 0 — | 0 |
| | | | | |

(P area) Super block constant setting area

P-00~259 Super block constant setting area

(S area) Special setting items

| S-00 V | /DC detection gain | 0.0~200.0 (adjusted before delivery) | _ | % | × |
|---------|---------------------------------|--------------------------------------|---|---|---|
| S-01 In | nverter control mode | VF64S · VF64V · VF64 | | - | × |
| S-02 Ir | nverter capacity, voltage class | 1r122~18022 | | - | × |
| | | 1r144~100044 | | | |

0

4. Explanation of setting items

In VF64 Inverter, basic setting items and extended setting items of $(A \sim S)$ are available as the setting items to set parameters of each function and control.

In basic setting items, comparatively well used setting items were picked up and collected and in extended setting items of (A~

S), the other items were collected dividing into the groups of relative setting items each other.

In this Chapter, functions of VF64 Inverter are explained in order of each setting items.

some functions need setting of plural items related each other. Relevant items are explained later.

As the control mode of VF64 Inverter, following 3 modes are available.

(1) Speed sensorless vector control mode (VF64S mode)

(2) Vector control mode with speed sensor (VF64V mode)

(3) V/f control mode

Depending on the mode, a part of setting items differs.

In this Manual, the said modes are expressed and classified as shown below.

[common]Items which are common to 3 modes of Speed sensorless vector control, Vector control with speed sensor and V/f control.

[Vector control].....Items which are common to 2 modes of Speed sensorless vector control and Vector control with speed sensor.

[V/f control]Items which are effective to V/f control only.

[Speed sensorless vector control]Items which are effective to Speed sensorless vector control mode only.

[Vector control with speed sensor].....Items which are effective to Vector control with speed sensor.

(VF64 mode)

4-1. Basic setting items

In the basic setting items, comparatively well used items in the setting of VF64 Inverter were picked up and collected. As detailed explanations were collected to relative setting items ($A \sim L$), please see them also. (Note 1) Among "Unit" in the tables, that which can be displayed by standard console are 4 kinds only of r/min, Hz,

A, V and other Units are not displayed, for which please pay attention. (Other units are displayed by Option Console)

(1) Rotation speed/ frequency setting (common)

(Vector control)

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit (Note 1) |
|---------|--|-----------------------------------|--------------------|----------------------|------------------|
| 0.SrEF | Reference(setting)speed (Upper tier: Sensorless)(Lower tier: With sensor) | -max. speed~max.speed | 1 | 12 0 | r/min |
| 1.FJoG | Forward jog speed | min. speed \sim 300 | 1 | 24 | r/min |
| 2.rJoG | Reverse jog speed | $-300 \sim -$ min. speed | 1 | -24 | r/min |

(V/f control)

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit (Note 1) |
|---------|-----------------------------|-----------------------------------|--------------------|----------------------|------------------|
| 0.FrEF | Reference(setting)Frequency | —max. freq.~max. freq. | 0.1 | 0.5 | Hz |
| 1.FJoG | Forward jog speed | min. freq.~ 30.0 | 0.1 | 1.0 | Hz |
| 2.rJoG | Reverse jog speed | -30.0 \sim $-$ min. frequency | 0.1 | -1.0 | Hz |

0.SrEF/0.FrEF

Setting in case of setting of drive speed/frequency by console. It will become effective when "console" is selected as the speed/frequency command setting position at b-15 and b-16.(See item of Setting Item b)

1.FJoG 2.rJoG

Set jog speed/frequency at the times of forward jog and reverse jog respectively.

| () | e () | | | | |
|---------|--------------|-----------------------------------|--------------------|----------------------|------|
| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
| 3.Acc1 | Accel time 1 | 0.0 ~ 3600.0 | 0.1 | 30.0 | sec |
| 4.dEc1 | Decel time 1 | 0.0 ~ 3600.0 | 0.1 | 30.0 | sec |
| 5.Acc2 | Accel time 2 | 0.0 ~ 3600.0 | 0.1 | 0.3 | sec |
| 6.dEc2 | Decel time 2 | 0.0 ~ 3600.0 | 0.1 | 0.3 | sec |

(2) Accel/decel time setting (common)

Set accel. time from 0 to max. speed/frequency (A-00) and decel. time from max. speed / frequency (A-00) to 0, respectively. VF64 Inverter has 4 kinds of accel/decel times (accel/decel times 3, 4 are d-02~d-05) and they can be changed over by setting or multifunction input, programed operation, etc.from external (3.Acc1, 4.dEc1 are ordinary operation and 5.Acc2, 6.dEc2 are jog operation in setting by default. For details of accel/decel times setting, please see item of Setting Item d)

(3) Speed control gain (vector control)

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|--|-----------------------------------|--------------------|----------------------|-----------------|
| 7.ASrP | Speed control proportional gain 1 | 3 ~ 50 | 1 | 15 | _ |
| 8.ASri | Speed control integrated time constant | 20 ~ 10000 | 1 | 40 | msec |
| 9.ASrJ | Speed control inertia moment | 0 ~ 32767 | 1 | 10 | gm ² |

In vector control, speed control is executed by MFC control combining feedforward and cancelation using disturbance torque observer.

7.ASrP

Set proportional gain of speed control.

8.ASri

Set integrated time constant equivalent of speed con- Speed command trol by filter time constant.

9.ASrJ

Set inertia moment to be used for cancelation of speed control and feedforward by unit of gm^2 . Ordinary, input 20~100% of added value of "converted value of load inertia moment to motor shaft" and "inertia moment of motor itself". In cases that gear creaks caused by large back rush of gear and belt vibrates by belt connection, make the setting smaller or make no use of cancelation, feedforward by setting of E-06, E-07.



SPEED CONTROL BLOCK

(4) Torque boost level (V/f control)

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|--------------------|-----------------------------------|--------------------|----------------------|------|
| 7.tbSt | Torque boost level | 0.0 ~ 20.0 | 0.1 | 0.0 | % |

Set boost voltage at the time of manual boost by the ratio to the rated voltage setting (A-03). When torque at starting time is short, it can be increased by making large the starting current through making large this setting. (See Setting item b: boost mode selection, Setting item E: V/f pattern setting also.

Note) This function is ineffective when auto-boost is selected.



(5) DC brake amount (V/f control)

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|------------------|-----------------------------------|--------------------|----------------------|------|
| 8.dcbr | DC brake voltage | 0.0 ~ 20.0 | 0.1 | 0.0 | % |

Set the voltage at the time of DC braking by ratio to the rated voltage setting (A-03). When higher braking power by DC brake is required, make this setting large. However, please pay attention since there may be a case of operation of overload protection if too much current is flown. (See item of DC brake of setting item b also)

(6) Stabilizer (adjustment for stabilization) (V/f control)

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|--------------------|-----------------------------------|--------------------|----------------------|------|
| 9.Stb | Stabilizing amount | 0.0 ~ 100.0 | 0.1 | 0.0 | % |

When motor running becomes unstable, it can be stabilized by adjustment of this setting. Operate Inverter by frequency, which makes motor running unstable, and increase stabilizing amount gradually until motor running becomes stable. (Pay attention since running may become unstable if stabilizing amount is increased too much)

(7) Selection of extended function setting (common)

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|--------------------------------|--|--------------------|----------------------|------|
| Func | Selection of extended function | (If [SET] key is pressed here, display turns to "Fund" and by ↑ ↓ keys, item of Setting Items A~P can be selected) | _ | _ | _ |

By pressing of [SET] key in the status of display of selection of this item, display turns to Fund and it becomes possible to set the extended function setting item (setting item A \sim setting item P).

4-2. Setting Item A : Setting of max. speed, rated value, parameter of moter

This item is the area to set the parameter of motor, which becomes necessary in order for VF64 Inverter to execute control. Surely set conforming to the motor and system to be used, before operation of VF64 Inverter. A-11 \sim A-25 are set automatically by execution of auto-tuning. Make auto-tuning combining with motor to be used before regular operation and set each data of A-11 \sim A-25.

(1) Max., min. speed/frequency of motor (common)

(Vector control)

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|--|-----------------------------------|--------------------|----------------------|------------|
| A-00 | Max. speed | 300 ~ 14700 | 1 | 1800 | r/min |
| A-01 | Min. drive speed | 12~max. speed (A-00) | 1 | 12 | r /min |
| | (upper tier: sensorless) (lower tier: with sensor) | 0~max. speed (A-00) | I | 0 | r / 111111 |

(V/f control)

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|----------------------|-----------------------------------|--------------------|----------------------|------|
| A-00 | Max. frequency | 15.0 ~ 400.0 | 0.1 | 60.0 | Hz |
| A-01 | Min. drive frequency | 0.0 ~ 10.0 | 0.1 | 0.5 | Hz |

A-00

(Vector control) Set the max. speed (absolute value) of motor. Inverter controls the speed making this setting as 100% (standard). Make setting in the range of $1\sim4$ times of the rated speed of motor to be used. In case of use of motor with speed of less than its rated speed only, set the rated speed of motor for setting of max. speed. (However, never set larger value than 240Hz equivalent of frequency conversion (14400 at 2 pole, 7200 at 4 pole, 2400 at 6 pole times respectively.

(V/f control) Set the max. frequency (absolute value) of motor. Inverter controls the frequency making this setting as 100% (standard). Set higher value than the rated frequency of motor to be used.

A-01

(Vector control) Set the min. speed of motor. Even if speed command is inputted at less than this speed in absolute value, speed is limited to this value in the case of speed control. (However, this is ineffective at the times of torque control and of use of super block function)

(V/f control) Set the min. frequency of motor. In case that [min. frequency start] is selected at b-02 (start mode selection), output frequency starts from this frequency.

| Display | Conten | t | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|-----------------------|------------------|---|--------------------|----------------------|------------|
| A-02 | Motor consoity | (vector control) | (can set capacity from Inverter rated one till capacity of 3 ranks down in capacity of VF64) | 0.1 | 0.0 | E/M |
| A-02 | Motor capacity | (V/f control) | 0~Inverter rated capacity | 0.1 | Inverter rating | r v v |
| A 02 | Mater rated voltage | (vector control) | 140~230 (200V class) 280~460 (400V class) | 4 | 0 | V |
| A-03 | wotor rated voltage | (V/f control) | | I | 200V 400V | v |
| | | (vector control) | 40~150% of Inverter rating current | | 0.0 | |
| A-04 | Motor rated current | (V/f control) | $0{\sim}150\%$ of Inverter rating current | 0.1 | Inverter rating | A |
| A-05 | Motor rated speed | (vector control) | 25~100% of max. speed | 1 | 0 | r /min |
| A-03 | wow rated speed | (V/f control) | 400~24000 | I | 1760 | 1 / 111111 |
| A-06 | Motor pole selection | | 2~12[Pole] | — | 4 | Pole |
| A-07 | Motor rated frequency | (vector control) | Rated speed x pole/120 ~rated speed x pole/120+7.0 | 0.1 | 0.0 | Hz |
| | | (V/f control) | 15.0~max. frequency(A-00) | | 60.0 | |

(2) Setting of motor rating plate values (common)

Note) At the time of initializing in V/f control, typical value of same motor capacity with Inverter capacity is set.

For the items of A-02~A-07, set each rating value described in motor rating plate and data sheet. As these settings are used at the time of vector control and auto-tuning (automeasuring of constant), surely set them before auto-tuning. (If auto-tuning is done without setting, setting error (SEtO) is displayed.

Set each value described in motor rating plate as per Fig. right and in data sheet of motor.

(Vector control) Less than motor rated speed is control area of torque constant an more than rated speed is control area of power constant.

(V/f control) V/f characteristics become motor rated voltage (A-03) at the time of motor rated frequency (A-07). In the frequency of more than rated frequency (A-07), rated voltage becomes constant at motor rated voltage (A-03).







(3) Selection of motor cooling fan (sensorless vector control)

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|--------------------------------|--|--------------------|----------------------|------|
| A-08 | Selection of motor cooling fan | 0: self cooling fan 1: forced cooling fan | _ | 0 | _ |

A-08 correct the variation of motor constant caused by temperature change of the inside of motor. Select 1 (forced cooling fan) in case that motor cooling fan is drived by another fan motor. Select 0 (self cooling fan) in case of cooling by fan connected directly with motor shaft (cooling by rotation of motor itself).

(4) Setting of number of PG(speed sensor) pulse (vector control with sensor)

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|-----------------|-----------------------------------|--------------------|----------------------|------|
| A-09 | No. of PG pulse | 60~3600 | 1 | 600 | P/R |

A-09 set the number of pulse of PG, which is connected directly with shaft of motor to be used.

(5) Setting of carrier frequency (common)

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------------|-------------------|-----------------------------------|--------------------|----------------------|------|
| Note) A-10 | Carrier frequency | 1.0~ 15.0 | 0.1 | 6.0 15.0 10.0 | kHz |

Note) This is modulated carrier frequency of voltage output PWM of Inverter.

As to figures of initializing data, upper tier is at the time of vector control, middle tier is 37kW or less at V/f control and lower tier is 45kW or over at V/f control.

(Vector control) Set 6kHz ordinary. In case of setting at 9kHz or over in the types of Inverter capacity 37kW or less and at 6kHz or over in the types of Inverter capacity 45kW or over, please contact us since it is necessary to use lowering the Inverter rated current.

(V/f control) Set 15kHz in the types of Inverter capacity 37kW or less and 10kHz in the types of Inverter capacity 45kW or over ordinary. In case of setting at 10kHz or over in the types of Inverter capacity 45kW or over, please contact us since it is necessary to use lowering the Inverter rating current.

(common) In case that carrier frequency is changed, it is necessary to do auto-tuning (DC mode) since a part of constant must be re-adjusted, for which please pay attention. (See explanation of auto-tuning)

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|----------------------------------|---|--------------------|----------------------|------|
| A-11 | Dead time compensation amount U+ | 0~400 | 1 | — | _ |
| A-12 | Dead time compensation amount U- | 0~400 | 1 | — | |
| A-13 | Dead time compensation amount V+ | 0~400 | 1 | — | |
| A-14 | Dead time compensation amount V- | 0~400 | 1 | — | — |
| A-15 | Dead time compensation amount W+ | 0~400 | 1 | — | _ |
| A-16 | Dead time compensation amount W- | 0~400 | 1 | — | — |
| A-17 | Primary resistance | (Depending on Inverter capacity, setting range and resolution differ) | | _ | mΩ |

(6) Electrical constant of motor, Inverter (common)

Note) In case of initialization by V/f control mode, typical value is set for initializing data depending on capacity. (However, reset by auto-tuning to the utmost since actual value differs depending on individual Inverter and motor) In vector control mode, all are initialized to 0.

(vector control)

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|--------------------------------------|---|--------------------|----------------------|------|
| A-18 | 2ndary resistance | Setting range and resolution differ, depending on Inverter capacity | | 0 | mΩ |
| A-19 | Leakage inductance | | | 0 | mΗ |
| A-20 | Mutual inductance | | | 0 | mΗ |
| A-21 | Inductance saturation compensation 1 | | | 0 | % |
| A-22 | Inductance saturation compensation 2 | | | 0 | % |
| A-23 | Iron loss conductance | 0.0~600.0 | 0.0 | 0.0 | mho |
| A-24 | Loss factor 1 | 0.0~200.0 | 0.0 | 0.0 | % |
| A-25 | Loss factor 2 | 0.0~200.0 | 0.0 | 0.0 | % |

(Vector control)

A-17~A-25 are electrical and mechanical constants of Inverter and motor to be used for operation of vector control. These settings are automatically set by execution of auto-tuning.

A-11~A-16 are dead time compensation amount of switching element(IGBT element) in the Inverter and it compensate influence to the flux operation. As there are elements at +side, -side of U, V, W phases respectively, dead time compensation amount is also prepared for 6 elements individually. By execution of auto-tuning, the most suitable compensation amount for each element are set.

A-17~A-23 are electrical parameters in the motor and they are used for operation of vector control. Please set them by autotuning.

Inductance saturation compensation 1, 2 are increased amount (%) from mutual inductance at the time of 100% flux in case that each flux is 90% and 70%.

A-24~A-25 are factors to show electrical and mechanical loss of motor itself, which are measured and operated by auto-tuning.

(V/f control)

A-11~A-16 are used for compensation to output voltage deviation caused by dead time of switching element (IGBT element) in the Inverter and used for operation of auto-boost.Typical value is set by initializing but compensation value of more suitable for each element of Inverter unit to be used, is set by execution of auto-tuning.

A-17 is resistance value between primary winding of motor and wiring of motor-Inverter.

It is used for operation of auto-boost, which automatically compensates voltage drop caused by this resistance component. Also, it is used for operation of torque. Typical value is set by initializing but compensation value of more suitable for each element is set by execution of auto-tuning.

(7) Auto-tuning (automatic measurement of constant) (common)

VF64 Inverter has auto-tuning function, which sets electrical constant of motor and Inverter automatically. By auto-tuning, data of A-11~A-25 and correction table memorized in the Inverter are set automatically.

In auto-tuning, 2 kinds (full mode and DC mode) are available.

Note) Without execution of auto-tuning and even if the result of auto-tuning executed by other Inverter is set in A-11 \sim A-25, Inverter cannot be operated since correction table is not set. In such case, Inverter can be operated by execution of auto-tuning of DC mode after setting of A-11 \sim A-25. Also, in case of replacement of control P.C.Board caused by trouble, etc., all data including individual table can be copied by using of setting copy function (option console).

A) Full mode auto-tuning (vector control)

A-11~A-25 and all of internal correction table are measured automatically.

At the time of tuning, motor runs until about the rated speed. Disconnecting the motor from load machine, execute auto-tuning in the status of motor alone.

B) DC mode auto-tuning (common)

A-11~A-17 (dead time compensation amount, motor primary resistance) and internal correction table only are measured automatically. Since test is executed by DC current, motor does not run (in case of status of motor alone, there may be a case of very slow run of motor). Therefore, test can be executed even in case that it is difficult to separate the load machine. DC mode auto-tuning is used in cases that (1) data of A-18~A-25 are known in advance and (2) wiring was changed after full mode atuo-tuning (since wiring resistance is operated as a part of primary resistance, primary resistance varies on appearance when wiring is changed) and (3) setting of carrier frequency was changed. (For risk prevention, tuning should be done braking the load machine side.

- C) Order of auto-tuning (common)
- (In case of full mode) (vector control)
- 1) Disconnecting the motor from load machine, connect it with Inverter.
- 2) Turn on the power of Inverter and set the setting of A-00~A-10 from motor rating plate,etc.
- 3) Once turn off the power and open the cover. Set No.6 of DIP switch SW-1 on the control VFC64-P.C.Board of Inverter at ON.
- 4) Turn on the power again. ("tun" is displayed in console)
- 5) When console [JOG] key is pressed, auto-tuning starts. ("tunst" is displayed) As motor runs at this time, please be careful.
- 6) By several minutes (time differs depending on capacity), tuning ends. ("tuned" is displayed in console)
- 7) Turn off the power of Inverter and return No.6 of DIP-SW1 to OFF.
- 8) Turning on the power, confirm that the data were set at each setting of A-11 \sim A-25.

(In case of DC mode) (common)

- 1) Connect the motor with Inverter.
- 2) Turn on the power of Inverter and set the setting of A-00 \sim A-10 from motor rating plate, etc.
- 3) Once turn off the power and open the cover. Set Nos. 5 and 6 of DIP-SW1 on the control VFC64-P.C.Board of Inverter at ON. (in case of V/f control, mode turns to DC mode by setting of No.6 only of DIP-SW1)
- 4) Turn on the power again. ("tund" is displayed in console)
- 5) When console [JOG] key is pressed, auto-tuning starts. ("tunst" is displayed) As current flows to motor at this time, please be careful.
- 6) By several minutes (time differs depending on capacity), tuning ends. ("tunEd" is displayed in console)
- 7) Turn off the power of Inverter and return No.5 and 6 of DIP-SW1 to OFF.
- 8) Turning on the power, confirm that the data were set at each setting of A-11 \sim A-17.
- (Error during tuning) (common)
- If error occurred during tuning, error indication is displayed in console and Inverter stops.
- When SEtO is displayed :
 - Setting error of A-00~A-10 can be presumed. Revise the setting and redo from the beginning.
- When tun-- is displayed:

This shows that there is an error in the result of tuning. Confirm setting of A-00 \sim A-10, wiring between Inverter and motor, and whether load is not connected with motor (full mode only) and redo.

- Other protective indication:
- It shows the operation of protective function during auto-tuning. Eliminate the cause and redo from the beginning.

4-3. Setting Item b Selection of operation mode, operation sequence

(1) Selection of HC(super block) function (common)

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|---------------------------------------|-----------------------------------|--------------------|----------------------|------|
| b-00 | Selection of HC(super block) function | 0 : OFF 1 : ON | _ | OFF | _ |

For using of HC(super block) function, setting should be ON. Usually, set at OFF.

As to details of HC(super block) function, see Manual [Super Block Editor].

(2) Selection of operation mode (speed control/ torque control) (vector control)

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|-----------------------------|--|--------------------|----------------------|------|
| b-01 | Selection of operation mode | 0: Speed control mode 1: -direction of torque command takes priority 2: +direction of torque command takes priority 3: Torque control mode 4: Contact-changeover of speed/torque control | _ | 0 | _ |

Select operation mode (speed control/ torque control/ priority). Combining with multifunction input, it is possible to changeover by external contact.



SELECTION OF OPERATION MODE

(3) Selection of highly efficient operation mode (vector control)

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|---|-----------------------------------|--------------------|----------------------|------|
| b-02 | Selection of highly efficient operation | 0 : OFF 1 : ON | - | OFF | _ |

At the time of light load, execute highly efficient operation adjusting excitation current command automatically. (As responsiveness is damaged, set at OFF in the application which requires high speed response)

(4) Selection of start mode (V/f control)

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|----------------------|--|--------------------|----------------------|------|
| b-02 | Start mode selection | 0: Free start 1: Min. frequency start | _ | 1 | _ |
| b-06 | Re-start time | 0.100~10.000 | 0.001 | 0.100 | sec |

By b-02, select start mode. By b-06, set re-start time after stop of Inverter. Until passing over of this time, Inverter does not re-start even if operation signal is turned to ON.

Note) In case of free start of comparatively large capacity motor, free start may fail caused by residual flux remained in motor if motor is re-started just after operation.

In such case, elongate re-start time of b-06 and adjust. In case that Inverter operation is turned to OFF by frequency of less than 1/10 of max. frequency, Inverter output current starts from min. frequency even if free start is selected for next start time.

| Free start | Min. frequency start |
|--|--|
| When operation command is turned to ON during free run of motor, Inverter starts from frequency synchronized with motor speed. | Regardless of running of motor, Inverter starts from min. op- eration frequency (A-01). (In case of re-starting after instan- taneous power failure, output current re-starts from opera- tion frequency of just before detection of power failure) |
| Operation command Output current free run Motor speed | Operation command Output current free run Motor speed |

(5) Selection of stop mode (common)

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|---|--|--------------------|----------------------|-------|
| b-03 | Stop mode selection | 0: Free stop 1: Decel stop 2: Decel stop with DC brake | _ | 1 | _ |
| b 04 | Stop frequency (at the time of sensorless vector control, V/f control) | 0.0~30.0 | 0.1 | 1.0 | Hz |
| D-04 | Stop speed (vector control with sensor) | Min. speed~300 | 1 | 30 | r/min |
| b-05 | DC brake operating time | 0.0~10.0 | 0.1 | 0.0 | sec |
| b-06 | DC brake current (vector control only) | 20~500 (rated excitation current = 100%) | 1 | 100 | % |
| b-07 | Jog stop mode selection | 0: Free stop 1: Decel stop 2: Decel stop with DC brake | _ | 0 | _ |
| b-08 | Jog stop frequency (at the time of sensorless vector control, V/f control) | 0.0~30.0 | 0.1 | 1.0 | Hz |
| | Jog stop speed (vector control with sensor) | Min. speed~300 | 1 | 30 | r/min |

Settings b-03 and b-07 select activation in case of turning to OFF of operation command / jog command. (In case that b-01 is set at other point than 0(speed control) in vector control, motor always becomes "Free Stop" regardless of setting of Settings b-03 and b-07.

| Free stop | Decel stop | Decel stop with DC brake |
|--|--|---|
| Output voltage stops when operation command/jog command are turned to OFF. | Output voltage stops after deceleration in accordance with decel. time until the speed of b-04/b-08. | Make DC braking for the time of b-05 after deceleration in accordance with decel. time until speed of b-04/b-08. (vector control) Adjust current at the time of DC braking, by b-06. (V/f control) Adjust current at the time of DC braking, by 8.dcbr. |
| Operation/jog command | Operation/jog command | Operation/jog command |
| Output current | Output current Motor speed b-04/b-08 | Output current |

(6) Change of speed control gain at jog time (vector control)

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|---|--|--------------------|----------------------|------|
| b-09 | Speed control proportional gain (2) | 3 ~ 100 | 1 | 15 | _ |
| b-10 | Proportional gain selection at jog time | 0: speed control proportional gain (1) 1: speed control proportional gain (2) | - | 0 | — |

When other proportional gain than that of ordinary operation is used at jog time, select (2) for speed control proportional gain by proportional gain selection (b-10) at jog time. At jog time, make speed control by proportional gain (2) of b-09, instead of proportional gain of basic setting item [7.ASrP].

(7) Selection of boost mode (V/f control)

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|----------------------|-----------------------------------|--------------------|----------------------|------|
| b-09 | Boost mode selection | 0: Manual boost 1: Auto-boost | _ | 0 | _ |

Depending on the motor and load characteristics, following 2 boost modes are selectable.

| Manual boost | Auto-boost | | | |
|---|--|--|--|--|
| Conforming to the characteristics of motor load, adjust boost level by 7.tbSt. (At the time of multi-motors drive, select manual boost) | Depending on the load, adjust boost level automatically. (Set- ting of 7.tbSt becomes ineffective) Since dead time compen- sation amount and primary resistance are necessary to be set accurately, execute auto-tuning (see setting item A) at the time of use. This is not usable in case of multi-motors drive) | | | |
| Output voltage A-03 (motor rated voltage) 7.tbSt A-07(motor rated frequency) Output frequency | Output voltage A-03 (motor rated voltage) Load increase A-07(motor rated frequency) Output frequency | | | |

(8) Setting of operation at re-starting after instantaneous power failure (common)

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|--|-----------------------------------|--------------------|----------------------|------|
| b-11 | Selection of re-starting after instantaneous power failure | 0 : ON 1 : OFF | _ | OFF | _ |

If instantaneous power failure occurred, operation stops temporarily and after that, select transaction after re-supply of power. OFF: Even after re-supply of power, operation does not start (Inverter keeps stopping). For re-starting of operation, it is necessary to turn operation (jog) command to OFF once and to turn again to ON.

ON : After re-supply of power, operation re-starts automatically. However, operation command to Inverter is necesary to be held at ON in case that Inverter is operated by contact signal or command of digital option.

| (9) | Settina o | f rev. | run | inhibition | function | (common |) |
|-----|-----------|--------|-----|------------|----------|---------|---|
| (~) | 00000.90 | | | | | (00 | , |

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|-------------------------------------|---|--------------------|----------------------|------|
| b-12 | Selection of reverse run inhibition | OFF (ordinary) Inhibition of rotation to reverse direction against command Inhibition of reverse rotation | _ | 0 | _ |

Reverse run is inhibited.

1) Ordinary operation (b-12=0)

This is ordinary operation. There is no limit in both forward and reverse operation.

2) Inhibition of rotation to rev. direction against command (b-12=1)

Inhibit rotation to reverse direction against direction of operation command at the time of Inverter starting. (Once Inverter started, rotation to reverse direction against direction of command at the time of starting is inhibited until stop of Inverter. Even if forward run operation command and reverse run operation command are exchanged after starting, direction of rotation does not change unless Inverter is stopped)

(vector control)

| | At the time of | speed control | At the time of |
|--------------------------------------|---|---|--|
| | In case that speed command input is +side | In case that speed command input is -side | torque control |
| Starts by for. run operation command | Operates to for. run | Limit to min. speed of for. run side | Limit output frequency of rev. run side to 0 |
| Starts by rev. run operation command | Operates to rev. run | Limit to min. speed of rev. run side | Limit output frequency of for. run side to 0 |

(V/f control)

| | In case that frequency command input is +side | In case that frequency command input is -side |
|--------------------------------------|---|--|
| Starts by for. run operation command | Operates to for. run | Limit to min. operation frequency of for. run side |
| Starts by rev. run operation command | Operates to rev. run | Limit to min. operation frequency of rev. run side |

3)Inhibition of reverse run operation

Regardless of direction of operation command, inhibit operation to reverse run direction (when phase sequence of Inverter output voltage is $U \rightarrow V \rightarrow W$, direction of rotation is regarded as " forward run") of motor. Limit speed command (frequency command) to reverse run direction to 0.

Note) When [Inhibition of operation to reverse direction against cmmand] or [Inhibition of reverse run opration] is selected, there is a case of deterioration of speed control characteristics since frequency is limited in the area of low speed. In such case, select OFF (ordinary)

(10) Setting of regeneration stall prevention function (common)

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|--|-----------------------------------|--------------------|----------------------|------|
| b-13 | Regeneration stall prevention function | 0 : OFF 1 : ON | _ | OFF | _ |

(vector control) In case that DC voltage increased exceeding [DB operation level (F-00) + 5V (10V in case of 400V)], trip by actuation of overvoltage protection (0V) can be prevented by limiting the torque command of regeneration side (-direction at the time of forward run and +direction at the time of reverse run) to 0 (by stopping of deceleration once if during deceleration).

(V/f control) In case that DC voltage increased exceeding [DB operation level (F-00) + 5V (10V in case of 400V)], trip by actuation of overvoltage protection (0V) can be prevented by stopping of deceleration once if during deceleration.

(11) Selection of sequence function (common)

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|--------------------------------|-----------------------------------|--------------------|----------------------|------|
| b-14 | Selection of sequence function | 0 : OFF 1 : ON | _ | OFF | _ |

Select use of sequence function incorporated in VF64 Inverter.

As to details of sequence function, see [Sequence Manual].

(12) Selection of setting positions of speed/frequency, operation, jog command (common)

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|---|--|--------------------|----------------------|------|
| b-15 | Selection of setting position at interlocking | 0: terminal block 1: Console (SET64) 2: Digital communication option | _ | 1 | _ |
| b-16 | Selection of speed command setting position (vector control) Selection of frequency command setting position (V/f control) | 0: Interlocking 1: Terminal block 2: Console (SET64) 3: Digital communication option 4: Isolated analog input option | _ | 0 | _ |
| b-17 | Selection of operation command setting position | 0: Interlocking | - | 0 | _ |
| b-18 | Selection of jog command setting position | 2: Console (SET64) 3: Digital communication option | _ | 0 | _ |

(Select setting positions of speed (frequency), operation, jog command. These setting positions can be set en bloc by setting of b-15. Selection position of each command by combination of settings of b-15~b-18 are as per Table of next page.

| | | Selection of setting positions at interlocking (b-15) | | | |
|---------------------------|------------------------------------|---|---|---|--|
| | | 0: Terminal block | 1: Console | 2: Digital communication option | |
| | 0: Interlocking | VFC64TB-P.C.Board [0-±10] or [4-20] terminal | Console [0.SrEF] setting [0.FrEF]setting | Speed command by communication | |
| Speed/frequency | 1: Terminal block | VFC64TB-P.C.Board [0-±10] or [4-20] terminal | VFC64TB-P.C.Board [0-±10] or [4-20] terminal | VFC64TB-P.C.Board [0-±10] or [4-20] terminal | |
| command (b-16 setting) | 2: Console(SET64) | Console [0.SrEF] setting, [0.FrEF] setting | Console [0.SrEF] setting, [0.FrEF] setting | Console [0.SrEF] setting, [0.FrEF] setting | |
| | 3: Digital communication option | Command by communication | Command by communication | Command by communication | |
| | 4: Isolated analoginput | ISO64, IO64 option | ISO64, IO64 option | ISO64, IO64 option | |
| | 0: Interlocking | VFC64 P.C.Board [ST-F],[ST-R] terminal | Console [START], [FOR/REV] key | Operation command by communication | |
| Operation | 1: Terminal block | VFC64 P.C.Board [ST-F],[ST-R] terminal | VFC64 P.C.Board [ST-F],[ST-R] terminal | VFC64 P.C.Board [ST-F],[ST-R] terminal | |
| (b-17 setting) | 2: Console(SET64) | Console [START],[FOR/REV]key | Console [START],[FOR/REV]key | Console [START],[FOR/REV]key | |
| | 3: Digital communication option | Operation command by communication | Operation command by communication | Operation command by communication | |
| | 0: Interlocking | VFC64 P.C.Board [JOG-F],[JOG-R] terminal | Console [JOG],[FOR/REV] key | Jog command by communication | |
| Jog command | 1: Terminal block | VFC64 P.C.Board [JOG-F],[JOG-R] terminal | VFC64 P.C.Board [JOG-F],[JOG-R] terminal | VFC64 P.C.Board [JOG-F],[JOG-R] terminal | |
| (b-18 setting) | 2: Console(SET64) | Console [JOG],[FOR/REV] key | Console [JOG],[FOR/REV] key | Console [JOG],[FOR/REV] key | |
| | 3: Digital communication option | Jog command by communication | Jog command by communication | Jog command by communication | |

•In case that speed command is inputted from terminal block, changeover of $[0-\pm10]$ terminal block ($0 \sim \pm 10V$ voltage input or $0 \sim +10V$ voltage input) and [4-20] terminal block ($4 \sim 20$ mA current input) is performed by G-02 setting. (By default, $[0-\pm10](0 \sim +10V$ voltage input:uni-polarity) is selected)

•In case that super block function use selection (b-00) is set at ON, speed command is outputted from super block function, regardless of this selection.

•In case that sequence function use selection (b-14) is set at ON, operation/jog command is outputted from sequence function, regardless of this setting.

(13) Selection of torque command setting position (vector control)

| | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|------|--|--|--------------------|----------------------|------|
| b–19 | Selection of torque command setting position | 0: Terminal block 1: Analog option 2: Digital communication option | _ | 1 | - |

Select setting position of torque command at the time of torque control mode.

Terminal block : Input from VFC64TB-P.C.Board [0-±10] terminal. Analog option : Input from terminal of ISO64 option.

Digital communi-

cation option : Torgue command by communication.

Torque command characteristic in case of input from terminal block and analog option is as per Fig. right.

Note) Since detection speed of VFC64TB-P.C.Board[0-±10] terminal input is a bit slow (1ms each), use analog option in case of use in application which requires high speed response.



Torque Command Input Characteristic

(14) Mode selection at the time of initial excitation (vector control with sensor)

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|---------------------------------|--|--------------------|----------------------|------|
| b-20 | Selection of initial excitation | 0: AC initial excitation 1: DC initial excitation | _ | 1 | _ |

Select the mode at the time of initial excitation.

AC initial excitation : If motor runs during initial excitation, frequency is varied conforming to the speed of motor in order not to output the torque.

DC initial excitation : Even if motor runs during initial excitation, DC of excitation component is held.

Note) In sensorless vector control, AC initial excitation mode cannot be selected.

| Initial excitation | Initial excitation |
|----------------------------|----------------------------|
| command | command |
| Motor speed | Motor speed |
| (in case was made rotation | (in case was made rotation |
| from load side) | from load side) |
| Output current | Output current |
| AC initial excitation mode | DC initial excitation mode |

4-4. Setting item c Relatives of multifunction input/output

(1) Multifunction input (common)

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|--|---|--------------------|----------------------|------|
| c-00 | Multifunction input position selection | 0: Terminal block 1: Digital communication option | _ | 0 | — |
| c-01 | Terminal block MI1 (multifunction | 0: Preset speed command selection 1 | _ | 0 | _ |
| | input 1) function selection | 1: Preset speed command selection 2 | _ | 1 | — |
| c-02 | Terminal block MI2 (multifunction | 2: Preset speed command selection 3 | — | 3 | — |
| | input 2) function selection | 3: Accel/decel time selection 1 | — | 4 | — |
| c-03 | Terminal block MI3 (multifunction | 4: Accel/decel time selection 2 | — | 7 | — |
| | input 3) function selection | 5: Speed UP command (MRH mode) | — | 14 | — |
| c-04 | Terminal block MI4 (multifunction | 6: Speed DOWN command (MRH mode) | | | |
| | input 4) function selection | 7: Speed hold | | | |
| c-05 | Terminal block MI5 (multifunction | 8: S pattern accel/decel inhibition | | | |
| | Input 5) function selection | 9: Max. frequency reduction | | | |
| c-06 | lerminal block MI6 (multifunction | 10: Droop control inactive | | | |
| | | 11: Torque control selection | | | |
| | | 12: For/Rev changeover command | | | |
| | | 13: DC brake command | | | |
| | | 14: Initial excitation command | | | |
| | | 15: External failure signal 1 (protection relay active) | | | |
| | | 16: External failure signal 2(protection relay active) | | | |
| | | 17: External failure signal 3(protection relay active) | | | |
| | | 18: External failure signal 4(protection relay active) | | | |
| | | 19: External failure signal 1 (protection relay inactive) | | | |
| | | 20: External failure signal 2(protection relay inactive) | | | |
| | | 21: External failure signal 3(protection relay inactive) | | | |
| | | 22: External failure signal 4(protection relay inactive) | | | |
| | | 23: Trace back external trigge | | | |
| | | 24: 2nd motor selection | | | |
| | | 25: Emergency stop (B contact) | | | |
| | | 26: Programed operation advance | | | |
| | | 27: Speed command terminal block selection | | | |

Set input signal to multifunction input.

If c-00 is set at 1, bit signal input from digital communication option is selected for input signal to each function of following multifunction input. If c-00 is set at 0, terminal blocks MI1 \sim MI6 on VFC64TB-P.C.Board are set as input signal terminal blocks to each function of multifunction input to be set by c-01 \sim c-06. (input of function which is not selected on any terminal block is regarded as OFF)

Note) However, in case that sequence function use selection (b-14) is set at ON, aforesaid setting is disregarded and terminal blocks [MI1]~[MI6] on VFC64TB-P.C.Board become input terminals to sequence function. At this time, each function of following multifunction input is controled by output of sequence function.

| Multifunction input items | (In V/f control, [speed] | in the Table below is to | be converted to | [frequency]. |
|---------------------------|--------------------------|--------------------------|-----------------|--------------|
|---------------------------|--------------------------|--------------------------|-----------------|--------------|

| items | Explanation of function | | | | | | |
|--|--|--|---|---|---|--|--|
| Preset speed | By use of 3 inputs of preset speed command selections $1 \sim 3$, it is possible to operate, selecting speed | | | | | | |
| command selection | setting of preset speed command 1~7. | | | | | | |
| | (Preset speed and programed operation speed are common. However, preset speed command 8 is for programed operation only and cannot be used for preset) | | | | | | |
| | programed operation | | | | | | |
| | | Preset speed selection 3 | Preset speed selection 2 | Preset speed selection 1 | Speed command | | |
| | | OFF | OFF | OFF | as per standard selection(preset is not used) | | |
| | | OFF | OFF | ON | H-00 (preset speed command 1) | | |
| | | OFF | ON | OFF | H-01 (preset speed command 2) | | |
| | | OFF | ON | ON | H-02 (preset speed command 3) | | |
| | | ON | OFF | OFF | H-03 (preset speed command 4) | | |
| | | ON | OFF | ON | H-04 (preset speed command 5) | | |
| | | ON | ON | OFF | H-05 (preset speed command 6) | | |
| | | ON | ON | ON | H-06 (preset speed command 7) | | |
| | | | | | | | |
| Accel/decel time selection | By use of input of operation. (In case use selection) at (| accel/decel tir e of use of S p ON) | ne selection 1 attern accel/de | \sim 2, it is possi ecel, it is nece | ble to changeover accel/decel time during ssary to set d-06(S pattern accel/decel | | |
| | | Accel/decel time selection 2 | Accel/decel time selection 1 | Accel/decel tim | e to be selected (including S pattern accel/decel) | | |
| | | OFF | OFF | Standard (ad | ccel/decel time selected by d-00) | | |
| | | OFF | ON | Accel/decel | time 2 (5.Acc2, 6.dEc2 and d-11~14) | | |
| | | ON | OFF | Accel/decel ti | me 3 (d-02, d-03 (no S pattern accel/decel)) | | |
| | | ON | ON | Accel/decel ti | me 4 (d-04, d-05 (no S pattern accel/decel)) | | |
| | | | | | | | |
| Speed UP/DOWN command (MRH mode) | Turn d-23 (MRH f lection) to ON and terminal block at s position by b-15 a comes possible to speed by Speed U mand. (However, at d-24 and d-25 (er limit speeds). In exceeded upper/le Inverter accelerat upper/lower limit a without UP/DOWI setting the minus limit speed, it bec execute for/rev op | unction use set d by selection of speed commar- ind b-16, it be- o accel/decel th JP/DOWN Cor- speed is limite (MRH upper, lo n case that spe- ower limit, es/decelerates automatically N command. E value at lower omes possible beration) | he Speed UP com m- d Speed DOWN c Speed DOWN c 2000 d24-MRH upper 1 5 to d25-MRH lower to Motor speed | mmand ommand imit speed | | | |
| Speed hold | when this signal during accel/dec suspends accel/ holds the speed a lf that signal is tu cel/decel is resta "hold" is ineffecti stop by stop comr | Is turned to C el of Inverter decel once a t that time. rned to OFF, a arted. (Howev ive during de nand) | DN , it AC- er, Cel Speed hold Speed settin Motor speed | | | | |
| S pattern accel /decel inhibition | Even in case that S pattern accel/decel ca | attern accel/decel n be inhibited for | operation is perfo cedly and be cha | rmed turning d-00 nged to ordinary a | 6 (use selection of S pattern accel/decel selection), S accel/decel by turning this signal to ON. | | |

| items | Explanation of function |
|--|---|
| Max. speed reduction | In case that terminal block is selected at speed command setting position, speed command is reduced based on setting of c-17 (max. speed reduction rate) by turning of this signal to ON as shown in Fig, right. This signal changes over ON/OFF during stop of Inverter. Even if Inverter is tried to change over during operation, it is not performed until operation stop once. (This function is effective for analog input only from terminal block) |
| Droop control inactive | Even though i-00 (droop function use selection) was turned to ON, droop control is inactive if this signal is turned to ON. (as to droop control, see item of Setting Item i) |
| Torque control selection (vector control only) | When b-01 (control mode selection) is set at 4 (contact changeover of speed/torque control), speed control and torque control can be changed over by this signal. Speed control by OFF and torque control by ON. (See item of Setting Item b) |
| For/Rev changeover command | If this signal is turned to ON, For/Rev run of operation/jog command is changed over. (For. run \rightarrow Rev. run, Rev. run \rightarrow For. run) |
| DC brake command | If this signal is turned to ON, it becomes DC brake which flows DC current to motor. The current at this time can be adjusted by b-06(DC brake current) in vector control mode and by 8.dcbr (DC brake current) in V/f control mode. After passing of time set by b-05 (DC brake time) from turning to OFF of this signal, Inverter stops. In case of simultaneous input of operation/jog command,and DC brake command, operation/jog command takes priority. |
| Initial excitation command (vector control only) | If this signal is turned to ON, it becomes initial excitation operation which flows current of excitation component to motor. This signal is used in case that response at starting time is required to be hastened, exciting in ad- vance.In an initial excitation operation, AC initial excitation and DC initial excitation modes are available and any mode can be selected by b-20 (initial excitation mode selection). In case of simultaneous input of opera- tion/jog/DC brake command and b-20, each of operation/jog/DC brake command takes priority. |
| External failure signal (protection relay active) | By inputting of failure signal of peripheral devices, Inverter can be stopped for protection. When signal of exter- nal failure signals 1~4 is turned to ON, Inverter breaks output and turns protection relay to ON. At the same time,[EF1]~[EF4] are displayed on console. Also, trace back is triggered by this signal. For releasing of trou- ble, reset protection relay. |
| External failure signal (protection relay inactive) | Same as above but protection relay is inactive and trace back is not triggered by this signal. In this case, trouble is released automatically if all of each command of operation/jog/DC brake/initial excitation of Inverter are turned to OFF. |
| Trace back external trigger | Ordinary, trace back triggers at the times of failure and protective operation.However, it can be triggerd forcedly by input of this signal |
| 2nd motor selection | If this signal is turned to ON, keeping L-00 (2nd motor use selection) at ON, each parameter of 2nd motor of Setting Item L is used instead of parameter of of motor set at Setting Item A. As to details of 2nd motor at the time of use, see item of Setting Item L. |
| Emergency stop (B contact) | This is emergency stop signal of B contact input. It turns to emergency stop by contact-open. (Therefore, if this function is set at any terminal block, Inverter cannot be operated owing to emergency stop unless contact is closed) |
| Programed oper- ation advance | If this signal is turned to ON during programed operation, operation is proceeded to next step forcedly although programed time has not passed yet. As to programed operation, see item of Setting Item H. |
| Selection of speed command terminal block | If this signal is turned to ON, speed command input position is designated to terminal block(VFC64TB[0-±10] or [4-20] terminal) forcedly, regardless of setting of b-15, b-16 (speed command position selection). At the time of simultaneous input with preset speed command selection, this signal takes priority. |

Note) Items shown as (vector control only) in above Table are not actuated in V/f control mode

(2) Multifunction output (common)

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|---|--|-----------------------|----------------------|------|
| c-07 | Terminal block MO1 (multifunction output 1) function selection | 0: Programed operation end 1: Speed detection (1) (speed = detection setting) | | 7 | |
| c-08 | Terminal block MO2 (multifunction output 2) function selection | 2: Speed detection (1)(speed >=detection setting) 3: Speed detection (1)(speed <=detection setting) | | 0 8 | |
| c-09 | Terminal block MO3 (multifunction output 3) function selection | 4: Speed detection (2)(speed = detection setting) 5: Speed detection (2)(speed >=detection setting) | | | |
| c-10 | Terminal block MO4 (multifunction output 4) function selection | 5: Speed detection (2)(speed >=detection setting) 6: Speed detection (2)(speed <=detection setting) 7: Setting-reach 8: Torque detection 9: Absolute value torque detection 10: During power failure 11: Overload pre-alarm 12: During retry 13: During reverse run 14: Protective operation code | | | |

Terminal blocks MO1 \sim MO4 on VFC64TB-P.C.Board are set as output terminal blocks of each function of multifunction output to be set by c-07 \sim c-10, respectively (each terminal block of MO1 \sim MO4 is open collector output).

Note) However, in case that sequence function use selection (b-14) is set at ON, above setting is disregarded and terminal blocks $MO1 \sim MO4$ on VFC64TB-P.C.Board become output terminal from sequence function. Also, output of each function of following multifunction output can be used as input to sequence function.

Multifunction output item (in V/f control, [speed] in the above Table is to be converted to [frequency])





| Item | Explanation of function |
|---------------------------------|--|
| Absolute value torque detection | (vector control) Turn output to ON when absolute value of torque command becomes larger than setting of c-15. (V/f control) Turn output to ON when absolute value of operation torque becomes larger than setting of c-15.(Note) c-15 detection torque setting x (-1) |
| During power failure | Turn output to ON when DC part voltage becomes smaller than 180V (360V in case of 400V class) and to OFF when it be- comes larger than 200V (400V in case of 400V class). (However, turn output to OFF when power of control P.C.Board is lost) 180V (at the time of 200V class) |
| Overload pre-alarm | Turn output to ON when overload counter, which starts counting in the beginning of over- load and actuates overload or overtorque pro- tective operation (vector control only) at 100% load, exceeds the level set by c-16 (overload pre-alarm operation level). (For example, when c-16 is set at 50% in case that overcurrent protection actuates by 150% current 60 sec. and in case that output current is 150% as per Fig. right, output turns to ON at 30 sec., which is 50% of 60 sec., by which over- load protection actuates) |
| During retry | Turn output to ON for 10 sec. after retry from trouble. As to "retry from trouble", see item of Setting Item F. |
| During rev. run | Turn to ON during reverse run of motor. (There is a hysteresis of 12r/min (sensorless vector control) or 1r/min (vector control with sensor) near 0 speed for prevention of chattering. |

Note) In V/f control, accuracy of operation torque is not guaranteed. In case that accuracy of torque is needed, use vector control.

| Item | Explanation of function | | | | | | | | | |
|---------------------------|--|-----|-----|-----|-----|----------------------|-----|-----|-----|-----|
| Protective operation code | When trouble occurred and protection actuates, code of actuated protection is outputted using 4 multifunction output terminals. (For this function, it is necessary to set [protective operation code] to all terminals (MO1~MO4) of 4 multifunction outputs, different from other functions) Table of output code | | | | | | | | | |
| | Content | MO1 | MO2 | MO3 | MO4 | Content | MO1 | MO2 | MO3 | MO4 |
| | Overcurrent | ON | OFF | OFF | OFF | Communication error | ON | OFF | OFF | ON |
| | IGBT abnormal | OFF | ON | OFF | OFF | Speed control error | ON | ON | ON | OFF |
| | IGBTU abnormal | OFF | ON | OFF | OFF | Motor overheat | OFF | OFF | ON | OFF |
| | IGBTV abnormal | OFF | ON | OFF | OFF | Slave abnormal | OFF | ON | OFF | OFF |
| | IGBTW abnormal | OFF | ON | OFF | OFF | FCL abnormal | OFF | OFF | ON | OFF |
| | Overcurrent | ON | ON | OFF | OFF | Setting error 0 | ON | ON | OFF | ON |
| | Overload | OFF | OFF | ON | OFF | Setting error 1 | ON | ON | OFF | ON |
| | DC fuse blown | ON | OFF | ON | OFF | Setting error 2 | ON | ON | OFF | ON |
| | Start stall | OFF | ON | ON | OFF | Setting error 3 | ON | ON | OFF | ON |
| | Overspeed, freq | ON | ON | ON | OFF | External failure 1 | OFF | OFF | ON | ON |
| | Power failure | OFF | ON | OFF | ON | External failure 2 | ON | OFF | ON | ON |
| | Overtorque | OFF | OFF | ON | OFF | External failure 3 | OFF | ON | ON | ON |
| | Overheat | OFF | ON | OFF | OFF | External failure 4 | ON | ON | ON | ON |
| | Option abnormal | OFF | OFF | OFF | ON | Storage memory error | OFF | OFF | OFF | ON |

(3) Each setting data of multifunction input/output (common)

(vector control)

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|------------------------------------|-----------------------------------|--------------------|----------------------|-------|
| c-11 | Detection speed (1) | -max. speed~+max. speed | 1 | 0 | r/min |
| c-12 | Detection speed (2) | -max. speed~+max. speed | 1 | 0 | r/min |
| c-13 | Speed detection range | 0~600 | 1 | 0 | r/min |
| c-14 | Detection torque (with polarity) | -205~205 | 1 | 0 | % |
| c-15 | Detection torque (absolute value) | 0~205 | 1 | 0 | % |
| c-16 | Overload pre-alarm operation level | 0~100 | 1 | 50 | % |
| c-17 | Speed command reduction rate | 50.0~100.0 | 0.1 | 90.0 | % |

(V/f control)

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|------------------------------------|-----------------------------------|--------------------|----------------------|------|
| c-11 | Detection speed (1) | -max. freguency~+max. freguency | 0.1 | 0.0 | Hz |
| c-12 | Detection speed (2) | -max. freguency~+max. freguency | 0.1 | 0.0 | Hz |
| c-13 | Speed detection range | 0.0~10.0 | 0.1 | 0.0 | Hz |
| c-14 | Detection torque (with polarity) | -205~205 | 1 | 0 | % |
| c-15 | Detection torque (absolute value) | 0~205 | 1 | 0 | % |
| c-16 | Overload pre-alarm operation level | 0~100 | 1 | 50 | % |
| c-17 | Speed command reduction rate | 50.0~100.0 | 0.1 | 90.0 | % |

The above are setting data to be used in each multifunction input/output. As to details of function, see items of multifunction input, multifunction output.

4-5. Setting Item d Accel/decel setting, Speed/frequency jump function, MRH function selection

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|--|--|--------------------|----------------------|------|
| d-00 | Ordinary operation accel/decel selection | 0: accel/decel time 1 1: accel/decel time 2 | _ | 0 | _ |
| d-01 | Jog operation accel/decel selection | 2: accel/decel time 3 3: accel/decel time 4 | _ | 1 | _ |
| d-02 | Accel. time 3 | 0.0 ~ 3600.0 | 0.1 | 30.0 | sec |
| d-03 | Decel. time 3 | 0.0 ~ 3600.0 | 0.1 | 30.0 | sec |
| d-04 | Accel. time 4 | 0.0 ~ 3600.0 | 0.1 | 30.0 | sec |
| d-05 | Decel. time 4 | 0.0 ~ 3600.0 | 0.1 | 30.0 | sec |
| d-06 | S pattern selection | 0 : OFF 1 : ON | _ | OFF | _ |
| d-07 | S pattern rise time-1 | 0.0~60.0 | 150 | 0.1 | sec |
| d-08 | S pattern accel. reach time-1 | 0.0~60.0 | 150 | 0.1 | sec |
| d-09 | S pattern fall time-1 | 0.0~60.0 | 150 | 0.1 | sec |
| d-10 | S pattern decel. reach time-1 | 0.0~60.0 | 150 | 0.1 | sec |
| d-11 | S pattern rise time-2 | 0.0~60.0 | 150 | 0.1 | sec |
| d-12 | S pattern accel. reach time-2 | 0.0~60.0 | 150 | 0.1 | sec |
| d-13 | S pattern fall time-2 | 0.0~60.0 | 150 | 0.1 | sec |
| d-14 | S pattern decel. reach time-2 | 0.0~60.0 | 150 | 0.1 | sec |

(1) Selection, setting of accel/decel times (common)

By d-00 and d-01, select accel/decel time settings which are used in ordinary operation and jog operation, respectively. Accel/decel time settings of ordinary operation can be changed by multifunction input also. This setting becomes ineffective at the time of programed operation. See items of Setting Item c (multifunction input) and Setting Item H (programed operation).

| Selection by d-00, d-01 setting or by multifunction input | Accel time | Decel time | S pattern rise time | S pattern accel. reach time | S pattern fall time | S pattern decel. reach time |
|---|------------|------------|---------------------|--------------------------------|------------------------|--------------------------------|
| 0: Accel/decel time 1 | 3.Acc1 | 4.dEc1 | d-07 | d-08 | d-09 | d-10 |
| 1: Accel/decel time 2 | 5.Acc2 | 6.dEc2 | d-11 | d-12 | d-13 | d-14 |
| 2: Accel/decel time 3 | d-02 | d-03 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3: Accel/decel time 4 | d-04 | d-05 | 0.0 | 0.0 | 0.0 | 0.0 |

Each time of accel/decel to be selected

 \cdot 3.Acc1, 4.dEc1, 5.Acc2, 6.dEc2 are basic setting items.

· When accel/decel times 3, 4 were selected, all of S pattern accel/decel times become 0.0.

As shown in accel/decel time chart (S pattern accel/decel) of Fig. below, each accel/decel time setting is accel/decel time and S pattern curving time between 0 \Leftrightarrow max. speed setting.

When S pattern accel/decel function is used, d-06 (S pattern accel/decel use selection) is necessary to be turned to ON. If OFF is kept, S pattern accel/decel is not realized in spite of each time setting of S pattern accel/decel is set, for which please pay attention.



Time chart of accel/decel (S pattern accel/decel)

(2) Speed deviation limit function at accel/decel times (vector control)

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|--|-----------------------------------|--------------------|----------------------|------|
| d–15 | Selection of speed deviation limit command | 0 : OFF 1 : ON | _ | OFF | |
| d–16 | +direction deviation max. value | 0.0~100.0 | 0.1 | 5.0 | % |
| d–17 | -direction deviation max. value | -100.0~0.0 | 0.1 | -5.0 | % |

Turning d-15 to ON, difference between actual motor speed and output of accel/decel control is limited to deviation set by d-16 (plus side) and d-17 (minus side). By this function, prevents the case that load becomes light suddenly in the state of low speed caused by coming up to torque limit during speed control operation as well as sudden acceleration caused by sudden change of power source voltage, and can reset the speed by inclination to be set by accel/decel time. (If deviation is made too small, accel/decel is limited, for which please pay attention.

(3) Speed/frequency command jump function (common)

(vector control)

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|------------------|-----------------------------------|--------------------|----------------------|-------|
| d-18 | Jump (1) speed | 0~max. speed | 1 | 0 | r/min |
| d-19 | Jump (2) speed | 0~max. speed | 1 | 0 | r/min |
| d-20 | Jump (3) speed | 0~max. speed | 1 | 0 | r/min |
| d-21 | Jump (4) speed | 0~max. speed | 1 | 0 | r/min |
| d-22 | Jump speed range | 0~300 | 1 | 0 | r/min |

(V/f control)

| Display | Content | Setting range (selection item) | Setting resolution | Initiali-zing data | Unit |
|---------|----------------------|-----------------------------------|--------------------|-----------------------|------|
| d-18 | Jump (1) frequency | 0~max. frequency | 0.1 | 0.0 | Hz |
| d-19 | Jump (2) frequency | 0~max. frequency | 0.1 | 0.0 | Hz |
| d-20 | Jump (3) frequency | 0~max. frequency | 0.1 | 0.0 | Hz |
| d-21 | Jump (4) frequency | 0~max. frequency | 0.1 | 0.0 | Hz |
| d-22 | Jump frequency range | 0~10.0 | 0.1 | 0.0 | Hz |

(common) This is function to make speed/frequency command jump in order to avoid resonance point speed of load machine. At the jump point, make speed/frequency command jump like hysteresis shape as per Fig. below (in case that the field of speed/frequency command jump function and jump field are overlapped). As the object to be jumped is speed/frequency command to input to accel/decel control, it passes in jump width by inclination by accel/decel time setting during acceleration/deceleration.







Setting voltage (terminal block) $([0{\sim}{\pm}10]{\text{-}}[\text{GND}])$ When jump fields are overlapped

(4) MRH (accel/decel by contact) mode (common)

(vector control)

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|-------------------------|--|--------------------|----------------------|-------|
| d-23 | MRH operation selection | 0 : OFF 1 : ON | _ | OFF | _ |
| d–24 | MRH upper limit speed | MRH lower limit speed (d-25) ~max. speed | 1 | 300 | r/min |
| d–25 | MRH lower limit speed | max. speed MRH upper limit speed (d-24) | 1 | 0 | r/min |

(V/f control)

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|---------------------------|--|--------------------|----------------------|------|
| d-23 | MRH operation selection | 0 : OFF 1 : ON | _ | OFF | _ |
| d-24 | MRH upper limit frequency | MRH lower limit frequency (d-25) ~max. frequency | 0.1 | 5.0 | Hz |
| d-25 | MRH lower limit frequency | -max. frequency ~MRH upper limit frequency (d-24) | 0.1 | 0.0 | Hz |

(common) If d-23 is turned to ON, accel/decel control by contact can be done (MRH mode). At this time, if speed/frequency command setting selection position is selected to Terminal Block by setting of b-15 and b-16 and is selected to Console Side by console $\uparrow \downarrow$ keys, it is possible to make UP, DOWN of speed/frequency.

Speed/frequency is accelerated/decelerated to d-24 (MRH upper limit speed/frequency) by UP command input and to d-25 (MRH lower limit speed/frequency) by DOWN command input.

In case of no input command of both UP, DOWN and of input command of both UP, DOWN, speed at that time is maintained. However, if speed is not in the range between settings of d-24 and d-25, speed accelerates/decelerates up to d-24 or d-25 automatically.

By inputting of minus value to d-25 (MRH lower limit speed/frequency), for/rev operation by contact is possible.



Note) When signals of multifunction input preset speed/ frequency command selection, speed/frequency command terminal block selection are inputted during selection of MRH mode, speed command of each multifunction input preset speed/ frequency command, speed/frequency command terminal block takes priority.

4-6. Setting Item E Relatives of torque limit value, torque command characteristics, speed control, vector control
 (1) Torque limit value (common)

(vector control)

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|--|-----------------------------------|--------------------|----------------------|------|
| E-00 | For. run powering torque limit value | 0~200(Note) | 1 | 150 | % |
| E-01 | For. run regeneration torque limit value | —200∼0 (Note) | 1 | -150 | % |
| E-02 | Rev. run powering torque limit value | —200~0 (Note) | 1 | -150 | % |
| E-03 | Rev. run regeneration torque limit value | 0~200(Note) | 1 | 150 | % |

Torque limit can be set at powering and regeneration sides for both forward run and reverse run. When torque command exceeds these settings, torque is limited to these setting values.

Note) Max.(min.) value of setting range varies until max.(min.) 200(-200), depends on the rated current of motor to be used. In case of use of motor, of which capacity coincides with Inverter capacity, setting range should be until 150%(-150%) ordinary.

(V/f control)

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|--|-----------------------------------|--------------------|----------------------|------|
| E-00 | Powering side torque limit value | 0~200(Note) | 1 | 150 | % |
| E-01 | Regeneration side torque limit value | _200~0 (Note) | 1 | -150 | % |
| E-02 | Powering side torque limit value use selection | 0 : OFF 1 : ON | _ | ON | _ |
| E-03 | Regeneration side torque limit value use selection | 0 : OFF 1 : ON | _ | ON | _ |

If both E-02 and E-03 are turned to ON, it is possible to limit the torque for powering side and regeneration side, respectively.

<Powering side>

When E-02 is at ON, if operation torque exceeds setting of E-00 to the powering side, acceleration of frequency is limited and frequency is lowered. In case that lowering of frequency is required to inhibit, turn E-02 to OFF.

<Regeneration side>

When E-03 is at ON, if operation torque exceeds setting of E-01 to the regeneration side, deceleration of frequency is limited. Note) Since control of torque is not executed directly in V/f control, torque cannot be limited accurately. In case of need of accurate limit of torque, use vector control mode.

(2) Torque command fine adjustment gain (vector control)

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|---------|-----------------------------------|--------------------|----------------------|------|
| E-04 | Unused | — | — | — | |

(3) Torque command mode selection (vector control)

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|-------------------------------|---|--------------------|----------------------|------|
| E-05 | Torque command mode selection | 0: % command 1: absolute value command | _ | 0 | _ |

Select characteristics of torque command in the area of fixed output (weak excitation).



In case of absolute value command selection



· Even if torque command is constant, output torque falls in · Even in fixed output area, output torque is constant if accordance with weakening rate of flux in fixed torque area.

command is constant. (Limiter lowers)

(4) V/f pattern selection (V/f control)

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|---|---|--------------------|----------------------|------|
| E-04 | V/f pattern selection | 0: straight line 1: square reduction 2: bend line | _ | 0 | _ |
| E-05 | Bend point voltage of bend line at the time of V/f | 0~230 (200V class) 0~460 (400V class) | 1 | 0 | V |
| E-06 | Bend point frequency of bend line at the time of $\ensuremath{V/\!f}$ | 0.0~max. frequency (A-00) | 0.1 | 0.0 | Hz |

Conforming to the characteristics of load, select the pattern of V/f.



(5) Speed control (ASR) selection (vector control)

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|---------------------------|-----------------------------------|--------------------|----------------------|------|
| E-06 | ASR cancelation selection | 0 : OFF 1 : ON | _ | ON | |
| E-07 | ASR feedforward selection | 0 : OFF 1 : ON | _ | ON | _ |

In VF64 Inverter, robust speed control (MFC control) is structured combining cancelation using disturbance observer and feedforward. These cancelation and feedforward can be turned to OFF individually. (If both of them are turned to OFF, that will be equal to conventional PI control)

(See item of Basic Setting Item, Speed control gain)
(6) Adjustment of variable proportional gain (vector control)

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------------------------------------|--|--|--------------------|----------------------|------|
| E-08 | Variable proportion variation start speed | 0.01~100.00 | 0.01 | 5.00 | % |
| F 00 | | 0~100(VF64S mode) | 4 | 20 | % |
| E-09 | Variable proportional min. gain ratio | 0~100(VF64V mode) | | 100 | |
| Adjust vari gain depe speed com | able proportional gain, which varies pro nding on the largeness of deviation mand and motor speed. | portional Proportion- gain Proportion-gain setting value | | | |

E-08 Speed deviation

(absolute value)

Variable proportional gain

(7) Flux command adjustment (vector control)

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|---|-----------------------------------|--------------------|----------------------|------|
| E-10 | Flux command | 20.0~150.0 | 0.1 | 100.0 | % |
| E-11 | Strengthening rate of flux at starting time | 100.0~150.0 | 0.1 | 100.0 | % |

E-10(Flux command) : Command value on the largeness of flux to be used in vector control. Set it at 100.0% ordinary.
 E-11(Strengthening rate of flux at starting time) : This is used in case of strengthening the flux at starting time only for increasing the starting torque. As there may be a case of instability depending on motor, set it at 100.0% (no strengthening) ordinary.

(8) Current control gain adjustment (common)

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|--|-----------------------------------|--------------------|----------------------|------|
| E-12 | Current control proportional gain | 0.0~9.9 | 0.1 | 3.0 | _ |
| E-13 | Current control integration time constant | 0.0~9.9 | 0.1 | 1.5 | ms |
| E-14 | Current control feedforward component gain | 0~200 | 1 | 70 | _ |

The above is gain of current control. Keep initial value ordinary.(In V/f control, this gain is used at auto-tuning and at the time of free start only)

(9) Use selection of temperature detection option (vector control)

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|---|-----------------------------------|--------------------|----------------------|------|
| E-15 | Selection of temperature detection option | 0 : OFF 1 : ON | _ | OFF | _ |

ON is selected when compensation of temperature variation is performed by motor temperature, which is detected by temperature sensor embedded in motor. Temperature detection option (T/V61V) is needed separately.

In VF64 Inverter, motor temperature compensation operation is included in the Inverter control operation however, as the temperature before running cannot be operated, temperature detection option is used for compensation of torque at starting time in case that starting torque is required at the places where motor temperature falls while motor is stopped.

4-7. Setting Item F Built-in DB operation setting, protective function, trace back setting (1) Built-in DB operation level (common)

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|-----------------------------|-----------------------------------|--------------------|----------------------|------|
| F-00 | Built-in DB operation level | 320~360(200V class) | 1 | 340 | V |
| | | 640~720(400V class) | 2 | 680 | V |

Set operation level of built-in DB transistor. When DC voltage rises higher than this setting, DB transistor is turned to ON and when lower than this setting DB transistor is turned to OFF. Ordinary, keep the level at initial value but in case that DB transistor is turned to ON owing to high power source voltage even not in brake mode, make setting at higher level. Also, this setting interlocks operation level of regeneration stall preventive function. (See item of b-13)

Note) In VF64-1R122~1122 (200V class), VF64-1R144~1544 (400V class), transistor for dynamic brake (DB) is incorporated and it can make dynamic braking by connection with DB resistor and thermal relay between main circuit terminal blocks [+2]-[B].

(2) Overspeed protection setting (vector control)

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|---------------------------------|-----------------------------------|--------------------|----------------------|-------|
| F-01 | For. run side overspeed setting | 0~max. speed(A-00)x1.5 | 1 | 1900 | r/min |
| F-02 | Rev. run side overspeed setting | -max. speed(A-00)x1.5~0 | 1 | -1900 | r/min |

When motor speed exceeds this setting value, overspeed protective function actuates and Inverter trips. Set forward and reverse sides individually. (In case of change of max. speed (A-00), set F-01 and F-02 at less than 1.5 times of max. speed in advance)

(3) Overfrequency protection setting (V/f control)

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|-----------------------------|-----------------------------------|--------------------|----------------------|------|
| F-01 | For. run side overfrequency | 0~max. frequency(A-00)x1.5 | 0.1 | 65.0 | Hz |
| F-02 | Rev. run side overfrequency | -max. frequency(A-00)x1.5~0 | 0.1 | -65.0 | Hz |

When output frequency exceeds this setting value, overfrequency protective function actuates and Inverter trips. Set forward and reverse sides individually. (In case of change of max. frequency (A-00), set F-01 and F-02 at less than 1.5 times of max. frequency in advance)

(4) Overload protection setting (common)

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|-----------------------------|-----------------------------------|--------------------|----------------------|------|
| F-03 | Overload protection setting | 20~110 | 1 | 100 | % |

Set reference current value of overload protection by ratio to motor rated current (A-04). If effective value of Inverter output current exceeds 105% of the reference current, overload protection counter starts sensing it as overload status and overload protection (OL) operates at the point of 60 sec. at 150% as per the curve of relation of OL actuation time and output current effective value of the Fig. below.



Note) Overload protection counter can be monitored by console. (comparing with counter of overtorque protection, larger one is displayed) Overload counter counts in the status of overload with the lapse of time and at 100%, overload protection operates and Inverter trips.

OL pre-alarm function, which outputs signal when overload counter exceeds discretionary point, can be used also. (See multifunction output of Setting Item c) (5) FCL (high speed current limit) level setting (common)

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|----------------------|-----------------------------------|--------------------|----------------------|------|
| F-04 | FCL level adjustment | 80~125 | 1 | 100 | % |

Set the limit value of FCL (high speed current limit). Set it at 100% ordinary.

When instantaneous current of 2.86 times of the rated current of Inverter main body flows to any of phases at 100% setting, FCL function turns output of each phase of Inverter to OFF once in order to protect the Inverter (if current value falls, it turns Inverter output to ON automatically). When ON/OFF of output by this FCL function continues for more than 10 sec. successively (min. 2 sec. in case of output frequency of less than 10Hz), FCL continual protection operates and Inverter trips.

(6) Overtorque protection (vector control)

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|---|-----------------------------------|--------------------|----------------------|------|
| F-05 | Selection of overtorque protective operation | 0: OFF 1: ON | _ | ON | — |
| F-06 | Overtorque protection setting | 110~205 | 1 | 150 | % |
| F-07 | Reference torque of overtorque protective operation | 50~105 | 1 | 105 | % |

Set overtorque protection. By F-05, active/inactive of protective operation can be selected.

In case that F-05 is set at ON, if torque command exceeds reference torque set by F-07,overtorque protection counter starts, sensing it as status of overtorque and overtorque protection (OT) operates at the point of 60 sec. in case of F-06 setting of torque command as per curve of relation of OT protection operating time and torque command of the Figure below. Torque command to be used for this protection can make compensation to deduct machine loss component from actual torque command. (See machine loss compensation of Setting Item i)



Overtorque protection (OT) operating time Note) Similarly to overload protection, overtorque counter can be monitored by console. (compared with overload protection counter, larger one is displayed)

Overtorque counter counts with the lapse of time in the status of overtorque and at 100%, overtorque protection operates and Inverter trips.

OT pre-alarm function, which outputs signal when overtorque counter exceeds discretionary point, can also be used.

(See multifunction output of Setting Item c)

| 1 | (7) | Sneed | control | error | protection | settina | (vector | control) |
|---|-----|-------|---------|-------|------------|---------|---------|----------|
| | | opoou | 001101 | 01101 | protootion | ootting | (*00101 | 00110101 |

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|--|-----------------------------------|--------------------|----------------------|-------|
| F-08 | Use selection of speed control error | 0: OFF 1: ON | _ | OFF | _ |
| F-09 | +side detection width of speed control error | 50~500 | 1 | 100 | r/min |
| F-10 | -side detection width of speed control error | -500~-50 | 1 | -100 | r/min |

By F-08, active/inactive of speed control error protection can be selected.

When speed control error operation is selected and if motor speed (operation speed in sensorless vector control) exceeds the range of $[SPD_REF+[F-10]\sim SPD_REF+[F-09]]$ ([F-10] is minus value) against speed command (SPD_REF), Inverter trips by speed control error.

Detective function actuates at the times of speed control part abnormal, PG abnormal (vector control with sensor only) and speed down caused by that load torque exceeds torque limit.



Reference speed command is speed command selected by b-01=0 (speed control). In case of others, it is speed command of input from $[0-\pm10]$ terminal block (or [4-20]) of VFC64TB terminal block.

(8) Motor overheat protection (common)

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|--|-----------------------------------|--------------------|----------------------|------|
| F-12 | Selection of motor overheat protective | 0: OFF | _ | OFF | _ |
| | operation | 1: ON | | 011 | _ |

Select active/inactive of motor overheat protection. In case that this function is set at ON and motor temperature exceeds 150 C, Inverter trips.

Note) This function needs motor incorporating temperature sensor and motor temperature detection option (T/V61V). If T/V61V is not connected, keep this function at OFF.

(9) Operation of protection relay at the time of power failure (common)

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|---|-----------------------------------|--------------------|----------------------|------|
| F-13 | Selection of operation of protection relay at the time of power failure | 0: OFF 1: ON | _ | OFF | _ |

Select operation of protection relay (86A) at the time when Inverter detects power failure.

OFF: Even if Inverter detected power failure, protection relay does not operate and when running (or jogging, initial excitation, DC brake) command is turned to OFF after re-supply of power, "uV" (undervoltage) of protection display is reset automatically. When [b-11] (re-start selection after instantaneous power failure) is at ON, Inverter is reset after re-supply of power automatically and re-starts.

ON: Detecting power failure, protection relay operates and Inverter trips. Even if [b-11] (re-start selection after instantaneous power failure) is turned to ON, Inverter does not re-start automatically. In this case and similarly to other protective operations, protection relay (86A) and "uV" (undervoltage) of protection display are reset by protection reset operation by reset terminal or reset key.

(10) Retry-after-trouble function (common)

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|--|-----------------------------------|--------------------|----------------------|------|
| F-14 | Number of times of retry-after-trouble | 0~5 | 1 | 0 | — |

When trouble and protective operation occurred, [automatic protection reset] \rightarrow [automatic re-start] is repeated until the number of times set at F-14. Automatic reset is done after 1 sec. from occurrence of protective operation and after that, automatic re-operation is done. If protective operation occurred again within 10 sec. after re-start, arrange counter of retry to add 1 and if counter value is less than setting value of F-14, reset again and re-start Inverter. If protective operation does not occur for 10 sec. after re-start by automatic re-operation, clear the figure of counter of retry as retry was done satisfactorily. Note) Objective protection of retry are limited to the kinds of overvoltage, fuse blown, overspeed, overfrequency, power fail-

Note) Objective protection of retry are limited to the kinds of overvoltage, fuse blown, overspeed, overfrequency, power failure (at ON time of 86A), option error, external failure.

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|---------------------------|-----------------------------------|--------------------|----------------------|------|
| F-15 | Trace back pitch | 1~100 | 1 | 1 | ms |
| F-16 | Trace back trigger point | 1~99 | 1 | 80 | _ |
| F-17 | Trace back CH1selection | 0~64 | 1 | 0 | _ |
| F-18 | Trace back CH2 selection | 0~64 | 1 | 0 | _ |
| F-19 | Trace back CH3 selection | 0~64 | 1 | 0 | _ |
| F-20 | Trace back CH4 selection | 0~64 | 1 | 0 | _ |
| F-21 | Trace back CH5 selection | 0~64 | 1 | 0 | _ |
| F-22 | Trace back CH6 selection | 0~64 | 1 | 0 | _ |
| F-23 | Trace back CH7 selection | 0~64 | 1 | 0 | _ |
| F-24 | Trace back CH8 selection | 0~64 | 1 | 0 | _ |
| F-25 | Trace back CH9 selection | 0~64 | 1 | 0 | _ |
| F-26 | Trace back CH10 selection | 0~64 | 1 | 0 | _ |
| F-27 | Trace back CH11 selection | 0~64 | 1 | 0 | _ |
| F-28 | Trace back CH12 selection | 0~64 | 1 | 0 | _ |

(11) Trace back function setting (common)

F-15: Set the interval of trace back.

F-16: Set trigger point of trace back.

 $F-17 \sim F-28$: Select whether each CH of trace back is to be internal data of Inverter or to be "variable" of superblock function.

Note) Setting of trace back pitch and trace back point is necessary to be executed before collection of data of trace back by protective operation, etc.



Setting of trace back point

| (vector c | control): Table | of setting of | of F17~28 |
|-----------|-----------------|---------------|-----------|
|-----------|-----------------|---------------|-----------|

| F-17~28 setting | In case of 0 | | In case of 1~64 | | |
|-----------------|---|---|---|-------------------------|--|
| | Record data | Dimension | Record data | Dimension | |
| CH1 | U phase current | | Output RAM | 20000/100% | |
| CH2 | V phase current | (3536/Inverter rating) 10/1V (200V class) 5/1V (400V class) | (3536/Inverter rating) | (1~64) of superblock | |
| CH3 | W phase current | | (setting of | | |
| CH4 | DC voltage | | F-17~28 is selection of output RAM as it is) | | |
| CH5 | Output voltage | | | | |
| CH6 | Motor speed | | | as it is) | |
| CH7 | Speed command (after accel/decel control) | 20000/max. speed | | | |
| CH8 | Torque command | 5000/100% | | | |
| CH9 | Output frequency | 20000/frequency | | | |
| CH10 | Slide frequency | correspond to max. speed | | | |
| CH11 | Flux | 1024/rated flux | | | |
| CH12 | Motor temperature | 10/1°C | | | |

(V/f control): Table of setting of F17~28

| F-17~28 setting | In case of 0 | | In case of 1~64 | | |
|-----------------|---|------------------------|-----------------------------|------------|--|
| | Record data | Dimension | Record data | Dimension | |
| CH1 | U phase current | (3536/Inverter rating) | Output RAM | 20000/100% | |
| CH2 | V phase current | | $(1 \sim 64)$ of superblock | | |
| СНЗ | W phase current | | (setting of | | |
| CH4 | DC voltage | 10/1V (200V class) | F-17~28 is selection of | F-17~28 is | |
| CH5 | Output voltage | 5/1V (400V class) | | | |
| CH6 | Unused | | as it is) | | |
| CH7 | Speed command (after accel/decel control) | 20000/max. frequency | | | |
| CH8 | Torque command | 5000/100% | | | |
| CH9 | Output frequency | 20000/max. frequency | | | |
| CH10 | Unused | |] | | |
| CH11 | Unused | | | | |
| CH12 | Motor temperature | 10/1℃ | | | |

4-8. Setting Item G Analog input/output setting, Gain adjustment

(1) Analog input (VFC64TB P.C.Board)[0-±10],[4-20] terminal input adjustment (common)

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|------------------------------------|-----------------------------------|--------------------|----------------------|------|
| G-00 | Analog input +side adjustment gain | 50.00~150.00 | 0.01 | 100.00 | % |
| G-01 | Analog input -side adjustment gain | 50.00~150.00 | 0.01 | 100.00 | % |

This is adjustment gain to adjust finely the analog input of VFC64TB P.C.Board [0-±10], [4-20] terminal. When plus voltage is inputted, G-00 is effective and when minus voltage is inputted, gain of G-01 is effective. This is adjusted before delivery ordinary however, re-adjustment is needed in case that initializing (default) of P.C.Board is executed. (This item is effective in both cases that input is used as speed/frequency command and as torque command)

Adjustment method of gain

1) Select monitor [G-AdJ] of console.

2) Input +10V to between [0-±10] - [GND].

3) Adjust G-00 to make monitor display 10.000.

4) Input -10V to between [0-±10] - [GND].

5) Adjust G-01 to make monitor display 10.000. (even if minus voltage is inputted, monitor displays absolute value)

Note 1) Adjust monitor to display 5.000 by 20mA input at the adjustment by 4~20mA input and to display 10.000 by 150kHz at the adjustment by pulse train input.

Note 2) Adjustment of 4), 5) is unnecessary in case that setting of minus side is not used.

(2) Analog speed/frequency command (VFC64TB P.C.Board [0-±10],[4-20] terminal input) characteristic setting (common)

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|---|--|--------------------|----------------------|------|
| G-02 | Analog speed/frequency command characteristic selection | 0: $0 \sim \pm 10V$ (bipolarity) 1: $0 \sim 10V$ (unipolarity) 2: $4 \sim 20mA$ 3: Pulse train($0 \sim 150kHz$) | _ | 1 | _ |
| G-03 | Analog speed command upper limit speed/frequency | Absolute value of (G-04)~100.0 | 0.1 | 100.0 | % |
| G-04 | Analog speed command lower limit speed/frequency | -(G-03)~(G-03) | 0.1 | 0.0 | % |

Note) G-03, G-04 are set by % to max. speed/frequency (A-00). Set G-03, G-04 in case that [0-±10],[4-20] terminal block of VFC64TB P.C.Board is used as speed/frequency command. (As to setting of speed/frequency command position selection, see items of b-15, b-16. In case of use as the torque command input, characteristic is to be 0~±10V(-10V:150%,+10V:-150%), regardless of this setting.)

At G-02, set any one of voltage input (bipolarity/unipolarity), current input, pulse train input is to be speed/frequency command input. Not G-02 only, it is necessary to changeover SW1, SW2 on VFC64TB. Table below shows "G-02 setting", "SW1, SW2 settings" and "terminal block to input setting signal" for respective setting input.

| Setting input to be used | Voltage input (0-±10V) | Voltage input (0-+10V) | Current input (4~20mA) | Pulse train input (0-150kHz) |
|-----------------------------|---------------------------|---------------------------|---------------------------|---------------------------------|
| G-02 setting | 0 | 1 | 2 | 3 |
| SW1 | OFF | OFF | OFF | ON |
| SW2 | OFF | OFF | OFF | ON |
| Input terminal block | [0-±10] terminal block | [0-±10] terminal block | [4-20] terminal block | [0-±10] terminal block |

Characteristic of speed/frequency command to the selected setting input is explained as follows.

1) Voltage input (0~±10V)(G-02=0)

By making the command input voltage to minus voltage, motor can be run reversely (in case of drive by reverse run command, rotation is changed to reverse run by plus voltage and forward run by minus voltage). Characteristic is of G-03 setting at the time of +10V input and, minus value of G-03 setting at the time of -10V input however, minus side than G-04 setting is limited (therefore, G-04 is necessary to be set at -100% in case of use until max. of minus). Meanwhile, when A-01 (min. speed/frequency) is other than 0, absolute value is limited not to be less than this speed/frequency. In this case, when characteristic line passes near 0V, it has hysteresis characteristic as per Figures below (At starting time, it is min. speed/frequency of forward run in case of forward run start and that of reverse run in case of reverse run start).



1-1) At the time of voltage input $(0 \sim \pm 10 \text{V})$ selection



1-2) Hysteresis characteristic of minimum speed/frequency(A-01) near 0V

2) Voltage input (0~+10V)(G-02=1)

Characteristic is of G-04 at the time of 0V input and G-03 at the time of 10V input however, plus voltage only is effective and minus voltage is limited to G-04 (but 0 in case that minus value is set at G-04).

In case that A-01(min. speed/frequency) is other than 0, absolute value is limited not to be less than this speed/frequency. As speed/frequency command is forward run only, reverse run command is used in case of turning to reverse run.





2-2) At the time of $0 \sim +10V$ selection (at the time of G04<0)

3) Current input (4~20mA)(G-02=2)

Characteristic is of G-04 at the time of 4mA input and G-03 at the time of 20mA input however, plus side current only is effective and minus current is limited to G-04 (but 0 in case that minus value is set at G-04) at the time of input. Meanwhile when A-01 (min. speed/frequency) is other than 0, absolute value is limited not to be less than this speed/frequency. As speed/frequency command is forward run only, reverse run command is used in case of turning to reverse run.



4) Pulse train input (G-02 =3)

In case of use by pulse train, turn SW1, SW2 on VFC64TB P.C.Board to ON and input pulse signal of duty 1:1 by 0-15V to between [0-±10] - [GND] terminals.

As setting characteristic is same with that of voltage input ($0 \sim +10V$), read item of ($0 \sim +10V$) to 0 - 150kHz instead.

(3) Analog input 0 limit function (common)

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|------------------------------|-----------------------------------|--------------------|----------------------|------|
| G-05 | Analog input 0 limit voltage | 0.000~1.000 | 0.001 | 0.000 | V |

0 limit voltage In case that absolute value of command input voltage inputted to VFC64TB[0-±10] is less than this setting, above function makes it to 0 forcedly.

This function is used when voltage does not become 0 perfectly caused by drift, etc. of analog circuit, in spite of setting at 0V. (It is effective in case of use of both speed/frequency command and torque command)

(4) Setting of relatives of analog output (VFC64TB-P.C.Board[A] terminal block)

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|---------------------------------|---|--------------------|----------------------|------|
| G-06 | Analog output selection | 0: Output voltage 1: Output current 2: Torque command (vector control) Operation torque (V/f control) 3: Motor speed (vector control) Output frequency (V/f control) 4: Speed command (vector control) Frequency command (V/f control) 5: Super block output 6: Calibration 7: (For our testing) | | 1 | _ |
| G-07 | Analog output adjustment gain | 50.0~150.0 | 0.1 | 100.0 | % |
| G-08 | Analog output adjustment offset | -50.0~50.0 | 0.1 | 0.0 | % |

The above is setting of selection of data, offset adjustment, gain adjustment of analog output which are outputted from between terminal blocks [A]-[GND] of VFC64TB P.C.Board.

Analog output selected by G-06

(vector control)

| | Selection item | Output voltage | | Selection item | Output voltage |
|---|--------------------------------|--|---|--|-----------------------|
| 0 | Output voltage | 7.5V/200V (200V class) 7.5V/400V (400V class) | 4 | Speed command (after accel/decel control) | 10V/max. speed (A-00) |
| 1 | Output current effective value | 5V/Inverter rated current | 5 | Super block output | 5V/20000(100%) |
| 2 | Torque command | 5V/100% | 6 | Calibration | outputs 5V |
| 3 | Motor speed | 10V/max. speed (A-00) | 7 | (For our testing) | |

(V/f control)

| | Selection item | Output voltage | | Selection item | Output voltage |
|---|--------------------------------|--|---|---|---------------------------|
| 0 | Output voltage | 7.5V/200V (200V class) 7.5V/400V (400V class) | 4 | Frequency command (after accel/decel control) | 10V/max. frequency (A-00) |
| 1 | Output current effective value | 5V/Inverter rated current | 5 | Super block output | 5V/20000(100%) |
| 2 | Operation torque | 5V/100% | 6 | Calibration | outputs 5V |
| 3 | Output frequency | 10V/max. frequency(A-00) | 7 | (For our testing) | |

(5) Speed(frequency) meter (VFC64TB P.C.Board [f] terminal block) output selection (common)

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|---|--|--------------------|----------------------|------|
| G-09 | Speed(frequency) meter output selection | 0: PG output (duty 1:1) 1: Output frequency (6F output) 2: Motor speed (6F output) 3: Calibration (6F output) | _ | 2 | _ |

Note) PG output can be selected by vector control mode with sensor only.

Signal, which is outputted to between [f]-[GND]terminal blocks on VFC64TB-P.C.Board, is selected.

0: PG output

Making frequency dividing of wave form of PG (B phase), outputs as signal of (0-10V). It is possible to select 1/2 frequency dividing and 1/4 frequency dividing by SW3 on VFC64TB P.C.Board. (SW3: OFF:1/2 frequency dividing, ON: 1/4 frequency dividing)

1: Output frequency, 2: Motor speed, 3: Calibration

When these are selected, frequency signal (6F signal) of 6 times of frequency (or frequency conversion value) is outputted from [f]-[GND] terminal blocks as shown in the Fig. of next page.

When motor speed is selected, frequency conversion value F is calculated as:-

F = (motor speed) / 60 x (number of motor pole) / 2

(Since motor speed is not displayed in case of V/f control, F is always 0)

When calibration is selected, frequency conversion value corresponding to max. speed (A-00) in case of vector control and max. frequency (A-00) in case of V/f control are outputted.

When frequency/speed meters of digital counter type are used, make 1/6 frequency dividing of pulse count.

DC average voltage to output frequency is as per Fig. [Frequency-Voltage characteristic] below. In case of use of DC voltmeter, adjust it conforming to the characteristic of this Figure. (However, in case that frequency conversion value of max. speed in vector control or max. frequency in V/f control exceeds 120Hz, the value will be 1/2 and when that exceeds 240Hz, the value will be 1/4 of the said rate)



T1, T2 of above Fig. are:-

T1 = 1ms (Frequency conversion value (max. frequency in case of V/f control) of max. speed is less than 120Hz)

= 0.5ms (Frequency conversion value (max. frequency in case of V/f control) of max. speed is less than 240Hz)

speed are less than 120Hz)

= 0.25ms (Frequency conversion value (max. frequency in case of V/f control) of max. speed exceeds 240Hz)

T2 = 1/(6xF) F: Output frequency or frequency conversion value

| 1 | <u>^</u> | In a last a di ava a a al lína | | and the second s | 1004 | a all a stress a set | () |
|----|------------------|--------------------------------|---------------|--|--------------|----------------------|--------|
| () | h1 | Isolated sheed/tre | allency comms | ina anaioa in | ILINA ODTION | adilistment | common |
| v | \mathbf{v}_{i} | isolated specel inc | queries comme | ind analog in | | aujustinont | |

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|---|-----------------------------------|--------------------|----------------------|------|
| G-10 | Isolated analog setting adjustment gain | 50.00~150.00 | 0.01 | 100.00 | % |
| G-11 | Isolated analog input characterictic selection | 0:0~+10V | | 0 | |
| | | 1: 4~20mA | | 0 | _ |
| G-12 | Isolated analog setting upper limit speed/frequency | Absolute value of (G-13) ~100.0 | 0.1 | 100.0 | % |
| G-13 | Isolated analog setting lower limit speed/frequency | -(G-12)~(G-12) | 0.1 | 0.0 | % |

Note) G-12, G-13 are set by % to max. speed/frequency (A-00).

Set the input between terminal blocks [1]-[3] of ISO64 Option P.C.Board or terminal blocks [1]-[2] of IO64 Option P.C.Board. As characteristic of setting is same with analog input of VFC64TB P.C.Board, see items of G-00 \sim G-04. However, minus voltage input and pulse train input cannot be used. Further, this setting is for input of speed/frequency command. When input is used by 0 \sim +10V, turn SW1 on ISO64 P.C.Board, IO64 P.C.Board to OFF and when used by 4-20mA, turn SW1 to ON. (Display of console monitor [G_AdJ] at the time just after setting of G-10 is input voltage of terminal block [1] of this ISO64 Option P.C.Board. As resolution of input operation is low compared with VFC64TB[0-±10] terminal input, ripple of about ±0.01 occurs by display of [G_AdJ])

(7) Isolated torque command analog input (ISO64 Option) adjustment (common)

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|--|-----------------------------------|--------------------|----------------------|------|
| G-14 | Isolated torque command input adjustment gain | 50.0~150.0 | 0.1 | 100.0 | % |
| G-15 | Isolated torque command input offset adjustment q'ty | -50.0~50.0 | 0.1 | 0.0 | % |

Adjust gain and offset between terminal blocks [4]-[3] of ISO64 Option P.C.Board. As this input can get the data faster than other analog input by 12 bit A/D Converter, it is used isolating the torque command, which needs high speed response.

G-14: This is adjustment gain to the input and effective for both plus and minus sides.

G-15: This is offset adjustment. It adjusts to make torque command 0 at the time of 0V input.

(Torque command is not available at the time of V/f control but it can be used as input of super block function)



Torque command input characteristic

| (8) | Isolated | analog | output | (IO64 | Option) | adjustment | (option) |
|-----|----------|--------|--------|-------|---------|------------|----------|
|-----|----------|--------|--------|-------|---------|------------|----------|

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|---|---|--------------------|----------------------|----------|
| G-16 | Isolated analog output selection | 0 : Output voltage 1 : Output current 2 : Torque command (vector control) Operation torque (V/f control) 3 : Motor speed (vector control) Output frequency (V/f control) 4 : Speed command (vector control) Frequency command (V/f control) 5 : Super block output 6 : Calibration 7 : (For our testing) 8 : Output voltage (4~20mA) 9 : Output current (4~20mA) 10 : Torque command (4~20mA) (vector control) Operation torque (4~20mA) 11 : Motor speed (4~20mA) (V/f control) 11 : Motor speed (4~20mA) (V/f control) 12 : Speed command (4~20mA) (vector control) Output frequency 13 : Super block output (4~20mA) (vector control) 13 : Super block output (4~20mA) 14 : Calibration (4~20mA) | | 1 | |
| G-18 | Isolated analog output offset adjustment d'ty | -50.0~50.0 | 0.1 | 0.0 | -/o % |
| G-10 | isolated analog output onset adjustment q ty | -50.0 -50.0 | 0.1 | 0.0 | /0 |

The above is analog output, which outputs to between terminal blocks [3]-[4] of IO64, and adjustment of gain and offset. In case of selection of analog signal to output, select as shown in the next Table.

| | ±10V output | | 4-20mA output | | |
|---------------------------------|--------------|--|---------------|--|--|
| | 1064-SW2 = | ON | 1064-SW2 = 0 | FF | |
| | G-16 setting | Output voltage rate | G-16 setting | Output current rate | |
| Output voltage | 0 | 7.5V/200V(200V class) 7.5V/400V(400V class) | 8 | 16mA/200V(200V class) 16mA/400V(400V class) | |
| Output current | 1 | 5V/Inverter rated current | 9 | 12mA/Inverter rated current | |
| Torque command (vector control) | 2 | 5V/100% | 10 | 12mA/100% | |
| Operation torque (V/f control) | 2 | 54/100/0 | 10 | | |
| Motor speed (vector control) | 3 | 10V/max. speed (A-00) | 11 | 20mA/max. speed (A-00) | |
| Output frequency (V/f control) | 5 | 10V/max. frequency (A-00) | 11 | 20mA/max. frequency (A-00) | |
| Speed command (vector control) | 4 | 10V/max. speed (A-00) | 10 | 20mA/max. speed (A-00) | |
| Frequency command (V/f control) | | 10V/max. frequency (A-00) | 12 | 20mA/max. frequency (A-00) | |
| Super block output | 5 | 5V/20000(100%) | 13 | 12mA/20000(100%) | |
| Calibration | 6 | outputs 5V | 14 | outputs 12mA | |

Note) In case that 4-20mA is selected, absolute value of data is outputted since output is turned to unipolarity of plus side.

(9) Motor temperature detection option (T/V61V Option) adjustment (common)

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|--|-----------------------------------|--------------------|----------------------|------|
| G-19 | Temperature correction option offset adjustment quantity | -20.0~20.0 | 0.1 | 0.0 | % |
| G-20 | Temperature correction option gain adjustment quantity | 50.0~150.0 | 0.1 | 100.0 | % |

Adjust the offset and gain of motor temperature correction option (T/V61).

4-9. Setting Item H Setting of relatives of preset operation/ programed operation

(1) Preset operation/ programed operation speed/frequency command (common) (vector control)

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|------------------------|-----------------------------------|--------------------|----------------------|-------|
| H-00 | Preset speed command 1 | | 1 | 0 | r/min |
| H-01 | Preset speed command 2 | | 1 | 0 | r/min |
| H-02 | Preset speed command 3 | | 1 | 0 | r/min |
| H-03 | Preset speed command 4 | may aroud a may aroud | 1 | 0 | r/min |
| H-04 | Preset speed command 5 | -max. speed ~max. speed | 1 | 0 | r/min |
| H-05 | Preset speed command 6 | | 1 | 0 | r/min |
| H-06 | Preset speed command 7 | | 1 | 0 | r/min |
| H-07 | Preset speed command 8 | | 1 | 0 | r/min |

(V/f control)

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|----------------------------|-----------------------------------|--------------------|----------------------|------|
| H-00 | Preset frequency command 1 | | 0.1 | 0.0 | Hz |
| H-01 | Preset frequency command 2 | | 0.1 | 0.0 | Hz |
| H-02 | Preset frequency command 3 | | 0.1 | 0.0 | Hz |
| H-03 | Preset frequency command 4 | | 0.1 | 0.0 | Hz |
| H-04 | Preset frequency command 5 | -max. frequency~max. frequency | 0.1 | 0.0 | Hz |
| H-05 | Preset frequency command 6 | | 0.1 | 0.0 | Hz |
| H-06 | Preset frequency command 7 | | 0.1 | 0.0 | Hz |
| H-07 | Preset frequency command 8 | | 0.1 | 0.0 | Hz |

(common)Item H is setting of speed/frequency command of preset operation function or undermentioned programed operation function selected by multifunction input signal. As to selection by multifunction input signal of preset operation,see item of Setting Item C, Multifunction input/output.

Note) Since selectable speed is up to 7 kinds, [(H-07) preset speed/frequency command 8] cannot be used but by programed operation only.

(2) Selection of programed operation mode (common)

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|---------------------------------------|---|--------------------|----------------------|------|
| H-08 | Selection of programed operation mode | 0 : OFF 1 : One-Time 2 : End-less | _ | 0 | _ |

0:OFF Programed operation is not executed (ordinary operation). 1:One-Time Executing one time only of 1~8 speeds of programed operation

1:One-Time Executing one time only of 1~8 speeds of programed operation, Inverter stops automatically. (If operation command is kept inputting for more than 10 secs., Start Stall trouble occurs and "StrF" is displayed.

2:End-less Programed operation is repeated until operation command is turned to OFF. (Until pressing the [STOP] key at the time of console operation)

(3) Setting of programed operation time (common)

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|--|-----------------------------------|--------------------|----------------------|------|
| H-09 | Selection of programed operation time unit | 0: Sec. 1: Min. 2: Hour | _ | 0 | |
| H-10 | Programed operation time 1 | | 0.1 | 0.0 | — |
| H-11 | Programed operation time 2 | | 0.1 | 0 | |
| H-12 | Programed operation time 3 | | 0.1 | 0 | |
| H-13 | Programed operation time 4 | 0.0. 2600.0 | 0.1 | 0 | — |
| H-14 | Programed operation time 5 | 0.0~3600.0 | 0.1 | 0 | — |
| H-15 | Programed operation time 6 | | 0.1 | 0 | — |
| H-16 | Programed operation time 7 | | 0.1 | 0 | — |
| H-17 | Programed operation time 8 | | 0.1 | 0 | _ |

H-09: Set the time unit of setting of H-10 \sim 17.

H-10 \sim 17: Set the operation time of each step of programed operation. (Set 0.0 for the time of step of no use)

(4) Accel/decel time selection at the time of programed operation (common)

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|--|-----------------------------------|--------------------|----------------------|------|
| H-18 | Programed operation accel/decel time selection 1 | 0: Accel/decel time 1 | _ | 0 | _ |
| H-19 | Programed operation accel/decel time selection 2 | 1: Accel/decel time 2 | _ | 0 | — |
| H-20 | Programed operation accel/decel time selection 3 | 3: Accel/decel time 4 | _ | 0 | _ |
| H-21 | Programed operation accel/decel time selection 4 | | _ | 0 | — |
| H-22 | Programed operation accel/decel time selection 5 | | _ | 0 | — |
| H-23 | Programed operation accel/decel time selection 6 | | _ | 0 | — |
| H-24 | Programed operation accel/decel time selection 7 | | _ | 0 | _ |
| H-25 | Programed operation accel/decel time selection 8 | | _ | 0 | _ |

At the time of programed operation, select accel/decel time setting of each step by H-18 \sim H-25, regardless of setting of d-00, d-01 or multifunction input (accel/decel time selection).

| Selection of H−18~25 | Accel time | Decel time | S pattern rise time | S pattern accel reach time | S pattern fall time | S pattern decel reach time |
|-------------------------|------------|------------|------------------------|-------------------------------|------------------------|----------------------------|
| 0: Accel/decel time 1 | 3.Acc1 | 4.dEc1 | d-07 | d-08 | d-09 | d-10 |
| 1: Accel/decel time 2 | 5.Acc2 | 6.dEc2 | d-11 | d-12 | d-13 | d-14 |
| 2: Accel/decel time 3 | d-02 | d-03 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3: Accel/decel time 4 | d-04 | d-05 | 0.0 | 0.0 | 0.0 | 0.0 |

Each time of accel/decel to be selected.

3.Acc1, 4.dEc1, 5.Acc2, 6.dEc2 are basic setting items.

When accel/decel times 3, 4 are selected, all of S pattern accel/decel times are 0.0.

Start command



Example of programed operation pattern

4-10. Setting Item i Droop control, machine loss compensation

(1) Droop control setting (common)

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|--|-----------------------------------|--------------------|----------------------|------|
| i-00 | Droop control selection | 0 : OFF 1 : ON | _ | OFF | _ |
| i–01 | Droop start speed/frequency | 0.0~100.0 | 0.1 | 0.0 | % |
| i-02 | Droop ratio changeover speed/frequency | 0.0~100.0 | 0.1 | 0.0 | % |
| i-03 | Droop ratio | 0.0~50.0 | 0.1 | 0.0 | % |
| i-04 | Droop start torque | 0.0~90.0 | 0.1 | 0.0 | % |

Note) i-01 and i-02 are set by % to max. speed/frequency (A-00).

Execute each setting of droop control, which is used in order to balance the torque of 2 motors, etc.

- i-00: Select active/inactive of droop control.
- i-01: Droop control starts at i-01 or over. (When speed/frequency become lower than this speed/frequency as a result of droop control, it is limited to this speed/frequency.
- i-02: Making the speed/frequency set here as the boundary, execute "% droop control" to the input speed/frequency in the higher area and "absolute value droop control"which is based on the speed/frequency set at i-02 in the lower area.

i-03: Set droop amount of the time when torque command becomes 100%. When torque command is higher than the value set by i-02, droop ratio is constant and when that is lower than the value set by i-02, droop amount is constant.

i-04: Drooping is not done at less than this torque.



Droop control characteristic

(2) Machine loss compensation setting (vector control)

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|---|-----------------------------------|--------------------|----------------------|------|
| i-05 | Selection of machine loss compensation | 0 : OFF 1 : ON | _ | OFF | _ |
| i-06 | Machine loss offset | 0~100 | 1 | 0 | % |
| i-07 | Machine loss inclination | 0~100 | 1 | 0 | |

At the times of overtorque protection and droop control, torque control deducting component of i-06 machine loss offset and i-07 machine loss inclination can be done.

Note) Machine loss compensation for torque command input at the time of torque control is not done. Also, torque command monitor display is not compensated.

i-05: Select active/inactive of machine loss compensation. (In case of inaction, settings of i-06 and i-07 become ineffective.

i-06: Set offset quantity of machine loss component in case of 0 speed, making rated torque as 100%.

i-07: Set motor speed proportion component of machine loss, by torque at the time of max. speed.

4-11. Setting Item J Communication option setting

(common)

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|---|--|--------------------|----------------------|------|
| J-00 | Use selection of communication option | 0: OFF 1: ON | - | OFF | — |
| J-01 | ASYC64 communication speed | 0: 1200bps 1: 2400bps 2: 4800bps 3: 9600bps 4: 19200bps 5: 38400bps | _ | 2 | _ |
| J-02 | RSH64 communication speed | 0: 125kbps 1: 250kbps 2: 500kbps 3: 1Mbps | _ | 3 | _ |
| J-03 | | | — | 0 | — |
| J-04 | No. of frame of input (Inverter \rightarrow master office) | 3~19 | 1 | 14 | _ |
| J-05 | No. of frame of output (Inverter \rightarrow master office) | 2~12 | 1 | 6 | |

J-00

:This is use selection of communication option. When this setting is OFF, Inverter does not work even if communication option is selected at speed command and operation command position (speed command is 0). Also, When this setting is turned to ON, VFC64 P.C.Board checks the status of option.

If this setting is turned to ON under situation of no connection of communication option, "option error"occurs and Inverter trips, for which please pay attention.

J-00~05 :These are settings related to communication. For details, see Manuals of each communication option.

4-12. Setting Item L 2nd motor parameter setting, 2nd speed control gain

VF64 Inverter has "2nd motor functin" to use 2 different motors alternately changing by contact, setting their rating, constant and speed control system gain in advance.

By turning to ON of [2nd motor selection] of multifunction input, following data are used instead of each data of ordinary motor.

Note) Changeover of multifunction input should be done while Inverter is stopped. Changeover cannot be done during operation (including DC braking and initializing) of Inverter.

(1) Use selection of 2nd motor function (common)

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|-------------------------------------|-----------------------------------|--------------------|----------------------|------|
| L-00 | Use selection of 2nd motor function | 0: OFF 1: ON | _ | OFF | _ |

By turning of this setting to ON, 2nd motor functions become effective. In the status of OFF of setting, 2nd motor does not starts even if multifunction input [2nd motor selection] is turned to ON.

| Display | Content | | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|--|------------------|---|--------------------|----------------------|-------|
| | | (vector control) | (Capacities from rated capacity of Inverterr till that of 3 ranks lower in VF64 capacity can be set) | 0.1 | 0.0 | |
| L-01 | 2nd motor capacity | (V/f control) | 0~Inverter rated capacity | 0.1 | Inverter rating | KVV |
| | 2nd motor | (vector control) | $140 \sim 230(200 \text{ class})$ | | 0 | |
| L-02 | rated voltage | (V/f control) | 280~460(400V class) | 1 | 200V 400V | V |
| L-03 | 2nd motor rated current | (vector control) | 40 \sim 150% of Inverter rated current | 0.1 | 0.0 | A |
| | | (V/f control) | 0~150% of Inverter rated current | | Inverter rating | |
| 1_04 | 2nd motor rated speed | (vector control) | 400~12000 | 1 | 0 | r/min |
| L 04 | | (V/f control) | 400 ~24000 | | 1760 | |
| L-05 | Selection of pole of 2r | nd motor | 2~12 [Pole] | — | 4 | Pole |
| L-06 | 2nd motor | (vector control) | Rated speed x pole/120 \sim rated speed x pole/120+7.0 | 0.1 | 0.0 | Hz |
| | rated frequency | (V/f control) | 15.0~max. frequency(A-00) | | 60.0 | |
| L-07 | 2nd motor cooling fan selection (sensorless vector control mode only) | | 0: Self cooling fan 1: Forced cooling fan | _ | 0 | _ |
| L-08 | Number of 2nd motor PG pulse (vector control mode with sensor only) | | 60~3600 | 1 | 600 | P/R |

(2) Setting of rating plate values, cooling fan and PG pulse of 2nd motor (common)

Note) At the time of initializing in V/f control, typical value of same capacity of motor with that of Inverter is set.

Set rating plate values, cooling fan and PG pulse number of 2nd motor. At the time of selection of 2nd motor, these values are replaced by each settings A-02 \sim A-09 of ordinary motors. In case of auto-tuning work of 2nd motor, these values are necessary to be set in advance. (As to details of each setting, see items of A-02 \sim A-09)

(3) Electric constant of 2nd motor (common)

(common)

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|------------------------------|---|--------------------|----------------------|------|
| L-09 | 2nd motor primary resistance | Setting range, resolution differ depending on Inverter capacity | — | 0 | MΩ |

Note) In case of initializing by V/f control mode, typical value is set in the initializing data depending on capacity. (However, since actual value differ depending on Inverter and motor, reset by auto-tuning to the utmost.) In vector control mode, all are initialized to 0.

| (vector | control) |
|---------|----------|
|---------|----------|

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|--|-----------------------------------|--------------------|----------------------|------|
| L-10 | 2nd motor 2ndary resistance | | | 0 | mΩ |
| L-11 | 2nd motor leakage inductance | | | 0 | mH |
| L-12 | 2nd motor mutual inductance | | | 0 | mH |
| L-13 | 2nd motor inductance saturation compensation 1 | | | 0 | % |
| L-14 | 2nd motor inductance saturation compensation 2 | | | 0 | % |
| L-15 | 2nd motor iron loss conductance | 0.0~600.0 | 0.0 | 0.0 | mho |
| L-16 | 2nd motor loss factor 1 | 0.0~200.0 | 0.0 | 0.0 | % |
| L-17 | 2nd motor loss factor 2 | 0.0~200.0 | 0.0 | 0.0 | % |

The above is setting of electric constant of 2nd motor. At the time of selection of 2nd motor, these settings are replaced by settings of A-17 \sim A-25 of ordinary motor. Also, when auto-tuning of 2nd motor is executed, these data are set automatically. (As to details of each items, see items of A-17 \sim A-25)

(4) 2nd motor speed control adjustment gain (vector control)

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|---|-----------------------------------|--------------------|----------------------|------|
| L-18 | 2nd speed control proportional gain | 3~100 | 1 | 15 | _ |
| L-19 | 2nd speed control integration time constant | 20~10000 | 1 | 40 | ms |
| L-20 | 2nd motor control inertia moment | 0~32767 | 1 | 10 | gm² |

At the time of selection of 2nd motor, different speed control gain from ordinary motor is used. When 2nd motor is selected, speed control gain is replaced by basic setting items 7. ASrP, 8.ASri, 9.ASrJ, and L-18~L-20 are used. (As to details of each gain, see items of 7.ASrP, 8.ASri, 9.ASrJ)

- (5) Auto-tuning of 2nd motor (common)
 - For execution of auto-tuning of 2nd motor:-
 - 1) Turn L-00 (Selection of 2nd motor function) to ON.
 - 2) Set each of settings of L-01~L-08.
 - 3) Turn multifunction input terminal, which selected multifunction input [2nd motor selection], to ON.
 - 4) Make auto-tuning in accordance with [Order of auto-tuning] of item of Setting Item A.
 - (Display of console at this time is [tun2] instead of ordinary [tun])

5) Since data are set at each of settings of L-09 \sim L-17 (L-09 only in case of DC mode) instead of A-11 \sim A-25, confirm it supplying the power source.

Note) Even if auto-tuning only of 2nd motor is executed, Inverter cannot be operated since A-11 \sim A-16 (dead time correction quantity) and correction table are not set.

Therefore, execute [auto-tuning of ordinary motor] in advance.

4-13. Setting Item n Monitor setting

(1) Line speed setting (common)

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|-------------------------------|-----------------------------------|--------------------|----------------------|------|
| n-00 | Line speed monitor adjustment | 0~20000 | 1 | 0 | — |

Adjust display gain of console [Line speed] monitor.

Set line speed at the time of max. speed/frequency (A-00).

Display of line speed monitor is:-

Motor speed x (n-00)/(A-00) (vector control)

Output frequency x (n-00)/(A-00) (V/f control)

(2) Monitor setting for our adjustment (common)

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|-------------|------------------------------------|-----------------------------------|--------------------|----------------------|------|
| n−01 ~09 | Monitor setting for our adjustment | - | _ | _ | _ |

Monitor setting item for adjustment in our factory. Usually, keep the status of the time of delivery.

4-14. Setting Item P Setting area of super block constant

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------------|---------------------------------|-----------------------------------|--------------------|----------------------|------|
| P-000 ∼259 | Setting of super block constant | _ | _ | _ | _ |

[Setting Item P] is Constant setting area of super block function. As to details, see explanatory leaflet of super block function. (When super block function is not used, this setting is not necessary)

4-15. Setting Item S Special setting item

(1) VDC detection gain (common)

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|--------------------|-----------------------------------|--------------------|----------------------|------|
| S-00 | VDC detection gain | 0.0~200.0 | 0.1 | — | % |

The above is detection adjustment gain of DC voltage which Inverter detects. Adjust this gain in case that display of console monitor [Vdc] is different from voltage between main circuit terminal block [+2] - [-].

Note) At the time of initializing, by inputting of voltage between $[\oplus 2] - [\bigcirc]$ at that time, this Vdc detection gain is counted backward and set. Use this gain as it is usually.

If main circuit P.C.Boards (GAC61 or MAC61, etc.) are replaced, there may be a case that [Vdc] display of console is dislocated from the voltage between $[\oplus 2] - [\bigcirc]$. In such case, adjust VDC detection gain by this setting, without initializing the memory.

(2) Inverter control mode (common)

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|-----------------------|-----------------------------------|--------------------|----------------------|------|
| S-01 | Inverter control mode | VF64S VF64V VF64 | _ | _ | _ |

By reading of this setting, set control mode of Inverter can be confirmed.

VF64S : Speed sensorless vector control mode

VF64V : Vector control mode with speed sensor

VF64 : V/f control (open control) mode

Note) This setting is read only and "write" is not available (always "write" is inhibited). In case of changeover of Inverter control mode, execute changeover operation of Inverter control mode or initializing (default) of memory.

(3) Inverter capacity, voltage series (common)

| Display | Content | Setting range (selection item) | Setting resolution | Initializing data | Unit |
|---------|---------------------------------|-----------------------------------|--------------------|----------------------|------|
| S-02 | Inverter capacity,voltage class | 1r122~18022 1r144~100044 | _ | _ | _ |

By reading of this setting, set capacity and voltage class of Inverter can be confirmed.



Note) This setting is read only and "write" is not available (always "write" is inhibited). In case of change (by exchange of spare parts, etc.) of Inverter capacity, voltage class set on P.C.Board, it is necessary to do from the initializing of memory. If Inverter capacity, voltage class set on P.C.Board do not match the capacity, voltage class of Inverter fitting that P.C.Board, normal control cannot be done and could result in trouble, for which please pay attention.

Chapter 4 Selection of peripheral devices and options

1. Selection guide



| | Name | Туре | Application | Remarks |
|-----------------|--|---|--|--|
| Peri- pheral | AC reactor | | Apply for the cases of input power factor improvement and suppression of distorted wave form. | For input side connection |
| device | Noise filter | Ioise filter NF3 □□ Apply for reduction of electro-magnetic noise general from Inverter. MIF3 □□ From Inverter. NF3 □□ is noise filter for attenuation of high band MIF3 □□ | | For input side connection |
| | Zero phase reactor | | Zero phase reactor is noise filter in case that it corresponds to EMS of EN55011 in EC mark. | For output side connection |
| | DC reactor | | Apply for the case of improvement of input power factor DC reactor is standard accessory for VF64-1522, ED64sp-2244 or over and is Option for Inverters of less than these capacities. | Connect between ⊕1~⊕2 |
| | Sine wave converter | VF61R | Apply for the case that drastic remodeling,power factor improvement of power source regeneration braking, power source harmonic are necessary. In case of use of sine wave converter, it is necessary. to fit ACL for converter. AS there are kinds of capacity, please refer to catalog and instruction manual of VF61R. | Apply for Inverter input side |
| | Dynamic brake unit Resistor Thermal relay | | Apply for the case that braking of Inverter is necessary. At the time of application, use combining with dynamic brake unit, resistor and thermal relay. (As to types of VF64-1122 or less and VF64-1544 or less, dynamic brake unit is incorporated. | Connect between⊕2~⊖ Types incorporating dynamic brake unit should connect resistor and thermal relay between B~⊕2 |

Note 1) For selection of circuit breaker, input/output side electro-magnetic contactor and size of wiring, see next page.

Note 2) As to earth leakage circuit breaker, use the product which complied with high harmonic.

- Note 3) DCL is standard accessory for Inverters of 200V class 15kW (VF64-1522) or over and 400V class 22kW (VF64-2244) or over. DCL is option for Inverters of less than these capacities. However, DCL and dynamic brake unit (including resistor, thermal relay) are unnecessary in case that sine wave converter is used.
- Note 4) Filter condenser and magnetic contactor for closing of filter condenser are needed when sine wave converter (VF61R) is used. Electromagnetic contactor for closing is used to turn to ON when sine wave converter is operated and to OFF when that converter is stopped.

Note 5) Please use electro magnetic contactors of input side and output side in accurdance with applications.

2. Input/output devices and wiring

| | | | | aripharal davia | | 14/5 | ring olao (mg | 2) #E | |
|---------------------|-----------------|------------------|---------------|-------------------|--------------------|------------------|------------------|---------------------|------------|
| | Motor output *2 | Type of Inverter | Input MCCB *3 | Input MC *4 | es Output MC *4 | Input side | Output side | DCL | earth wire |
| ● 200V Class * 1 | 1.1kW | VF64-1R122 | 15A | S-N20 SC-5-1 | S-N20 SC-5-1 | 2 | 2 | 2 2 | 2 |
| | 2.2kW | VF64-2R222 | 20A | S-N20 SC-5-1 | S-N20 SC-5-1 | 3.5 3.5 | 3.5 3.5 | 3.5 3.5 | 2 |
| | 3.7kW | VF64-3R722 | 20A | S-N20 SC-5-1 | S-N20 SC-5-1 | 3.5 3.5 | 3.5 3.5 | 3.5 3.5 | 2 |
| | 5.5kW | VF64-5R522 | 30A | S-N35 SC-N2 | S-N35 SC-N2 | 5.5 5.5 | 5.5 5.5 | 5.5 5.5 | 3.5 |
| | 7.5kW | VF64-7R522 | 40A | S-N50 SC-N2S | S-N50 SC-N2S | 5.5 8 | 5.5 8 | 8 8 | 3.5 |
| | 11kW | VF64-1122 | 60A | S-N65 SC-N3 | S-N65 SC-N3 | 8 14 | 8 14 | 8 14 | 5.5 |
| | 15kW | VF64-1522 | 60A | S-N65 SC-N3 | S-N65 SC-N3 | 14 22 | 14 22 | 14 22 | 5.5 |
| | 18.5kW 22kW | VF64-2222 | 100A | S-N95 SC-N5 | S-N95 SC-N5 | 22 38 | 22 38 | 22 38 | 5.5 |
| | 30kW | VF64-3022 | 125A | S-N125 SC-N6 | S-N125 SC-N6 | 38 38 | 38 38 | 38 38 | 14 |
| | 37kW | VF64-3722 | 150A | S-N150 SC-N7 | S-N150 SC-N7 | 38 60 | 38 60 | 60 60 | 14 |
| | 45kW | VF64-4522 | 225A | S-N220 SC-N10 | S-N220 SC-N10 | 60 80 | 60 80 | 80 80 | 22 |
| | 55kW | VF64-5522 | 300A | S-N300 SC-N11 | S-N300 SC-N11 | 80 100 | 80 100 | 100 100 | 22 |
| | 75kW | VF64-7522 | 400A | S-N400 SC-N12 | S-N400 SC-N12 | 150 150 | 150 150 | 150 200 | 22 |
| | 90kW | VF64-9022 | 400A | S-N400 SC-N12 | S-N400 SC-N12 | 150 200 | 150 200 | 200 150×2P | 38 |
| | Motor output *2 | Type of Inverter | F | Peripheral device | es | Wi | ring size (mn | n ²) *5 | oorth wire |
| | 1 11/10/ | VE64 1D144 | | S-N20 | S-N20 | 2 | 2 | 2 | |
| <u> </u> | | | 104 | SC-5-1 S-N20 | SC-5-1 S-N20 | 2 | 2 | 2 | 2 |
| | 2.2KVV | | 104 | SC-5-1 S-N20 | SC-5-1 S-N20 | 2 | 2 | 2 | 2 |
| | 3.7KVV | VF64-3R744 | IUA | SC-5-1 S-N20 | SC-5-1 S-N20 | 2 | 2 | 2 | 2 |
| | 5.5kW | VF64-5R544 | 15A | SC-5-1 | SC-5-1 | 3.5 | 3.5 | 3.5 | 2 |
| | 7.5kW | VF64-7R544 | 30A | SC-N1 | SC-5-1 | 3.5 | 3.5 | 3.5 | 2 |
| | 11kW | VF64-1144 | 30A | SC-N2 | SC-N1 | 3.5 | 3.5 | 5.5 | 3.5 |
| | 15kW | VF64-1544 | 50A | S-N50 SC-N2S | S-IN50 SC-N2 | 5.5 | 5.5 | 5.5 | 3.5 |
| | 22kW | VF64-2244 | 50A | S-N50 SC-N2S | S-N50 SC-N2S | 8 14 | 8 14 | 8 14 | 5.5 |
| | 30kW | VF64-3044 | 75A | S-N80 SC-N4 | S-N80 SC-N3 | 14 22 | 14 22 | 14 22 | 5.5 |
| | 37kW | VF64-3744 | 100A | S-N95 SC-N5 | S-N95 SC-N5 | 14 22 | 14 22 | 22 22 | 5.5 |
| | 45kW | VF64-4544 | 100A | S-N100 SC-N6 | S-N100 SC-N5 | 22 38 | 22 38 | 38 38 | 14 |
| | 55kW | VF64-5544 | 125A | S-N125 SC-N6 | S-N125 SC-N6 | 38 38 | 38 38 | 38 38 | 14 |
| | 75kW | VF64-7544 | 200A | S-N200 SC-N10 | S-N150 SC-N7 | 60 60 | 60 60 | 60 60 | 14 |
| | 110kW | VF64-11044 | 300A | S-N300 SC-N11 | S-N220 SC-N10 | 80 100 | 80 100 | 100 100 | 22 |
| | 160kW | VF64-16044 | 400A | S-N400 SC-N12 | S-N300 SC-N11 | 150 200 | 150 200 | 200 200 | 22 |
| | 200kW | VF64-20044 | 500A | S-N600 SC-N14 | S-N400 SC-N12 | 200 250 | 200 250 | 200 250 | 38 |
| | 250kW | VF64-25044 | 600A | S-N600 SC-N14 | S-N600 SC-N14 | 250 150×2P | 250 150×2P | 250 150×2P | 38 |
| | 315kW | VF64-31544 | 800A | S-N800 SC-N16 | S-N800 SC-N16 | 150×2P 150×2P | 150×2P 150×2P | 150×2P 150×2P | 50 |

*1 200V class set the device at input voltage AC200V and 400V class set the device at input voltage AC380V.

*2 Motor output is shown in referential kW. Select it by the type of inverter.

*3 Input MCCB shows the rated current value. Determine the breaking capacity of MCCB by power source capacity, etc.

*4 Types of MC, shown above are application examples of Mitsubishi Elec. Co.(upper tier) and of Fuji Electric Co. (lower tier) products.

*5 Please arrange wiring between VF64 and motor to make voltage drop to 2% or less.Sizes of wiring shown above are:-Upper tier: Wiring size for inside panel (wiring length 3m by MLFC) Lower tier: Wiring size for outside panel (wiring length 30m by CV).

*6 As to crimp style terminal, please use R type standardized by Japan Industrial standard (JIS C2805).

3. AC Reactor

For AC Reactor of Inverter input side, use types of the table below.

| 200V class | | | | | | | |
|---------------|-----------------|--|--|--|--|--|--|
| Inverter type | AC Reactor type | | | | | | |
| VF64-1R122 | AL15A1000L | | | | | | |
| VF64-2R222 | AL15A1000L | | | | | | |
| VF64-3R722 | AL20A333L | | | | | | |
| VF64-5R522 | AL37A180L | | | | | | |
| VF64-7R522 | AL55A122L | | | | | | |
| VF64-1122 | AL70A97L | | | | | | |
| VF64-1522 | AL70A97L | | | | | | |
| VF64-2222 | AL105A64L | | | | | | |
| VF64-3022 | AL140A49L | | | | | | |
| VF64-3722 | AL173A39L | | | | | | |
| VF64-4522 | AL209A32L | | | | | | |
| VF64-5522 | AL253A27L | | | | | | |
| VF64-7522 | AL341A20L | | | | | | |
| VF64-9022 | AL416A17L | | | | | | |

| 400\ | / class |
|---------------|-----------------|
| Inverter type | AC Reactor type |
| VF64-1R144 | AL6A2000L |
| VF64-2R244 | AL15A1000L |
| VF64-3R744 | AL15A1000L |
| VF64-5R544 | AL20A333L |
| VF64-7R544 | AL20A333L |
| VF64-1144 | AL37A180L |
| VF64-1544 | AL55A122L |
| VF64-2244 | AL55A122L |
| VF64-3044 | AL70A97L |
| VF64-3744 | AL84A80L |
| VF64-4544 | AL105A64L |
| VF64-5544 | AL140A49L |
| VF64-7544 | AL173A39L |
| VF64-11044 | AL253A27L |
| VF64-16044 | AL341A20L |
| VF64-20044 | AL503A14L |
| VF64-25044 | AL585A11L |
| VF64-31544 | AL850A8L |
| | |

•External form and dimension



| AL Type | w | Н | D | А | В | С | Е | F | G | I | Туре | Mass |
|------------|-----|-----|-----|-----|-----|-----|-----|----|-----|-----|------|------|
| AL6A2000L | 140 | 91 | 96 | 60 | 66 | 30 | 46 | 5 | M3 | - | Α | 2.5 |
| AL15A1000L | 150 | 117 | 118 | 90 | 78 | 40 | 58 | 7 | M4 | - | Α | 4.3 |
| AL20A333L | 160 | 100 | 120 | 100 | 80 | 40 | 60 | 7 | M8 | - | Α | 3.4 |
| AL37A180L | 170 | 110 | 125 | 100 | 85 | 40 | 70 | 7 | M6 | - | Α | 3.9 |
| AL55A122L | 170 | 110 | 135 | 100 | 95 | 40 | 70 | 7 | M8 | - | Α | 4.2 |
| AL70A97L | 170 | 110 | 135 | 100 | 95 | 40 | 75 | 7 | M8 | - | Α | 4.9 |
| AL84A80L | 170 | 110 | 135 | 100 | 95 | 40 | 75 | 7 | M8 | - | Α | 5.4 |
| AL105A64L | 190 | 140 | 155 | 100 | 105 | 50 | 75 | 7 | M10 | - | Α | 7.5 |
| AL140A49L | 190 | 150 | 155 | 100 | 105 | 50 | 75 | 7 | M8 | - | Α | 9.0 |
| AL173A39L | 190 | 150 | 170 | 100 | 110 | 60 | 80 | 7 | M10 | - | Α | 10 |
| AL209A32L | 220 | 180 | 175 | 150 | 115 | 60 | 90 | 7 | M10 | - | Α | 14 |
| AL253A27L | 250 | 200 | 198 | 160 | 138 | 60 | 100 | 7 | M12 | - | Α | 19 |
| AL341A20L | 220 | 180 | 200 | 150 | 140 | 60 | 90 | 7 | M12 | - | Α | 15 |
| AL416A17L | 280 | 235 | 240 | 150 | 160 | 70 | 120 | 10 | M12 | 40 | Α | 28 |
| AL503A14L | 300 | 265 | 228 | 150 | 170 | 70 | 130 | 10 | M16 | 40 | Α | 32 |
| AL585A11L | 300 | 255 | 280 | 180 | 150 | 130 | 112 | 10 | M12 | 35 | Α | 45 |
| AL850A8L | 350 | 335 | 342 | 250 | 172 | 170 | 122 | 15 | M12 | 100 | В | 75 |

4. Noise filter

4-1. Noise filter (Option)

As to noise filter of Inverter input side, use types of the table below, (Regarding noise filter complying with CE marking, use types shown in next page.)

| I ype of Inverter | Type of noise filter |
|-------------------|----------------------|
| VF64-1R122 | NF3010A-CD |
| VF64-2R222 | NF3015A-CD |
| VF64-3R722 | NF3020A-CD |
| VF64-5R522 | NF3030A-CD |
| VF64-7R522 | NF3040A-CD |
| VF64-1122 | NF3060A-CD |
| VF64-1522 | NF3060A-CD |
| VF64-2222 | NF3100A-CD |
| VF64-3022 | NF3150A-CD |
| VF64-3722 | NF3150A-CD |
| VF64-4522 | NF3200A-CD |
| VF64-5522 | NF3250A-CD |
| VF64-7522 | NF3400A-CD |
| VF64-9022 | NF3400A-CD |

| 400V class | | | | | | | | |
|------------------|----------------------|--|--|--|--|--|--|--|
| Type of Inverter | Type of noise filter | | | | | | | |
| VF64-1R144 | NF3005C-CD | | | | | | | |
| VF64-2R244 | NF3010C-CD | | | | | | | |
| VF64-3R744 | NF3010C-CD | | | | | | | |
| VF64-5R544 | NF3015C-CD | | | | | | | |
| VF64-7R544 | NF3020C-CD | | | | | | | |
| VF64-1144 | NF3030C-CD | | | | | | | |
| VF64-1544 | NF3040C-CD | | | | | | | |
| VF64-2244 | NF3050C-CD | | | | | | | |
| VF64-3044 | NF3080C-CD | | | | | | | |
| VF64-3744 | NF3080C-CD | | | | | | | |
| VF64-4544 | NF3100C-CD | | | | | | | |
| VF64-5544 | NF3150C-CD | | | | | | | |
| VF64-7544 | NF3200C-CD | | | | | | | |
| VF64-11044 | NF3250C-CD | | | | | | | |
| VF64-16044 | NF3400C-CD | | | | | | | |
| VF64-20044 | NF3500C-CD | | | | | | | |
| VF64-25044 | NF3600C-CD | | | | | | | |
| VF64-31544 | NF31000C-CD | | | | | | | |

• External form and dimension



| Ту | /pe | | Dimension (unit: mm) | | | | | | | | | | | | | | | | | |
|------------|-------------|-----|----------------------|-----|-----|-----|-----|----|-----|-----|-----|----|-----|----|---------------|---------|----|-----|-----|------|
| 200V class | 400V class | А | В | С | D | Е | F1 | F2 | G | Н | J | К | L | М | Ν | Р | Q | R | S | Fig. |
| NF3005A-CD | - | 147 | 140 | 125 | 110 | 95 | 70 | - | 50 | 50 | 25 | 10 | M4 | M4 | φ4.5 | R2.25×6 | - | - | - | |
| NF3010A-CD | NF3005C-CD | 167 | 160 | 145 | 130 | 110 | 80 | _ | 60 | 70 | 35 | 15 | - | - | φ5 . 5 | R2.75×7 | - | - | _ | |
| NF3015A-CD | NF3010C-CD | 167 | 160 | 145 | 130 | 110 | 80 | - | 60 | 70 | 35 | 15 | - | - | $\phi 5.5$ | R2.75×7 | - | - | - | |
| NF3020A-CD | NF3015C-CD | 167 | 160 | 145 | 130 | 110 | 80 | - | 60 | 70 | 35 | 15 | - | - | $\phi 5.5$ | R2.75×7 | - | - | - | |
| _ | NF3020C-CD | 167 | 160 | 145 | 130 | 110 | 80 | - | 60 | 70 | 35 | 15 | - | - | $\phi 5.5$ | R2.75×7 | - | - | - | |
| NF3030A-CD | _ | 175 | 160 | 145 | 130 | 110 | 80 | - | 60 | 70 | 35 | 15 | M4 | M5 | $\phi 5.5$ | R2.75×7 | - | - | - | |
| NF3040A-CD | NF3030C-CD | 215 | 200 | 185 | 170 | 120 | 90 | _ | 70 | 70 | 35 | 15 | M4 | M5 | $\phi 5.5$ | R2.75×7 | - | - | - | |
| _ | NF3040C-CD | 215 | 200 | 185 | 170 | 120 | 90 | _ | 70 | 70 | 35 | 15 | M4 | M5 | $\phi 5.5$ | R2.75×7 | - | - | - | А |
| NF3050A-CD | NF3050C-CD | 255 | 230 | 215 | 200 | 140 | 110 | - | 80 | 80 | 40 | 15 | M4 | M5 | $\phi 6.5$ | R2.75×8 | - | - | - | |
| NF3060A-CD | NF3060C-CD | 255 | 230 | 215 | 200 | 140 | 110 | - | 80 | 80 | 40 | 15 | M4 | M5 | $\phi 6.5$ | R2.75×8 | - | - | - | |
| NF3080A-CD | NF3080C-CD | 310 | 280 | 260 | 240 | 200 | 150 | - | 120 | 100 | 55 | 20 | M6 | M8 | $\phi 6.5$ | R2.75×8 | - | - | - | |
| NF3100A-CD | NF3100C-CD | 420 | 370 | 350 | 330 | 210 | 170 | 60 | 120 | 155 | 95 | 20 | M10 | M6 | $\phi 6.5$ | R3.25×8 | - | - | - | |
| NF3150A-CD | NF3150C-CD | 435 | 370 | 350 | 330 | 210 | 170 | 60 | 120 | 155 | 95 | 20 | | M6 | $\phi 6.5$ | R3.25×8 | - | - | - | |
| NF3200A-CD | NF3200C-CD | 475 | 410 | 390 | 370 | 230 | 190 | 70 | 140 | 180 | 100 | 25 | M12 | M6 | $\phi 6.5$ | R3.25×8 | - | - | - | |
| NF3250A-CD | NF3250C-CD | 475 | 410 | 390 | 370 | 230 | 190 | 70 | 140 | 180 | 100 | 25 | | M6 | $\phi 6.5$ | R3.25×8 | - | - | - | |
| NF3400A-CD | _ | 450 | 340 | 310 | 280 | 220 | 180 | 80 | 146 | 170 | 85 | 18 | - | - | - | 80 | 45 | 4.5 | 4 | |
| - | NF3400C-CD | 485 | 375 | 345 | 315 | 220 | 180 | 80 | 146 | 170 | 85 | 18 | - | - | - | 80 | 45 | 4.5 | 4 | |
| - | NF3500C-CD | 595 | 445 | 415 | 385 | 240 | 200 | 80 | 160 | 170 | 85 | 18 | - | - | - | 95 | 60 | 5 | 4.5 | В |
| _ | NF3600C-CD | 595 | 445 | 415 | 385 | 240 | 200 | 80 | 160 | 170 | 85 | 18 | - | - | - | 95 | 60 | 7 | 6 | |
| | NF31000C-CD | 645 | 445 | 415 | 385 | 300 | 270 | 90 | 180 | 190 | 98 | 20 | - | _ | - | 120 | 75 | 8 | 8 | |

5. DC Reactor

DC Reactor is separately supplied as option for VF64-1122 or less of 200V class and VF64-1544 or less of 400V class. DC Reactor of separate installation type is equipped as standard for VF64-1522 or over of 200V class and VF64-2244 or over of 400V class. See [chaper9 item4-2] of external form dimension.

6. VF61R/VF64R Sine wave converter

In cases of regeneration of energy at the time of brake torque and improvement of input power factor and of distortion rate is required, power regenerative sine wave converter can be used. We prepare VF61R or VF64R (under development) series as sine wave converter unit. For details, please contact our sales division or see [Instruction Manual of VF61R Sine Wave Converter] of separate issue.

7. Dynamic brake unit (DB unit)

If sine wave converter is not used in case of need of brake torque, dynamic brake unit (DB unit) is used for disposing of generated energy. In case of VF64, units of 200V class 11kW (VF64-1122) capacity or less and 400V class 15kW (VF64-1544) capacity or less incorporate the transistor for dynamic braking and by adding the resistor and protection relay at external,dynamic braking can be performed. In case of higher types of aforesaid ones, dynamic brake unit (DB unit) should be used. For details, please contact our sales division or see [Instruction Manual of Dynamic brake (DB unit)] of separate issue.

7-1. Dynamic brake unit (Option)

Standard table dynamic brake unit, resistor and relay correspond to the capacity of Inverter.

| | | | | | | | | VF64 | 22 | 200V (| class | | | | | | | | |
|-------------------------------------|---------------------|---------------------|---------------------|---------------|--------------|-------------|------------------|-------------------------|-------------------------------------|------------|-----------|----------|------|------------|-------------------------------|----------|-----------|-------|--|
| Type of inverter | 1R1 | 2R | 2 31 | R7 | 5R5 | 7R5 | 1 | 1 | 15 | 22 | 30 | 37 | , | 45 | 55 | 7 | 75 | 90 | |
| Motor capacity | 1.1 | 2.2 | 2 3 | .7 | 5.5 | 7.5 | 1 | 1 | 15 | 22 | 30 | 37 | , | 45 | 55 | 7 | 75 | 90 | |
| DB unit | Built-in | type | | | | | | | Use separate type(Type VFDB2002-50) | | | | | | Use separate Type×2parallelly | | | | |
| Max. braking power | 1.2 | 2.9 | 3 | .2 | 9 | .8 | 13 | .1 | | | 17.3 | | | | | 34 | 4.6 | | |
| Ave. braking power | 0.04 | 0.08 | з 0. | 16 | 0 | .2 | 0.2 | 24 | .4 0.4 | | | | | | | 0 | .8 | | |
| Type, q'ty(*2) of brake resistor | 200W 100Ω ×1S | 200 220 ×23 | W 20 2 10 5 × | 0W Ω 4S | 250W 3 | .3Ω×4S | 400 3.3 ×3 | DW Ω IS | W 400W 1.5Ω×5S | | | | | | 400V | V 1.5Ω | ×5S× | 2sets | |
| Thermal setting | 1.0 | 2.4 | 3 | .5 | 7 | .5 | 8. | 5 | 5 13.0 | | | | | 13.0 | | | | | |
| *1.Types of VF64-1 | 522 or ov | er use DI | 3 unit(sep | oarate t | ype). VF64 | -1122 or le | ess inco | orporat | e DB unit c | ircuit. *2 | .2S shown | in table | mean | s use of 2 | resistor | connecte | ed in ser | ies. | |
| Tuno of Investor | | | | | | | | VF64 | 44 | 400V | class | | | | | | | | |
| Type of inverter | 1R1 | 2R2 | 3R7 | 5R5 | 5 7R5 | 11 | 15 | 22 | 30 | 37 | 45 | 55 | 75 | 110 | 160 | 200 | 250 | 315 | |
| Motor capacity | 1.1 | 2.2 | 3.7 | 5.5 | 7.5 | 11 | 15 | 22 | 30 | 37 | 45 | 55 | 75 | 110 | 160 | 200 | 250 | 315 | |
| DB unit | Built-in | type | | | | | | Use | separate t | pe(Type | VFDB2002 | 50) | | Use sep | parate Ty | /pe×2p | arallelly | ' | |
| Max. braking power | 1.3 | 2.6 | 5.9 | | 8.6 | 15. | 2 | | | 22.4 | | | | | 44 | .8 | | | |
| Ave. braking power | 0.04 | 0.08 | 0.16 | | 0.24 | 0.4 | Ļ | 0.56 | | | | | | | 1.1 | | | | |
| Type, q'ty(*2) of brake resistor | 200W 500Ω ×1S | 200W 100Ω ×2S | 200W 22Ω ×4S | 200 | W 10Ω ×6S | 400W ×5 | 6.8Ω S | 400W 3.3Ω×7S 400W 3.3Ω> | | | | | ×7S× | 2sets | | | | | |
| Thermal setting | 0.6 | 1.2 | 2.4 | | 3.5 | 6.0 |) | 8.5 8.5 | | | | | .5 | | | | | | |

*1.Types of VF64-2244 or over use DB unit(separate type). VF64-1544 or less incorporate DB unit circuit. *2.2S shown in table means use of 2 resistor connected in series.

| Large capacity dynamic brake unit | | VF64DB2002-200 | | | | | | | | | |
|--|--|------------------------|------------------------|-----------------------|------------------|------------------------|------------------------|------------------------|-----------------------|-----------------------|--|
| Voltage class | | 200V class 400V class | | | | | | | | | |
| Max. braking power | 17.3 | 34.6 | 51.9 | 69.2 | 22.4 | 44.8 | 67.2 | 89.6 | 112 | 134.4 | |
| Ave. braking power | 0.4 | 0.8 | 1.2 | 1.6 | 0.56 | 1.1 | 1.68 | 2.24 | 2.8 | 3.36 | |
| Type, q'ty(*2) of brake resistor | 400W 1.5Ω ×5S | (400W 1.5Ω ×5S) ×2P | (400W 1.5Ω ×5S) ×3P | (400W 1.5Ω ×5S)×4P | 400W 3.3Ω ×7S | (400W 3.3Ω ×7S) ×2P | (400W 3.3Ω ×7S) ×3P | (400W 3.3Ω ×7S) ×4P | (400W 3.3Ω ×7S)×5P | (400W 3.3Ω ×7S)×6P | |
| Thermal setting | 13.0 N60A type N60 | | | | | | | | | | |
| *1. The combination which it's maximum braking power exceeds 1.5 times of the inverter capacity cannot be done. *2. Two parallel running or more is also possible. | | | | | | | | | | | |

Outline of DB unit, Type:VFDB2002-50



Outline form of DB unit, Type:VFDB2002-200



Outline form of thermal relay



Outline of brake resistor



Dimension table of brake resistor

| oon ooitu | Dimension (mm) | | | | | | | | | | |
|-----------|----------------|-----|------|----|-----|--|--|--|--|--|--|
| capacity | L1 | L2 | Н | D | E | | | | | | |
| 200W | 306 | 331 | 49.5 | 28 | 8.2 | | | | | | |
| 250W | 343 | 358 | 59.0 | 40 | 4.5 | | | | | | |
| 400W | 380 | 408 | 82.0 | 50 | 9.5 | | | | | | |

- (Note 1) Use twisted wire for connection and make wiring as short as possible.
- (Note 2) As brake resistor becomes hot (about 200°C), mount it at the well ventilated place and don't put inflamable materials at its surroundings.

(Note 3) Installation of resistors, in case of series connection of brake resistors, should be done securing a space of 100mm or more between center of resistors in both lateral placement and stacking arrangement.

- 7-2. Connection example of dynamic brake circuit
- Connection example of DB unit built-in type



• Connection example of separate type DB unit



- Connection example of DB unit • Connection example use of plural number of built-in type with separate type DB unit separate type DB unit VFDB2002-FDB2002--RUN と SLAVE 52 MAX Łe SLAVE MASTER 52 MAX MASTER -3 DBR P 6 DBR N FAU Ł@ *****76 Unused_ **BUN** VFDB2002-2 VF64 60 IM SI A DCL 60 -DBR-FAUL Śнт RUN -6 Speed/ (PS ST-Ń -0-0frequency -10 run command 60 setting VF64 60 IM 60 -(2 8 52MA (52 MAX PS Speed/ GT-----frequency setting run command 2 52MA ×1
- Note.1) Please run/stop the contact point of 52MAX at the same time as the drive contact point of VF64 (Terminal ①-②). The lowpower relay must be used as the one for this contact point.
- Note.2) VFDB2002- Can be applied to both 200V class and 400V class. Please change the connection with the jumper (CN4,5, CN7,8) and switch voltage with the indicator.

Note.3) It is necessary to set the slave machine with the indicator when using in parallel. Please refer its detail to the instruction manual.

8. Corresponding standards

8-1. Noise filter complying with CE marking (Option)

Please use the inverter and Noise filter by the following combination to suit the EMC(Electromagnetic Compatibility) instruction of Europe. Noise filter is connected with the input of the inverter, and please store on the control board and use the inverter and Noise filter. Application is possible the performance (attenuation characteristic) more than the equal application Noise filter a even if it is not the following, recommended goods.EMC agreement standard suits following PDS(Power Drive Systems).

EMI (Emission): Normative Standard EN61800-3

EMS (Immunity): Normative Standard EN61800-3

Please add common-mode reactor (core) besides above-mentioned Noise filter to the inverter unit output line in the form of a common mode (three aspect batch penetration) when you clear standard EN55011 with EMS(Emission).

Note:Please arrange in the vicinity of the inverter output terminal, and roll number (T) of turns of tables below in common-mode reactor.

Note:Please refer to the manual for details for EMC.

| | EN | 155011 | | EN | 155011 |
|---------------------|--------------|------------------------|---------------------|---------------|------------------------|
| | EN61800-3 | | | EN61800-3 | |
| Type of Inverter | Noise filter | Common mode reactor | Type of Inverter | Noise filter | Common mode reactor |
| VF64-1R122 | | | VF64-2222 | FN3258-100-35 | RC5060×2Pcs×3T |
| VF64-2R222 | FN3258-16-45 | RC5060×3T | VF64-3022 | FN3258-130-35 | F6045GB×1T |
| VF64-3R722 | FN3258-30-47 | RC5060×3T | VF64-3722 | FN3258-180-40 | F6045GB×1T |
| VF64-5R522 | FN3258-30-47 | RC5060×3T | VF64-4522 | FN3259-250-28 | F6045GB×1T |
| VF64-7R522 | FN3258-55-52 | RC5060×3T | VF64-5522 | FN3259-250-28 | F6045GB×1T |
| VF64-1122 | FN3258-75-52 | RC5060×2Pcs×3T | VF64-7522 | FN3259-400-99 | F140100PB×1T |
| VF64-1522 | FN3258-75-52 | RC5060×2Pcs×3T | VF64-9022 | FN3259-400-99 | F140100PB×1T |

200V class noise filter complying with CE marking (option)

400V class noise filter complying with CE marking (option)

| | EN | 55011 |] | | EN5 | 5011 |
|------------|---------------|----------------|---|------------|--------------------|-------------------|
| | EN61800-3 | | | | EN61800-3 | |
| Type of | | Common | | Type of | | Common |
| Inverter | Noise filter | mode reactor | | Inverter | Noise filter | mode reactor |
| VF64-1R144 | | | | VF64-5544 | FN3258-130-35 | F6045GBx1T |
| VF64-2R244 | FN3258-7-45 | RC5060×3T | | VF64-7544 | FN3258-180-40 | F140100PB×2T |
| VF64-3R744 | FN3258-16-45 | RC5060×3T | | VF64-11044 | FN3259-320-45 | F140100PBx2T |
| VF64-5R544 | FN3258-30-47 | RC5060×3T60 | | VF64-16044 | FN3259-400-45 | F140100PBx2Pcsx1T |
| VF64-7R544 | FN3258-30-47 | RC5060×3T | | VF64-20044 | FN3259-600-45 | F140100PBx3Pcsx1T |
| VF64-1144 | FN3258-42-47 | RC5060×3T | | VF64-25044 | FN3259-600-45 | F140100PBx3Pcsx1T |
| VF64-1544 | FN3258-42-47 | RC5060×3T | | VF64-31544 | FN3259-1000-99 | F140100PBx5Pcsx1T |
| VF64-2244 | FN3258-55-52 | RC5060x2Pcsx3T | | VF64-40044 | FN3259-600-99x2Pcs | F140100PBx6Pcsx1T |
| VF64-3044 | FN3258-75-52 | RC5060×2Pcs×3T | | VF64-50044 | FN3259-600-99×2Pcs | F140100PB×6Pcs×1T |
| VF64-3744 | FN3258-100-35 | RC5060x2Pcsx3T | | VF64-60044 | FN3259-600-99×3Pcs | F140100PBx9Pcsx1T |
| VF64-4544 | FN3258-130-35 | F6045GB×1T | | VF64-75044 | FN3259-600-99×3Pcs | F140100PB×9Pcs×1T |

В

45

8-2. Common mode reactor



8-3. Filter external form

Dimension

type

RC5060 F6045GB F140100PB А

67 78

162



| type | A | \ | В | | С | | D | | Е | | F | G | i | I | | Fig | Weight(g) |
|----------------|-----|----------|------|-----|-------|-----|-----|-----|-----|----|------|-----|----|-----|----|-----|-----------|
| FN3258-7-45 | 19 | 90 | 70±0 | .6 | 40 | | 160 | | 180 | | 20 | 4. | 5 | M5 | | А | 0.5 |
| FN3258-16-45 | 25 | 50 | 70±0 | .6 | 45 | | 220 | | 235 | | 25 | 5.4 | 4 | M5 | | А | 0.8 |
| FN3258-30-47 | 27 | '0 | 85 | | 50 | | 240 | | 255 | | 30 | 5.4 | 4 | M5 | | А | 1.2 |
| FN3258-42-47 | 31 | 0 | 85 | | 50 | | 280 | | 295 | | 30 | 5.4 | 4 | M6 | | А | 1.4 |
| FN3258-55-52 | 25 | 50 | 90 | | 85 | | 220 | | 235 | | 60 | 5.4 | 4 | M6 | | А | 1.8 |
| FN3258-75-52 | 27 | '0 | 135± | :1 | 80 | | 240 | | 255 | | 60 | 6. | 5 | M6 | | А | 3.2 |
| FN3258-100-35 | 27 | '0 | 150± | :1 | 90±0. | 8 | 240 | | 255 | | 65 | 6. | 5 | M10 | | А | 4.3 |
| FN3258-130-35 | 27 | '0 | 150± | :1 | 90±0. | 8 | 240 | | 255 | | 65 | 6.5 | 5 | M10 | | А | 4.5 |
| FN3258-180-40 | 38 | 30 | 170± | :1 | 120±0 | .8 | 350 | | 365 | | 102 | 6.5 | 5 | M10 | | А | 6.0 |
| | | | | | | | | | | | | | | | | | |
| type Dimension | A | В | С | D | E | F | G | н | I | J | к | м | N | 0 | Ρ | Fig | Weight(g) |
| FN3359-250-28 | 365 | 125 | 180 | 205 | 230 | — | - | 120 | 110 | 40 | 62.5 | M10 | — | — | 35 | B | 7.0 |
| FN3359-320-99 | 300 | 115 | 210 | 235 | 260 | 306 | 40 | 120 | 60 | 35 | 20 | M12 | 12 | 6 | — | C | 10.5 |
| FN3359-400-99 | 300 | 115 | 210 | 235 | 260 | 306 | 40 | 120 | 60 | 35 | 20 | M12 | 12 | 6 | — | C | 10.5 |
| FN3359-600-99 | 300 | 135 | 210 | 235 | 260 | 306 | 40 | 120 | 60 | 35 | 20 | M12 | 12 | 8 | _ | C | 11.0 |
| FN3359-100-99 | 350 | 170 | 230 | 255 | 280 | 356 | 50 | 145 | 60 | 64 | 25 | M12 | 12 | 8 | - | C | 18.0 |

Chapter 5 Function-up option

Table of Options

| | | | | 1 |
|----------|-------------------------------------|---|--|---|
| | Name | Туре | Application | Remarks |
| Function | Extension cable | CBL64-L | 3 kinds of 1m/3m/5m are available | |
| up | Metal fitting of console | | Metal fitting to be used for mounting of SET64OP or SET64 on panel, etc. | |
| | Isolation input card | Analog isolation 2 inputs are equipped. | Mount one | |
| | Isolation input output card | IO64 | Analog isolation 1 input/ 1 output are equipped. | of them on VFC2001. |
| | Motor tem- perature detection | T/V61V *1 | Apply for motor start torque compensaion and motor protection. | Mount in VF64. |
| Network | JEMA-Net | OPCN64 | Comply with OPCN-1 compliance class TYPE-S521. | Select one Kind of then |
| | RS422/485 RS232C | ASYC64 | Communication of start/stop synchronous serial system can be executed. | and mount exchanging P.C.Board VF64TB. |
| | Device-Net | DNET64 | | |
| | PROFIBUS | PBUS64 | | |



(*1) Owing to the limited space,T/V61V cannot be added to the following models as option,VF64-1R122 ,2R222 ,3R722 ,1R144 ,2R244 ,3R744.

1. Extension cable and metal fitting

O Extension cable

(SET64)

| Type | |
|----------|----|
| CBL64-L1 | 1m |
| CBL64-L3 | 3m |
| CBL64-L5 | 5m |
| | |

\bigcirc Metal fitting

To be used when standard console (SET64) is fitted to the external(Control panel door, etc.)





Outline dimension

2. Isolated input card : ISO64

 ISO64 can be used as input of HC function and sequence function and, as input of feedback signal of pressure control and air volume control.
 (Note1) As to ISO64 and IO64,please select and use any one of them.





Specification

| Function | Kind of input | Input resistance | Input terminal | Remarks |
|---------------------------|---------------|------------------|----------------|---------|
| Isolated analog input (1) | -10V~0V~+10V | 69KΩ | 4-3 (0V) | _ |
| Isolated analog input (2) | 0V~+10V | 150KΩ | 1-3 (0V) | SW1-OFF |
| | 4~20mA | 250Ω | 2-3 (0V) | SW1-ON |

3. Isolated input output card : IO64

• IO64 can be used as input output of HC function and sequence function, and as input output of feedback signal of pressure control and air volume control. (Note1) As to ISO64 and IO64, please select and use any one of them.

(Note2) Insulation analog input is $0V \sim +10V$ when it is used as speed command input and is $-10V \sim 0V \sim 10V$ when it is used as torgue command input.





Specification

| Function | Kind of input output | Input resistance | Load resistance | Input Output terminal | Remarks |
|------------------------|----------------------|------------------|---------------------|-----------------------|---------|
| | -10V~0V~+10V | 150KΩ | — | 1-2(0V) | SW1-OFF |
| Isolated analog input | 4~20mA | 250Ω | — | 1-2(0V) | SW1-ON |
| | 4~20mA | _ | 500Ω or less | 3-4 (0V) | SW2-OFF |
| isolated analog output | -10V~0V~+10V | _ | $10k\Omega$ or over | 3-4 (0V) | SW2-ON |

(Note) Minus voltage input is in the time only when it is used as torque command

4. Motor temperature compensation : T/V61V

By incorporating of our own motor temperature compensation system (Patent Pending) and function to measure and set variance of motor electric constant automatically, which was problem point of conventional vector Inverter control, Linearity and Reproducibility are improved drastically.

Other functions:-

- When motor temperature exceeds 150 $^\circ\!C$,Inverter is stopped.
- · Displays motor temperature on console panel.





- (Note 1) In case of fitting of temperature compensation option, it is necessary to mount temperature detector (PT100 equivalent 3 wires type resistance thermometer). Please designate motor with thermometry resistor.
- (Note 2) Use twisted shielded cable for connection of temperature detector and temperature compensation option.

(Note 3) Temperature compensation option(T/V61V) can not be used for VF64-1R122,2R222,3R722,1R144,2R244, and 3R744.

Chapter 6 Communication system up option

1. OPCN64 : OPCN-1(JPCN-1) compliance

By use of OPCN64, VF64 Inverter can perform drive command, speed command, setting/ drive monitoring, etc. of kinds of parameter with upper CPU system and personal computer • PLC via communication circuit highly speedy.

| Item | Specification |
|--|--|
| Power source | Supply from isolated control power source of VF64 Inverter |
| Data link layer | Network specification OPCN-1 |
| Electric characteristic of physical layer | Based on RS485 |
| Connection form | Bus type (multi drop system) |
| Object device of communication | Devices having specification of master office of OPCN-1 |
| Transmission speed and transmission distance | Speed is set by console of VF64 main body 125kbps:within 1000m 250kbps:within 800m 500kbps:within 480m 1Mbps :within 240m |
| Class of adaptability | TYPE-S52I |
| Synchronous method | Frame synchronous method |
| Coding method | NRZI |
| Setting of Local Number | Among 01-7F, 31 offices (selectable by rotary switch)which are not overlapped with other office |
| Number of connection office | Max. 31 offices for master office of 1 unit |
| Connection/wiring method | Terminal block (5 poles), 2 wires type or 3 wires type |
| Data form | Bit data by frame composition |
| Error detection | FCS system (frame inspection sequence) |
| Recommendable cable | CO-SPEV (SB) -0.5mm ² ×2P |

OPCN64 adopted Standard Specification OPC N-1 which was recommended by The Japan Electrical Manufacturers' Association and communication protocol is based on the specification of the slave office. VF64 can perform connection • control with other maker s • different types that have master office function of OPC N-1, in addition to our PLC (μ GPCsx), needless to say. OPCN64 obtained [Authentication No.J990908JPCNS031]. Control program canbe made at customer side.As Instruction Manual is prepared, please contact us.



2. ASYC64 : Complied with RS232C/RS485 start-stop synchronous serial communication

ASYC64 is an option for communication network by start/stop synchronous communication(max. 19200bps). It can control and monitor VF64 Inverter by upper CPU system, PLC and personal computer communication line. See [Instruction Manual of ASYC64] of another volume.

| Item | Specification | | | | | |
|--|--------------------------------|------------------------------|--|--|--|--|
| Power source | Supply from isolated control p | ower source of VF64 Inverter | | | | |
| Elec. characteristic of physical layer | RS422/RS485 compliant | RS232 compliant | | | | |
| Transmission distance | 1000m | 3m | | | | |
| No. of office | 1 : max. 31 units | 1:1 | | | | |
| Communication control system | Polling/selecting system | Polling system | | | | |
| Communication | 1200/2400/4800/9600/ | 1200/2400/4800/9600/ | | | | |
| speed | 19200/38400bps | 19200bps | | | | |
| Transmission procedure | Semi-double (no procedure) | Semi-double (no procedure) | | | | |
| Connection form | Terminal block (M3) | Connector | | | | |
| | | (5051-04 of MOLEX) | | | | |
| Data type | Data length ASCII (7 b | pits) | | | | |
| | Start bit (1 bit) | | | | | |
| | Parity check (1 bit | even number) | | | | |
| | Stop bit (1 bit) | | | | | |
| Error detection | Sum check | | | | | |



3. DNET64 : Complied with DeviceNet

DNET64, being network option board of VF64, can beconnected with DeviceNet of open network standard and offers communication function as a DeviceNet slave device.

DeviceNet is lower network to connect simple device (sensor, actuator) for industrial use and upper device (controller).

Also, DeviceNet is open network standard and its specification and protocol are opened by Open DeviceNet Vendor Association, Inc.(ODVA) and offers mutual compatible connection between devices of same kind by plural vendors.

This product was tested at test laboratory of the third party, which was authorized by by ODVA, and recognized adaptation to conformance test software Ver.A-14 of ODVA.

| Item | Specification |
|-------------------------|------------------------------------|
| Communication | Slave function |
| function of DeviceNet | |
| Vendor ID | 178 |
| Device profile | AC Drive |
| Setting range of MAC ID | 00~63 |
| Connection form | T branch, DG chain connection |
| Communication function | 1/0 message |
| | Polling |
| | Explicit message |
| | Group2 Only server, Overlap MAC ID |
| Transmission speed and | 125kbps : within 500m |
| transmission | 250kpbs : within 250m |
| | 500kpbs : within 100m |



4. PBUS64 : Complied with PROFIBUS

PBUS64, being an option of VF64 series, is communication option to connect VF64 Inverter with network of PROFIBUS, the world standard of field bus. PROFIBUS is the standard of open type field bus, without dependence on vendor, which is used in wide range of actuator/sensor-le is regulated by International Standard IEC61158.

PBUS64 has function of PROFIBUS-DP slave and can control, monitor VF64 Inverter from other master station.

PBUS64 is PROFIDRIVE-Profile compliant and can use PRO-Type 1 5.

PBUS64 passed Authentification Test of TEST-LAB., recognized officially by PROFIBUS Association and was approved by PROFIBUS Association.

| Item | Specification | | | |
|----------------------------------|--|--|--|--|
| Power source | supply from isolated control power source of VF64 Inverter | | | |
| Communication protocol | PROFIBUS-DP slave | | | |
| Physical layer | RS485 compliant | | | |
| Connection form | Bus type | | | |
| Object device of P communication | Devices having specification of PROFIBUS-DP master | | | |
| Transmission speed and | 9.6kbps : within 1200m | | | |
| transmission distance | 19.2kbps : within 1200m | | | |
| | 93.75kbps : within 1200m | | | |
| | 187.5kbps : within 1000m | | | |
| | 500kbps : within 400m | | | |
| | 1.5Mbps : within 200m | | | |
| | 3Mbps : within 100m | | | |
| | 6Mbps : within 100m | | | |
| | 12Mbps : within 100m | | | |
| Station number setting | Setting by console of VF64 | | | |



Chapter 7 System-up option

Making the most of our experience of developed VF64 Inverter as the product which can perform to meet the demand of market. We also prepared following system-up options as the function to pursue the easiness in use of Inverter. In order to use these function, special technology to structure the system is required. In case of use of these functions, PC Tool (separate sale) such as dedicated Editor, etc., which are operated on personal computer, is needed. In case of handling of PC Tool, please consult our sales division.

1. HC (High speed control) function

This function consists of:-

- 1) Numerical value operation part, called [Super block].
- 2) Function to link mutual input/output between plural super blocks.

3) Processing part to link the discretional data of input/output of super blocks.

By super block editor (separate sale) to be operated by personal computer, the most suitable motor drive system to the applications of customer can be structured prepared in VF64 in advance.

For details, see [Instruction of super block editor] in [PC Tool Manual II] of separate issue.

2. Sequence (PLC) function

Sequence function is the function to edit the sequence of VF64 inside by sequence editor (separate sale), which operates by personal computer, using ladder circuit, and to control transposing with standard sequence incorporated in VF64. By this function, the most suitable sequence to customers' application can be structured in VF64 inside, and it is possible to omit PLC and a part of relay circuit, which were necessary so far.

For details, see [Instruction of sequence editor] in [PC Tool Manual II] of separate issue.

3. Trace back monitor function

Trace back function is to memorize the status of running at the time of protective operation of VF64 and information of 16ch of component of current, voltage, etc. of each phase at the time of protective operation, in the Inverter inside. By this function, it is possible to analyze the cause of trouble of Inverter and system, and carry out restoration in short time. Trace back monitor function is to display the memory data of this trace back on the screen of personal computer, using [trace back monitor tool software] (separate sale).

For details, see [Instruction manual of trace back monitor] in [PC Tool Manual I] of separate issue.

4. Trend monitor function

Trend monitor function is the function to display the internal sequence signal such as operation command and protective operation signal, etc. of VF64 inside as well as internal data such as effective value current, voltage, etc., on the screen of personal computer on real time. Since it is possible to display each output data of super block, which were put in using aforesaid HC function, in addition to the standard internal data, this function can be used for checking, etc. of operation status of the system and also for debugging of circuit put in by HC function. For using of this function, [Trend monitor tool software] (separate sale), which is operated on personal computer, is needed.

For details, see [Instruction manual of trend back monitor] in [PC Tool Manual I] of separate volume.

5. Console data setting function

This is function to perform read/write of console setting of VF64 at the same time by personal computer. Also, it is possible to copy the setting data between Inverters. For using of this function, [Trend monitor tool software] (separate sale), which is operated on personal computer, is needed.

For details, see [Instruction manual of console data set] in [PC Tool Manual I] of separate issue .

Chapter 8 Maintenance inspection

1. VF64 protection display and trouble shooting

When abnormalities arise during operation and an inverter carries out protective operation, please check LED of a standard console, and protection display LED of each P.C. Board as well as study the cause by trouble shooting of the following, and take suitable measures.

| | | Protectio | on display | LED on P. | .C .board | | | | |
|---------|-----------------|-----------------------|-------------|----------------------------|-----------|--|--|--|--|
| SET64 | | In single unit | | ngle unit In slave unit of | | The contents of | The main factors which carried out | | |
| LED | LED Model of pa | | of parallel | | allel | protective | protective operation | The main check points and | |
| Dispiay | | connection connection | | operation | | countermeasure | | | |
| | | PRIM61 | GAC2001 | PRIS61 | GAC2001 | | | | |
| Fu | 1R122~ | | - | | | Main circuit DC | * The power supply | * The check of input-and-output | |
| | 9022 1R144~ | | | | | part fuse melting | wasconneected to theinverter | wiring. * The conduction check of ICBT | |
| | 31544 | | | | | | * IGBT (IPM) was damaged by a | (IPM). | |
| | 15022~ | Fu | - | - | - | Main circuit DC | certain cause. | * Exchange of damage parts and | |
| | 40044~ | | | | | part fuse melting | * Ground-fault or short-circuit of | a fuse. | |
| | 100044 | | | | | in a master unit | the output wiring cable. | * Exchange of a unit. | |
| | | - | - | Fu | - | Main circuit DC | * The dynamic brake circuit was | | |
| | | | | | | part fuse melting | uamageu. | | |
| | | | | | | in a slave unit | | | |
| oL | All models | _ | _ | _ | _ | Protection operates when the current of 150% or equivalent of motor rated current flows to an | Load capacity is unusually large. Selection of an inverter and motor capacities is not correct. The setting value of load rate of over load protection is | * Prectical use of over load pre- alarm function (C-16). * Mitigation of load. Revision of an inverter and motor capacities. * Revision of the setting value of | |
| | | | | | | inverter output for 1 minute. | unsuitable. * The motor is stalled. (V/f control mode). * The setting value of the number of PG pulse is incorrect (only in case of vector control mode with a speed sensor). * Wiring of PG is not normal. Phase A and B are reverse (control with sensor). * Setting of each rating of motor is not suitable. | the overload protection setting (F-03). * Adjustment of torque limit value (E-00~03). * Revision of the setting value of the number (A-09) of PG pulse. * Check the wiring and direction of rotation of PG (control with sensor). * Revision of setting value of motor rated setting (A-02~07 or L-01~06). | |
| FcL | All models | _ | _ | _ | _ | Protection operates when about 290% current of inverter rating flows to an inverter output for several seconds. | * Ground-fault or short-circuit of the output wiring cable. * Acceleration and deceleration times are too short (V / f control). * Load capacity is unusually large. * Motor could not be accelerated by full voltage starting (V / f | * The check of output wiring. * Elongate the acceleration and deceleration times. * Mitigation of load. Revision of an inverter and motor capacities. * Stop full voltage starting and change to ordinary starteng. * Remove phase advance | |
| oc | All models | | | | | When about 350% or more of the current of inverter rating flows to an inverter output, protection operates immediately. | * The motor with a phase advance capacitor is used. * Current control gain is unsuitable (vector control). * The setting value of FCL operation level is unsuitable. * Setting value of auto-tuning is unsuitable. * Combination of inverter and motor is incorrect. * An erroneous operation of speed detection (control with sensor). | * Adjust current control gain (E12 ~14). * Revision of the setting value of FCL level (F-04). * Carry out full mode auto-tuning again. * Make combination of inverter and motor correctly. * The check of PG wiring route, separation from the main circuit wiring. | |

| | | Protectio | on display | LED on P | .C .board | | | |
|----------------|-----------------------------------|-----------------------|-----------------------------------|------------|----------------------|---|---|--|
| SET64 | SET64 a | | In single unit and master unit | | e unit of | The contents of | The main factors which carried out | The main check points and |
| LED Dispiav | Model | connection connection | | protective | protective operation | countermeasure | | |
| | | PRIM61 | GAC2001 | PRIS61 | GAC2001 | operation | | |
| oH | 7522~ 18022 7544~ 100044 | _ | ОН | _ | _ | Overheating of heat sink for IGBT module in a unit and input rectification diode modules. | Trouble of the fan motor for cooling. Ambient temperature is high. The cooling space of a unit is not enough. The direction of installation of a unit is unsuitable. DCL was not connected. Carrier frequency was set beyond initial value. Operation of the temperature detection sensor for cooling fins is poor. | * Exchange of the fan motor for cooling. * A check of installation environment, a check of the temperature rise in a control board. * Secure sufficient cooling space. * Make correct installation. * Connect DCL. * Set carrier frequency (A-10) below the initial value, or reduce load capacity. * The conduction check of a cooling fin temperature sensor (Non-conduction is normal when fin temperature is low). |
| oV | All models | _ | _ | | _ | Intermediate DC part of a unit (master unit in case of parallel units) over voltage protection (Operates by DC voltage of about 400(200V series)/ 800V(400V series)). | * Ground-fault or short-circuit of the output wiring cable. * Deceleration time is too short. * Erroneous setting of built-in DB operation voltage * The erroneous operation of a dynamic brake option. * An unusual rise of input power supply voltage. * The inertia of load is large. | * The check of output wiring. * Elongate decel. time or use regeneration stall prevention function (b-13). Or connect DB option. * Adjustment of built-in DB operation voltage (F-00). * Exchange a dynamic brake option. * Confirm input power supply voltage. * Use a regeneration converter or dynamic brake option. |
| iGbt | 1R122~ 2222 1R144~ 2244 | | | | | IPM module protective operation in a unit (IGBT element over-current, IGBT gate power supply voltage down. overheating of fin for IPM module, input rectification diode module) | * IGBT(IPM) was damaged by a certain cause. * Ground-fault or short-circuit of the output wiring cable. * Trouble of the fan motor for cooling. * Ambient temperature is high. * The cooling space of a unit is not enough. * The direction of installation of a unit is unsuitable. * DCL was not attached even in model, to which DCL is attached as the standard accessory. * Set carrier frequency at higher value than initial one. * Continued the operation at lower frequency than10Hz. * Operation of the P.C. Board GAC64 and MAC64 is poor. | * Check the conduction of IGBT (IPM). * The check of output wiring. * Exchange of the fan motor for cooling. * A check of installation environment, a check of the temperature rise in a control board. * Secure sufficient cooling space. * Make correct installation. * Connect DCL. * Set carrier frequency (A-10) at lower value than initial one, or reduce load capacity. * Reduce capacity according to the capacity reduction curve at the time of low frequency operation. * Exchange of GAC64 or MAC64 P.C.board. |

| Protection display LE | | | LED on P | .C .board | | | | |
|-----------------------|---------------|-------------|-----------|-----------------|---------|-------------------------|---|-------------------------------------|
| SET64 | | and ma | ster unit | In slave unit o | | The contents of | The main factors which carried out | |
| LED Model | | of parallel | | parallel | | protective | protective operation | The main check points and |
| Dispiay | | conn | ection | conne | ction | operation | | countermeasure |
| | | PRIM61 | GAC2001 | PRIS61 | GAC2001 | | | |
| iGbt | 7522~ | - | OGU | - | - | Over-current | * IGBT (IPM) was damaged by a | * Check the conducyion of IGBT |
| | 18022 | | | | | protection of U | ceratin cause. | (IPM). |
| | 7544~ | | | | | phase IGBT | * Ground-faukt or short-circuit of | * The check of output wiring. |
| | 100044 | | | | | module in a unit, | the output wiring cable. | * Carry-out the full mode auto- |
| | | | | | | or output over- | * Setting value of auto-tuning is | tuning. |
| | | | 001 | | | Current protection. | * Acceleration and deceleration | * Revision of scceleration and |
| | | | 000 | | | protection of V | times are too short (V / f | * Mitigation of load. |
| | | | | | | phase IGBT | control). | Revision of inverter and motor |
| | | | | | | module in a unit, | * Load capacity is unusually | capacities. |
| | | | | | | or output over- | large. | * Instead of full-voltage starting, |
| | | | | | | current protection. | * Motor could not be accelerated | make ordinary starting. |
| | | - | ocw | - | - | Over-current | by full-voltage starting (v / f | * Remove phase advance |
| | | | | | | protection of W | * Motor with phase advance | * Reduce capacity according to |
| | | | | | | phase IGBT | condenser is used. | the capacity reduction curve at |
| | | | | | | or output over- | * Continued the operation at | the time of low frequency |
| | | | | | | current protection. | lower frequency than 10Hz. | operation. |
| | | - | UV-G | - | - | IGBT gate power | * Operation of GAC2001 P.C. | * Exchange of GAC2001 P.C. |
| | | | | | | supply voltage in a | board is poor. | board. |
| | | | | | | unit is abnormal | | |
| | | | | | | (Liphase N side is | | |
| | 15022- | FCI | | | | detected) | | |
| | 18022~ | | | | | Protection | * Ground-fault or short-circuit of | * The check of output wiring. |
| | 40044~ | | | | | about 290% | * Accel/decel time are too short | * Reduse the load.Revise |
| | 100044 | | | | | current of inverter | (V / f control) | capacity of Inverter-motor. |
| | | | | | | rating flows | * Load capacity is unusually | * Instead of full-voltage starting, |
| | | | | | | continuously for | large. | make ordinary starting. |
| | | | | | | about 2 seconds | * Motor could not be accelerated | * Remove phase advance |
| | | | | | | master unit or a | control) | * Adjust current control gain (E- |
| | | | | | | slave unit output. | * Motor with phase advance | $12 \sim 14$). |
| | | | | | | | condenser is used. | * Revise FCL level (F-04) setting |
| | | | | | | | * Current control gain is | value. |
| | | | | | | | unsuitable (vector control) | * The check of PG wiring route, |
| | | | | | | | * The setting value of FCL | separation from the main circuit |
| | | | | | | | * An erroneous operation of | wiring. |
| | | | | | | | speed detection (control with | |
| | | | | | | | sensor). | |
| iGt1 | 3022~ | / | / | / | / | Protective (IGBT | * U,V,W phases of IGBT (IPM) | * The conduction check of IGBT |
| | 5522 | / | / | / | | operation element | were damaged by a certain | (IPM). |
| | 5044~ 5544 | / | | / | | of U overcurrent, | cause. | * The check of output wiring. |
| | | / | / | / | / | phase IPM IGBTgate | * Ground-tault or short-circuit of | * Exchange of Fan Motor for |
| | | / | / | / | / | a unit. sag | * Trouble of the fan motor for | * A chek of installation |
| iGt2 | | / | / | / | / | Protective Ovenheat | cooling. | environment, a check of the |
| | | / | / | / | / | operation of gin for | * Ambient temperature is high. | temperature rise in a control |
| | | / | | / | | of V IPM · input | * The cooling space of a unit is | board. |
| | | / | / | / | / | phase IPM rectigication | not enough. | * Secure sufficient cooling space. |
| | | / | / | / | // | module in diade | The direction of installation of a unit is unsuitable | * Make correct installation. |
| iGt3 | | <u> </u> | <i>(</i> | <i>(</i> | / | Protective trauble of | * DCL was not connected | * Set carrier frequency (A-10) at |
| .0.0 | | / | / | / | / | operation gin motor | * Carrier frequency was set at | lower value than initial one , or |
| | | / | / | / | / | of W for | higher value than initial one. | reduce load capacity. |
| | | / | / | / | / | phase IPM ventilation | * Continued operation at lower | * Reduce capacity according to |
| | | / | / | / | / | module in of inside | frequency than 10Hz. | the capacity reduction curve at |
| | | / | / | / | / | a unit. of a unit. | * Operation of the P.C. boards | the time of low frequency |
| | | / | / | / | / | | GAU04 IS POOR. | * Exchange of GAC64 P.C |
| | | / | / | V | / | | | board |
| SET64 LED Dispiay | Model | Protection In sing and ma of pa conne | on display gle unit ster unit arallel ection | LED on P. In slave para conne | C .board e unit of allel ection | The contents of protective operation | The main factors which carried out protective operation | The main check points and countermeasure |
|-------------------------|-------------------------------------|---|--|--|--|--|---|--|
| | | PRIM61 | GAC2001 | PRIS61 | GAC2001 | | | |
| StrF | All models | _ | _ | _ | _ | Protection operates when Inverter does not work even though 10 seconds passed after inputting or operation and jog commands. | Inputted the operation and jog commands for more than 10 seconds sfter detection of under-voltage (power failure). Inputted the operation and jog commands for more than 10 seconds during input of emergency stop signal. | * Turu the instantaneous power failure re-starting selection (B- 11) to on. * Sequence should be that operation and jpg commands are turned to off at the time of an emergency stop signal input. |
| oPEr | All models | _ | _ | _ | _ | The abnormal operation or poor connection of a digital option P.C. board. | * In spite of no use of digital option P.C. Board,selected the use of digital option (J-00). * Operation of a digital option P.C. board is poor. * The digital option P.C.board is not surely connected. | * Turn digital option use selection (J-00) to OFF. * Exchange of a digital option P.C. board. * Check the connection with a digital option P.C. boarf and the state of the insertion of a connector. |
| cS2 | All models | _ | _ | _ | _ | EEPROM data sum check error of VFC2001 P.C. board. | VFC2001 P.C. board of no initialozing was mounted. Erroneous writing to EEPROM by the excessive noise. The defect of EEPROM parts. | Initialize the VFC2001 P.C. board. Take countermeasure against noise to wring from VFC2001. Exchange of VFC2001 P.C. board. (Once console indication is turned to cS2. it cannot be released unless VFC2001 is initiallzed.) |
| ccEr1 | All models | _ | _ | _ | _ | The communication timeout error between VFC2001 P.C. board~ console panel (SET64). | Disconnection of a console panel connection cable and poor insertion of a connector. VFC2001 P.C. board is in the program rewriting mode. Mal-operation of VFC2001 P.C. board. | * An insertion check of a connector. Exchange of a connection cable. * Confirm that SW 3 and SW4 of VFC2001 P.C. board are OFF. * Exchange of VFC2001 P.C. board. |
| ccEr2 | All models | _ | _ | _ | _ | The communication sum check error between VFC2001 P.C. board~ console panel. | * The excessive noise invaded into the extension cable, connected with console panel (SET64). * Mal-operation of VFC2001 P.C. board. | * Take countermeasure against noise to the extension cable, connected with console panel (SET64). * Exchange of VFC2001 P.C.board. |
| ccEr3 | All models | _ | _ | _ | _ | There was an error in the communication data which VFC2001 P.C. board received. | Disconnection of a console panel (SET64) connection cable and poor insertion of a connector. Two console panels (SET64) were connected to the connector for SET64 simultaneously. | * An insertion check of a connector.Exchange of a connection cable. * To the connector for SET64,only one cosole panel SET64 should be connected. |
| tS | All models | _ | _ | _ | _ | The communication timeout error between digital option P.C. board~ communication master office. | * Operation of a communication master office is poor. * Disconnection of connection cable between digital option P.C. board~ communication master office. Poor insertion of a connector. | * The check of operation of a communication master office. * The check of insertion of a connector.Exchange of connection cable. |
| SLF | 15022~ 18022 40044~ 100044 | _ | _ | _ | ОН | Overheat of heat sink for IGBT module in slave unit. Overheat of heat sink for input converter at slave side. | Trouble of fan motor for cooling of slave unit. Ambient temperature is high. Cooling space of unit is insufficient. Direction of installation of unit is unsuitable. Set carrier frequency at higher than initial value. DCL is not connected. Mal-function of temperature detection sensor of cooling fin. | * Replace fan motor for cooling. * Confirm installation environment and temperature increase of inside of control panel. * Secure sufficient cooling space. * Install correctly. * Set carrier frequency (A-10) at lower than initial value or reduce load capacity. * Connect DCL. * Conduction check of temperature sensor of cooling fin (When fin temperature is low, non-condrction is normal). |

| SET64 LED Dispiay | Model | Protection In sing and ma of pa conne | n display gle unit ster unit arallel ection | LED on P. In slave para conne | C .board e unit of allel ection | The contents of protective operation | The main factors which carried out protective operation | The main check points and countermeasure |
|-------------------------|--|---|---|--|--|---|---|--|
| SLF | 15022~ 18022 40044~ 100044 | PRIM61 | GAC2001 | PRIS61 | GAC2001 OV-S | Over voltage protection at inter- mediate DC part of slave unit (operates when DC voltage is | * Earthing or shortcircuit of output wiring cable. * Deceleration time is too short. * Malfunction of DB option. * Extra-ordinary increase of input power source voltage. | * Check output wiring. * Elongate deceleration time or use preventive function (b-13) of regeneration stall. Or,connect DB option. * Replace DB option. |
| | | | | | | about 400V(200V series) /800V (400V series) | * Load inertia is large. | Confirm input power source voltage. * Use regeneration converter or DB option. |
| | | _ | _ | _ | OCU | Overcurrent protection of U- phase IGBT module in slave unit or output overcurrent protection. | * IGBT (IPM) broke. * Earthing or shortcircuit of output wiring cable. * Setting value of auto-tuning is unsuitable. * Accel/decel times are too short (V / f control) | Conduction check of IGBT (IPM). Creck output wiring. Execute full mode auto-tuning. Revise accel/decel times. Reduce the load and revise capacity of Inverter motor. |
| | | _ | - | - | OCV | Overcurrent protection of V- phase IGBT module in slave unit or output overcurrent protection. | Load capacity is extra-ordinarily large. Motor could not be accelerated by full-voltage starting (V / f control). Motor with phase-advance condenser is used. | * Stop full voltage starting and change to ordinary starting. * Remove phase-advance condenser. * Reduce capacity in accordance with capacity reduction curve at the time of operation by low |
| | | _ | _ | _ | OCW | Overcurrent protection of W- phase IGBT module in slave unit or output overcurrent protection. | * Executed continuous operation by low frequency of less than 10Hz. | frequency. |
| | | _ | _ | _ | UV-G | Abnomal voltage of IGBT gate power source in slave unit (Detect N-side of U-phase). | * Malfunction of GAC2001 P.C.board. | * Replace GAC2001 P.C.board. |
| | | _ | _ | _ | OV-S | Abnomal voltage of GAC2001 control power source in slave unit | * Mal-function of GAC2001 P.C.board. | * Replace GAC2001 P.C.board. |
| | | PSCF | _ | - | - | Voltage lowering of PRIM61. PRIS61 control power source or dis-connection of power source supply line. | Disconnection of connection cable between master unit and slave unit. Erroneous insertion of connector. Mal-function of PRIM61 P.C.board. | Confirm insertion of connector,Replace connection cable. Replace PRIM61 P.C.board. |
| SPdE | All models (Only vector control mode) | | | | | Protection operates, when the deviation of speed command value from motor speed comes off the speed range of speed control error detection. | * The setting value of detection speed rabge is unsuitable. * Since load was large,torque restriction function startde. * Since accel/decel times were short,torgue restriction function started. * Operation of an external speed setter is poor. (Following items are in case of "control with sensor" only) * Disconnection of PG line,operation of PG is poor. * Erroneous connection between Inverter output terminal and motor. | * Set the suitable value for detection speed range (F-09~ 10). * Reduce the load. * Elongate acceleration /deceleration times. * Operation check of an external speed setter. * A check of PG line, exchange of PG. * Confirm connection line between PG and VFC2001 P.C. board. * Confirm connection line between inverter and motor. |

| | | Protection display LED on P.C .board | | | | | | | |
|---------|---------------|--------------------------------------|-----------|----------|-----------|---------------------|-------------------------------------|--|--|
| OFT64 | | In sing | gle unit | In slave | e unit of | The contents of | The main factors which comind out | | |
| | Model | and ma | ster unit | par | allel | The contents of | ne main factors which carried out | The main check points and | |
| Dispiav | Model | conn | ection | conne | ection | operation | protective operation | countermeasure | |
| Diopicy | | PRIM61 | GAC2001 | PRIS61 | GAC2001 | oporation | | | |
| EF1 | All | - | - | — | — | The external | * The external failure signal was | * Check the input conditions of an | |
| | models | | | | | failure 1 of a | inputted. | * external failure signal. | |
| | | | | | | multifunction input | * Setting of multifunction input is | Check the conditions of the | |
| | | | | | | was inputted. | unsuitable. | setting of a multifunction input | |
| EF2 | All | - | - | _ | - | The external | | (000-00). | |
| | models | | | | | railure 2 of a | | | |
| | | | | | | was inputted. | | | |
| EF3 | All | - | - | - | - | The external | | | |
| | models | | | | | failure 3 of a | | | |
| | | | | | | multifunction input | | | |
| | | | | | | was inputted. | | | |
| EF4 | All | - | - | _ | - | The external | | | |
| | models | | | | | tailure 4 of a | | | |
| | | | | | | was inputted | | | |
| 05 | All | | | _ | | Protection | * Operation of an external speed | * Check the operation of an | |
| | models | | | | | operates, when | setter is poor. | external speed setter. | |
| | (Only | | | | | motor speed | * The overshoots by poor | * Re-adjustment of a speed | |
| | vector | | | | | exceeds the over | adjustment of a speed control | control system gain(7. ASRP, 8. | |
| | control | | | | | speed setting (F- | system gain. | ASri, 9. ASrJ). | |
| | mode) | | | | | 01, F-02). | * Load is smaller than torque | * Revision of torque command | |
| | | | | | | | command value at the time of | value. | |
| | | | | | | | the torque control mode. | * Revision of the setting value of | |
| | | | | | | | setting is unsuitable | * The check of PG wiring route | |
| | | | | | | | * An erroneous operation caused | separation from the main circuit | |
| | | | | | | | by noise of speed detection . | wiring. | |
| | | | | | | | * The setting value of the number | * Revise the setting value of the | |
| | | | | | | | of PG pulse is unsuitable(only in | number (A-09) of PG pulse. | |
| | | | | | | | case of vector control mode with | | |
| oF | All | _ | _ | _ | _ | Operates when | * Mal-function of external | * Confirm operation of external | |
| | models | | | | | Inverter output | frequency setter. | frequency setter. | |
| | (Only | | | | | frequency exceeds | * Setting value of overfrequency | * Revise setting value of | |
| | vector | | | | | overfrequency | setting is unsuitable. | overfrequency setting | |
| | control | | | | | setting (F-01, F- | | (F-01 ~ F-02) | |
| | All | | | | | U2). | | | |
| | models | | | | | | * Mai-function of external torgue | | |
| | (Only | | | | | 105% counting | * Setting values of relatives of | * Revision of setting of relatives | |
| | vector | | | | | starts and when it | over torgue protection function | of over torque protection | |
| | control | | | | | reaches 150% for | are unsuitable. | function (F-05~07). | |
| | mode) | | | | | 1 minute or | * Load capacity is unusually | * Mitigation of load. | |
| | | | | | | equivalent, | large. | Revision of inverter and motor | |
| | | | | | | protection | | capacities. | |
| | A 11 | | | | | operates. | | | |
| INOH | All models | | | _ | | when the motor | | ✤ i ne cneck of cooling fan motor of amotor | |
| | | | | | | detection option is | * The ambient temperature of a | * The check of installation | |
| | | | | | | equipped if motor | motor is high. | environment of a motor. | |
| | | | | | | temperature | * Disconnection of wiring of motor | * The check of motor temperature | |
| | | | | | | exceeds 150℃, | temperature detection invasion | detection wiring | |
| | | | | | | protection | of a noise. | countermeasure for noise. | |
| | | | | | | operates. | * Unsuitable adjustment of motor | * Re-adjustment of motor | |
| | | | | | | | temperature detection gain, etc. | temperature detection gain (G- | |
| | | 1 | | | | | | 13, 20). | |

| | | Protectio | n display | LED on P | .C .board | | | | |
|-------------------------|-------------------------|--|-----------|--|-----------|--|--|--|--|
| SET64 LED Dispiay | Model | In single unit and master unit of parallel connection | | In slave unit of parallel connection | | The contents of protective | The main factors which carried out protective operation | The main check points and countermeasure | |
| Display | | PRIM61 | GAC2001 | PRIS61 | GAC2001 | operation | | | |
| SEt0 | All models | _ | _ | _ | _ | In the status that settings of values of motor rating plate and of carrier frequency are unsuitable, operation / jog command or auto- tuning start command was inputted. | * Setting value of inverter capacity of the plate is different from that of actual inverter unit. * The setting of values of motor rating plate and of carrier frequency are unsuitable. * Although use of the 2nd motor was selected, values of the 2nd motor rating plate have not been set. * Auto-tuning was not carried out sfter changing of carrier frequency. | Reset from memory initializing and coincide setting value of inverter capacity with that of inverter unit. Set the values of motor rating plate (A-02~07) and carrier frequency (A-10) corre-city,and carry out auto-tuning. Set the values of plate (L-01~ 06) of the 2nd motor correctly and carryout auto-tuning. After chanfe of carrier frequency (A-10), surely carry out suto- tuning. | |
| SEt1 | All models | _ | | _ | | In the status that settings of PG pulse vector control and of relatives of current control are unsuitables, operation / jog command was inputted. | * The setting value of the number of PG pulse is unsuitable (only in case of vector control mode with speed sensor). * Setting of relatives of current control gain is unsuitable. * Auto-tuning has not been carrted out or auto-tuning was not performed correctly. | Revision of setting value of the number of PG pulus (A-09). Revision of setting of current control gain (E-12~14). Carry out auto-tuning (When use of the 2nd motor is chosen,carry out suto-tuning also of the 2nd motor). | |
| SEt2 | All models | _ | _ | _ | _ | Operation / jog command was inputted in the state that setting of relatives of speed exceeded setting possible range. | * Absolute value of settings of overspeed/overfrequency (F- 01,F-02) exceeded 1.5 times of the maximum speed/frequency (A-00). * Setting values related to speed and frequency exceeded the max. frequency (A-00). | Revision of setting values related to overspeed and over- frequency (F-01,F-02). Revise setting values related to speed/frequency. (If setting values are correct,reset Inverter from initia lizing of VFC2001 P.C. board). | |
| SEt3 | All models | _ | _ | _ | _ | Operation / jog command was inputted when analog input / output gain setting is incorrect. | * Setting of relatives of analog input / output gain is unsuitable. | * Revirsion of setting values related to analog input / output gain (G-00~20) (If setting values are correct,reset inverter from initialiging of VFC2001 P.C/ board). | |
| uV | class200V all models | _ | _ | _ | _ | Intermediate DC part voltage of the unit dropped to about 180V or less during operation. | * The input power supply interrupted during operation (instant electric power failure). * Open phase of an input power supply. | * Confirm an input power supply. * Turn to "ON" the selection of re-start function at instaneous power failure (b-11). | |
| | class400V all models | | | _ | | Intermediate DC part voltage of the unit dropped to about 360V or less during operation. | | | |
| EnGon | All models | | | | | Display only when the input contact of an emergency stop is "ON". | (EnGon is not a protection display) | _ | |

(Note 1) All other LEDs for protection display on each other P.C. boards are red and they go on at the time of protective operation. However, they go off in case that the input power supply of an inverter is cut once and is revived.

2. Periodical inspection

In order to keep always the Inverter in best condition and to make it deliver excellent performance fully, execute periodical inspection once a half year at least and at that time, inspect enough the points which are not inspected in daily visual operation check.

Maintenance inspection is to be executed by persons having safety knowledge on electricity.

CAUTION [as to inspection work]

- Don't open the cover during input power is supplied. There is a fear of electric shock
- Make inspection after turning the power source of Inverter to OFF and going off of LED for confirmation of [CHG] on main circuit P.C.Board.
 - When cover of Inverter is opened, LED can be confirmed on P.C.Board.
 - There is a fear of electric shock
 - There is a fear of injury
- There may be a case that temperature of heat sink rises higher than that of use conditions, for which please pay attention.
 - There is a fear of burn

DANGER [as to maintenance, inspection, replacement of parts]

- Make inspection after passing of 10 minutes or more from turning off of input power source. Also, check DC voltage between [⊕ 2 and⊙] and confirm that it is less than 30V.
 - There is a fear of electric shock
- Maintenance, inspection and exchange of parts should be done by designated persons only. [Remove worn metallic materials (watch, bracelet) before these works.] (Surely use insulated tools at the time of these works.) There is a fear of electric shock and injury

Table of items of periodical inspection

| Inspection item, object | Content of inspection |
|---------------------------------|---|
| External appearance of the unit | Check whether vent and heatsink are choked with dust. If they are choked, clean them. |
| Cooling fan | If dust adhered to cooling fan, clean it. Replace the fan making its life (about 30,000 hours) as a criterion. |
| Inside of the unit | Check whether dust adhered to P.C.Board and other electronic parts. If adhered, clean them. |
| Terminal block, terminal screw | Check whether terminal block and fitting screws became loose. If looseness is found, make increased tightening. |
| Connector | Check whether connectors and terminals of control P.C.Board became loose. |
| Wiring | Check whether defects such as crack and deformation, etc. are found on insulation coating of wiring. |
| Electrolytic condenser | Replace if defects such as leak and discoloration of eletrolyte are found. Criterion of replacing time of condenser is 5 years under condition of 12 hours use per day, with ambient average temperature of less than 35°C. |

AUTION [as to condenser]

 In case of use of spare Inverter, of which storing period is more than 3 years, impress rated AC input voltage to Inverter for about 8 hours in the status of disconnecting the output wire of Inverter since electrolytic condenser is mounted in the Inverter. After this aging work of condenser, use Inverter.
 If such condenser is used without aging, it could result in breakage of condenser and dangerous situation.

3. Insulation resistance test

 Clean each part and make insulation resistance test by DC 500V Megger. For Megger test, remove all wirings once and shortcircuit between terminal blocks of main circuit as per Fig. below.
 (Don't make Megger Test of control circuit)



- (2) After completion of preparation, measure insulation resistance between terminal of main circuit terminal block TB1 and earth terminal ($\frac{|}{=}$).
- (3) Remove all shortcircuit wires after testing.

4. Disposal

When disposing of replaced parts and maintenance parts, execute it conforming to the local regulations.

5. Compatibility with old models

In VF64, some parts are not compatible between new and old models as shown in the table below (this Manual explains based on the new model).

In case of repair at the time of trouble and placing order of spare parts, customer is requested to inform us whether relevant Inverter unit is new or old model.

5-1. How to distinguish the new/old models

New/old models can be distinguished from the application mark (APPL.) of model column of the unit. In case that application mark (APPL.) is less QA19, unit is old model and over QA21, unit is new model.

Application mark can be confirmed from the description of console panel (SET64) fitting board, opening the front cover of the unit. (See the drawing at right side)

(In case of new model, application mark is shown in the label of front cover.)



Part of SET64 fitting board

5-2. Compatibility of new - old models

New and old models are same as the function of the unit and have perfect compatibility however, a part of spare P.C. board, etc.have not compatibility owing to model change of P.C. board etc. of the inside of the unit.

We explain the changing points of P.C.board from old models to new models of each type, capacity and also the compatibility of combination of new/old models and each P.C. board an follows.

Option P.C.boards (RSH64, 1064, etc.) of other than under-mentioned board have no difference in new - old models.

(1) 1.1~55kW (VF64 1R122~5522, VF64-1R144 ~ 5544.)

 $\langle {\rm Changing\ points\ from\ old\ models\ to\ new\ models} \rangle$

- Controrl P.C.board was changed to VFC2001 and main circuit P.C.board was changed to MAC64 (1.1~7.5kW) and gate P.C.board was changed to GAC64 (11~55kW) respectively.
- Terminal block P.C.board (VFC64TB) was minor model-changed (application mark QA3→QB3).

As this minor change is for the units of 75kW or over, there is a case that conventional P.C.board is mounted in this capacity.

 $\langle Table of compatibility \rangle$

| | P.C.board name | New model product | Old model product | Remark |
|------------------------|----------------|-------------------------------|----------------------|--------|
| Control P.C.board | VFC2001 | Standard application | (Unusable) | |
| | VFC64 | (Unusable) | Standard application | |
| Terminal block | VFC64TB (QB3) | Standard application | (Unusable) | |
| P.C.board | VFC64TB (QA3) | Standard application (a part) | Standard application | |
| Main circuit P.C.board | MAC64-0000 | Standard application | (Unusable) | |
| (1. 1∼7. 5kW) | MAC61-0000 | (Unusable) | Standard application | |
| Gate P.C.board | GAC64-0000 | Standard application | (Unusable) | |
| (11~55kW) | GAC61-0000 | (Unusable) | Standard application | |

(2) 75~160kW (400V series) (VF64-7544~16044)

 $\langle {\rm Changing\ points\ from\ old\ models\ to\ new\ models} \rangle$

Controrl P.C.board was changed to VFC2001 and Gate P.C.board was changed to GAC2001 respectively.

• Terminal block P.C.board (VFC64TB) was minor model-changed (application mark QA3→QB3).

• By adoption of GAC2001, internal structure of the unit was changed.

 $\langle Table of compatibility \rangle$

| | P.C.board name | New model product | Old model product | Remark |
|-------------------|----------------|----------------------|----------------------|--------|
| Control P.C.board | VFC2001 | Standard application | (Unusable) | |
| | VFC64 | (Unusable) | Standard application | |
| Terminal block | VFC64TB (QB3) | Standard application | (Unusable) | |
| P.C.board | VFC64TB (QA3) | (Unusable) | Standard application | |
| Gate P.C.board | GAC2001 | Standard application | (Unusable) | |
| | GAC61-0000 | (Unusable) | Standard application | |

(3) 75 \sim 180kW (200V series), 200 \sim 1000kW (400V series) (VF64-7522 \sim 18022, VF64-20044 \sim 100044) (Changing points from old models to new models)

Controrl P.C.board was changed to VFC2001 and Gate P.C.board was changed to GAC2001 respectively.

• Terminal block P.C.board (VFC64TB) was minor model-changed (application mark QA3→QB3).

· By adoption of GAC2001, internal structure of the unit was changed.

 $\langle Table of compatibility \rangle$

| | P.C.board name | New model product | Old model product | | Remark |
|-----------------------|----------------|----------------------|----------------------|--|--|
| Control P.C.board | VFC2001 | Standard application | (Unusable) | | |
| | VFC64 | (Unusable) | Standard application | | |
| Terminal block | VFC64TB (QB3) | Standard application | (Unusable) | | |
| P.C.board | VFC64TB (QA3) | (Unusable) | Standard application | | |
| Gate P.C.board | GAC2001 | Standard application | (Unusable) | For VF64-20 were used in | 044 or over. 3 boards old model but 1 |
| | GAC61-0000 | (Unusable) | Standard application | board in case of GAC2001. | |
| Power source | PSM61-0000 | (Unnecessary) | Standard application | | In new model. power |
| P.C.board | PSS61-0000 | (Unnecessary) | Standard application | For slave unit side of parallel use. GAC2001. | |
| Parallel P.C.board | PRIM61-0000 | Standard application | Standard application | Master unit sid | e of parallel use. |
| (parallel units only) | PRIS61-0000 | Standard application | Standard application | Slave unit side of parallel use. | |
| | | | | | |

5-3. Changing points of each P.C.board

Table below shows the changing points of each P.C.board

| | New P.C.board | Old P.C.board | Changing points |
|-----------------------------|---------------|---------------|---|
| Control P.C.board | VFC2001 | VFC64 | Added connector for connection to new Gate P.C.board (GAC2001) Added LED for confirmation of CPU operation. Added U, V, W input terminals of PG (these are unusable in VF64) |
| Terminal block P.C.board | VFC64TB (QB3) | VFC64TB (QA3) | Added stability circuit which is necessary when power is supplied from power source GAC2001. |
| Gate P.C.board | GAC2001 | GAC61-0000 | Made common to all types of 75kW or over. Unified the function of power source P.C.boards (PSM61, PSS61). Unified the content of 3 phases in the models of more than 200kW (old model needs 3 boards) Deletion of circuit used in old type (VF61). (Unnecessary in VF64) |
| | GAC64-0000 | GAC61-0000 | • Deletion of circuit used in old type (VF61). (Unnecessary in VF64) |
| Main circuit P.C.board | MAC64-0000 | MAC61-0000 | |

Chapter 9 Standard specifications

1.Common specifications

Common specifications of 3 kinds of control system [Speed sensorless vector control], [Vector control with speed sensor] and [V/f control] are as shown below. By utilizing of under-mentioned performance and function, the most suitable control system for application can be selected.

| | Performance/Function | Speed sensorless vector control | Vector control with speed sensor *1 | V/f control | | | |
|------|----------------------------|--|---|---|--|--|--|
| Pow | ver source rating | 200V class: 200~230V, 50/60Hz | 400V class: 380V~460V, 50/60Hz | - - | | | |
| Pow | ver source fluctuation | | | | | | |
| Con | trol system | Hybrid type vector | Frequency-Voltage control system | | | | |
| | | | (Equivalent sine wave voltage type PWM) | | | | |
| | | Sensorless high speed, | High speed • high accuracy, | V/f pattern: Selective from3 kinds of | | | |
| | | speed-torque control | speed-torque control with sensor | Straight V/f constant (with auto.boost | | | |
| | | | | function) • square reduction • Bend line. | | | |
| Max | . speed/frequency | Until 245Hz | or equivalent | 400Hz | | | |
| Car | rier frequency | 1~1 | 5kHz | 1~15kHz | | | |
| | | Types of 3722, 3744 or less: Reduction | n of capacity is required at 9kHz or over | Types of 4522,4544 or over: Reduction | | | |
| | | Types of 4522, 4544 or over: Reduction | n of capacity is required at 6kHz or over | of capacity is required at 10kHz or over. | | | |
| Inve | rter efficiency | 95% or more (at the | time of rated output) | | | | |
| Ove | rload capacity | | 150% current 1 min. | | | | |
| Spe | ed control range | 1:150(TOYO Inv.motor) | 1:1000(TOYO Inverter motor) | About 1:10 | | | |
| | | 1:75(general purpose motor) | | | | | |
| Spe | ed accuracy / | Digital input:±0.5% | Digital input:±0.01% | Digital input: ±0.01% | | | |
| Free | quency accuracy | Analog input: $\pm 0.5\%$ | Analog input: \pm 0.2% | Analog input: ±0.2% | | | |
| | | | | (Speed depends on slip amount of motor) | | | |
| Spe | ed control system | MFC control & PI control | MFC control & PI control | | | | |
| | | (Speed operation feedback control) | (PG speed feedback control) | | | | |
| Spe | ed control response | 200rad/s(-3dB) | 400rad/s(-3dB) | | | | |
| Toro | que control accuracy | ±5%(TOYO Inv. motor) | ±3%(TOYO Inv. motor) | | | | |
| | | $\pm 8\%$ (general purpose motor)*3 | *2 | | | | |
| Toro | que control response | 2krad/s(-3dB) | 2krad/s(-3dB) | | | | |
| Pow | ver constant range *4 | 1:4(TOYO Inv. motor) | 1:4(TOYO Inv. motor) | | | | |
| Zero | o speed control | Unavailable Available *5 | | | | | |
| Star | ting torque | 150% (| 150% | | | | |
| Tore | que limit | For. run powering, For. run regenera | Powering, Regeneration | | | | |
| | | Rev. run powering, Rev. run regene | ration | Setting range:0~150% each *6 | | | |
| | | Setting range: 0~150% each (Poss | ible to set until 200% by combination | | | | |
| | | with motor) | | | | | |
| | Accel/decel time | 0.1~3600sec.(Possible to changeover 4 l | kinds of setting from terminal block and 2 ki | nds of them are S pattern accel/decel time) | | | |
| | S pattern accel/decel time | $0{\sim}60$ sec. (Possible to changeove | r 2 kinds of setting from terminal blo | ock) | | | |
| | Programed operation | Possible to set max. 8 points (Time | unit: possible to changeover hour, mir | nute, second. Range: 0.0~3600.0) | | | |
| NT | Rotation direction | For. run and rev. run are possible | (Possible to select inhibition of coun | ter direction against command) | | | |
| Ř | Dynamic braking(DB) | Types of 1122 (200V class), 1544 | (400V class) or less incorporate dyr | namic brake circuit. | | | |
| Ľ | | (Brake resistor, thermal relaly are Option and of external mounting) | | | | | |
| F | Droop control | Possible (Setting function of droop | ratio, droop starting torque, etc. is a | available) | | | |
| UN | Drive of 2nd motor | Possible to drive two motors altern | nately. | | | | |
| C C | Stop mode | Possible to select decel. stop/ DC | brake after decel. stop/ Free stop. | | | | |
| | Initial excitation | Possible to select by multifunction | input. | _ | | | |
| N N | DC braking | At decel. stop : 0~10sec. | | At decel. stop: 0~10sec. | | | |
| | | 20~500% of rated excitation curre | ent | Voltage: 0~20% | | | |
| | Jog drive | Min. rotation speed \sim 300min ⁻¹ | Min. frequency~30Hz | | | | |

| F | Performance/Function | Speed sensorless vector control | Vector control with spe | ed sensor *1 | V/f control | | | |
|-------------|----------------------------------|---|-----------------------------------|-----------------------------------|---|--|--|--|
| 8 | Jump function | Possible to make 4 kinds of speed | iump setting. | | Possible to make 4 kinds of frequency jump setting | | | |
| Ñ T B | Highly efficient drive | Possible to select automatic flux a | diustment drive at ligh | nt load. | | | | |
| L E | Boost | | | Select manual boost, auto, boost, | | | | |
| UZU UZU | Instability suppression function | | | | With stabilization adjustment function. | | | |
| | Control terminal block input | Possible to changeover sink mode | e / source mode. | | | | | |
| | Speed/frequency command | Terminal block: DC 0~10V or ± 10 | 0V or 4∼20mA input n | on-isolated. | | | | |
| Ň | Drive signal | For, run, Rev. run, Joa for, run, Joa rev. run, Emergency stop. Reset. | | | | | | |
| U U | Speed detection signal | Speed detector(PG) (Standard 600P/R | DC12 V A-phase B-phas | e:to be used at th | ne time of vector control with sensor only) | | | |
| Т | Output for speed/frequency meter | PWM pulse of 6 times of output frequency (Possible to connect analog meter). Rotation speed output (frequency conversion) at vector control | | | | | | |
| 0 | Analog voltage output | DC 10V output voltage: Output current | / Motor speed (output fre | equency)/Speed of | command (frequency command), etc. | | | |
| T | Contact output (2) | Operate by drive: Operate by prote | ective functions en bloo | C. | | | | |
| U U | Multifunction input | Preset speed command (7), Accel/dece | I time selection (4 kinds), | Accel/decel drive | by contact,Hold of speed.Inhibition of | | | |
| Т | (contact input) | S pattern accel/decel, Droop control ina | active, Reverse run comm | nand, DC brake co | ommand, External failure signal (4), | | | |
| Ş | | Trace back external trigger, Second mo | otor selection, Emergency | v stop B contact, F | Programed drive advance, Speed | | | |
| G | | command terminal block selection, Initia | al excitation · Speed/torque | e control changeo | ver (Vector control only), etc. | | | |
| N A | Multifunction output | Speed (frequency) detection (2), Setti | ng-reach, Torque detect | tion (2 of "with po | plarity" and "absolute value"), During | | | |
| Ĺ | (Open collector output) | power failure, Load pre-alarm, During | retry, During rev. run, P | Protective operation | on code, Sum check abnormal. | | | |
| HC fu | inction | Addition/subtraction, Multiplication, Comparator, First order lag, Dead band, PI Amplifier, | | | | | | |
| | | Feedforward, Cancelation (Modern control), Diode preference, Simple accel/decel, S pattern accel/decel, | | | | | | |
| | | Data selector, Hysteresis non-linear, Pattern generator, 1 bit selection of data, etc. | | | | | | |
| Sequ | ence function | Make sequence of drive. stop and multifunction input/output conforming to the application. | | | | | | |
| (PLC | function) | Input: Terminal block 10 contacts (By communication, input from upper CPU is also possible). | | | | | | |
| | | Output: Open collector 4, Contact output 2 (1a.1c) (By communication, output to upper CPU is also possible) | | | | | | |
| | | Kind of internal relays: Master con | trol relay 1, Cont | trol relay IN 128 | B, Control relay OUT 128, | | | |
| | | Internal rel | ay 30, Latc | h relay 10, | ON differentiation relay 10, | | | |
| | | OFF differen | ntiation relay 10, ON o | delay timer 10, | OFF delay timer 10. | | | |
| Trace | back function | Possible to memorize digital 12ch | + [status of drive • prot | tection] X 100 p | points for past 2 times. Memory | | | |
| | | content: Memorize Output current | , Output voltage, Torq | ue command, (| Output of each super block, etc. | | | |
| 1 poir | nt trace back function | Records the history of past 5 protective operation a | and 6 points data of output curre | ent, output voltage, torc | que command, etc. at the time of protective operation | | | |
| Cons | ole panel | Indicator : 7 segments, 5 digits LE | D display. | | | | | |
| | | Display: Status of drive / Data monitor / Function Setting data / Protective operation / Protection history. | | | | | | |
| | | Unit indication: LED 4 Indication | of status: LED 6 Op | peration: Touch | i key 8 | | | |
| Prote | ctive function | Output overcurrent, Output overload (electr | onic thermal), DC part over | voltage, Fin overho | eat, IGBT power source abnormal, Memory | | | |
| | | abnormal, Earth fault, Overspeed (over-free | quency), Option abnormal, S | Start stall, External | failure, Under voltage, Communication | | | |
| | | abnormal, Over torque (Vector control mode only), Speed control error (Vector control mode only), Motor overheat (Option), etc. | | | | | | |
| Safet | y indication | LED | goes on while chargin | ng. | | | | |
| Prote | ctive structure (JEM1030) | IP00 | (open type) | | | | | |
| Ambie | ent environment | Operation temperature : 0~50°C | Humidity : 20~90% | RH (No conde | nsation) | | | |
| | | Altitude : 1000m or less | Storage temperatu | re : -20~60℃ | | | | |
| | | Atmosphere : To be no harmful ga | is, metal powder, oil, e | etc. | | | | |
| | | Vibration : 5.9m/S ² (0.6G or less | 10~55Hz), conformin | g to JIS C0040 |) | | | |

 $\ast 1.$ Shows specifications in case of use combined with TOYO Inverter motor.

*2. If requested, we show guarantee values in case of adjustment in our factory.

*3. Range of powering side only in case of speed sensorless vector control. Special motor is not included.

*4. In case of use in the range of power constant, please contact us.

*5. As speed varies depending on drive condition, carrier frequency, etc. in case of continuous drive, please contact us.

*6. In V/f control system, torque is limited when lowering of frequency and accel/decel time.

If high accuracy is required, use speed sensorless vector control or vector control with speed sensor.

☆In case of delivery of VF64 Inverter as standard type and alone, factory set of control system is [V/f control system].

2. Table of types

Capacity range of VF64 Inverters.
200V class : 1.1~180kW
400V class : 1.1~ 1000kW

Type-selection of Inverters by motor rated voltage is shown below.
200V class : Type-selection by motor rated voltage of 200V and 180V.
400V class : Type-selection by motor rated voltage of 400V and 360V.
In case of use of Inverter by vector control with speed sensor, use it making motor rated voltage at 90% or less of source voltage. (When motor rated voltage and source voltage are equal, control characteristics may lower at 90% or more of rated speed.)



VF64 Inverter. 7.5kW 200V

| | | Motor capacity (kW) | | | | |
|---|-------------------------|---------------------|------|--|--|--|
| | 200V class VF64 Type | Motor rated voltage | | | | |
| | | 200V | 180V | | | |
| | VF64-1R122 | 1.1 | *1.1 | | | |
| | VF64-2R222 | 2.2 | 1.5 | | | |
| | VF64-3R722 | 3.7 | 2.2 | | | |
| | VF64-5R522 | 5.5 | 3.7 | | | |
| | VF64-7R522 | 7.5 | 5.5 | | | |
| | VF64-1122 | 11 | 7.5 | | | |
| | VF64-1522 | 15 | 11 | | | |
| | VF64-2222 | 22 | 18.5 | | | |
| | VF64-3022 | 30 | 22 | | | |
| | VF64-3722 | 37 | 30 | | | |
| | VF64-4522 | 45 | 37 | | | |
| | VF64-5522 | 55 | 45 | | | |
| | VF64-7522 | 75 | 55 | | | |
| | VF64-9022 | 90 | 75 | | | |
| ★ | VF64-15022 | 150 | 132 | | | |
| ★ | VF64-18022 | 180 | 160 | | | |

Table of Type-selection

| | Motor capacity (kW) | | | | | | | |
|-------------------------|---------------------|------------|--|--|--|--|--|--|
| 400V class VF64 Type | Motor rate | ed voltage | | | | | | |
| | 400V | 360V | | | | | | |
| VF64-1R144 | 1.1 | *1.1 | | | | | | |
| VF64-2R244 | 2.2 | *2.2 | | | | | | |
| VF64-3R744 | 3.7 (4.0) | *3.7 | | | | | | |
| VF64-5R544 | 5.5 | — | | | | | | |
| VF64-7R544 | 7.5 | 5.5 | | | | | | |
| VF64-1144 | 11 | 7.5 | | | | | | |
| VF64-1544 | 15 | 11 | | | | | | |
| VF64-2244 | 22 | 18.5 | | | | | | |
| VF64-3044 | 30 | 22 | | | | | | |
| VF64-3744 | 37 | 30 | | | | | | |
| VF64-4544 | 45 | 37 | | | | | | |
| VF64-5544 | 55 | 45 | | | | | | |
| VF64-7544 | 75 | 55 | | | | | | |
| VF64-11044 | 110 | 90 | | | | | | |
| VF64-16044 | 160 | 132 | | | | | | |
| VF64-20044 | 200 | 160 (180) | | | | | | |
| VF64-25044 | 250 | 200 (220) | | | | | | |
| VF64-31544 | 315 | 280 | | | | | | |
| VF64-40044 | 400 | 355 | | | | | | |
| VF64-50044 | 500 | 450 | | | | | | |
| VF64-60044 | 600 | 530 | | | | | | |
| VF64-75044 | 750 | 670 | | | | | | |
| VF64-100044 | 1000 | 900 | | | | | | |

(Note 1) Types with \bigstar mark use Inverter units parallelly.

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- (Note 2) Types with * mark need not capacity derating even in case of reduced voltage.
- (Note 3) Motor capacity in () is usable if motor current is within the rated current of inverter.

3. Table of capacities

3-1. Motor rated voltage is 200V • 400V

| Туре | | 200V class | | | | | | | | | | | | | |
|----------------------------------|-------|---|----------|-----------|-------|------|-------------------|------|------|------|------|------|------|------|--|
| VF64- | 1R122 | 2R222 | 3R722 | 5R522 | 7R522 | 1122 | 1522 | 2222 | 3022 | 3722 | 4522 | 5522 | 7522 | 9022 | |
| Applicable motor capacity(kW) *1 | 1.1 | 2.2 | 3.7 | 5.5 | 7.5 | 11 | 15 | 22 | 30 | 37 | 45 | 55 | 75 | 90 | |
| Rated output current (A) | 5.5 | 10.0 | 17.0 | 24.0 | 32.5 | 46.0 | 62.5 | 87.0 | 121 | 146 | 185 | 222 | 280 | 340 | |
| Max. output voltage (V) | | 200~230V (complies with input voltage) *2 | | | | | | | | | | | | | |
| Input power source | | 3 phase 3 wires 200~230V±10% 50/60Hz±5% | | | | | | | | | | | | | |
| Input power factor *3 | | [Del | ay] abou | t 0.7(0.9 | *4) | | [Delay] about 0.9 | | | | | | | | |
| Input capacity (kVA)*5 | 2.1 | 4.1 | 7.0 | 10.3 | 14.0 | 20.5 | 21.8 | 33.8 | 43.6 | 53.7 | 69.2 | 84.6 | 116 | 139 | |
| DC Reactor (DCL D) | | | Op | tion | | | 1522 | 2222 | 3022 | 3722 | 4522 | 5522 | 7522 | 9022 | |
| Cooling system | | Forced air cooling | | | | | | | | | | | | | |

| Туре | | | | | | | | | 400V | class | | | | | | | | |
|----------------------------------|-------|---|---------|---------|---------|--------|--------|-------------------|-------|-------|------|------|------|-------|-------|-------|-------|-------|
| VF64- | 1R144 | 2R244 | 3R744 | 5R544 | 7R544 | 1144 | 1544 | 2244 | 3044 | 3744 | 4544 | 5544 | 7544 | 11044 | 16044 | 20044 | 25044 | 31544 |
| Applicable motor capacity(kW) *1 | 1.1 | 2.2 | 3.7 | 5.5 | 7.5 | 11 | 15 | 22 | 30 | 37 | 45 | 55 | 75 | 110 | 160 | 200 | 250 | 315 |
| Rated output current (A) | 3.1 | 5.5 | 9.2 | 13.0 | 17.0 | 24.0 | 32.5 | 46.0 | 62.5 | 75.5 | 92.5 | 111 | 146 | 210 | 300 | 370 | 460 | 600 |
| Max. output voltage (V) | | 380~460V (complies with input voltage) *2 | | | | | | | | | | | | | | | | |
| Input power source | | | | | | 3 phas | e 3 wi | res 38 | 0~460 |)V±10 | % 50 | ∕60H | z±5% | | | | | |
| Input power factor *3 | | [D | elay] a | bout 0. | 7(0.9 * | ÷4) | | [Delay] about 0.9 | | | | | | | | | | |
| Input capacity (kVA)*5 | 2.1 | 4.1 | 7.0 | 10.3 | 14.0 | 20.5 | 28.0 | 32.0 | 46.1 | 56.9 | 69.2 | 84.6 | 116 | 170 | 247 | 308 | 385 | 485 |
| DC Reactor (DCL | | | | Option | | | | 2244 | 3044 | 3744 | 4544 | 5544 | 7544 | 11044 | 16044 | 20044 | 25044 | 31544 |
| Cooling system | | Forced air cooling | | | | | | | | | | | | | | | | |

For the items with * mark $1 \sim 5$, see next page.

3-2. Motor rated voltage is 180V • 360V

| Туре | | 200V class | | | | | | | | | | | | |
|----------------------------------|-------|---|-----------|------------|-------|------|------|------|------|-----------|-----------|------|------|------|
| VF64- | 1R122 | 2R222 | 3R722 | 5R522 | 7R522 | 1122 | 1522 | 2222 | 3022 | 3722 | 4522 | 5522 | 7522 | 9022 |
| Applicable motor capacity(kW) *1 | 1.1 | 1.5 | 2.2 | 3.7 | 5.5 | 7.5 | 11 | 18.5 | 22 | 30 | 37 | 45 | 55 | 75 |
| Rated output current (A) | 5.5 | 10.0 | 17.0 | 24.0 | 32.5 | 46.0 | 62.5 | 87.0 | 121 | 146 | 185 | 222 | 280 | 340 |
| Max. output voltage (V) | | 200~230V (complies with input voltage) *2 | | | | | | | | | | | | |
| Input power source | | 3 phase 3 wires 200~230V±10% 50/60Hz±5% | | | | | | | | | | | | |
| Input power factor *3 | | [De | lay] abou | ut 0.7(0.9 | *4) | | | | | [Delay] a | about 0.9 | | | |
| Input capacity (kVA)*5 | 2.1 | 2.9 | 4.4 | 7.4 | 10.8 | 14.7 | 21.5 | 28.0 | 35.5 | 45.8 | 56.5 | 73 | 89 | 122 |
| DC Reactor (DCL | | | Ор | tion | | | 1522 | 2222 | 3022 | 3722 | 4522 | 5522 | 7522 | 9022 |
| Cooling system | | Forced air cooling | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |

| Туре | | | | | | | | 40 | 0V cla | SS | | | | | | | |
|----------------------------------|--------|---|---------|-----------|-------|------|-------------------|------|--------|------|------|------|-------|-------|-------|-------|-------|
| VF64- | 1R144 | 2R244 | 3R744 | 7R544 | 1144 | 1544 | 2244 | 3044 | 3744 | 4544 | 5544 | 7544 | 11044 | 16044 | 20044 | 25044 | 31544 |
| Applicable motor capacity(kW) *1 | 1.1 | 2.2 | 3.7 | 5.5 | 7.5 | 11 | 18.5 | 22 | 30 | 37 | 45 | 55 | 90 | 132 | 160 | 200 | 280 |
| Rated output current (A) | 3.1 | 5.5 | 9.2 | 17.0 | 24.0 | 32.5 | 46.0 | 62.5 | 75.5 | 92.5 | 111 | 146 | 210 | 300 | 370 | 460 | 600 |
| Max. output voltage (V) | | 380~460V (complies with input voltage) *2 | | | | | | | | | | | | | | | |
| Input power source | | 3 phase 3 wires 380~460V±10% 50/60Hz±5% | | | | | | | | | | | | | | | |
| Input power factor *3 | | [Dela | y] abou | ıt 0.7(0. | 9 *4) | | [Delay] about 0.9 | | | | | | | | | | |
| Input capacity (kVA)*5 | 2.1 | 4.1 | 7.0 | 10.8 | 14.7 | 21.5 | 28.3 | 33.6 | 48.4 | 60 | 73 | 89 | 146 | 214 | 259 | 323 | 404 |
| DC Reactor (DCL | Option | | | | | | 2244 | 3044 | 3744 | 4544 | 5544 | 7544 | 11044 | 16044 | 20044 | 25044 | 31544 |
| Cooling system | | Forced air cooling | | | | | | | | | | | | | | | |

For the items with * mark $1 \sim 5$, see next page.

3-3. Large capacity Inverters (parallel units)

| Туре | 200V | class | 400V class | | | | | | | | | |
|--|----------------------------------|----------------------------------|---|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|--|--|--|--|--|
| VF64- | 15022 | 18022 | 40044 | 50044 | 60044 | 75044 | 100044 | | | | | |
| Applicable motor capacity (kW) *1 | 150 | 180 | 400 | 500 | 600 | 750 | 1000 | | | | | |
| Rated output current(A) | 560 | 680 | 740 | 920 | 1110 | 1380 | 1840 | | | | | |
| Max. output voltage (V) | 200~230V(comply) | with input voltage)*2 | 380~460V (comply with input voltage) *2 | | | | | | | | | |
| Input power source | 3 phase 3 wires 200~23 | 30V±10% 50/60Hz±5% | | | | | | | | | | |
| Input capacity (kVA)*5 | 231 | 277 | 616 | 769 | 923 | 1154 | 1538 | | | | | |
| Capacity in single unit and number of units in combination | VF64-7522 2 units in parallel | VF64-9022 2 units in parallel | VF64-20044 2 units in parallel | VF64-25044 2 units in parallel | VF64-20044 3 units in parallel | VF64-25044 3 units in parallel | VF64-25044 4 units in parallel | | | | | |

(1) Motor rated voltage is 200V • 400V

(2) Motor rated voltage is 180V · 360V

| Туре | 200V | class | 400V class | | | | | | | | | |
|--|----------------------------------|----------------------------------|---|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|--|--|--|--|--|
| VF64- | 15022 | 18022 | 40044 | 50044 | 60044 | 75044 | 100044 | | | | | |
| Applicable motor capacity (kW) *1 | 132 | 160 | 355 | 450 | 530 | 670 | 900 | | | | | |
| Rated output current(A) | 560 | 680 | 740 | 920 | 1110 | 1380 | 1840 | | | | | |
| Max. output voltage (V) | 200~230V(comply) | with input voltage)*2 | 380~460V (comply with input voltage) *2 | | | | | | | | | |
| Input power source | 3 phase 3 wires 200~23 | 30V±10% 50/60Hz±5% | 3 | 3 phase 3 wires 3 | 380~460V±109 | % 50∕60Hz±59 | б | | | | | |
| Input capacity (kVA)*5 | 203 | 246 | 546 | 692 | 815 | 1030 | 1384 | | | | | |
| Capacity in single unit and number of units in combination | VF64-7522 2 units in parallel | VF64-9022 2 units in parallel | VF64-20044 2 units in parallel | VF64-25044 2 units in parallel | VF64-20044 3 units in parallel | VF64-25044 3 units in parallel | VF64-25044 4 units in parallel | | | | | |

(*1) Shows in capacity of general 4 pole motor.

(*2) Voltage of more than AC input voltage cannot be outputted.

(*3) Values at the time of rated output but they vary depending on power source impedance.

 $(\ast 4)$ Shows the values in case that DC Reactor of Option is connected.

(*5) Shows the values at the time of rated output of applied motor.

4. Outline dimensions

4-1. Main body



4-M5

screw or holes for M5

4-M5

M5

screw or holes for

4-M6

M6

screw or holes for

244

4-M6

M6

screw or holes for

294

4-M8

M8

screw or holes for

424





(NOTE 1)

In case that cooling fin is used installing outside,

see $\ensuremath{\bigcirc}\xspace \mathsf{Panel}$ cut dimensions of cooling fin outside installation

(for 45~160kW,please inquire us)

©Fitting method for outside installation of cooling fin of the figures shown below.

Painting color

Inverter main body : Munsell notation 5B2/6 (Dark blue) Console : DIC727 (Wine red)



4-2. DC Reactor (Standard • Option)

For the types of VF64-1522 or over in 200V class and VF64-2244 or over in 400V class, DC Reactor of separate installation is equipped as standard. As to the types of less than these capacities, DC Reactor is optional.

External form and dimensions



200V class (hatching part is optional type)

| | DC Reactor | | | | Dim | nension | (n | nm) | | | | Turne | Weight |
|-------------------|------------|-----|-----|-----|-----|---------|-----|-----|----|-----|----------|-------|--------|
| Inverter capacity | type | A | B | С | D | E | G | Н | N | L | terminal | туре | (kg) |
| VF64-1R122 | DCL3R722 | 97 | 90 | 70 | 55 | — | — | 120 | — | - | M4 | А | 2.1 |
| VF64-2R222 | DCL3R722 | 97 | 90 | 70 | 55 | — | — | 120 | — | - | M4 | А | 2.1 |
| VF64-3R722 | DCL3R722 | 97 | 90 | 70 | 55 | — | — | 120 | — | - | M4 | А | 2.1 |
| VF64-5R522 | DCL7R522 | 97 | 100 | 70 | 75 | — | — | 130 | — | - | M6 | А | 3.3 |
| VF64-7R522 | DCL7R522 | 97 | 100 | 70 | 75 | — | — | 130 | — | — | M6 | А | 3.3 |
| VF64-1122 | DCL1122 | 60 | 110 | 40 | 90 | 48 | 162 | 205 | — | 90 | M6 | В | 4.0 |
| VF64-1522 | DCL1522 | 60 | 110 | 40 | 90 | 48 | 169 | 212 | — | 90 | M8 | В | 5.0 |
| VF64-2222 | DCL2222 | 60 | 110 | 40 | 90 | 50 | 182 | 226 | - | 90 | M10 | В | 6.0 |
| VF64-3022 | DCL3022 | 90 | 120 | 70 | 100 | 75 | 181 | 224 | - | 90 | M10 | В | 10 |
| VF64-3722 | DCL3722 | 90 | 120 | 70 | 100 | 77 | 182 | 226 | _ | 90 | M10 | В | 10 |
| VF64-4522 | DCL4522 | 110 | 125 | 90 | 105 | 81 | 170 | 214 | _ | 90 | M12 | В | 11 |
| VF64-5522 | DCL5522 | 120 | 145 | 100 | 125 | 107 | 182 | 236 | _ | 90 | M12 | В | 15 |
| VF64-7522 | DCL7522 | 110 | 125 | 90 | 105 | 92 | 205 | 259 | _ | 100 | M12 | В | 16 |
| VF64-9022 | DCL9022 | 135 | 135 | 115 | 115 | 111 | 215 | 279 | 40 | 100 | M12 | В | 20 |

400V class (hatching part is optional type)

| | DC Reactor | | - | | Din | nension | (m | nm) | | | | Tuno | Weight |
|-------------------|------------|-----|-----|-----|-----|---------|-----|-----|----|-----|----------|------|--------|
| Inverter capacity | type | A | В | С | D | E | G | H | N | L | terminal | туре | (kg) |
| VF64-1R144 | DCL3R744 | 78 | 80 | 55 | 62 | — | — | 100 | — | - | M3 | А | 1.6 |
| VF64-2R244 | DCL3R744 | 78 | 80 | 55 | 62 | — | _ | 100 | — | _ | M3 | Α | 1.6 |
| VF64-3R744 | DCL3R744 | 78 | 80 | 55 | 62 | — | - | 100 | — | | M3 | А | 1.6 |
| VF64-5R544 | DCL7R544 | 97 | 100 | 70 | 70 | — | - | 120 | — | | M4 | А | 3.1 |
| VF64-7R544 | DCL7R544 | 97 | 100 | 70 | 70 | — | - | 120 | — | - | M4 | А | 3.1 |
| VF64-1144 | DCL1544 | 106 | 100 | 80 | 75 | — | - | 150 | — | - | M6 | А | 4.0 |
| VF64-1544 | DCL1544 | 106 | 100 | 80 | 75 | — | - | 150 | — | - | M6 | А | 4.0 |
| VF64-2244 | DCL2244 | 60 | 120 | 40 | 100 | 48 | 192 | 235 | - | 90 | M6 | В | 6.0 |
| VF64-3044 | DCL3044 | 60 | 120 | 40 | 100 | 48 | 192 | 235 | - | 90 | M8 | В | 6.5 |
| VF64-3744 | DCL3744 | 90 | 120 | 70 | 100 | 75 | 195 | 238 | - | 90 | M8 | В | 10 |
| VF64-4544 | DCL4544 | 90 | 120 | 70 | 100 | 75 | 186 | 230 | - | 90 | M10 | В | 10 |
| VF64-5544 | DCL5544 | 110 | 125 | 90 | 105 | 90 | 194 | 248 | — | 90 | M10 | В | 14 |
| VF64-7544 | DCL7544 | 110 | 125 | 90 | 105 | 92 | 209 | 263 | - | 100 | M10 | В | 16 |
| VF64-11044 | DCL11044 | 135 | 135 | 115 | 115 | 117 | 219 | 283 | 40 | 100 | M12 | В | 24 |
| VF64-16044 | DCL16044 | 145 | 145 | 125 | 125 | 124 | 251 | 325 | 40 | 110 | M12 | В | 28 |
| VF64-20044 | DCL20044 | 145 | 145 | 125 | 125 | 130 | 256 | 330 | 40 | 110 | M12 | В | 35 |
| VF64-25044 | DCL25044 | 155 | 155 | 135 | 135 | 141 | 283 | 367 | 40 | 120 | M16 | В | 40 |
| VF64-31544 | DCL31544 | 155 | 155 | 135 | 135 | 142 | 310 | 389 | 40 | 210 | M16 | B | 45 |

Cautions on installation

Since DCL becomes hot, do not install near DCL the device which is influenced by heat. Also, arrange not to circulate the heat of DCL in the panel.



Chapter 10 Necessary information to us in the inquiry from customers

In case of order for replacements of the unit and parts in trouble as well as technical question, please be requested to inform us or our distributor of the following items.

- 1) Type, capacity (kW), input voltage (V) of Inverter.
- 2) Capacity (kW) and rated speed (min-1) of motor.
- 3) Control modes : Speed sensorless vector control mode (VF64S) Vector control mode with speed sensor (VF64V) V/f control mode (VF64)
- 4) Serial number, Software version Number (See the label stuck on IC18 of VFC64 P.C.Board).
- 5) Details of trouble. Situation when trouble occurred.
- 6) Conditions of use. status of load, ambient conditions, date of purchase, how the Inverter was operated.
- 7) Name of our distributor.

Request to the distributor

When our Inverter is delivered to customer combining with your equipment, etc., please arrange to deliver this Instruction Manual also to the end user. If you changed setting values of Inverter from our default values, please arrange to deliver its content to the end user surely.



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