VF5100HG

HIGH PERFORMANCE
DIGITAL PWM AC DRIVE

INSTRUCTION MANUAL

Drivecon
MOTOR DRIVES AND CONTROLS

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Caution: **Never remove cover of VF5100HG inverter while power is on or charge light is illuminated due to high voltage within inverter.**

Contents and Guides before the Use

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D61276 5 speed, 110V Input Isolation Board
Instruction and Installation Manual

WARNING: THE VF5100HG INVERTER CONTAINS HAZARDOUS INTERNAL VOLTAGES AND SHOULD BE SERVICED ONLY BY QUALIFIED PERSONNEL. MOST COMPONENTS ARE NOT USER SERVICEABLE THEREFORE, CONSULT DRIVECON CORPORATION IF A PROBLEM SHOULD ARISE.

1. Confirmation of product purchased

Check the following points regarding the product delivered.

(1) Are the specification, ancillaries and spare parts in accordance with your Order?

(2) Is there any part damaged during transport?

(3) Is there loose screw or not?

Please contact the seller if undesirable point exists.

2. Installation

Since the good or poor installation greatly influences the life and reliability of equipment, please avoid use at the following places.

(1) Place where moisture or dust is abundant and place where water or oil drips

Such locations lead to drop of circuit insulation and to shortening of life of parts.

(2) Place where ambient temperature is beyond that of specification

When temperature is too high, life of parts such as condenser and fan motor for cooling is shortened.

(3) Place where corrosive gas exists

At such place, reliability of parts and wiring is lowered.

(4) Place where vibration occurs frequently

At such place, defective contact of connector, disconnection of wire and damage of parts are produced.

Caution

(1) Protective construction of VF5100HG Series Inverter Unit is manufactured by open type (NEMA 0, IP00). When using VF5100HG which is not equipped in control panel, caution should be extended to safety aspect.

(2) Ambient temperature upper limit +50°C of VF5100HG means the ambient temperature of inverter unit. When this unit is equipped in control panel, "50°C - (temperature rise of panel interior)" becomes the maximum value of control panel's ambient temperature.

3. Fitting to control panel

When fitting VF5100HG to control panel, caution should be extended to following point.

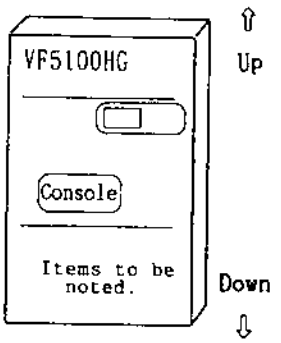
Caution

When carrying and fitting main body of VF5100HG, caution should be extended so as not to drop the VF5100HG. Unit that has holes for grasping at both sides of unit should make use of those holes and units without such holes should have the bottom part of unit firmly held.

3-1. Fitting direction

(1) VF5100HG main body

As shown in the following drawing, fit the unit vertically with the Series mark "VF5100HG" set at the upper side. Please avoid removal of console from inverter unit and use of horizontal position.



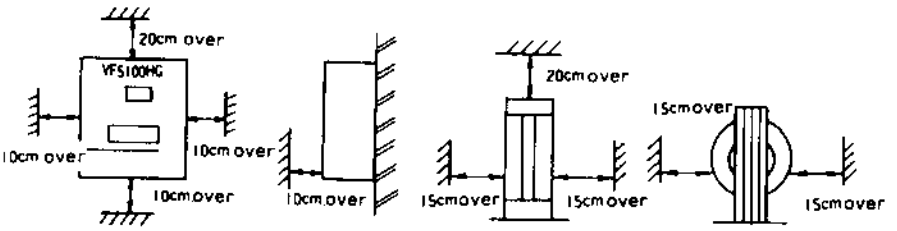
(2) DC reactor (DCL)

Since DC reactor is delivered as accessory for over 22KVA of 200V system and for over 37KVA of 400/480V system, be sure to fit reactor and wire this reactor. Please avoid the running without connection of DC reactor.

3-2. To secure cooling space

(1) VF5100HG main chassis

As regards VF5100HG unit chassis, cooling space should be provided as per the following drawing and peripheral equipment should be arranged (cooling of VF5100HG unit main body is such that air enters from the lower part and exhausts to the upper part).



(2) DC reactor

Please secure cooling space as per the following drawing as regards VF5100HG unit main body likewise (since insulation of DC reactor is manufactured by Class H, pay attention to temperature).

(3) Exhaust of control panel and loss of VF5100HG

When VF5100HG is fitted in control panel, heat generated from VF5100HG unit main body and DC reactor should be disposed exhausting outside of control panel. When running rating motor of maximum capacity that can by rated output capacity of VF5100HG, quantity of heat generated becomes about 3 ~ 6% of motor rated output capacity in general although this heat quantity differs by motor efficiency.

(Example):

When running 3.7kW by 5kVA VF5100HG, heat generated from VF5100HG is about 3.7kW x 6% = 222W.

When running 30kW by 45kVA VF5100HG unit, heat generated from this unit is about 30kW x 4% = 1.2kW.

When running 110kW by 150kVA VF5100HG unit, heat generated from this unit is about 110kW x 3% = 3.3kW.

Exhaust quantity of heat generated from VF5100HG when forced exhausting this heat quantity outside the panel by exhaust fan fitted to control panel becomes as described below.

$$q = \rho \cdot C \cdot Q \cdot (T_O - T_A)$$

whereas,

- q : heat quantity generated from VF5100HG (kW)
- ρ : density (kg/m^2), for air ρ= 1.057~1.251 kg/m^2 (50 ~ 0°C)
- C : specific heat ($kJ/kg \cdot °C$), for air C= 1.0 $kJ/kg \cdot °C$
- Q : exhaust flow rate (m^3/S)
- T_O : outlet temperature of exhaust fan (°C)
- T_A : temperature of air entering control panel (°C)

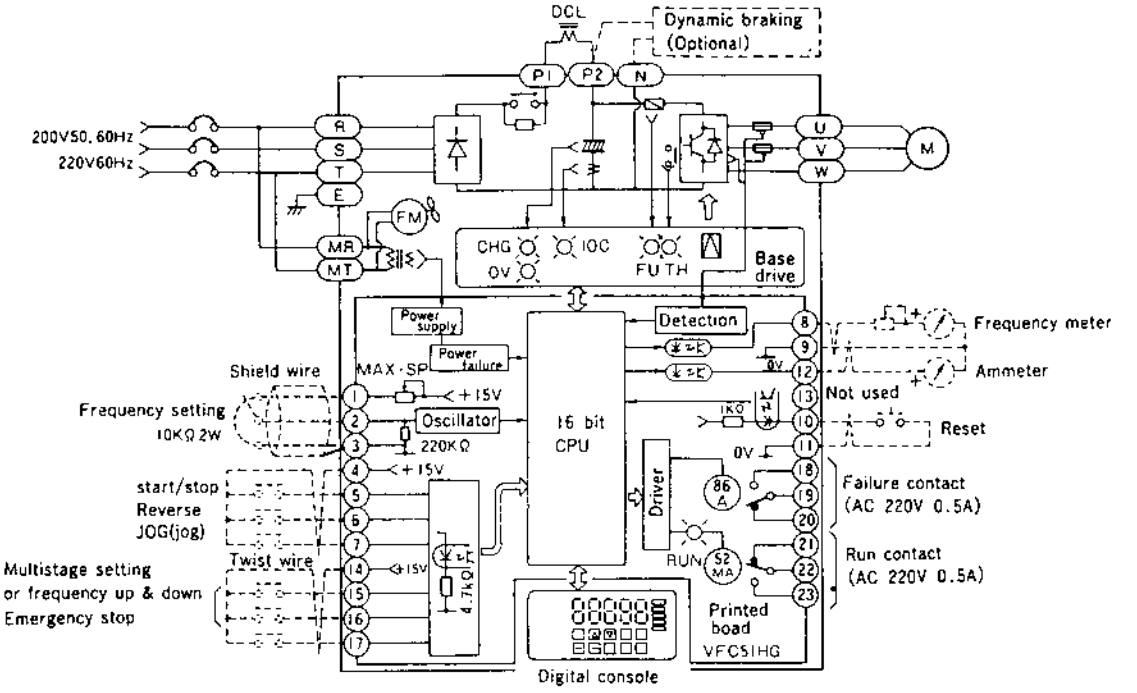
From the above equation, to offer the temperature difference between incoming air and exhaust air as 10°C ($T_O - T_A$ = 10°C), when setting ambient temperature of control panel as 40°C, about 0.1m^3/S (6000ℓ/min) of exhaust capability becomes necessary to exhaust 1kw.

Caution

On the occasion of fitting VF5100HG in control panel, please do not have the exhaust air of VF5100HG unit enter into the lower part of another VF5100HG unit as a result circulating in the panel.

4. Circuit composition

Following shows circuit composition of VF5100HG Series inverter.



Note 1. Above drawing shows the example of 200V series 22kVA. When voltage and capacity change, the following is likely to change

(A) P1, P2 terminals of intermediate DC part.

(B) DC reactor (DCL) is available/not available, or is contained in inverter unit or is provided separately.

(C) Composition of control power supply source terminals MR, MT.

(D) Cooling fan (FM) for semiconductor is available or not.

Details of terminal block composition against respective voltage and capacity, should refer to Item 7 "Explanation of terminal block". Also terminal block ① ~ ㉓ are always common irrespective to voltage and capacity.

Note 2. Dot line shows example of connection for operation or for monitoring of VF5100HG by signal from external controls.

Note 3. ⋈ shows L E D diode respectively indicating the following,

CHG ... Intermediate DC part is illuminated by live line.

IOC ... Illumination by output overcurrent (inverter stop).

FU ... Light is shutoff by melting off of input fuse of inverter part (inverter stop), LED illumination takes place at the time of normality.

TH ... Illumination takes place by temperature rise fitted only for the type of forced cooling.

OV ... Illumination takes place by overvoltage of intermediate DC part (inverter stop)

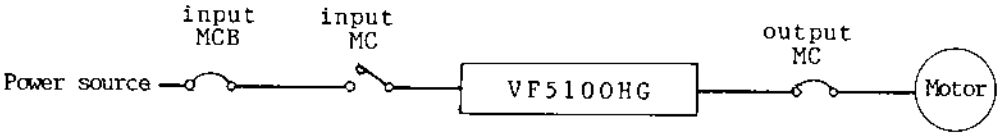
RUN ... Illumination takes place by running

Also particulars at time of fault are indicated by console including other faults.

5. Peripheral device and Wiring

5-1. Selection of input/output devices and caution concerning main circuit wiring.

Following shows input/output connection devices and wiring size of main circuit of VF5100HG.



200V System

Inverter unit	Type	VF5120HG-□□□									
		3	5	7.5	10	15	22	30	45	60	90
	Motor applied (kW)	2.2	3.7	5.5	7.5	11	15	22	30	45	55
	Capacity (kVA)	3	5	7.5	10	15	22	30	45	60	90
Peripheral devices	MCB for input (Note 1)	15	30	30	40	60	75	125	150	225	300
	MC for input (Note 2)	K20	K20	K20	K25	K35	K50	K80	K125	K180	K220
	MC for output (Note 2)	K20	K20	K25	K35	K50	K65	K95	K125	K180	K220
Wiring size (Note 3) (mm^2)	Input side(R,S,T) (Note 3)	2	3.5	3.5	5.5	8	14	22	38	60	100
	for DCL (P1, P2) (Note 3)	-	-	-	-	-	14	22	38	60	100
	Output side(U,V,W)(Note 4)	3.5	5.5	8	8	14	22	38	60	100	100

400/480V System

Inverter unit	Type	VF5140HG-□□□										
		3	5	7.5	10	15	25	37	50	75	100	150
	Motor applied (kW)	2.2	3.7	5.5	7.5	11	18.5	22	37	55	75	110
	Capacity (kVA)	3	5	7.5	10	15	25	37	50	75	100	150
Peripheral devices	MCB for input (Note 1)	10	15	20	30	30	50	75	100	150	200	300
	MC for input (Note 2)	K20	K20	K20	K20	K20	K25	K50	K65	K100	K150	K220
	MC for output (Note 2)	K20	K20	K20	K20	K25	K50	K50	K80	K125	K150	K220
Wiring size Size (mm^2)	Input side(R,S,T)(Note 3)	2	2	2	3.5	3.5	5.5	14	22	38	60	100
	for DCL(P1,P2) (Note 3)	-	-	-	-	-	-	14	14	38	60	100
	Output side(U,V,W)(Note 4)	2	2	2	2	3.5	8	14	22	38	60	100

Inverter unit	Type	VF5148HG-□□□										
		3	5	7.5	10	15	25	37	50	75	100	150
	Motor applied (kW)	1.5	3.7	5.5	7.5	11	18.5	22	37	55	75	110
	Capacity (kVA)	3	5	7.5	10	15	25	37	50	75	100	150
Peripheral devices	MCB for input (Note 1)	10	15	15	20	30	40	75	75	125	150	225
	MC for input (Note 2)	K20	K20	K20	K20	K20	K25	K35	K50	K80	K125	K180
	MC for output (Note 2)	K20	K20	K20	K20	K25	K50	K50	K80	K125	K150	K220
Wiring size Size (mm^2)	Input side(R,S,T)(Note 3)	2	2	2	2	3.5	5.5	14	14	22	38	60
	for DCL(P1,P2) (Note 3)	-	-	-	-	-	-	14	14	38	60	100
	Output side(U,V,W)(Note 4)	2	2	2	2	3.5	5.5	14	14	38	60	100

Note 1: Rated current of input MCB is shown. Rupturing capacity of MCB should be determined from power source installed capacity used. Rated current of above table is calculated from input current of inverter. And when load other than inverter is connected to secondary side of input MCB, rated current should be calculated,

Note 2: Input MC and output MC are not necessarily required to be connected. Input MC type of above table shows the example of Mitsubishi Electric product electro-magnetic contactor MS-K Series. The objective of connection of generic input/output MC is;

Input MC : For preparation of inverter running. It is not used for run/stop of inverter.

Output MC: When inverter input terminals are at live condition even during stop of inverter, intermediate DC voltage of inverter is imposed on motor. To prevent such condition from safety viewpoint, output MC is connected. (if input MC is provided and is set OFF, there is no voltage present on motor)

Note 3: Wiring size of input side shows from input MCB to input terminals of VF5100HG. Type of electric wire is of the example THHN electric wire. Wiring size of input MCB primary side should be determined by Standard such as Internal Wiring Rules or the NEC.

Note 4: Output side wiring is shown with electric wire with cable length of 30 meter between VF5100HG and motor set as the target (voltage drop by cable at rated output becomes within 2% of rated voltage).

5-2. Caution concerning control circuit

Since connection is made to electronic circuit excluding terminal numbers ⑱ ~ ㉓ if "Control circuit terminal block" of chapter 6 "Explanation of terminal block" following items should be paid attention when connecting wiring.

(1) Separation from main circuit wiring

Control line should be wired apart from main circuit wiring so as noise does not effect operation of VF5100HG.

(2) Wiring should be short as practicaland possible

Parts should be laid out so that wiring length of control line becomes short as practical.

(3) Use of shield wire and twisted wires

To avoid intrusion of noise, please use shield wire and/or twisted wire

(4) Installation of conduit pipe or metal pipe

When wiring outside control panel such as frequency setting wiring for instance, these wires should be put in conduit pipe or metal pipe for protection.

5-3. Grounding

Be sure to connect the grounding wiring of E terminal of VF5100HG inverter unit.

Caution

(1) When phase advance capacitor is used for the motor, be sure to remove this capacitor and then connect the wiring (When running inverter with phase advance capacitor connected intact, inverter unit is subject to damage).

(2) To ensure safety against the contingency of failure of inverter unit, be sure to connect circuit breaker for wiring to input side of inverter unit.

(3) "N" terminal of inverter unit is connected to minus side of intermediate DC part.

In no event should connection be made to N phase (Neutral) of AC power distribution or grounding wire.

(N terminal of inverter unit is used as option of dynamic brake or when up grading the system for use with options.

6. Explanation of terminal block

Explanation is given for terminal block of VF5100HG Series Inverter.

6-1. Main circuit terminal block

Following drawings show the composition of main circuit terminal block against respective types of VF5100HG.

R, S, T ... AC input including commercial power supply source is connected.

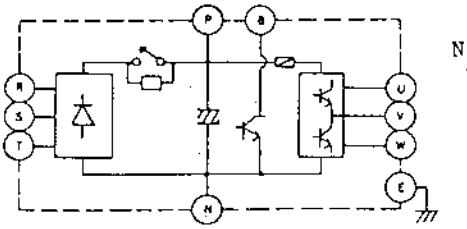
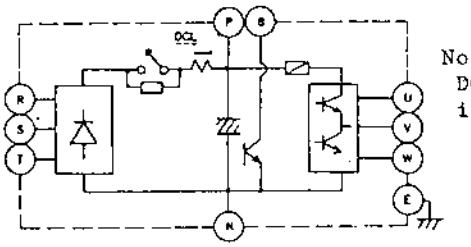
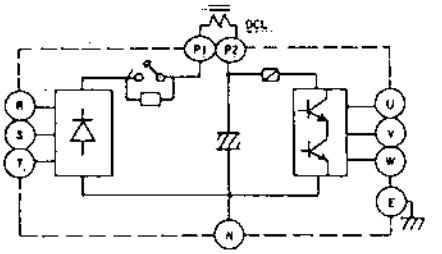
U, V, W ... Connection is made to motor.

P, B ... Braking resistor of dynamic brake option is connected.

P, N ... In the case braking force falls short by dynamic brake circuit contained in inverter unit, dynamic brake option provided seperately is connected.

P1, P2 ... Connection is made to DC reactor (DCL) provided separately.

P2, N ... Connection is made to dynamic brake option provided separately.

Inverter unit type	Composition of main circuit terminal block
VF5120HG-3, 5 VF5140HG-3, 5, 7.5, 10 VF5148HG-3, 5, 7.5, 10	 Note: There is no DCL.
VF5120HG-7.5, 10, 15 VF5140HG-15, 25 VF5148HG-15, 25	 Note: DCL is contained in inverter
VF5120HG-22, 30, 45, 60, 90 VF5140HG-37, 50, 75, 100, 150 VF5148HG-37, 50, 75, 100, 150	 Note: DCL is delivered as accessory. Conduct wiring as per left drawing.

Note

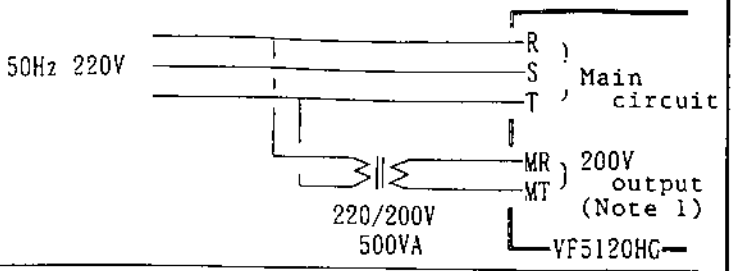
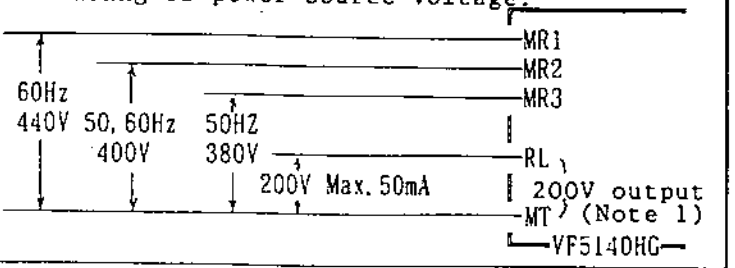
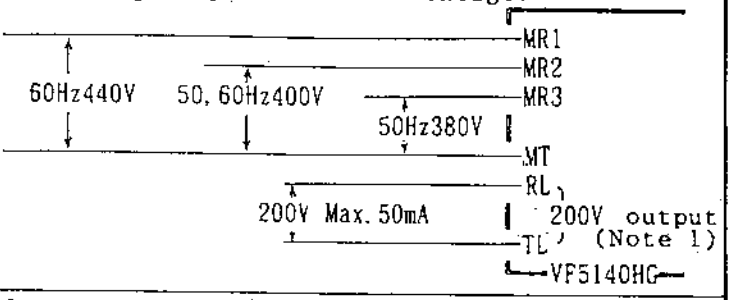
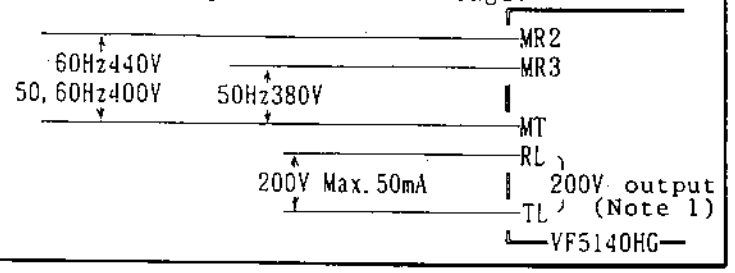
1. Inverter performs normally despite difference of phase order of AC input.

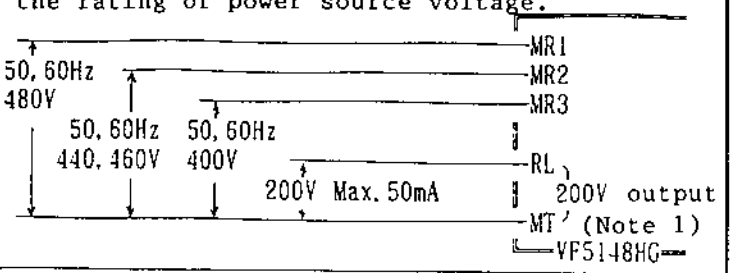
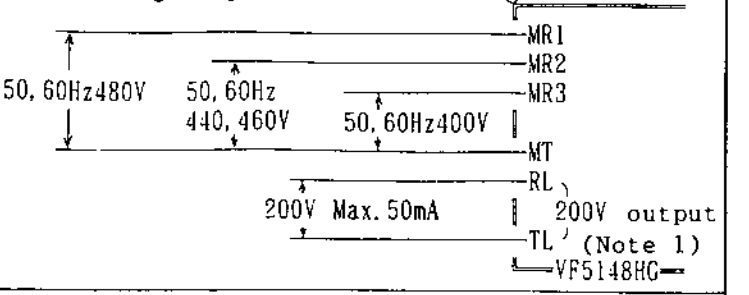
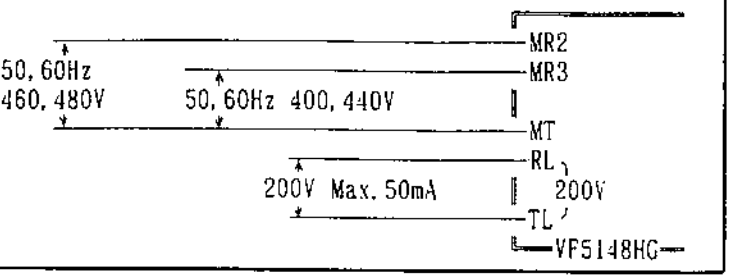
2. There is no relationship between phase order of AC input and phase order of output (output is of the phase order U→V→W by forward running).

3. Do not connect N terminal of VF51 to neutral point of AC power distribution or to grounding wire.

6-2. Terminal block of control power supply source

The following connections made available for respective types as regards main control circuit of VF5100HG and input terminals of cooling fan power supply source.

Power source Voltage	Inverter type	Composition of terminal block of control power supply source and explanation of connection
200V system	VF5120HG-3 ~ 90	Please input power supply source within 180V (200V -10%) ~ 242V(220V +10%) of 50Hz or 60Hz to MR, MT terminals. If power source voltage is 220V, 50Hz, please connect single phase transformer (500VA) of 220/200V to power source and between MR and MT (refer to following drawing). (In this case, there is no trouble despite inputting 50Hz 220V directly to AC input terminals R,S,T.) 
400V system	VF5140HG-3 ~ 7.5	Please connect like the following drawing by the rating of power source voltage. 
	VF5140HG-10 ~ 37	Please connect like the following drawing by the rating of power source voltage. 
	VF5140HG-50 ~ 150	Please connect like the following drawing by the rating of power source voltage. 

Power source voltage	Inverter type	Composition of terminal block of control power supply source and explanation of connection
480V system	VF5148HG-3 ~ 7.5	Please connect like the following drawing by the rating of power source voltage. 
	VF5148HG-10 ~ 37	Please connect like the following drawing by the rating of power source voltage. 
	VF5148HG-50 ~ 150	

Note:

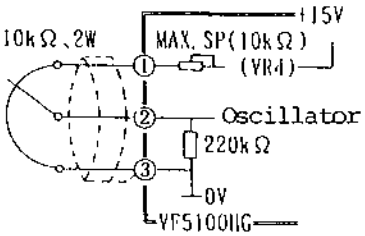
1. Note 1. At the terminal block that outputs 200V from inverter unit to external sequence, do not connect load of over 50mA and 200V power supply source.
2. Although this control power supply source is generally connected to line identically to main circuit AC input (R,S,T terminals), when connecting contactor to inverter input side, please connect this control power supply source to primary side of contactor (as connection is made to secondary side and as this contactor is opened at inverter fault. Fault content memorized in inverter unit and as power supply source is closed once again, fault that was memorized is indicated). Fault must be reset by direct keypad reset or through an external signal at terminals 10 and 11.

6-3. Terminal block of control circuit

Connection is made to printed board "VFC51HG" at the terminal block for control circuit external connection. Function of respective terminal blocks of printed board "VF51HG" is explained hereunder.

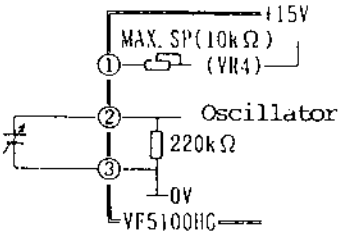
<table>
<tr><th>Printed board VFC51HG Term. No.</th><th>Function</th><th>Content</th></tr>
<tr><td>①②③</td><td>Frequency setting</td><td>
Although frequency setting for VF5100HG can be conducted from console of unit, in the case output frequency is set by variable resistor provided externally or by DC voltage signal, these terminals are used. Connection of these respective terminals are based on the following drawings.

Case of variable resistor



Both ends of variable resistor are connected to ①③ and variable part is connected to ②. Wiring to variable resistor should use shield wire and shield part should be connected to ③(Shield part of variable resistor side should be left intact without treatment.

Case of DC voltage signal



DC0~10V should be connected to ② as + and to ③ as −. At 10V, setting of maximum frequency is obtained. (although output frequency rises proportionally until 10.3V, fix at 3% up of maximum frequency takes place between 10.3V ~ 15V.

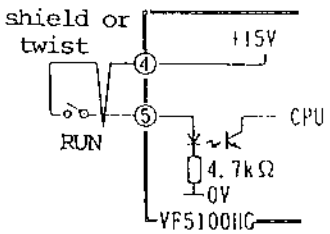
In the case of setting output frequency using these ①②③ terminals, there is the need to set operating selection of console to "REM". Refer to Chapter 7, "Frequency setting function including console."
</td></tr>
<tr><td>⑤④</td><td>RUN/ STOP</td><td>
Although VF5100HG can conduct RUN/STOP from console of unit in the case of conducting RUN/STOP by contacts provided externally these terminals are used.

Running is made available by closure between ④ and ⑤. When using this circuit, pay attention to following points.

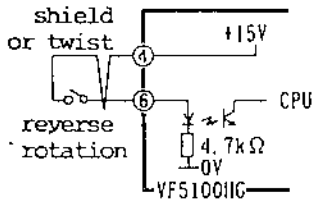
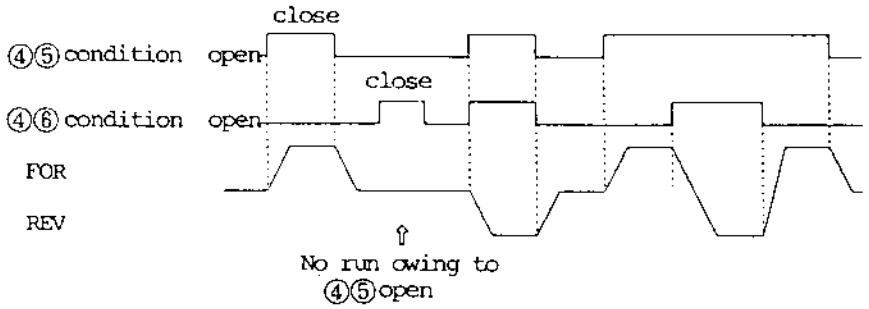
(A) Contact for opening/closing uses minute current contact plated with gold. (Do not use auxiliary contact of electro-magnetic contactor for this circuit.

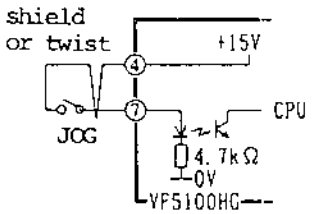
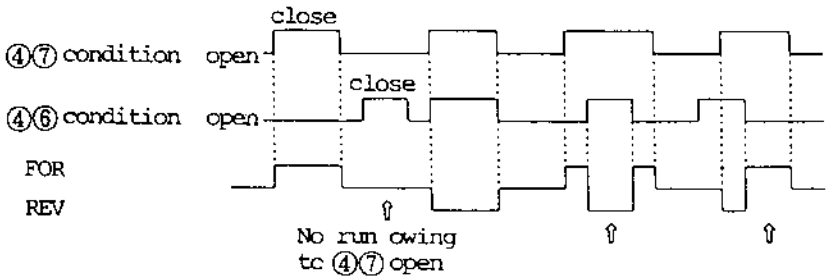
(B) Chattering should be avoided.

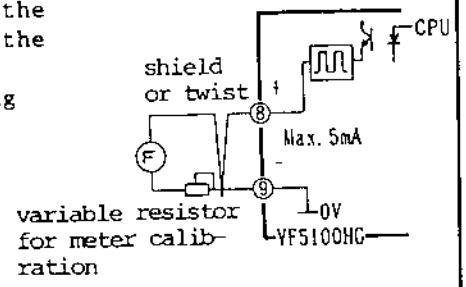
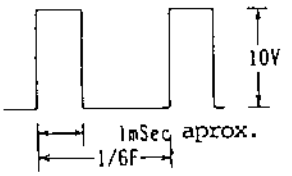
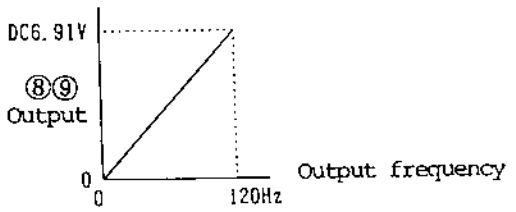
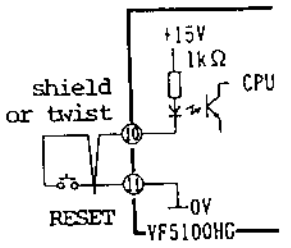
(C) Twist wire should be used for wiring.

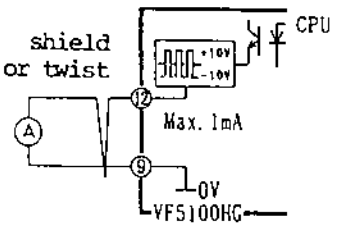
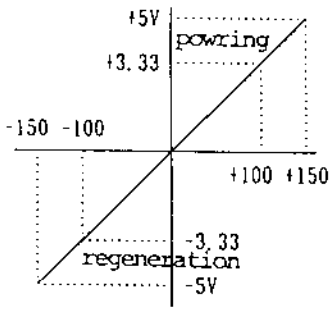


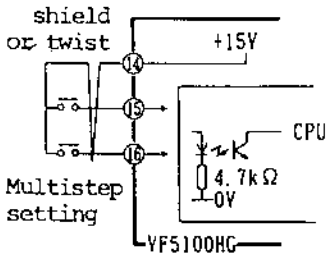
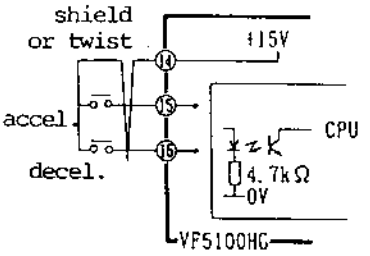
In the case of conducting the operation of RUN/STOP using these terminals, operating selection of console is required to be set to "REM". Refer to Chapter 7, "RUN/STOP function including console."
</td></tr>
</table>

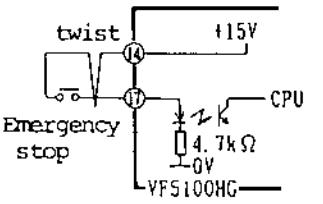
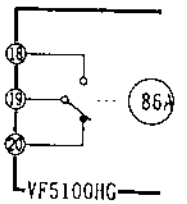
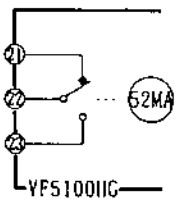
Printed board VFC51HG Term. No.	Function	Content
⑥④	Reverse rotation running	Although VF5100HG can conduct reverse rotation running from console of unit, in the case of conducting the operation of reverse rotation running by these contacts provided externally, these terminals are used. At the "Close" condition between ④ & ⑤ , reverse rotation is obtained by setting "Close" between ④ & ⑥ . The following shows the running condition at the conditions of ④ & ⑤ and ④ & ⑥ . When using this circuit, pay attention likewise to aforementioned RUN/STOP.   In the case of conducting the reverse rotation running from console of unit using these ④ , ⑥ terminals, selecting operation of console is required to be set to "REM". Refer to Chapter 7, "Reverse rotation function including console."

Printed board VFC5iHG Term. No.	Function	Content
⑦④	JOG	Although VF5100HG can conduct jog running from console of unit, in the case of conducting the operation of jog running by the contacts provided externally, these contacts are used. As ④ - ⑦ is closed, during the period of "close", running is conducted by the jog frequency set (setting by Code No.4 of Chapter 18, "Details of function".) Running of forward jog and reverse jog are given command jointly using the reverse running command of ④ , ⑥ . The relationship between ④⑥ and ④⑦ is described below. When using this circuit caution identical to RUN/STOP should be extended.   1 of above drawing: Because of open of ④ - ⑦ , running is not conducted. 2 Entering the running once, condition of ④⑥ is disregarded. (Note) As command of jog running is inputted, output frequency does not conduct soft start like the normal running but outputs the frequency set. Also command of open, output frequency stops immediately. In the case of conducting jog operation using these terminals ④⑦ , operating selection of console is required to be set to "REM". Refer to Chapter 7, "Jog function including console."

Printed board VFC51HG Term. No.	Function	Content
⑧⑨	Frequency meter output	Although VF5100HG can monitor the running frequency by console of unit, these terminals are used in the case frequency indication at outer part is required. At terminals ⑧, ⑨, rectangular wave of 6 fold of output frequency is outputted by the width 1m Sec and voltage 10V as shown in the following drawing. Indication is let to take place connecting counter as well as digital meter and analogue meter. When analogue meter is connected, as shown in the following drawing, the rate of DC6.91V/120Hz is outputted. Therefore rated voltage of DC voltmeter is determined by maximum frequency used indicating by frequency scale (for the purpose of meter calibration, DC voltmeter containing variable resistor for calibration should be connected externally as shown in the above drawing.  ⑧⑨ output waveform  F: output frequency(Hz) ⑧⑨ output characteristic  Function to calibrate meter before running is provided (Refer to Chapter 18, "Code No.42 of details of function").
⑩⑪	Reset	Although VF5100HG can conduct reset of fault by console of unit, these terminals are used in case of resetting fault from the outer part. As ⑩, ⑪ are closed, relay 86(A) which conducts contact output to default circuit. ⑱ ~ ⑳ terminals which are held by inverter interior is released. This circuit is effective when running command of ④, ⑤ and jog running command of ④⑦ are "open". Also for the time of "close command" of this circuit, please input about minimum 0.5 sec. When using this circuit, caution same as "Run/Stop" should be external.  In the case of conducting reset using these ⑩⑪ terminals, operating selection of console is required to be set to "REM". (Refer to Chapter 18, Code No.51 of "Function in details").

Printed board VFC51HG Term. No.	Function	Content
⑫⑨	Ammeter output	Although VF5100HG can conduct monitoring of output current by console of unit, these terminals are used in the case output current indication is required at the outer part. DC voltmeter of rated voltage about DC5V (sensitivity less than 1mA) should be changed and connected to current or % scale (output rate should refer to following drawing). By the function of Code No.42 terminals of this ammeter can select the following different kinds (refer to Chapter 18 "Details of function"). (A) Output of total effective current All output currents of VF5100HG are outputted. ⑫⑨ at this time are such that irrespective to powering and regeneration conditions, output is conducted by 0V by ⑨and + by ⑫ . (B) Output of effective component current Effective component current is outputted as + by ⑫ against ⑨at powering condition of motor and - by ⑫ against ⑨at regeneration condition. (refer to right drawing) Note: When outputting effective component current, be sure to conduct adjustment of Chapter 13 and 14.  ⑫⑨terminals Output characteristics (accuracy ±10% at 100% load)  When there is the need to indicate total effective current precisely, please connect moving iron piece type ammeter to the output terminals to the motor.
⑬	Not used	Do not connect this terminal.

Printed board VFC51HG Term. No.	Function	Content
⑮⑯－⑭	Multistep setting or frequency up/down	By the selection of frequency setting function system of Code No.46 objective of use of ⑮⑯ - ⑭ terminals changes as described below. (refer to Code No.46 of Chapter 18 "Details of function". (A) Code No.46 is "preset" setting As this setting is selected, ⑮ ⑯ performs as multistep setting function. And irrespective to the operation and running place of "DIR" or "REM" (operation for running from console or terminal block), during the running of VF5100HG, the following is made available. * As ⑭⑮ is set "close", frequency set by Code No.19 is outputted. * As ⑭⑯ is set "close", frequency set by Code No.20 is outputted. * As ⑭⑮ and ⑭⑯ are set "close" at the same time, frequency set by Code No. 21 is outputted.  (B) Code No.46 is set as "Interlock system" setting As this setting is selected, ⑮⑯ performs as so-called motor drive setting function. During running of VF5100HG, with "REM" (operation for running by terminal block ④⑤) selected as operating place, following is made available. * As ⑭⑮ is set "close", "speedup command" that increases output frequency is made available.  Note 1. When operating place is "DIR", Δ ∇ keys of console become the commands of speed up and speed down. Note 2. When Code No.46 is selected to "interlock system", frequency setting terminals of ②③ become ineffective (despite inputting frequency setting, acceptance cannot be conducted). When using this circuit as multistep setting or speed up/speed down command, please pay same attention as Run /Stop.

Printed board VFC51HG Term. No.	Function	Content
⑭⑰	Emergency stop	Whichever the selection of operating place may be (either "DIR" or "REM", as ⑭⑰ is set "close", VF5100HG conducts free run stop. Note: When conducting emergency stop using these terminals, running circuit of ④⑤ should be set "open" after emergency stop. As this circuit is set "open" with ④⑤ remaining "open", rerunning is conducted. When using this circuit, pay attention same as "RUN/STOP". 
⑱⑲⑳	Fault point output	As protection to stop amongst protection functions of VF5100HG is conducted, relay 86A of inverter interior activates. (refer to Chapter 16 "Trouble Shooting"). Contact capacity of ⑱ ~ ⑳ is AC220V 0.5A. Note: During activation of relay 86A, as "control power supply source" is cut off, relay 86A becomes OFF. 
㉑㉒㉓	Output of running contacts	During running of VF5100HG, relay 52MA of inverter interior activates. Contact capacity of ㉑ ~ ㉓ is AC220V 0.5A. Note: Relay 52MA conducts ON during performance of inverter. As an example, when stop method of VF5100HG is deceleration stop (as stop command is inputted, speed drops automatically to minimum frequency set and then stops), after inputting stop command, in practise, relay 52MA activates until inverter stops. (refer to Code No.37 of Chapter 18) 

Caution

Since terminal numbers ③⑨⑪ are connected to "0V" of control circuit, these terminals should not be connected to earth.

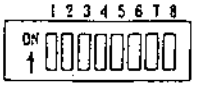
7. Outline of performance of respective keys of console

Objective of use of respective key switches of console fitted to VF5100HG inverter unit is arranged as described below.

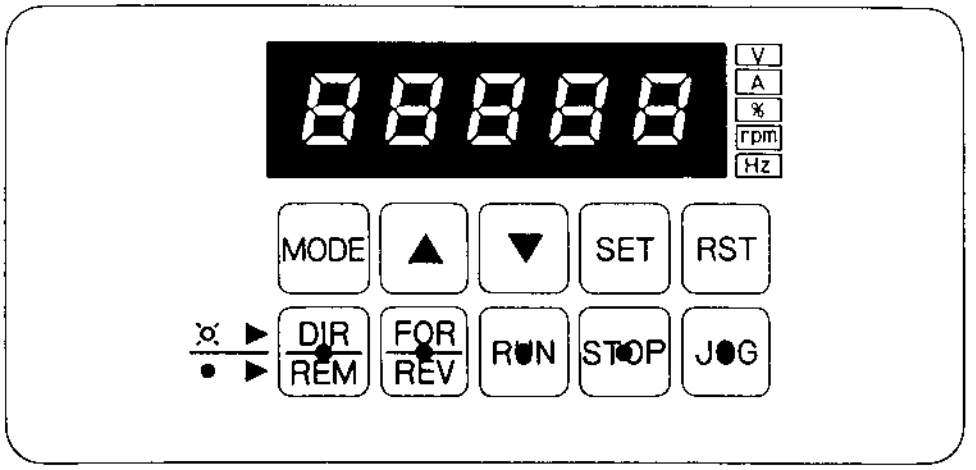
Dip switch ..... Hard switches that conduct write protection so that rewriting of set data cannot be conducted.

(Operate by removing cover)

Indicating part ..... By 7 segments indicator of 5 digits, Code No., Function abbreviated symbol, set data, running data and fault abbreviation are indicated.



Data unit indication ..... Unit of indication part data is indicated.

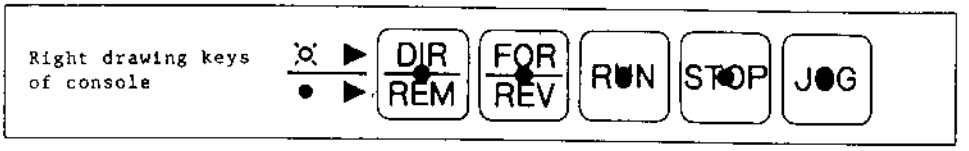


DIR/REM, FOR/REV, STOP, JOG key } ... When selecting place for operation and running and when running by console, operating switches (condition is indicated by L.E.D. diode in key) and keys.

MODE, Δ, ∇, SET keys } ... Keys for selection of respective kinds of function, calling out of present set data, data change and data input.

RST key ..... Reset key for inverter fault and forced return keys to Code No. 0 (frequency setting code).

8. Method of operation and running



By the operation including RUN/STOP of VF5100HG, operating place changes as described as per the selection condition of DIR/REM keys.

DIR/REM key (on such occasion of depressing, DIR/REM is changed over. And as DIR is selected, L.E.D. diode in key is illuminated)

→ DIR Mode ··· Mode that sets operation , running and frequency by command of of console.

(Operation and Running)

FOR/REV : Key for selecting rotating direction (as this key is depressed, FOR/REV is changed over. And when selecting FOR, L.E.D. diode in key illuminates)(Note 1.)

RUN : Running by depressing this key (by running, L.E.D. diode in key illuminates)(Note 2.)

STOP : Stop by depressing this key (by running, L.E.D. diode in key illuminates)(Note 2.)

JOG : Jog running by depressing this key (by running, L.E.D. diode in key illuminates).

RST : Key that resets at the time VF5100HG fault and that returns display to function Code No.0 (output frequency setting)

(Note 1.): By Code No.38 (function for inhibiting reverse running), this key can be made ineffective).

(Note 2.): As deceleration stop is selected by Code No.37 (function for inhibiting running), after STOP key is depressed, while speed drops to minimum frequency resulting in stop, both L.E.D. diodes in RUN AND STOP keys are illuminated.

(Output frequency setting)

Although frequency setting is conducted by MODE Δ ∇ set keys of console, following method can be selected by "frequency setting function of Code No.46.

(1) When selecting preset frequency setting system

Key operation	Indicating part data	Explanation
MODE ↓	OFSET	0 of Code No. flickers and function abbreviation is indicated at right (When other than Code No.0 is indicated, select Code No.0 by Δ ∇ keys.)
SET ↓	0 20	As SET key is depressed, indication of function abbreviation changes to output frequency set currently and flickering is indicated (Hz of unit indicating lamp is illuminated.)
Δ or ∇ ↓	0 60	Running frequency is set by Δ ∇ keys.
SET		As set key is depressed, change to frequency set by Δ ∇ keys takes place (after a few seconds, indicating part changes automatically to monitor mode)

(2) When selecting interlock frequency setting system

Key operation	Indicating part data	Explanation
MODE ↓	OFSET	0 of Code No. flickers and function abbreviation is indicated at right (When other than Code No.0 is indicated, select Code No.0 by Δ ∇ keys.)
SET ↓	0 20	As SET key is depressed, indication of function abbreviated symbol is changed to output frequency set at present. And flickering is indicated (Hz of unit indicating lamp is illuminated).
Δ or ∇	0 60	Interlocking to Δ ∇ keys, output frequency is changed. (When there is no Δ ∇ key operation for 3 minutes, indicating part changes automatically to monitor mode.)

→ REM MODE ··· Operation for running by contact signal from outer part, frequency setting mode by analogue or contact signal.

(Operation for running)

Rating direction : As control printed board's ④⑥ terminals in inverter unit are set "close", reverse rotation (REV) running is available (Note 1.)
(By "open of ④⑥ terminals, forward rotation (FOR) running is commanded.

RUN/STOP : As control printed board's ④⑤ terminals in inverter unit are set "open", running is commanded. And as these terminals are set "open", stop is commanded.

JOG : Jog running is conducted while control printed board's ④⑦ terminals in inverter unit are set "open".

RESET : Fault of VF5100HG is reset as control printed board's ⑩⑪ terminals in inverter unit are set "close".

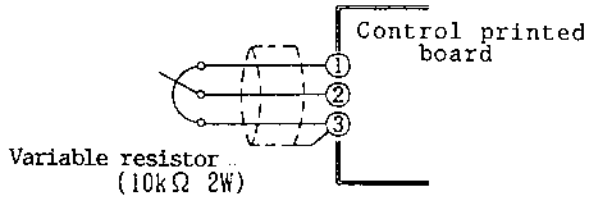
(Note 1.): By Code No.38 "Reverse rotation inhibition function", this function can be made invalid.

(Output frequency setting)

Following methods can be selected by "Frequency setting function" of Code No.45 explained in DIR Mode.

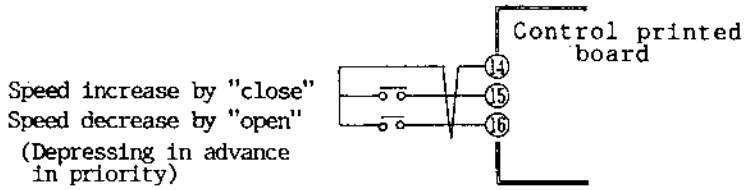
(1) When selecting preset frequency setting system.

DC 0~10V (10V is the running maximum frequency) is supplied as output frequency setting signal to control printed board's ②③ terminals in inverter unit (Polarity of signal is such that "+" is connected to ② terminal and "-" is connected to ③ terminal.)
In the constant voltage circuit of inverter unit, by connecting variable resistor as shown in the following drawing, frequency setting can be controlled as well.



(2) When selecting interlock frequency setting system

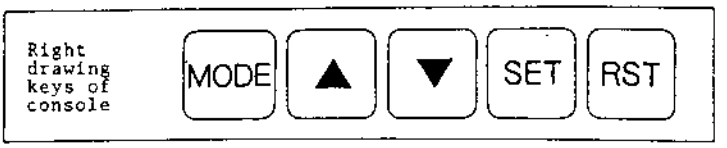
By connecting contact signal from outer part as shown in the following drawing, output frequency can be controlled as rise (speed increase) and drop (speed decrease).



Caution

1. Despite opening control power supply source of VF5100HG, changeover switches of DIR/REM, FOR/REV of console memorize the condition prior to inturruption.
2. As regards the respective operations of RUN/STOP, JOG, Reverse Rotation and Reset, DIR/REM is made invalid and only the console operation (operation from terminal block is made impossible) is made available, otherwise only the operation from terminal block (operation from console is made impossible) is made available ··· Setting is conducted by Code Nos.48~50
3. As control printed board's ⑭⑰ are set "close", VF5100HG conducts emergency stop.
4. Refer to Chapter 5 on the occasion of wiring to terminal block of control printed board.

9. Operating method for function setting



Respective kinds of function of VF5100HG are set by these keys. Although details of function explanation against respective Code Nos. are as per Chapter 18 "Function details", taking Code No. *1* "Setting of Running Maximum Frequency" as the example, the method of changing set data is shown below.

Key operation	Indicating part data	Explanation	Remarks
MODE	*0.FSEt*	AS MODE key is depressed, Code No. of furthest left flickers and function abbreviation is indicated at right.	
△ or ▽	*1t oPF*	Code No. desired to change setting by △, ▽ keys is called out. (1) △ key : Code No. increases (2) ▽ key : Code No. decreases	
SET	*1 60.0* Hz	Next as SET key is depressed, the flickering Code No. becomes illuminated condition, function abbreviation changes to data (value) set currently, flickering is indicated and unit indicating lamp is illuminated. (1) There is a part of function that does not illuminate unit indicating lamp.	As RST key is depressed in this interval, forced return to monitor mode takes place Set data is not changed
△ or ▽	*1 50.0* Hz	By △, ▽ keys, data (value) set newly is made available. (1) △ key : Data (value) increase (2) ▽ key : Data (value) decrease	
SET	*1 50.0* Hz	When change of data (value) is completed, depress SET key. Data (value) that was flickering becomes illuminated condition for a few seconds.	⟹ Here, data is changed
	0.0 Hz	Change to monitor mode set automatically takes place and present data is indicated.	

Caution

1. When there is no key operation for about 3 minutes, change to monitor mode that was set, takes place.
2. Depending on the content of function, there are some that can not change the setting during running. (Details are as per Chapter 18 "Function Details".

10. A list of functions and outline

Function of VF5100HG can be classified in large by Running Data, Running, Operating Sequence and Monitor. Hereunder outline explanation and details of respective Code Nos. are shown. As for the details, refer to Chapter 18.

10-1. Explanation of function relevant to Running Data

Code No.	Function abbreviated symbol	Content of function	Setting range	( ) is setting resolution	Change during running	Setting at shipment
0	FSEt	By touch key of console, command of running frequency	0~127Hz	(0.1Hz)		0Hz
1	toPF	Maximum running frequency	30~127Hz	(0.1Hz)		60Hz
2	botF	Minimum running frequency	between 0~code No.1	(0.1Hz)		0Hz
3	F1in	Limit of frequency setting input voltage	5~15V	(0.1V)		10.3V
4	JoGF	Jog running frequency	0~30Hz	(0.1Hz)		5Hz
5	boSt	Torque boost compensation at low frequency	0~20%	(0.1%)		0%
6	UAdJ	Output voltage adjustment at basic frequency	-30~+30%	(0.1%)		0%
7	Fch1	Synchronous PWM carrier frequency during running	400~1500Hz	(1Hz)		833Hz
8	Fch2	PWM carrier freqnency at starting	225~630Hz	(1Hz)		225Hz
9	CAP	Inverter voltage, capacity	200V 3kVA~480V 900kVA			
10	Acc	Frequency rise rate at rapid change of setting	0.5~100sec.	(0.1sec)		30sec.
11	dEc	Frequency drop rate at rapid change of setting	100~600sec.	(1sec)		30sec.
12	SAS	Rise time of S shape function	0~60sec.	(0.1sec)		0sec.
13	SAE	Setting time of S shape function (acceleration)				0sec.
14	SdS	Drop time of S shape function				0sec.
15	SdE	Setting time of S shape function (deceleration)				0sec.
16	StF	Output frequency when starting inverter	0~10Hz	(0.1Hz)		0.5Hz
17	oFS	Overfrequency protective performance value	35~127Hz	(1Hz)		65Hz
18	PcF	Basic frequency				60Hz
19	FS1	Multistep setting 1st step (It is unable to use when selecting "interlock running" by Code No. 46)	between Code No.1~2	(0.1Hz)		0Hz
20	FS2	" " 2nd step				0Hz
21	FS3	" " 3rd step				0Hz
22	FJ1	Jump frequency 1st step	between Code No. 10	(0.1Hz)		0Hz
23	FJ2	" " 2nd step				0Hz
24	FJ3	" " 3rd step				0Hz
25	FdF	Jump width	0.1~5Hz	(0.1Hz)		1Hz
26	dcb	Voltage(current) value of DC dynamic brake	0~20%	(0.1%)		0%
27	dct	DC dynamic brake performance time	0~5sec.	(0.1sec)		0sec.
28	oLS	Overload protective performance value	20~110%	(1%)		100%
29	CLd	Current limit performance value (at powering)	20~150%	(1%)		150%
30	CLb	Current limit performance value (at regeneration)	20~150%	(1%)		150%
31	drP	Sag value when using sag control	0~30%	(1%)		0%
32	uS	Slip frequency of motor	0~5Hz	(0.01Hz)		0Hz
33	ird	IR drop amount	0~6000	(1)		0

Code No.	Function abbreviated symbol	Content of function	Setting range	( ) is setting resolution	Change during running	Setting at shipment
34.	PF	Inverter rated current conversion motor power factor	30~97%	(0.1%)		75%
35.	---	Not used			—	0
36.	---	Not used			—	0
37. ~ 53.	Explanation of function relevant to operation-running sequence. (refer to next page)					
54. ~ 58.	Not used					
59.	-P	Proportional amount of control system when using ASR option	0~100%	(0.1%)		20%
60.	-I	Integrated amount of control system when using ASR option	0~100%	(0.1%)		20%
61.	---	Not used			—	0
62.	---	Not used			—	0
63.	OAJ	Zero point adjustment of ammeter output terminals	0~500	(1)		0
64.	AGn	Gain adjustment of ammeter output terminals	60~140%	(1)		100
65. ~ 68.	Not used					
69.	trF	Powering side torque limit when using ASR option	0~255	(1)	—	150
70.	trr	Regeneration side torque limit when using ASR option	0~255	(1)	—	150
71. ~ 73.	Not used					
74.	---	For our adjustment	0~7		—	0
75.	---	For our adjustment	320~360		—	340
76.	En1	For our adjustment	0000~FFFF		—	0
77.	En2	For our adjustment	0000~FFFF		—	0
78.	En3	For our adjustment	0000~FFFF		—	0
79.	En4	For our adjustment	0000~FFFF		—	0
80.	non	For our adjustment	0000~FFFF		—	

10-2. Explanation of function relevant to running operation sequence

Code No.	Function abbreviated symbol	Set data and Content of function	Change during running	Setting at shipment
37.	SS1	000 — Starting method: 0 : Start from min. frequency. 1 : Free start (start from motor rotating speed during coasting); Stop method: 0 : Stop after running to min. frequency. (deceleration stop) 1 : Inverter stop by stop command (free stop); DC brake: 0 : Not used. 1 : To use.	Impossible	000
38.	SS2	000 — Reversible run: 0 : Conduct this run. 1 : Do not conduct this run (inhibition of reverse run.); Current limit (powering): 0 : Powering side current limit performance. 1 : Above performance not conducted.; Current limit (regeneration): 0 : Regeneration side current limit performance. 1 : Above performance not conducted.	Impossible	000

Code No.	Function abbreviated Symbol	Set data and Content of function	Change during running	Setting at shipment
39.	SS3	000 V/f characteristic: 0 : Constant torque V/f characteristic. 1 : 2nd power reduction V/f characteristic. PWM modulation: 0 : Asynchronous/synchronous changeover PWM modulation system. 1 : Total area asynchronous PWM modulation system	Impossible	000
40.	SS4	000 Power output restart: 0 : Inhibition of restart. 1 : Automated restart. Restart timing: 0 : Restart after 1 sec. from power restoration. 1 : Restart after 0.1 sec. from power restoration.	Impossible	000
41.	SS5	000 Boost method: 0 : Manual boost. 1 : Automated boost.		000
42.	SS6	000 Ammeter output: 0 : Total effective current is outputted. 1 : Only effective component is outputted (at powering +, at regeneration -.) Frequency meter output: 0 : Running frequency is outputted. 1 : Calibration of external meter.	Impossible	000
43.	SS7	000 RS232C control: 0 : RS232C control not conducted. 1 : RS232C control is conducted. (Option printed board is required)	Impossible	000
44.	SS8	000 Frequency setting: 0 : Stack up system. 1 : Insensitive system.	Impossible	000
45.	SS9	00.0 Not used.	—	000
46.	SSA	000 Frequency setting: 0 : Preset system. 1 : Interlock system. Reverse rotation method by interlock system: 0 : Reverse rotation operation by FOR/REV key or at terminal block. 1 : This is used when conducting system by our company.	Impossible	000
47.	SSb	0 Frequency setting selection: 0 : Frequency setting place is selected by DIR/REM of console. 1 : Frequency is set by RS232C control. 2 : This is used when conducting system of our company.	Impossible	0
48.	SSC	0 Start/Stop selection: 0 : Selection of Start/Stop place by DIR/REM of console. 1 : Start/Stop by terminal block (inhibition of console operation) 2 : Start/Stop by console (inhibition of terminal block operation) 3 : Start/Stop by RS232C control. 4 : This is used when system up is conducted by our company.	Impossible	0
49.	SSd	0 Jog run selection: 0 : Selection of jog run place by DIR/REM of console. 1 : Jog run by terminal block (inhibition of console operation) 2 : Jog run by console (inhibition of terminal block operation) 3 : Jog run by RS232C control. 4 : This is used when conducting system up by our company.	Impossible	0
50.	SSE	0 Reverse rotation operation selection: 0 : Selection of reverse rotation operating place by DIR/REM of console. 1 : Reverse rotation operation by terminal block (inhibition of console operation). 2 : Reverse rotation operation by console (inhibition of terminal block operation) 3 : Reverse rotation running by RS232C control. 4 : This is used when conducting system up by ouor company.	Impossible	0
51.	SSF	0 Reset operation selection: 0 : Selection of reset operation place by DIR/REM of console. 1 : Reset operation by terminal block (inhibition of console operation) 2 : Reset operation by console (inhibition of terminal block operation) 3 : Operation from both terminal block and console.	Impossible	0

Code No.	Function abbreviated symbol	Set data and Content of function	Change during running	Setting at shipment
52	SSO	0 (Control system): 0 : V/f control 1 : Sag control 2 : Slip compensation control. 3 : ASR (automatic speed control) (Option)	Impos-sible	0
53	SSH	0 (Selection of operation): 0 : Interlock to DIR/REM of console. 1 : Enblock (Code Nos.48~53) RS232C control. 2 : This is used when conducting system up by our company.	Impos-sible	0
54	---	Not used.	—	0
55	---	Not used.	—	0
56	---	Not used.	—	0
57	---	Not used.	—	0
58	---	Not used.	—	0

10-3. Explanation of monitor function

Code No.	Function abbreviated symbol	Content of monitor
81	Fo	Running frequency is indicated by "Hz".
82	Io	Total effective current is indicated by "A".
83	Uo	Output voltage is indicated by "V".
84	Ir	Effective component (power component) of output current is indicated as "+" for powering side and as "-" for regeneration side.
85	Udc	Intermediate DC voltage of inverter is indicated by "V".
86	rPn	Motor speed is indicated by "rpm" when using ASR option.

Refer to Chapter 18 for explanation in detail of respective Code Nos.

Appendix A contains a complete program data list for recording all set points made in field.

11. Closing of power supply source

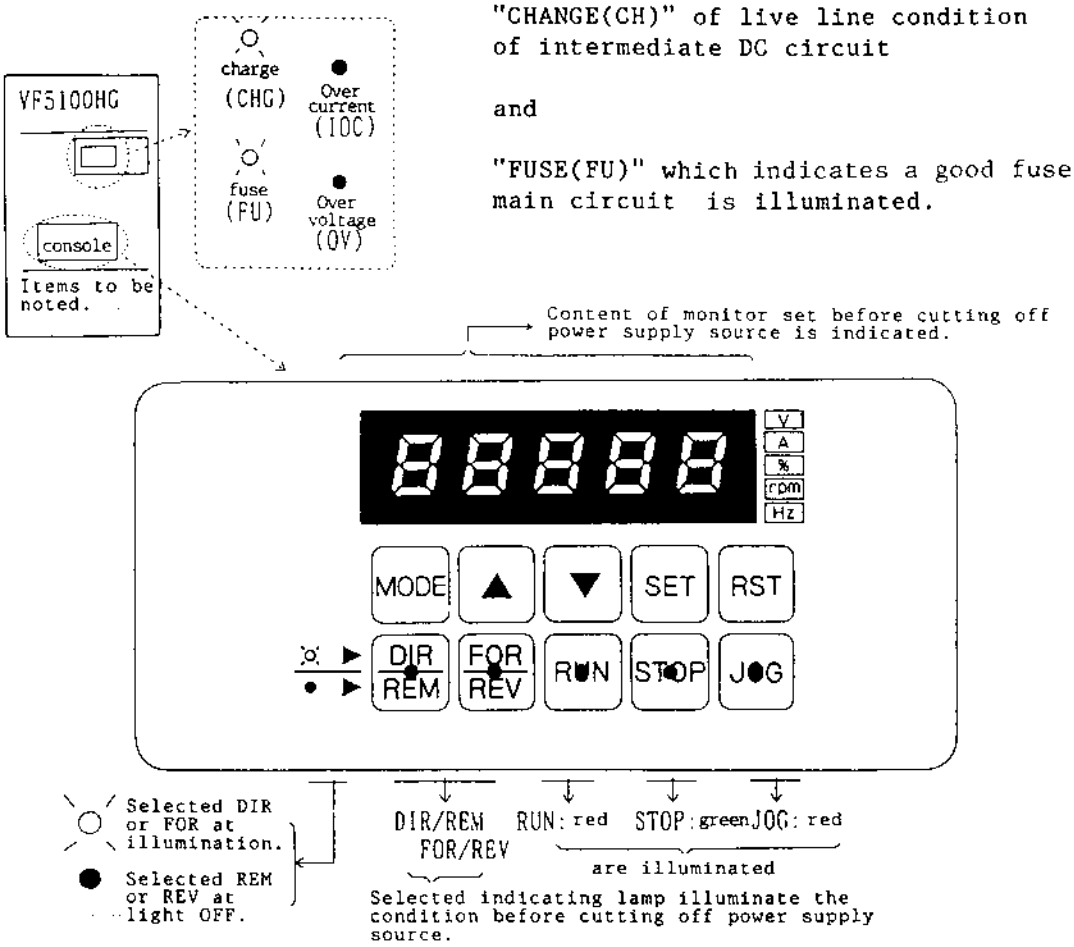
As main circuit and control power supply source is closed to VF5100HG the following indicating lamps are illuminated.

Referring to left drawing,

"CHANGE(CH)" of live line condition of intermediate DC circuit

and

"FUSE(FU)" which indicates a good fuse in the main circuit is illuminated.



Caution

For the period of about 10 years without application of electricity, the set condition before turning off power supply source (selected condition of DIR/REM and set condition of respective kinds of function) are held by battery in the inverter unit.

12. Confirmation of setting of function

Closing main circuit and control power supply source to VF5100HG, change or confirm the setting of data as per Chapter 7 ~ 10.

* Caution *
* On the occasion of confirming setting of function, to ensure safety, *
* please confirm after disconnecting the motor. *

13. Adjustment of motor no-load running

After confirming the setting of function of Chapter 12, conduct no-load running of motor. Then conduct the confirmation and adjustment as follows

Caution

On the occasion of connecting wiring to motor, turnoff main circuit and control power supply source . And after confirming that "(CHG)" indicating lamp of inverter unit is off, Start the operation.

* Item of confirmation

Result of confirming the setting of function of Chapter 12 should be rechecked by conducting no-load running of motor.

* Items of adjustment

Please set the following adjustments in order to realize the full performance of VF5100HG. (This adjustment is conducted to raise the efficiency of torque versus current of motor. And if the adjustment is poor, there may be a case that motor output torque can not be obtained in proportion to the amount of current.)

- Methods of adjustment -

(1) Code No.41 "Torque compensating method" should be set to Manual Boost (data 000). (This setting is possible to change only when VF5100HG is stopped. Also when setting Auto Boost, after completing the load adjustment of Chapter 14, please stop VF5100HG and change the set data of Code No.41 to 001 of Auto Boost.)

(2) On the stop condition of VF5100HG, data of Code No.5 "Torque Compensation" (function symbol boSt) should be set to 3%. (In the case boost amount of motor used is known, please set its value).

(3) Run the motor at no-load and conduct the adjustment described below.

Running at rated frequency ←

↓

Register the data of Code No.84 "Effective component current monitor" (function symbol Ir).
(this data is set as Ir1)

↓

Running at 1/10 of rated frequency

↓

Register the data of Code No.84 "Effective component current monitor" (function sysmbol Ir).
(this data is set as Ir2)

↓

Compare data of Ir1 and Ir1.

↓ ↓

Same Different

↓ ↓

Completion Running -Change value of Code No.33 (Ir drop amount) set up or down.

Caution

1. Since this adjustment is conducted including the wiring to motor, please perform the operation in the final installed condition.
2. Although set data "Ir drop amount" of Code No.33 differs by characteristic of motor, this set data is about 600.
3. By the explanation of Code No. 33 of Chapter 18 "Details of function", the corrected value of "IR drop" should be loaded in advance.

14. Adjustment of motor load running

After completing the adjustment of no-load running of motor of Chapter 13, the load running of motor and conduct the following adjustment.

Caution

For this adjustment of motor load running, conditions described below are required.

(1) Rotating speed of motor should be over 80% of rating (Note 1.)

(2) Load torque should be over 50% of motor rated torque.

The setting of Code No.34 "Power factor correction" (function symbol PF) when these conditions are unable to be satisfied should be taken from rated power factor table of motor of Chapter 22, "Table-1."

- Methods of adjustment -

(1) Connect the motor and load. And commence running at over 80% of rating of motor rotating speed and at load torque of over 50% of motor rated torque.

(2) Register the data of Code No.84 "Effective component current monitor" (function symbol Ir), data of Code No.82 "Total effective current monitor" (function symbol Io) and data Code No.34 "Power factor correction" (function symbol PF).
(Data of above Code No.84 is set as Ir, data of above Code No.82 is set as Io and that of above Code No.34 is set as PFr.)

(3) Power factor correction value PFi is calculated from following equation based on above data.

$$PFi = \frac{10}{\text{for motor rated current}} \times \frac{Ir}{PFr} \times 100\ (\%)$$

(4) Input the calculated result of PFi to Code No.34 "Power factor correction" (function symbol PF).

Note 1. As regards motor rotating speed when using at rated output characteristic (constant output voltage over a certain frequency), please perform running at base frequency of the motor.

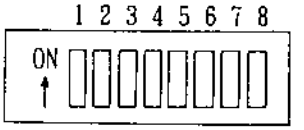
Adjustment is complete.

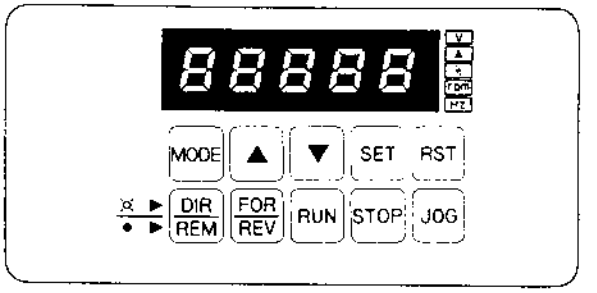
15. Write protection

When all adjustments are completed, to prevent change of data due to erroneous operation, write protection (inhibition of writing data such as set value) is suggested.

- Method of write protection -

Remove cover of VF5100HG. And the method of protection at ON/OFF condition of dip switch (SW1) No.1 & No.2 of upper left of console is as described in the following table.





Note 1. Dip switches No.1 & No.2 are possible for ON/OFF during running (Protection release by OFF, protection by ON.)

Note 2. At ON both for No.1 & No.2 takes the priority.

Note 3. At standard shipment, both No.1 & No.2 are set OFF.

Item	Content of protection	
	No.1 is set "ON"	No.2 is set "ON"
Frequency setting at Code No.0 Console is →	possible	not possible
Various settings of Code No.1 ~ 73, running performance, sequence etc. are →	not possible	not possible
Changeover of monitor Code Nos.81 ~ 85 voltage and current are →	possible	not possible
Selection of operating place by DIR/REM key is →	possible	not possible
Operation and running of RUN/STOP, FOR/REV, JOG at DIR mode are →	possible	not possible
Set operation by RST key is →	possible	not possible
Code Nos.74 ~ 80 are →	not possible	not possible

- Switches other than No.1 and No.2 -

No.3 ... for RS232C option (refer to Chapter 19)

No.4 ~ No.6 .... Normally "OFF" not used

No.7 ... Initializing switch (Normally "OFF")
When setting "ON", set data of respective functions become default value (value at our standard shipment)
Note: Code No.9 "Inverter capacity" (function symbol CAP) is set to 200V 3kVA irrespective to type used.
Setting as ON and as data is initialized, "all data ...." follows. And when depressing SET key after flickering of SUrE, End is indicated. When End indication appears, set back to "OFF" and input set data of respective functions including Code No.9 "Inverter capacity".

No.8 ... Forced reset switch (normally OFF) → Strictly do not set to ON.
When setting to ON, set data of respective functions is cleared in entirety.

Caution

1. Do not set No.7 "ON" during running of VF5100HG.
(When setting "ON" during running, inverter stops)
2. No. 8 is inhibited for "ON".

16. Troubleshooting

16-1 Fault diagnosis as indicated on console.

As faults arise in VF5100HG, its diagnosis is symbolized and indicated on LED display of console. Following table shows the root cause of abnormality and remedy that should be taken.

Caution: When troubleshooting, commence the operation after becoming familiar with the items noted of Chapter 17.

Console indication	Cause of trouble	Fault relay (86A) in inverter unit	Root cause and remedial measures that should be taken.
oc or oc 1	Overcurrent OC of inverter unit is detected.	Closed	(1) Short-circuited, grounding of output side; check for short circuit and grounding & output wiring and motor. (2) Locked motor; check motor and load. (3) Rapid acceleration; lengthen acceleration time (resetting Code No. IO) or increase capacity of inverter. (4) Direct closing start (Note 3); change of sequence or inverter capacity raise.
OU	Overvoltage *OV of D.C. circuit inverter unit is detected.	Closed	(1) Rapid deceleration; lengthen decelerating time (resetting of Code No. 11) or connect dynamic brake option. (2) No function of dynamic brake option; investigation, or replacement. (3) Capacity shortage of dynamic brake option; capacity raise (when requiring brake of over 150% torque, inverter capacity raise also) (4) Motor is rotated from load or machine; if short time, connect dynamic brake option. If continuous, change to regeneration converter system. (5) Grounding of output side; check short circuit of output wiring and motor.
OH.	Heat sink over heat *OH of inverter unit is detected.	Closed	Note: This protection is only for forced air cooling system (over 10kVA for 200V, 400V, and 480V series) (1) Cooling fan trouble; replacement (2) Ambient temperature is high; improve the exhaust of control panel containing VF5100HG. (3) Lack of cooling capacity; shortage of cooling due to high ambient conditions, add cooling device.
OF	Over frequency. OF of inverter unit is detected.	Closed	(1) Over frequency is too low. Over frequency setting (Code No. 17) is low against maximum frequency (Code No. 1) (2) Abnormal frequency setting + Investigation of frequency setting signal.

Console indication	Cause of trouble	Fault relay (86A) in inverter unit	Root cause and remedial measures that should be taken.
LU1 or alternating illumination of LU1 and StrF (Note 2)	Under voltage (control power supply source)	No action. Whereas, when continuing for 10 sec., action by sluggishness of starting. (Note 2)	Note: This protection goes in action as control power supply source of VF5100HG senses shortage. Also as this protection goes in action continuing for 10 seconds,once sluggishness of starting is activated, StrF and LU1 at console illuminated alternately shifting to stop of VF5100HG. Root cause presumed. (1) Removal of control power source - Check control power supply source's input terminals of VF5100HG.(MR-MT) (2) Control power supply transformer in VF5100HG is defective - repair or replacement.
LU2 or alternating illumination of LU2 and StrF (Note 2)	Under voltage (intermediate DC voltage)	No action. Whereas, when continuing for 10 sec., action by sluggishness of starting. (Note 2)	Note: This protection goes in action as DC power supply source of VF5100HG results in shortage. Also as this protection conducts action continuing for 10 seconds, sluggishness of starting is activated, StrF and LU2 at console illuminated alternately shifting to stop of VF5100HG. Root cause presumed. (1) Abnormality drop of main circuit voltage - Check main circuit input voltage. (2) Blowing of intermediate DC Fuse - Light "FU" of inverter unit's indicating window is turned off (illumination when normal) - replace fuse.
LU3 or alternating illumination of LU3 and StrF (Note 2)	Abnormality of base drive power supply source.	No action. Whereas, when continuing for 10 sec., action by sluggishness of starting. (Note 2)	Note: This protection goes in action as base drive power supply source of VF5100HG becomes abnormal. Also as this protection conducts action continuing for 10 seconds, sluggishness of starting is activated, StrF and LU3 at console illuminate alternately shifting to stop of VF5100HG. Root cause presumed: (1) Base drive circuit is defective - replace printed board (BACHG-_ _).
CSI or CS2	ROM, RAM Abnormality of check sum	Closed	(1) Microprocessor circuit is defective - replace printed board (VFC51HG).
S IF	Serial communication is abnormal.	Closed	Microprocessor circuit is defective - replace printed board (VFC51HG) Malfunction of serial communication- check connections to computer and RS51 board.
Lb	Battery is abnormal	No action	Note: This protection goes into action when battery (fitted on printed board VFC51HG) for holding a variety of volitale data becomes abnormal (replacement after 10 years is required in conditions of normal environment and use)

(Note 1)At output short-circuit fault, when impedance from VF5100HG output to short-circuit point is less than 10 mH for 200V series and less than 50 mH for 400/480V series, there may be damage to main circuit parts.
(Note 2)When RUN/STOP take place at console, StrF does not illuminate alternately. Also fault relay (86A) does not activate (Only when selecting RUN/STOP mode at terminal block 4 5, illumination is conducted alternately. And after 10 seconds, fault relay (86A) is activated and stop is conducted.)

Console indication	Cause of trouble	Fault relay (86A) in inverter unit	Root cause and remedial measures that should be taken.
OL	Overload	Closed	(1) Load is too large - Check load or increase capacity of inverter and motor. (2) Setting is incorrect - Change overload action setting of Code No. 28
StFF and alternating illumination of LU1 LU2 or LU3 Refer to Note 2 hereunder	Sluggishness of starting	Closed	Note: This protection activates when running mode is not started after 10 seconds from the time starting signal is supplied to VF5100HG. Also at the time of activation of this protection, "RUN" of indicating LED on inverter unit does not illluminate and relay for running contacts (terminal block 21~23) does not activate. (1) Burning of intermediate DC fuce - "FU" of inverter unit's indicating window is turned off - replace fuse or check inverter since damage of transistor can be considered. (2) Damage of resistor for current suppression when closing power supply source - "CHG" of inverter unit's indicating window does not illluminate despite, main circuit power supply source - replace resistor for suppressing current - since frequency of "ON" & "OFF" of VF5100HG main circuit's power supply source may be excessive, please check frequency (within 1 time every 20 minutes).

Note 3: Direct line start: Method of starting motor or multiple of motors by connecting contactors to output side of inverter. When starting by output contactor is required when inverter is on, select capacity of VF5100 so that maximum peak current while direct line closing is within 150% of inverters rated current.

16-2. Trouble Shooting of abnormality seen from the phase of phenomena.

Abnormality seen from the phase of phenomena are shown in the following table. Please serve as an aid for trouble shooting of abnormality.

Abnormal phenomena	Condition of VF5100HG	Root cause that can be considered and measures to be taken.
Running is not conducted despite inputting starting signal.	*"CHG, FU" of inverter unit's indicating window are illuminated. *Fault of starting sluggishness is not indicated. *"RUN" of inverter unit's indicating window is not indicated.	(1) Function setting is incorrect Recheck Code No.48 (2) Protection is defective → Recheck protection method against setting of Code No.48 (3) Printed board VFC51HG is defective → replace it.
"IOC"is conducted simultaneously with starting.	*"IOC" of inverter unit's indicating window is illuminated and ,oc is indicated on display.	(1) Torque boost over compensation → readjustment of Code No.5.(lower) (2) Starting frequency is high → readjustment of Code No.15 (lower) (3) Connect phase advancing capacitor → remove phase advancing capacitor of motor. (4) Reverse rotation of motor → Stopping by mechanical brake, change to sequence that starts VF5100HG. (5) Drive of over motor capacity for standard application of VF5100HG → Capacity up of VF5100HG.
A lot of current in motor	*"CHG , FU, RUN" of inverter unit's indicating window are illuminated. *Current of Code No.82 is larger than motor no-load current. *"IOC" of inverter unit's indicating window is illuminated and ,oc may indicate on display.	Supplemental explanation of phenomena: When running it the condition without fitting coupling to motor output shaft, the phenomenon that the motor current flows a few times of no-load rated current (Such phenomenon becomes noticeable at 20～30Hz) and such phenomenon is generally called as unstable phenomenon. (1) Connect load → Since above phenomenon occurs frequently in motor unit with small inertia of system, check by connecting load. (2) Change carrier frequency → check by changing carrier frequency with respect to Code Nos. 39、7 and 8 (3) Change V/f and boost → Lower V/f by Code Nos. 1, 18 and 5 and reduce boost value by Code No.5
Frequency does not rise after starting	*"CHG , FU, RUN" of unit's indicating window are illuminated, *Starting frequency is indicated by Code No. 81	(1) Frequency setting is incorrect→ Recheck Code No. 47 (2) Protect is defective → Recheck protect method against setting of Code No. 47 (3) Printed board VFC51HG is defective → Replace it.

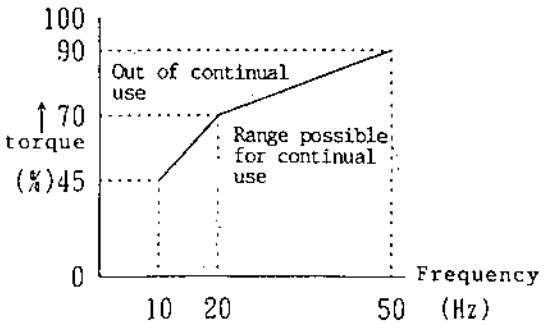
Abnormal phenomena	Condition of VF5100HG	Root cause that can be considered and measures to be taken.
Frequency rises but motor does not rotate	*"CHG, FU, RUN" of inverter unit's indicating window are illuminated. *Code No.8 indicates running frequency.	(1) Setting of motor constants are → Recheck motor no-load and load adjustment of Chapter 14 and 15. (2) Shortage of torque boost → Readjust Code No. 5 (raise it). (3) As torque boost is raised until motor rotates, stop takes place by oC or oL → Recheck since shortage of VF5100HG capacity can be considered.
Speed does not increase by accelerating time set.	*"CHG, FU, RUN" of inverter unit's indicating window are illuminated. *Running frequency is indicated by Code No. 8 1. *After a certain time, stop takes place by oL.	(1) Setting of motor constants is → Recheck motor no-load and load adjustment of Chapters 14 and 15. (2) Setting of overload protection is defective → Readjust Code No. 28 (raise it). (3) Setting of current limit is defective → Readjust Code No. 29 (raise it). (4) Shortage of torque boost → Readjust Code No. 5 (raise it). As torque boost is raised until follow takes place, stop is conducted by oC or oL → Recheck since shortage of VF5100HG capacity can be considered. (5) Accelerating time is short → Readjust Code No. 10 (lengthen it). (6) Shortage of VF5100HG capacity → For the application that accelerating time can not be lengthened, raise capacity of VF5100HG.
As acceleration is completed, stop is conducted by over voltage.	*"OV" of inverter unit's indicating window is illuminated oU indication appears on display.	(1) Change the method of completing acceleration → Input setting time of S letter function of Code No. 13 and provide roundness to completion of acceleration. (2) Accelerating time is short → Readjust Code No. 10 (lengthen it).
Motor rotation is not smooth	*"CHG, FU, RUN" of inverter unit's indicating window are illuminated.	(1) Phase failure → check motor current (3 phase) Balance for all 3 phases → Abnormality due to motor or load. Unbalance for all 3 phase → Transistor defect of printed board BACHG-□□ (2) Turn volume for adjusting VR2 stabilization (STB)
Load vibrates by a specific rotational speed.	*IOC" of inverter unit's indicating window is illuminated, (is indicated on display and stop may takes place.)	(1) Mechanical resonance → Avoid running at vibrational frequency by jump function of Code Nos. 22~25. (2) Vibration by carrier frequency → Determine optimum carrier frequency by Code Nos. 39、7、8.

Abnormal phenomena	Condition of VF5100HG	Root cause that can be considered and measures to be taken.
Motor is overheated.	*"CHG, FU, RUN" of inverter's unit indicating window are illuminated.	(1) Overload (motor current is over rated current) → Reduce load of capacity up of VF5100HG and motor. (2) Long time running at low speed → Reduce running time. Running time can not be reduced → Change to inverter motor (our "UF motor") possible of continuous running at low speed (when using standard motor, determine applicable capacity of motor from output reduction characteristics (refer to "Reference" described hereunder) and raise the capacity of VF5100HG to that for nameplate rating of standard motor applied.)
Speed does not decrease by decelerating time set.	*"CHG, FU, RUN" of inverter unit's indicating window are illuminated. *Code No. 8 1 indicates running frequency. *After a certain time, stop takes palce by oL	(1) Deceleraitng time is short → Readjust Code No. 11 (lengthen it). (2) Setting of current limit is defective → Readjust Code No. 30 (raise it). (3) Disable regenerative current limit, readjust code 38 to 100.
Stop is conducted by over voltage at the time of deceleration.	*"OV" of inverter unit's indicating window is illuminated and oU indication appears on display.	(1) Change method of starting deceleration input the lowering time of S letter function of Code No. 14 and provide roundness to starting of deceleration. (2) Decelerating time is short → Readjust Code No. 11 (lengthen it). (3) Over regeneration → Connect dynamic brake option (DB).
Stop is not conducted despite inputting stop signal.	Light of "RUN" of inverter unit's indicating window does not become OFF.	Note: Make stop by short-circuiting terminal block ⑭ - ⑰ (emergency stop). (1) Function setting is defective → Recheck Code No. 48 (2) Protect is defective → Recheck protect method against setting of Code No. 48 (3) Printed board VFC51HG is defective → Replace it.
Jog running can not be conducted.	LED diode of console JOG key does not illuminate.	(1) Function setting is incorrect → Recheck Code No. 49 (2) Protect is defective → Recheck protect method against setting of Code No. 49 (3) Printed board VFC51HG is defective → Replace it.

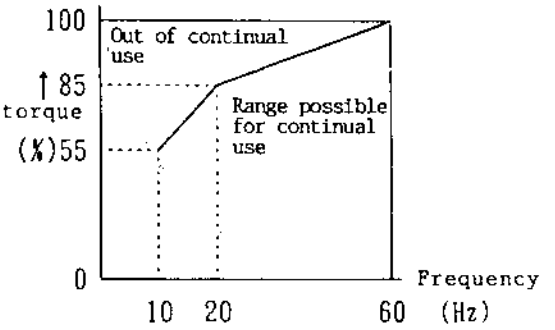
Abnormal phenomena	Condition of VF5100HG	Root cause that can be considered and measures to be taken.
As JOG running is conducted, trip takes place by over current.	*"IOC" of inverter unit's indicating window is illuminated and ,o c is indicated on display.	(1) JOG frequency setting is incorrect→ Recheck Code No. 4 (lower it). Lowering can not be conducted → Use multistep setting function of Code No. 19 (Starting characteristic of motor becomes poor)
Operation for reverse rotation can not be conducted.		(1) Function setting is incorrect→ Recheck Code Nos. 38, 50 (2) Protect is defective → Recheck protect method against setting of Code No. 50 (3) Printed board VFC51HG is defective → Replace it.
Reset of trouble can not be conducted.		(1) Function setting is incorrect→ Recheck Code No. 51 (2) Protect is defective → Recheck protect method against setting of Code No. 51 (3) Printed board VFC51HG is defective → Replace it.

Reference: Capacity reduction of standard motor.

When running standard motor by VF5100HG, temperature rise becomes higher than that when running by commercial use power source. Also since cooling of motor along with speed drop becomes poor, when running standard motor continuously by VF5100HG, please reduce motor output.
Example of output reduction of standard motor is shown in the following drawings.



When basic speed is set as 50Hz



When basic speed is set as 60Hz

Example: When running continuous standard motor of basic speed 50Hz, 11kW by 20Hz, this motor is used reducing its capacity to 11kW x 0.7 = 7.7kW. On the other hand, if 11kW capacity at 20Hz is required, capacity becomes 11kW ÷ 0.7 = 15.7kW resulting in the use of 15kW standard motor. Also the applicable capacity of VF5100HG at this time requires to provide the capacity that can drive a 15 KW motor.

17. Maintenance and Inspection

Caution

Pay attention to the following items on the occasion of performing maintenance and inspection of VF5100HG Inverter Equipment.

1. VF5100HG Inverter Equipment has a large capacity electrolytic condenser into its intermediate DC circuit. Therefore despite shutting off AC input power supply source, DC power supply source is charged for a while due to electrolytic condenser. It is very dangerous to inspect interior of inverter equipment and wiring in such condition. When performing maintenance and inspection, be sure to confirm that charge indicating lamp (CHG) is shut off. Otherwise, using meter please check voltage of terminal block P - N or P2 - N (P and P2 are +). (Please pay attention because voltage of main circuit is imposed on a part of printed circuit board.
2. Heat sink in inverter unit after continual running may become hot. When replacing diode, transistor and inverter, please pay attention to temperature of heat sink.
3. When main circuit AC input R, S and T are at energized condition even when inverter is stopped, DC potential is imposed on output terminals U, V, W. Therefore please pay attention. Since DC potential is imposed on motor terminals in the system without a disconnect between inverter and motor by means of a 3 pole contactor.

17-1. Composition of VF5100HG

VF5100HG series inverter equipment is constituted as described below.

1) Power Circuit

In the circuit of so-called power handling, the main parts are:

(1) Forward conversion rectifier by diode which converts AC input to DC.

(2) Circuit constituting of DC reactor (DCL) to offer a more ideal DC power supply source and electrolytic capacitor This circuit suppresses charge current to electrolytic capacitor at the time of closing power supply source.

(3) Inverting circuit constituted of transistor that obtains variable voltage and variable frequency power supply source by PWM (Pulse Width Modulation) control and surge absorbing circuit (printed board "SNB" or "SNBP").

(4) Besides, input fuses of reverse conversion circuit and current detecting circuit.

Above are arranged at the chassis (bottom side of mounting plate of printed board described below) of inverter unit. Rating of this output parts differs by AC input voltage and output capacity of inverter.

2) Rating of printed board "BACHG - □ □ □" which is the type of this printed board is as described below.

□□□

Indication of AC input voltage division:
2 : 200V series.
4 : 400V series.
5 : 480V series.

Indication of output capacity
Unit is kVA

This printed board has the following circuits incorporated.

(1) Circuit that drives transistor after amplyfing control signal from the main control printed boards described below.

(2) Protective detection and indication of output overcurrent and intermediate DC over voltage.

3) Printed board "VFC51HG".

This printed board is incorporated with the circuit that is constituted of sequence of RUN/STOP and a computer that conducts master control of VF5100HG such as PWM control. This printed board is fitted with terminals for operating input signal from outer part and terminals for output signal to other itemssuch as running condition and output frequency. This printed board can be used commonly in all VF5100 irrespective of input voltage and output capacity of inverter.

4) Printed board "DSP51HG".

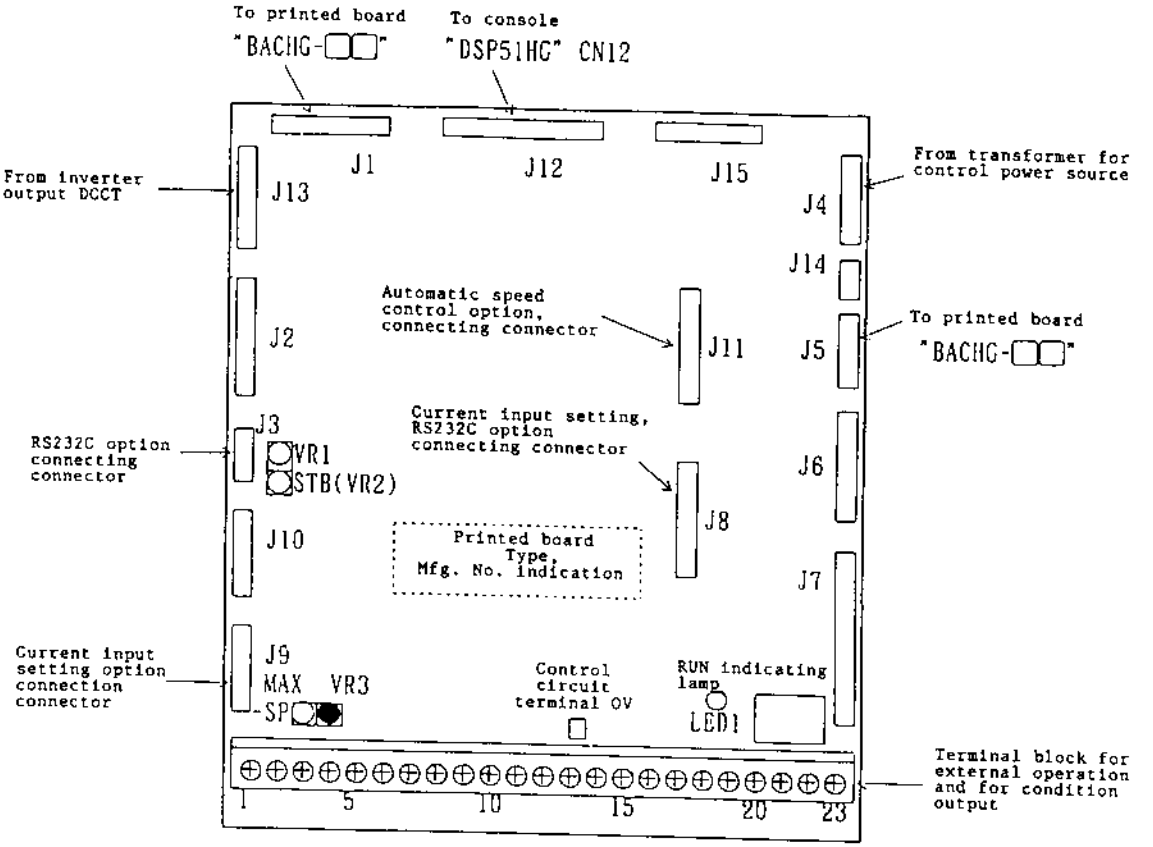
This printed board is incorporated with 7 segment, indicator of 5 digits, operating keys unit indicating lamp and write protection switch.
Setting of a variety of function, monitor of running condition and fault indication are performed by this circuit.
Similar to "VFC51HG", this printed board "DSP51HG" can be used commonly in VF5100 irrespective to input voltage and output capacity of inverter.

Caution

1. When replacing printed board "VFC51HG" with replacement please confirm the settings of a variety of functions.

17-2. Connector of printed board "VFC51HG".

Printed board "VFC51HG" is incorporated as standard connector for option or for system up by our company. The following drawing shows the connection of connector per standard specification and layout of devices for adjustment.



STB(VR2) : Volume for adjusting stabilization (refer to Chapter 16 (2))

MAX-SP(VR3): Volume for adjusting maximum speed (refer to explanation of terminal block, 1 2 3 of Chapter 6)

Caution

1. VR1 and 3 should not be adjusted.
2. Observe static handling proceedures.
3. Battery for holding data is incorporated in printed board "VF51HG". When this board is removed from inverter unit, do not place it on conductor such as steel sheet.

17-3. Periodic inspection

To maintain operate at best condition of equipment and to fully utilize its performance, inspection should be conducted at least once per half year and please examine to the very location by normal running monitoring with following set as the reference.

(1) Cleaning and upkeep

Remove dust in inverter unit.

(2) Visual inspection

Please conduct visual inspection as to whether abnormality of color change or deformation is present in insulation covering of wiring.

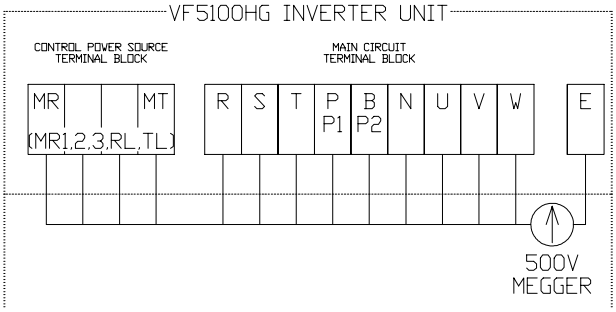
Also check whether there are loose fastners & loose connectors and terminals of control printed board.

(3) Increased tightening

Screws fitted to connecting part and equipment may becomes loose by use over a long period of time, since this condition may become the cause of overheat and the cause of cooling inpairment and as the cause also of unstable performance, please perform the operation of tightening periodically.

17-4 Measurement of insulation resistance.

Remove all input-output wires for the measurement of insulation resistance of VF5100HG inverter unit and measure the insulation resistance with a megger meter connected as follows:



Caution:
Terminals other than above-mentioned (terminals of No. 1~ No. 23 of printed board "VFC51HG") should not have insulation resistance test performed. Note insulation test voltage not to exceed 500V.

17.5 Withstand voltage test

Although withstand voltage test is not recommended, when this test must be performed, please conduct this test as described below.

Caution:
There may be the case to damage parts under test for withstand voltage in the connecting method is mistaken. Only apply high potential voltage after following the steps outlined below.

1) Remove cover and remove all wire connections to control circuit, control power supply source and power terminal block. Inverter should be completely removed from power circuit.

2) Remove all connectors to main printed board "VFC51HG- _ _ _" and base drive PCB "BACHG- _ _ _"

3) As a precaution, remove printed board from inverter unit as a complete assembly by loosening 4 phillips head screws and raising the PC board support up and out of the inverter chassis. See drawing 17-5b.

4) Remove all Faston terminals (refer to drawing 17-5a) connected to transistor module. (Printed board fitted to transistor module should be left in place fitted.)

5) Short circuit all terminals (C1,C2,C2E1,B1X,B2X,B1,E1,B2,E2) of each transistor module and connect to common potential source. (For each type of transistor module that uses plural transistors, all terminals of transistor module should be connected commonly.)

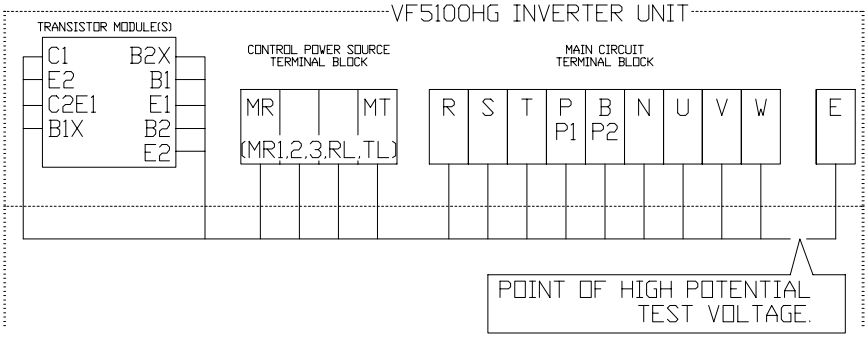
6) Connect all terminals (control power source terminals, AC input/output terminals and intermediate DC terminals) all transistor terminals, together and terminate at the point where high potential is to be applied.

7) High potential test is to be applied at common connection point and E terminals (inverter unit case)
Suggested high potential voltage is:

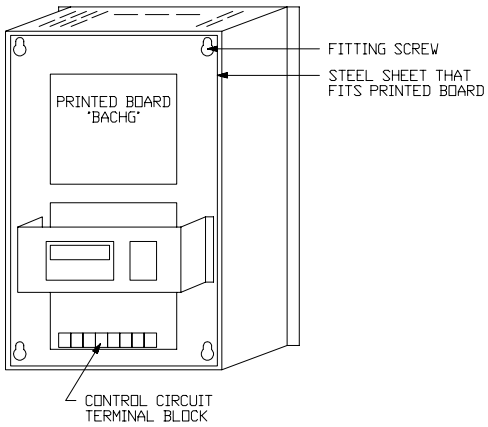
(2E + 1000) volt
E= AC input voltage for duration of 1 minute.

8) As withstand voltage test is completed, remove all short-circuit wires and restore inverter to original condition.

Method of high potential test:



By loosening screws of 4 points (or 2 points) of following drawing, steel plate that fits printed board ("VF51HG", "BACHG- _") and console can be readily removed as this plate is shifted upward.



Drawing 17-5b

= Faston terminal of transistor module =

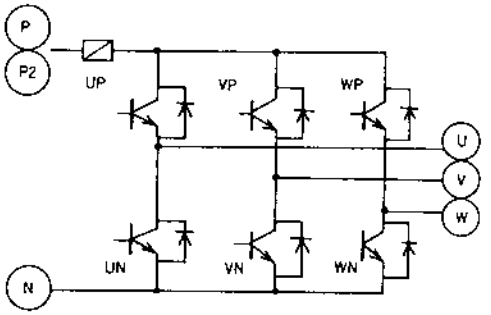
As wires are pulled upward at the small terminals connected at the side of transistor module, these wires should be marked (Since wire number is not indicated on wires, make sure not to mistake at the time of reassembly.)

17-6 Method of checking transistor

Transistors that are used in VF5100HG can be judged as to whether they are in good condition or not by following the description below.

1) A simple method of check of inverter unit with wires remaining intact. Intermediate DC terminals and AC output terminals of inverter unit are measured by resistance range of meter and confirm that the results are in accordance with values of following table.

Connecting end of + of tester	Connecting end of − of tester	Transistor to be checked	Resistance value
P or P2 terminal	U terminal	following drawing UP	Continuity available. By a few tens ~ a few kΩ, identical value in entirety.
P or P2 terminal	V "	" " VP	
P or P2 terminal	W "	" " WP	
U "	P or P2 terminal	following drawing UP	Over a few MΩ.
V "	P or P2 terminal	" " VP	
W "	P or P2 terminal	" " WP	
N "	U "	following drawing UN	Over few MΩ.
N "	V "	" " VN	
N "	W "	" " WN	
U "	N "	following draiwng UN	Continuity available. By a few tens ~ a few kΩ, identical value in entirety.
V "	N "	" " VN	
W "	N "	" " WN	



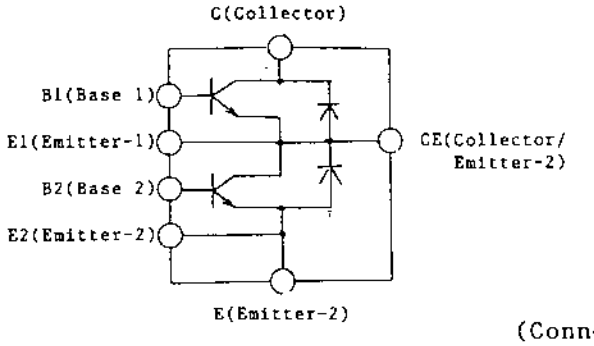
(2) Method of checking singular transistor module

Depending on output capacity, transistors used in VF5100HG are consisted of the one with 6 circuits incorporated in 1 piece of module and of the one with 2 circuits incorporated in 1 piece of module. Either of them should have resistance measured between terminals of transistor for each circuit using meter following suit to above-mentioned and confirm that the result is shown in the following table.

Connecting end of + rod of tester	Connecting end of − rod of tester	Resistance value
C (CE) terminal	CE (E) terminal	Continuity
CE (C) "	E (CE) "	∞
B1 (B2) "	C (CE) "	∞
C (CE) "	B1 (B2) "	Continuity
B1 (B2) "	CE (E) "	"
CE (E) "	B1 (B2) "	"

( ) is lower side transistor.

= Internal connection of transistor module incorporating 2 circuits =



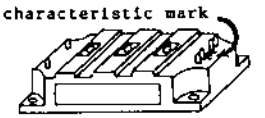
(Connection diagram is described on transistor main body.)

17-7. Replacement of transistor or diode

When replacing or when increasing tightening of transistor, diode, please perform this installation by tightening torque of following table.
Also at the time of replacement, thinly coat adhesive for instance, use product of Wakeman Inc. on the contact face between heat sink and transistor,diode.

Caution

Since transistors are used in parallel for types of over 30kVA 200V series and of over 50kVA of 400/480V series, at the time of replacement, to maintain the current balance of respective semiconductors, please use those matched with characteristic mark (gain), marked at the side of transistor. Refer to the drawing.



Inverter Unit		Tightening torque (Kg-cm)					
Type	Capacity (kVA)	Diode		Main transistor		Transistor for DB	
		Terminal part	Fitting part	Terminal part	Fitting part	Terminal part	Fitting part
VF5120HG	3~7.5	*	4~6	15~20	20~30	*	7.5~10
	10	15~20	20~30	15~20	20~30	15~20	20~30
	15	15~20	20~30	15~20	15~20	15~20	20~30
	20~90	24~28	24~28	15~20	15~20	None	None
VF5140HG VF5148HG	3~10	*	20~30	15~20	20~30	15~20	20~30
	15、25	*	24~28	20~30	20~30	15~20	20~30
	15~150	24~28	24~28	20~30	20~30	None	None

* Faston terminal

17-8. Nos. of years of durable use of parts

Among the parts constituting VF5100HG, following parts especially are required for replacement periodically from the viewpoint of life.

(1) Electrolytic capacitor of DC intermediate connection

When performing design and manufacture of VF5100HG, selection and manufacture of intermediate DC electrolytic capacitor is selected

so that life of over 5 years can be expected at condition of inverter unit in annual average temperature 35°C and 10 hours use per day. Since electrolytical capacitor has chemical reaction conducted internally, generally "Law of Arrenius 10°C 2 fold" (as temperature raises by 10°C, life becomes 1/2. And as temperature lowers by 10°C, life increases 2 fold) is applied. Based on this law, it is not desirable to increase ambient temperature of VF5100HG. Therefore pay attention.

(2) Fan motor for cooling

Life as seen from reliability aspect of fan motor for cooling used in VF5100HG series of forced cooling system is about 4 ~ 6 years (10 hours running per day). Please replace fan motor that has passed the numbers of years durable use.

Method of replacement:

Stop VF5100HG. Then after shuttingoff control power supply source, remove power source wire of cooling fan motor, remove screws that clamp fan motor and replace.

17-9. Storage and Reuse

When storing and reusing VF5100HG in case of spare pay attention to items described below.

(1) Storage

When storing inverter avoid place of high temperature and high humidity. provide storage indoors where there is no dust. Connect main circuit and control circuit to power supply source periodically and perform no-load running for about one day.

(2) After lapse of 2 ~ 3 years of storage at non-operation condition, when reusing VF5100HG, please use VF5100HG after conducting following operations because of foaming (activation) of electrolytic capacitor.

a) Impose 80% of rated voltage on main circuit of VF5100HG and leave it alone for one hour.

b) Next impose 90% of rated voltage on main circuit and leave it alone for one hour.

c) Lastly, imposing rated voltage, leave it alone for 5 hours.

Caution

1. When using VF5100HG which was put in storage, after checking in advance the correct settings of respective functions, commence the running.
2. As rated voltage is imposed abruptly, foaming of electrolytic capacitor is conducted, safety valve of capacitor opens and there may be the case of capacitor solvent blowing out. Therefore please pay attention.

18. Details of functions

Respective functions of VF5100HG are described hereunder as per order of Code Number.
Depending on the content of function, the possibility is listed for the change of setting during running. Especially in the case standard setting at shipment is different from that of your system as regards the function impossible for the change of setting during running, set VF5100HG at no-load condition (motor not connected), close main circuit and control power supply source and then please change as per Chapter 9 "Operating Method of function setting".

Caution

Torque compensation (Code No. 5), IR drop compensation (Code No.33) and power factor correction (Code No.34) can be readjusted by running motor. Refer to Chapters 13 and 14.

Code No.	Indication of function symbol	Content of function	Standard setting at shipment	Setting change during running
0	FSEt	Output frequency setting function of digital console.	0 Hz	possible

Explanation

When setting output frequency by digital console fitted to VF5100HG, this Code is selected and operation is performed. As the output frequency setting system against operation of digital control, the following 2 methods are offered.

(1) Preset setting system
As Code No. 0FSEt is selected by MODE key and as SET key is depressed, function symbol indication changes to the current running frequency. After setting to the new running frquency by depressing Δ key or ∇ key at above condition, as SET key is depressed, the change takes place to the frequency set by acceleration or deceleration setting time.

(2) Interlock setting system
Until SET key is depressed after selecting Code No.0FSEt by MODE Key, although the performance is the same as that of preset system, interlock system is such that as Δ key or ∇ key is depressed, frequency change by acceleration or deceleration setting time.
(Δ key: during depressing operation, frequency rises.)
(∇ key: during depressing operation, frequency drops.)

* Selection of preset system and interlock system is conducted setting by Code No. 46.55A (refer to Code No.46).

Other function relevant to output frequency setting

(refer to respective Code Nos. for the details of respective functions.)

(1) Code No.4JoGF ... jog frequency setting function
Function to set jog running frequency.

(2) Code No. 19F51 ~ 21F53 multistep setting function
As contact signal is supplied from outer part, the function that offers the frequency set in advance.

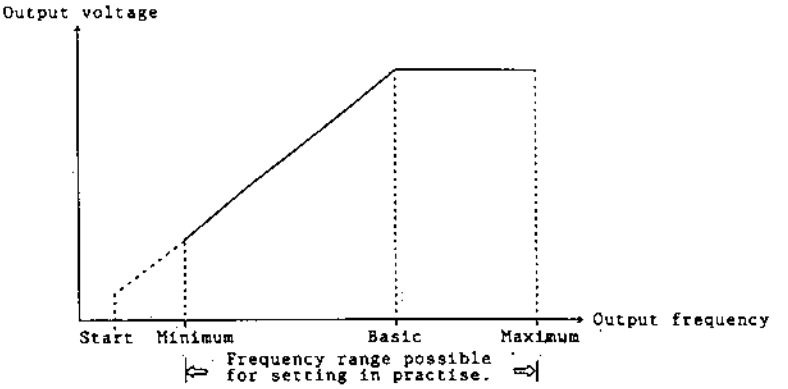
(3) Code No. 22FJ1 ~ 25FdF ... frequency jump
Function that is unable to set the specific frequency.

(4) Code No. 44558 ... function to set the relation between set voltage and output frequency from outer part.
To adjust relation of output frequency against analogue signal for frequency setting such as 0 ~ 10V.

Code No.	Indication of function symbol	Content of function	Standard setting at shipment	Setting change during running
1.	toPF	Setting function of max. frequency that limits running speed.	60 Hz	impossible
2.	botF	Setting function of min. frequency that limits running speed.	0 Hz	possible
16.	StF	Frequency setting function at inverter start.	0.5 Hz	possible
18.	PcF	Setting function of base frequency.	60 Hz	possible

Explanation of function

These settings are the functions to perform setting of frequency of voltage/frequency (V/f) characteristic that becomes the fundamental to run motor. The definition of maximum frequency, minimum frequency, starting frequency and base frequency is as described below.



* Starting frequency,

  Frequency that is supplied when inputting running command to inverter. (Generally, setting is conducted between0.5 ~ 2Hz.)

* Minimum frequency,

  Lower limit frequency possible for setting during operation.

* Base frequency,

  Frequency of base speed of motor.
  (frequency at motor rated voltage)

* Maximum frequency,

  Upper limit frequency possible for setting during operation.

  Note: When setting as starting frequency > Minimum frequency, output frequency of inverter suppliesstarting frequency at starting. And as frequency command is lowered frequency drops to starting frequency.

(Frequency setting and running characteristic of motor)

Between minimum frequency ~ base speed: By the setting of Code No.39 constant torque characteristic or second power reduction torque characteristic is made available.

Between base frequency maximum frequency: Motor provides constant output characteristic.

Setting range

(1) Code No. 1. Maximum frequency : 30 ~ 120Hz can be set by 0.1Hz pitch.

(2) Code No. 2. Minimum frequency : Between 0Hz ~ Code No. 1. setting can be made by 0.1Hz pitch.

(3) Code No. 15. Start-up frequency: 0 ~ 10Hz can be set by 0.1Hz pitch

(4) Code No. 18. Basic frequency : Between 30Hz ~ Code No. 1. setting can be made by 0.1Hz pitch.

Caution at the time of setting

(1) As an example, even when desiring to use motor of 60Hz rated frequency up to 120Hz always match the base frequency to rated frequency of motor.

Running frequency, other functions relevant to V/f characteristic setting ... refer to respective Code Nos. for the details of respective functions.

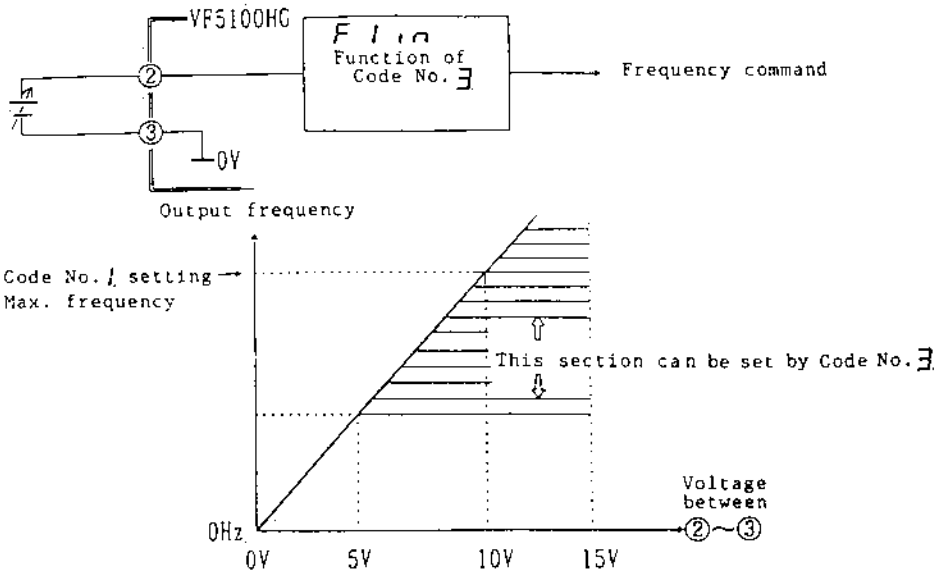
(1) Code No. 6.URdJ ... Rated output voltage
Function to set output voltage of base frequency.

(2) Code No. 5.boSt ... Torque compensation
Voltage correction function to output prescribed torque in the low domain of output frequency.

Code No.	Indication of function symbol	Content of function	Standard setting at shipment	Setting change during running
3.	F 1 ,n	Function of limiting frequency setting analogue input voltage.	10.3 V	possible

Explanation of function

Relationship between analogue signal from outer part and output frequency is such that at the time of DC 10V input maximum frequency of Code No. 1.toPF is supplied (Note).
Code No. 3.F 1 ,n is the function that limits the output frequency even if output frequency setting voltage which is supplied to terminal block ②③ is provided over its prescribed value. It's characteristics is shown in the following drawing.



Note: As for equipment with current setting input option, output frequency can be set by DC4 ~ 20mA, DC1 ~ 5V signal (refer to specific option for the details).

Range setting

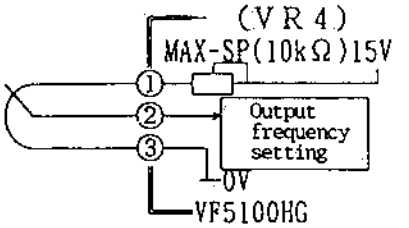
5 ~ 15V can be set by 0.1V pitch.

Other functions relevant to analogue setting ... refer to respective Code Nos. for the details of respective functions.

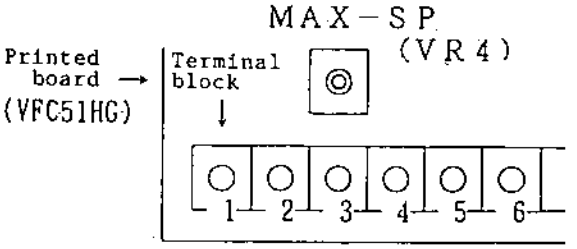
(1) MAX-SP ... Maximum speed adjustment at the time of speed setting by variable resistor.

When setting output frequency after connecting 10kΩ variable resistor to terminal block ①②③, by the adjustment of MAX-SP (VR4) fitted to control circuit printed board, output frequency can be limited.

When setting MAX-SP fully left, ① - ③ becomes 7.5V.
" " " " right, " " 15 V.
(adjustment of MAX-SP is set as 10V between ① - ③.)



MAX-SP circuit drawing



MAX-SP location

(2) Code No. 44558 ... relationship between analogue set voltage and output frequency

Function to adjust relationship between output frequency setting analogue voltage inputted from above (1) or other device and output frequency.

Code No.	Indication of function symbol	Content of function	Standard setting at shipment	Setting change during running
4.	JoGF	Function of jog running frequency setting.	5 Hz	possible

Explanation of function

Output frequency when operating jog running is set by this Code. Range can be set by 0.1Hz between 0 ~ 30Hz.

Jog running is activated while JOG key of console is depressed when operating place mode is DIR and when REM mode, jog running is activated during close period between ④ - ⑦ of terminal block. Jog running is not required to operate RUN key of console and RUN signal terminals from external. Also during jog running, when operating RUN key of console or RUN signal (terminals ④⑤) from outer part, jog running is cancelled and normal running mode takes the priority.

In the case of conducting forward and reverse jog running, after selecting the rotating direction by REV/FOR of console when operation place mode is DIR and by terminal block ④⑥ when above mode is REM, please start the operation of JOG or terminals ④ ⑤. (When inputting reverse running command during jog running, reverse operation occurs).

Range of setting

0 ~ 30Hz can be set by 1Hz pitch.

Caution at setting

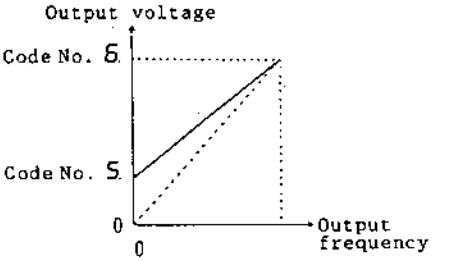
(1) To improve the accelerating characteristic of motor rotational speed at the time of jog operation, set frequency is outputted without delay after command jog input (a slight delay time is available from 0Hz to 30Hz. Thereby as jog frequency is increased for instance with load of large starting torque, there may be the case of causing trip by overload. In such case, raise capacity of inverter and motor or use multistep setting function (Code No. 19 ~ 21), although accelerating characteristic will exhibit ramp time.

(2) Release of jog operation, inverter stops without delay (output frequency does not drop gradually). Therefore, motor stops while inertial rotation of coasting by GD^2 of motor. When this coasting rotation is desired to be prevented, fit mechanical type brake to motor or load side, and brake should be activated making use of running contact (terminal block (21) - (23)) of VF5100HG. Otherwise change to DC braking function of Code Nos. 25 27 37 using multistep function (Code No. 19 ~ 21). (When using multistep setting function, accelerating characteristic of motor exhibits ramp time.

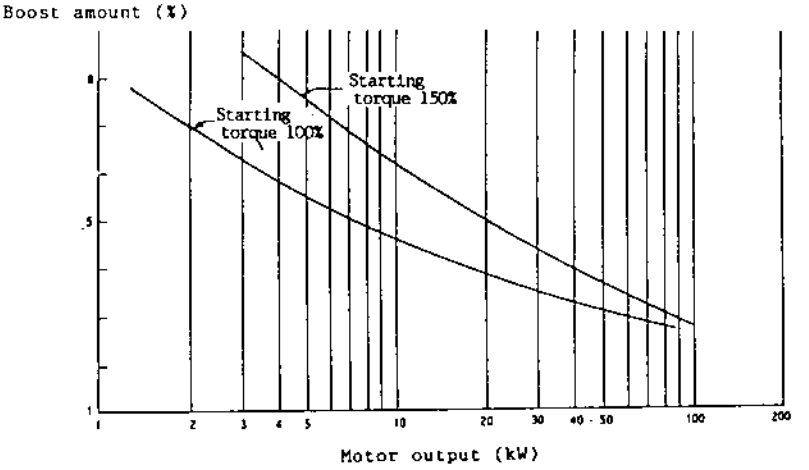
Code No.	Indication of function symbol	Content of function	Standard setting at shipment	Setting change during running
5	boSt	Torque compensation function at low frequency range (boost setting function)	0 %	possible

Explanation of function

This is the function to compensate shortage of motor output torque at starting or at low speed.
As this setting is raised, starting torque increases.



Setting is inputted by percentage (%) against rated output voltage at 0Hz output frequency set by Code No. 5.
When V/f characteristic of driving motor is known, output voltage at 0Hz is calculated from V/f characteristic and the result is programmed. In the case where characteristic is unknown and voltage (boost amount) is not known, please input referring to following drawing.



Setting range

0 ~ 20% can be set by 0.1% pitch.

Caution at setting

(1) When boost amount is raised beyond requirement, probable trouble such as inverter output over current and motor over-heating will arise.

Code No.	Indication of function symbol	Content of function	Standard setting at shipment	Setting change during running
6.	UAdJ	Adjusting function of rated output voltage.	0 %	possible

Explanation of function

Despite variance of AC input voltage, automatic voltage regulator (AVR) that controls output voltage to prescribed voltage is equipped as standard in VF5100HG. With Code No. 6UAdJ set as standard voltage of AVR, rated voltage of motor (voltage at frequency by 18PcF .... base frequency) is set.

Setting of rated output voltage is obtained by:

$$\left(\frac{\text{voltage of motor base frequency}}{Vr} - 1 \right) \times 100\%$$

Vr: Use 200V for VF5120HG (200/220V series)
Use 400V for VF5140HG (400/440V series)
Use 460V for VF5148HG (460/480V series)

Although setting of this Code is 0 % intact at standard setting at shipment when voltage of base frequency of motor is 200V, 400V, for 220V, 440V, please change the setting to -10%

Note: Output can not be conducted over power supply source voltage.
Example: At AC input voltage 200V, 220V can not be supplied

Range of setting

-30 ~ +30% can be set by 0.1% pitch.

Other functions relevant to output voltage ... refer to respective Code Nos. for the details of respective functions.

(1) Code No. 39553 ... V/f ratio
Function of selection of V/f ratio of constant torque or 2nd power reduction torque.

Code No.	Indication of function symbol	Content of function	Standard setting at shipment	Setting change during running
7.	Fch1	Function to change PWM carrier frequency during running.	833Hz	possible
8.	Fch2	Function to change PWM carrier frequency at starting.	225Hz	possible

Explanation of function

Refer to Code No. 39

Range of setting

(1) Code No. 7 PWM carrier frequency during running: 400 ~ 1500Hz can be set by 1 Hz pitch.

(2) Code No. 8 PWM carrier frequency at starting : 225 ~ 630Hz can be set by 1 Hz pitch.

Caution at setting

(1) When setting over 1250Hz at Code No. 7, please use by reducing rating of output current by 10%.

Code No.	Indication of function symbol	Content of function	Standard setting at shipment	Setting change during running
9	CAP	Function to set capacity & voltage of VF5100HG.	Set to article delivered.	impossible

Explanation of setting

This is the function to set capacity and voltage VF5100HG used. Setting is performed by following data provided for particular model.

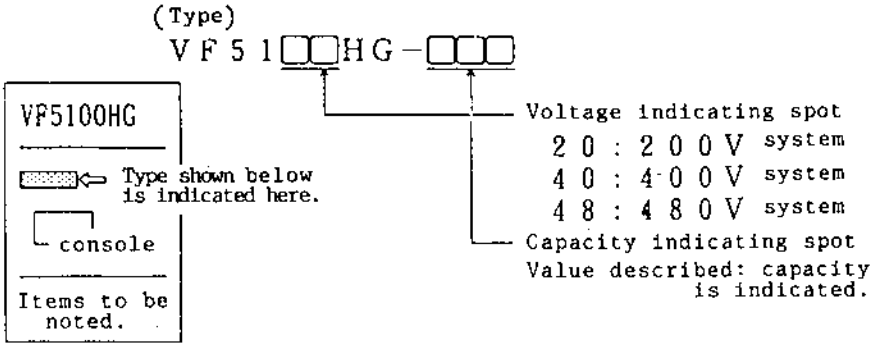
Series (Power source voltage)	VF5120HG (200V system)
Capa. (kVA)	Code No.9 data
3	3.2
5	5.2
7.5	7.2
10	10.2
15	15.2
22	22.2
30	30.2
45	45.2
60	60.2
90	90.2
120	120.2
180	180.2
270	270.2
360	360.2

Series (Power source voltage)	VF5140HG (400V system)	VF5148HG (480V system)
Capa. (kVA)	Code No.9 data	Code No.9 data
3	3.4	3.5
5	5.4	5.5
7.5	7.4	7.5
10	10.4	10.5
15	15.4	15.5
25	25.4	25.5
37	37.4	37.5
50	50.4	50.5
75	75.4	75.5
100	100.4	100.5
150	150.4	150.5
200	200.4	200.5
300	300.4	300.5
450	450.4	450.5
600	600.4	600.5
750	750.4	750.5
900	900.4	900.5

Caution at setting

(1) As Δ, ∇ keys are operated when changing data, internal data changes
3.2→5.2→7.2

(2) As regards collation of capacity and voltage of inverter unit, please check by the type indicated on cover (refer to following drawing).



(3) Data other than capacity and voltage collated from type of inverter should in no event be set.

(4) When replacing printed board VFC51HG (printed board provided with terminal block of ① ~ ㉓ for external wiring fitted)in inverter, following suit to other Code Nos., this Code No. should be checked as well.

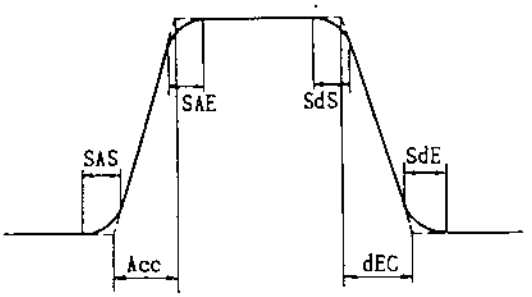
Code No.	Indication of function symbol	Content of function	Standard setting at shipment	Setting change during running
10.	Acc	Accelerating time setting function.	30 sec. (Note)	possible
11.	dEc	Decelerating time setting function.	30 sec. (Note)	possible
12.	SAS	Function of S letter function rise time setting.	0 sec. (Note)	possible
13.	SAE	Function of S letter function acceleration reaching time setting.	0 sec. (Note)	possible
14.	SdS	Function of S letter function drop time setting.	0 sec. (Note)	possible
15.	SdE	Function of S letter function deceleration reaching time setting.	0 sec. (Note)	possible

(Note) Unit of data indicated shows "sec." and unit indicating lamp does not illuminate.

Explanation of Function

as regards starting and reaching of acceleration and starting and reaching of deceleration respectively for VF5100HG, running can be conducted by S letter function provided with non linear response.

Definition of Code Nos. 10 ~ 15 is shown in the following drawing.



Also total acceleration time and deceleration time when using the S letter functions are based on the following equation.

$$\text{Total acceleration time} = (Acc) + \frac{(SAS)}{2} + \frac{(SAE)}{2}$$

$$\text{Total deceleration time} = (dEC) + \frac{(SdS)}{2} + \frac{(SdE)}{2}$$

Range of setting

(1) Code Nos. 10, 11, acceleration time and deceleration time
0.5 ~ 600 sec. can be set by the pitch of 0.1 sec. for the range of 0.5 ~ 100 sec. and by the pitch of 1 sec. for the range of 100 ~ 600 sec.

(2) Code Nos. 12 ~ 15, S letter function
0 ~ 60 sec. can be set by the pitch of 0.1 sec.

Caution at setting

(1) When running load of large GD^2 (when accelerating by 150% rated current or by over 150% of rating), there may be the case of stopping by over voltage (fault indicating lamp "OV" is illuminated) when completing to the acceleration. In such case, please provide S function to frequency when completing acceleration by function reaching S letter acceleration of Code Nos. 13 or connect dynamic brake option. (When inverter output frequency reaches setting, there may be the case that motor speed overshoots if accelerating characteristic is good The energy from this overshoot returns to inverter as regenerative electric power, raises intermediate DC voltage and there may be cause of stopping inverter by detection of over voltage).

(2) When decelerating time is too short, there may be cause of stopping inverter by over voltage (fault indicating lamp "OV" is illuminated). In such case, lengthen decelerating time or connect dynamic brake option (DB).

Code No.	Indication of function symbol	Content of function	Standard setting at shipment	Setting change during running
16.	StF	Function of inverter starting frequency setting	0.5 Hz	possible

Explanation of function

Frequency that appears when applying starting command to VF5100HG is set by this Code No. As regards inverter starting frequency of this function, when optimum starting frequency of motor driven (starting frequency that offers starting torque the most against boost amount set by Code No. 5) is known, its value is set.
When optimum starting frequency is unknown 0.5Hz of standard setting remains suggested.

Range of setting

0 ~ 10Hz can be set by pitch of 0.1Hz.

Caution at setting

(1) As starting frequency is set high, there may be cause that motor rotates rapidly by starting command input and causes overcurrent trip.

Code No.	Indication of function symbol	Content of function	Standard setting at shipment	Setting change during running
17.	oF5	Function of over frequency protection performance value setting	65 Hz	possible

Explanation of function

As output frequency becomes over the prescribed value, over frequency occurs to stop inverter by over frequency,(indicating code "OF" is illuminated).

Range of setting

Range of 35 ~ 127Hz can be set by 1Hz pitch.

Caution at setting

(1) Please input over maximum frequency setting value of Code No. 1.

(2) There is no time delay factor in this over frequency operation

Code No.	Incication function symbol	Content of function	Standard setting at shiplment	Setting change during running
18.	PcF	Setting function of base frequency	60 Hz	possible

Explanation of function

Refer to Code Nos. 1, 2.

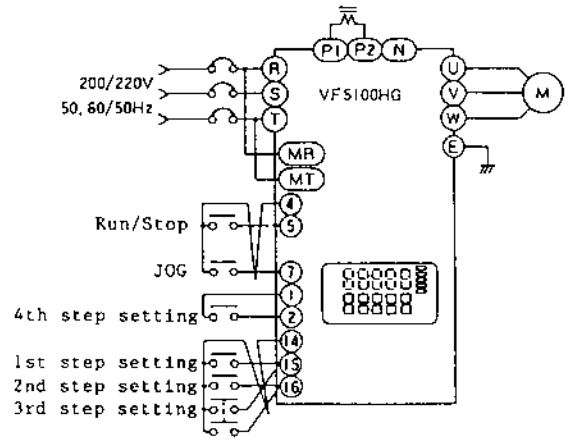
Code No.	Indication of function symbol	Content of function	Standard setting at shipment	Setting change during running
19.	F S 1	Multistep frequency setting function (1st step frequency setting)	0 Hz	possible
20.	F S 2	Multistep frequency setting function (2nd step frequency setting)	0 Hz	possible
21.	F S 3	Multistep frequency setting function (3rd step frequency setting)	0 Hz	possible

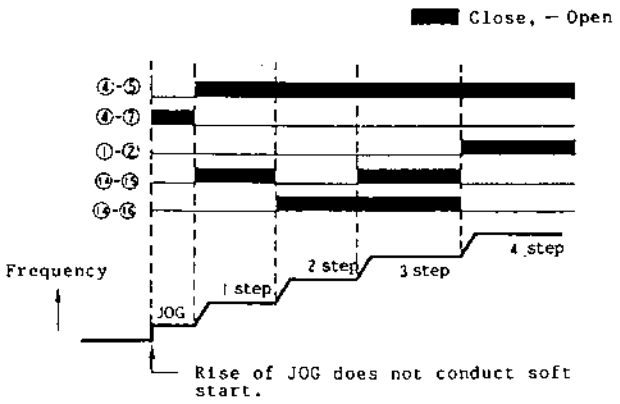
Explanation of function

Multistep setting is the function to select output frequency by contact command from external Relationship between terminal block number that receives contact command and Code No. that sets frequency is shown below.

As terminal block 14 - 15 is "closed", frequency set by Code No. 19.
" " " 14 - 16 " " , " " " Code No. 20.
" " " 14 - 15 and 14 - 16 are "closed" simultaneously, frequency set by Code No. 21.

JOG: As maximum frequency setting is added , speed setting of 5 steps can be provided as shown in the following drawing.





(Note)
JOG. As No. ② terminal is utilized, 5 steps setting can be provided.
(4th step becomes maximum output frequency)

Range of setting

Respective settings of Code Nos. 19~21 can be programmed between maximum frequency of Code No. 1 and minimum running frequency of Code No. 2.
Minimum setting pitch is 0.1Hz.

Note at setting

(1) Frequency rise and drop amongst respective settings conduct change by rate of accelerating time and decelerating time inputted by Code Nos. 10 ~ 15.

(2) As regards priority order of Code No. 0 "frequency setting" and multistep setting, Code No. 0 takes the priority at OFF (mode and) in entirety of multistep setting.

Caution

When interlock running is selected by Code No. 46 this function of multistep setting can not be used.

Code No.	Indication of function symbol	Content of function	Standard setting at shipment	Setting change during running
22.	FJ1	Frequency jump setting function	0 Hz	possible
23.	FJ2	Frequency jump setting function	0 Hz	possible
24.	FJ3	Frequency jump setting function	0 Hz	possible
25.	FdF	Function to set width of frequency that lets to jump	1 Hz	possible

Explanation of function

When motor or machine produces resonant vibration, running at that frequency can be avoided by this Code. A total of 3 jump points can be programmed.
(Code Nos. 22.~24.).

Code Nos. 22.~24. set the center of the frequency jump point. Code No. 25. sets the frequency width of jump. For example, to enable (jump) the frequency setting covering ±2.5Hz of the point 20Hz,

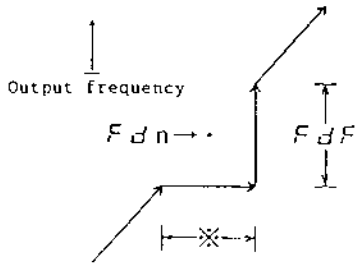
Code No. 22.FJ1 is programmed with 20Hz
Code No. 25.FdF is programmed with 5Hz

This frequency jump is a function not to change output frequency rapidly (by the above example, to change rapidly from 20-2.5 = 17.5Hz to 20+2.5 = 22.5Hz) but output frequency changes continuously by the function.

The relationship between output frequency setting and the frequency that is operated actually is shown below.

◆ When output frequency is let to rise
Frequency of f_1 described below is supplied at presetter position of *.

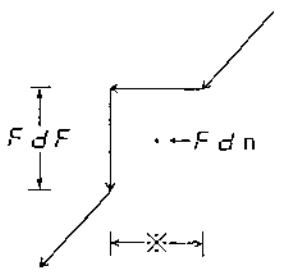
$$f_1 = Fdn - \frac{FdF}{2}$$



(Low) ← set voltage between ②③ → (High)
(Fdn : Code Nos. 22.~24. set value)

◆ When output frequency is let to drop
Frequency of f_2 described below is supplied at presetter position of *.

$$f_2 = Fdn + \frac{FdF}{2}$$



(Low) ← set voltage between ②③ → (High)
(FdF : Code No. 25. set value)

Range of setting

(1) Between OHz and maximum frequency of Code No. 1 can be set by 0.1Hz pitch.

Caution at setting

(1) Against Code Nos.22~24, jump width can not be set individually. (Setting of Code No. 25 is a value common to Code Nos.22~24.)

(2) Code Nos.22~24 can not be set within the width of Code No. 25.

Code No.	Indication of function symbol	Content of function	Standard setting at shipment	Setting change during running
26	dcb	Function of DC dynamic brake voltage setting	0 %	possible
27	dct	Function of DC dynamic brake performance time setting	0 sec. (Note)	possible

Note: Data unit indicated is indicated by "sec." and unit indicating lamp does not illuminate.

Explanation of function

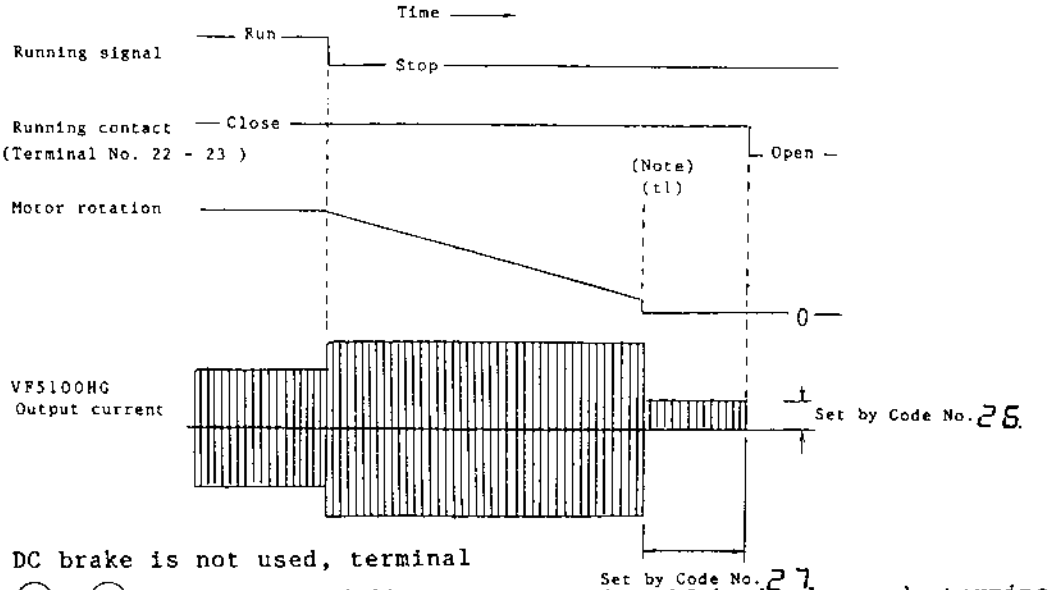
Stop system of FV5100HG consisted of the following.

- ◆ Free stop mode that stops inverter simultaneously with stop operation (Even without mechanical brake, motor speed stops while inertia coasting rotation by GD^2 of load).
- ◆ Deceleration stop mode such as that by stop operation, output frequency drops by decelerating time set by Code No. 11 and inverter stops when output frequency becomes 1Hz. (selection of modes respectively is set by Code No.37.)

These Code Nos. 26 27 are the function to apply DC brake to motor (DC current is supplied) by preventing coasting rotation of motor speed below 0.06Hz at which inverter snut off.

Code No. 26 sets strength of DC brake by adjusting DC voltage and Code No. 27 sets the operation time of DC brake (this DC brake is effective also for JOG running.)

Time chart of operation using DC brake is shown in the following drawing.



Note: When DC brake is not used, terminal nos. (22) - (23) are open at (t1), otherwise when DC brake is used, terminals 22-23 remain closed until DC brake switches off.

Range of setting

(1) DC voltage of Code No. 26 is such that 0 ~ 20% against rated output voltage set by Code No. 6 setting by 0.1% pitch.

(2) DC brake operation time of Code No. 27 can be set by 0.1 sec. pitch for 0 ~ 5 sec. (Data unit indicated is "second" and unit indicating lamp does not illuminate.)

Caution at setting

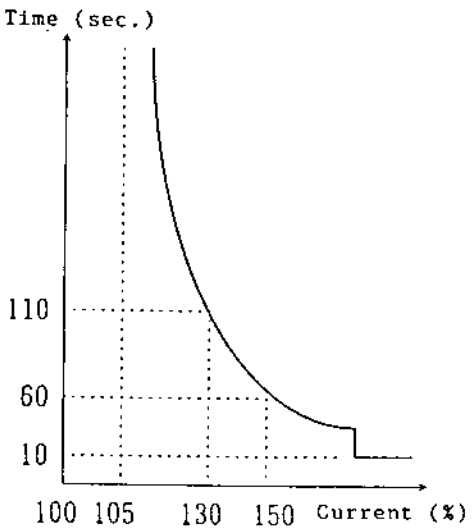
(1) When using DC brake function, stop mode is set as "decelerating mode" by Code No. 37 and furthermore select "use of DC brake"(refer to Code No. 37 for the details).

(2) When programming DC voltage setting of Code No. 26 at high value from the outset, there may be the case of causing trip by over current. Therefore while noteing rotation of motor, gradually raise the setting value and do not raise value beyond minimum requirements.

Code No.	Indication of function symbol	Content of function	Standard setting at shipment	Setting change during running
28	oL5	Function of overload protective performance value setting	100 %	possible

Explanation of function

This is the function to protect inverter and motor from overload, when current over 150% of set value continues for one minute, inverter stops by overload indication. This overload relay provides the time limit characteristic of following drawing.



- Overload protection characteristic -

When current over 150% flows, control of current permitted to inverter is activated (about 160% of rated current although this percentage differs by type of motor). As this continues for 2 ~ 10 sec., inverter stops by overload.

Note: After overload protective operation or after use in the area that overload protection does not activate, be sure to provide inverter cooling period of at least 10 minutes. (When overload condition is let to continue and cooling of inverter is insufficient, there may be the case of damaging internal devices).

Range of setting

(1) Value of 100% that becomes the criteria of set value can be programmed by 1 % pitch against 20 ~ 110% of rated output current of inverter (refer to tables shown below).

Rated current table of VF5100HG

Series power source voltage	VF5120HG 200V	VF5140HG 400V	VF5148HG 480V
Cap. kVA	Rated cur. A	Rated cur. A	Rated cur. A
3	10	5	4.4
5	16	8	7.6
7.5	24	12	11
10	32	16	14.6
15	45	22.5	21
22	64	37	34
30	87	53.5	46.5
45	130	72.2	65
60	173	108	96
90	260	144	125
120	346	217	189
180	520	288	251
270	780	434	378
360	1040	651	566
		868	755
		1085	944
		1302	1134

Caution at setting

(1) Generally, setting of this Code No. is programmed for 100% as regards to a single drive that drives plural number of motors and following equation is supplied for single drive that drives a single motor.

$$\text{Set value} = \frac{\text{Motor rated current}}{\text{Inverter rated current}} \times 100\ (\%)$$

Caution

This overload protection is to monitor the current that flows in the motor being unable to detect temperature rise of motor. In the case of requiring to protect motor temperature rise forecasted when driving standard motor, please also provide temperature detecting circuit.

Code No.	Indication of function symbol	Content of function	Standard setting at shipment	Setting change during running
29.	CLd	Function of current limit setting during powering (function to prevent stall)	150 %	possible
30.	CLb	Function of current limiting setting during regeneration (function to prevent stall)	150 %	possible

Explanation of function

This is the function of current limit to protect motor from not becoming overloaded condition. Code No. 29 sets the current limit value at acceleration or at overload during constant speed running (during powering running of motor) and Code No. 30 sets the current limit value at regeneration which is caused at deceleration.

In VF5100HG series, to prevent overload furthermore, effective current that actually lets to drive load is detected from motor current and in order to make this current stable & constant, voltage and frequency are controlled and overload is prevented.

Range of setting

(1)

20 ~ 150% of Code No. 29 and 0 ~ 150% of Code No. 30 can be set by 1 % pitch.

Caution at setting

(1) Although regeneration side current limit of Code No. 30 is such that intermediate DC voltage is controlled to avoid over voltage, when setting of decelerating time is short, there may be the case of resulting in stop by "over voltage". On such occasion, lengthen the decelerating time (setting of Code No. 11) or connect the option of dynamic brake (DB).

Code No.	Indication of function symbol	Content of function	Standard setting at shipment	Setting change during running
31	dr-P	Droop amount setting function when using droop control	0 %	possible

Explanation of function

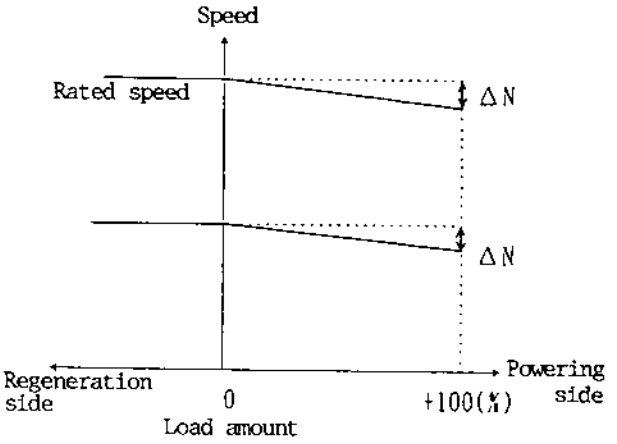
Speed droop function is available as the special feature of VF5100HG series. When standard motor is driven by inverter, as the load increase, motor speed drops by slip amount inherent to motor (generally about 2% though it differs by motor). However in some machines including conveyors, control to let motor speed drops (droop) along with increase of load like torque motor becomes necessary.

For such case, function to permit speed droop without detecting motor speed is provided in VF5100HG series.

In this Code No., droop amount when using speed droop function is set as described below.

* When not using droop control, there is no need to set the data in this Code No.

Droop speed amount (ΔN of following drawing) at motor rated output is inputted to Code No. 31 by percentage (%) against motor rated speed (Code No. 11, set value).



- Droop characteristic -

As an example, when desiring to have 90 rpm droop at rated output with ratd speed 2800 rpm, following is programmed to Code: 31.

$$\frac{90 \text{ rpm}}{1800 \text{ rpm}} \times 100 = 5 \ (\%)$$

Droop speed amount set herein is controllled as absolute value against respective speed settings (in the above example, when setting motor no load speed as 900 rpm, rated load speed becomes 900 - 90 = 810 rpm).

Also, although this speed droop functions at motor powering state, if motor falls in regeneration (motor conducts brake performance) domain, speed rises along with increase of regeneration amount.

(The case of running in regeneration domain always have dynamic brake option be connected. If running regeneration domain is continuous, since regeneration converter becomes necessary, please consult with Drivecon for sizing details.

Setting range

(1) 0 ~ 30% against rated speed of motor can be programmed by 1 % pitch.

Caution at setting

(1) When using this function, please select droop control by Code No. 52 (refer to Code No. 52 for the method of setting).

(2) Since output frequency is droop controlled in the range of 3 ~ 60Hz, please pay attention to the following points.

(A) V/f characteristic:

Output voltage should be set directly proportional to variance of output frequency so-called constant output V/f characteristic should not be used.

(B) Maximum output frequency:

Maximum of control range should be 60Hz. From the inhibition of above constant output V/f characteristic, please set less than 60Hz at the maximum frequency of Code No. 1 set as same value is base frequency of Code No. 18.

(C) Minimum output frequency:

To output rated torque at minimum output frequency,

$$\text{Code No. 2 set value} \geq \text{(slip frequency of motor)} + \frac{\Delta N \times P}{120} \text{ (Hz)}$$

should be inputted for Code No. 2 setting. (ΔN: droop speed, rpm, P: no. of poles of motor)
When this setting is too low starting can not be conducted with heavy load.

(3) Load 100% in explanation of function indicates rated current of inverter. When rated current of motor is less than inverter rated current, obtain droop speed at inverter rated current by the following equation and apply the ratio against motor rated speed.

$$\frac{\text{Inverter rated current}}{\text{Motor rated current}} \times \text{droop speed (rpm)}$$

Caution

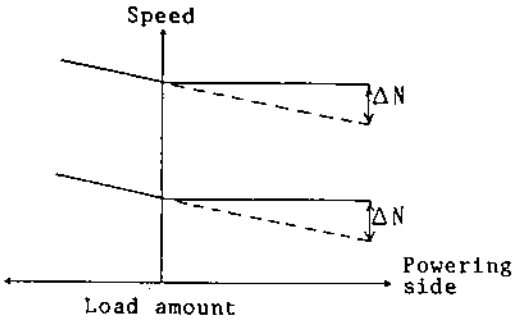
When using droop function, there is the need to execute precise power factor correction setting of Code No. 34 and adjustment of chapters 13 and 14.

Code No.	Indication of Function symbol	Content of function	Standard setting at shiplment	Setting change during running
32	u 5	Slip frequency setting function	0 Hz	possible

Explanation of function

VF5100HG series provides the slip compensation function that controls motor rpm to accuracy of ±1 % despite variance of load without detecting the actual speed of motor.
Code No. 32 inputs speed correction amount when using this slip compensation function by the following.

* When slip compensation control is not used, there is no need to set the data to this Code.



- Slip compensation characteristic -

Slip amount at motor rated output is converted to frequency and this frequency is programmed to Code No. 32.
When slip amount is indicated by percent as 60Hz, 1.5% calculation result of following equation is programmed to Code # 32.

$$60\ (\text{Hz}) = \frac{-1.5\ (\%)}{100\ (\%)} = 0.9\text{Hz}$$

Also at rated speed, when actual is 4 pole, 60Hz, 1773 rpm is indicated,

$$\text{Rated frequency} - \frac{\text{Rated speed x No. of poles}}{120} = \frac{1773 \times 4}{120} = 0.9\text{Hz}$$

& programmedto Code No. 32.
Although this slip compensation is controlled by powering mode and regeneration modeof motor, always connect dynamic brake option in the case of running in regeneration mode.
When running regeneration domain continuously, since regeneration converter becomes necessary, please consult Drivecon for application assistance.

Setting range

(1) 0 ~ 5Hz is inputted by 0.01Hz pitch.

Caution at setting

(1) When using this function, please select slip compensation control by Code No. 52.
(refer to Code No. 52 for the method of setting)

(2) Since slip compensation control in output frequency range of 3 ~ 60Hz, is available. Please note the following points.

(A) V/f characteristic:
Output voltage is set directly proportional to variance of output frequency. So-called constant output V/f characteristic should not be used.

(B) Maximum output frequency:
Maximum of control range should be 60Hz. From the inhibition of operation above constant output V/f characteristic, please program less than 60Hz with maximum frequency of Code No. 1 set as the same value as base frequency of Code No. 18.

(3) Load 100% of explanation of function indicates rated current of inverter. If motor rated current is less than inverter rated current, obtain slip at inverter rated current by the following equation and input the ratio against motor rated speed.

$$\frac{\text{Inverter rated current}}{\text{Motor rated current}} \times \text{Slip frequency at motor rating (Hz)}$$

Caution

When using slip compensation control, there is the need to conduct precise power factor correction setting of Code No. 34 and adjustment of Chapters 13 and 14.

Code No.	Indication of function symbol	Content of function	Standard setting at shipment	Setting change during running
33.	ir d	IR drop correction setting function	0 (Note)	possible

(Note) There is no unit of data.

Explanation of function

This is the function to correct voltage drop by wiring drop from VF5100HG inverter unit to motor and motor primary impedance drop.
When using,

Auto boost selected by Code No. 41.

Droop control and slip compensation control selected by Code No. 52.

IR drop correction should be set precisely.

When test report of motor is available, investigate wiring resistance to motor and calculation result of following. equation should be programmed to Code 133.

(200V series)
Code No. 33. input value = (Motor primary resistance *1 + wiring resistance *2) x Inverter rated current x 100

(400V series)
Code No. 33. input value = (Motor primary resistance *1 + wiring resistance *2) x Inverter rated current x 200

*1 : One phase resistance converted to Y (Unit ohm)

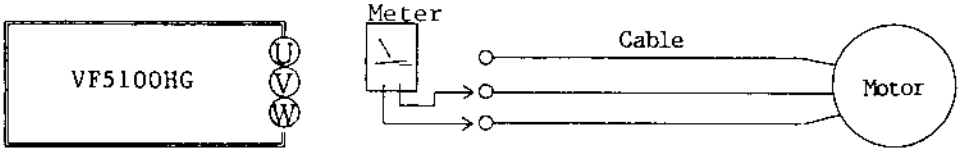
*2 : Wiring resistance of one phase (Unit ohm)

When there is no test report of motor, after measuring the outline value and inputting as per the following please adjust by Chapters 13 and 14.

Setting range

(1) 0 ~ 5000 is programmed by 1 pitch.

Method of measuring outline value of (motor primary resistance and wiring resistance)



Disconnect output cable of VF5100HG, measure the resistance value (Ruv, Rvw Ruw) between respective lines of cable and motor using meter and perform calculation by the following.

$$\text{(Motor primary resistance + wiring resistance)} = \frac{Ruv + Rvw + Ruw}{3} \times \frac{1}{2} \text{ (ohm)}$$

Code No.	Indication of function symbol	Content of function	Standard setting at shipment	Setting change during running
34.	PF	Power factor correction setting function	75 %	possible

Explanation of function

This is the function to set motor power factor converted to output current of VF5100HG. When using,

Effective component of output current selected by Code No. 42 (monitoring of motor output).

Droop control and slip compensation control selected by Code No. 52

set precise power factor correction by the following.

Following equation is programmed for Code 34

Motor power factor (%) at rated output of basic frequency

$$\times \frac{\text{Motor rated current at basic frequency}}{\text{Inverter rated current}}$$

Note: When motor power factor is unknown, refer to page (Table-1)

Rated current table of VF5100HG

Series power source voltage	VF5120HG 200V	
Cap. kVA	Rated cur. A	
3	10	
5	16	
7.5	24	
10	32	
15	45	
22	64	
30	87	
45	130	
60	173	
90	260	
120	346	
180	520	
270	780	
360	1040	

Series power source voltage	VF5140HG 400V	VF5148HG 480V
Cap. kVA	Rated cur. A	Rated cur. A
3	5	4.4
5	8	7.6
7.5	12	11
10	16	14.6
15	22.5	21
25	37	34
37	53.5	46.5
50	72.2	65
75	108	96
100	144	125
150	217	189
200	288	251
300	434	378
450	651	565
600	868	755
750	1085	944
900	1302	1134

Setting range

30 ~ 97% can be programmed by 0.1% pitch.

Caution at setting

(1) When using standard motor with derated output, please set power factor of motor itself (without reduced output). As an example, when using motor of 15kW pf=87% at 11kW, please program 87%

(2) Following equation is programmed for single drive that drives plural sets of motor.

$$\left(\frac{pf_1 \times I_1}{100} + \frac{pf_2 \times I_2}{100} + \cdots \frac{pf_n \times In}{100} \right) \frac{1}{\text{Inverter rated current}} \quad (\%)$$

pf_1, pf_2... pfn : Rated power factor (%) at base frequency of respective motors.

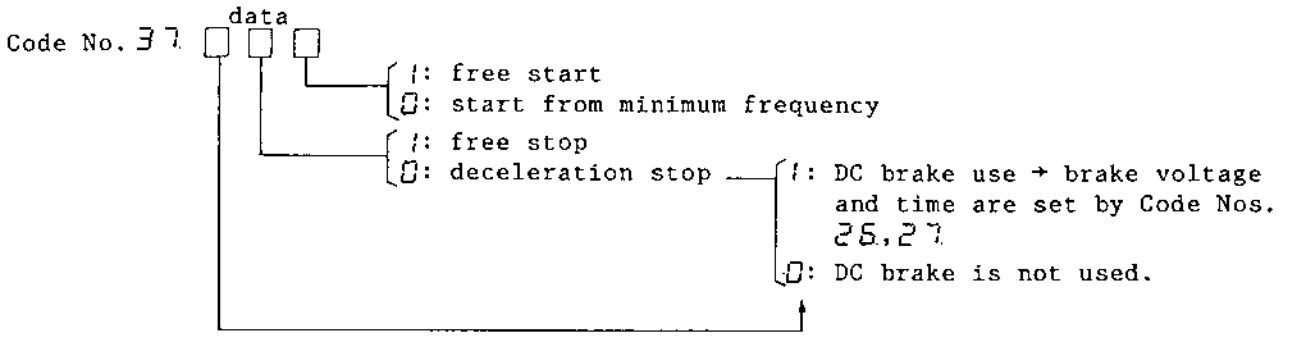
I_1, I_2 ... In : Rated current (A) at base frequency of respective motors.

Code No.	Indication of function symbol	Content of function	Standard setting at shipment	Setting change during running
35.	— — —	Not used	0	-
36.	— — —	Not used	0	-

Code No.	Indication of function symbol	Content of function	Standard setting at shipment	Setting change during running
37.	551	Setting function of start/ stop system and use of DC brake	000	impossible

Explanation of function

By this Code No., method of start/stop of VF5100HG and whether the use of injection brake is enabled is set by following (normally beside start/stop, JOG operation is set also.

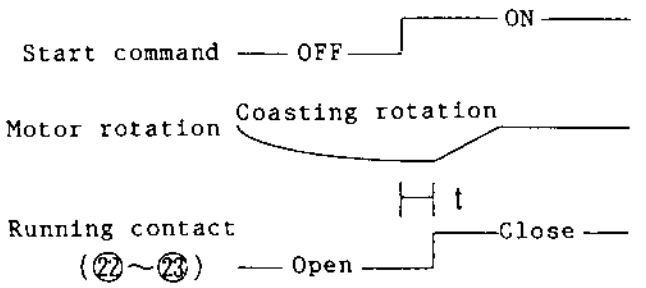


Explanation of respective functions

Respective methods of start/stop are explained (Note running contact ㉒ ~ ㉓ of time chart).

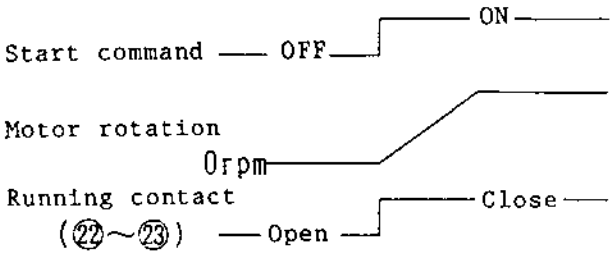
(1) Free start

As start command is given to inverter, inverter detects rotational frequency from motor output and starts from that frequency.
Due to the time of detecting rotational motor speed, delay arises for about maximum 1 sec. from the time of supplying start command until inverter starts actually (t of following drawing)



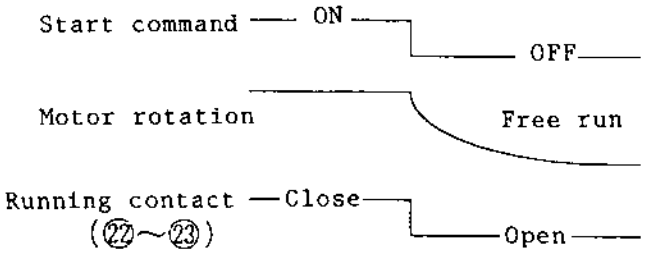
(2) Start from minimum frequency

As start command is initiated to inverter, inverter starts from starting frequency of Code No. 15 or minimum frequency of Code No. 2 irrespective to motor speed.
There is no delay from the time of input of start command until actual start.



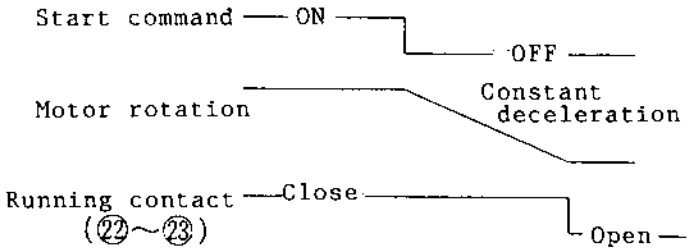
(3) Free stop

As start command of inverter is released, inverter turns off immediately. Unless mechanical brake is provided to motor or load, motor rotational speed decreases naturally by inertia and friction.



(4) Deceleration stop

As start command of inverter is initiated, inverter frequency drops by deceleration time set by Code No. 11 and inverter stops when reaching 0.06Hz.
As restart is given during frequency drop, the normal running mode is made available irrespective to starting method.



Setting range

(1) Set data changes to direction → described below by Δ key and to direction → described below by ∇ key.

000(standard setting at shipment) →001←→010←→011←→100←→101←→110←→111

Caution at setting

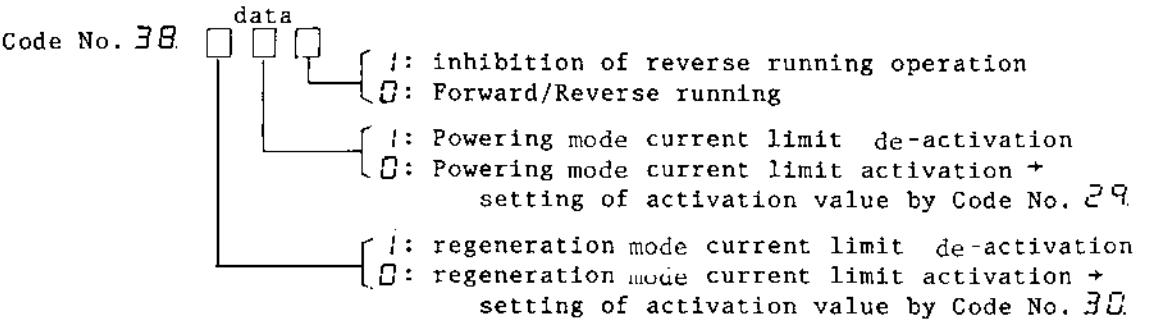
(1) Do not set "Free start" for single drive that drives plural sets of motor.

(2) For attachment with commercial use backup, in the system to changeover load of large GD^2 such as fan from commercial use to inverter, by setting "free start", it can manage to have slight drop of fan rotating speed during changeover time.

Code No.	Indication of function symbol	Content of function	Standard setting at shipment	Setting change during running
38	552	Function of setting inhibition of reverse running and current limit performance	000	impossible

Explanation of function

By this Code, inhibition of reverse rotation operation and de-activation of current limit can be set.



Explanation of respective functions

(1) Inhibition of reverse running operation, selection of Forward/Reverse running.

This is the function concerning reverse running operation at console or terminal block, refer to Code No. 50

(2) Selection of current limit activation of powering mode and regeneration mode

This is the setting function concerning activation of current limit function that activates at overload and is normally set in activation for both powering mode and regeneration mode.

(3) Selection of current limit non-activation of powering mode and regeneration mode.

This is set at the time of driving synchronous motor or when high performance system operation is required with no deviation from set acceleration and deceleration times.

Setting range

(1) Set data changes to the direction → described below by Δ key and to the direction ← by ▽ key.

000 (standard setting at shipment)→00 1←→0 10←→0 1 1←→100←→

10 1←→1 10←→1 1 1

Caution at setting

When conducting rapid acceleration and/or rapid deceleration with current limit of powering mode and/or regeneration mode set in de-activation, there may be a case of over current tripping.

Code No.	Indication of function symbol	Contnet of function	Standard setting at shipment	Setting change during running
39	553	Setting function of V/f ratio and PWM modulation system	000	impossible

Explanation of function

By this Code, setting as regards V/f ratio and PWM modulation system can be set.

Code No. 39 □ □ □

0

□: 2nd power reduction torque V/f pattern
1: Constant torque V/f pattern

□: entire area asynchronous PWM modulation system (carrier frequency is set by Code No. 7)
1: fixed modulation (carrier frequency is set by Code No. 8)

* * value during running can be changed for above Code Nos. 7 and 8

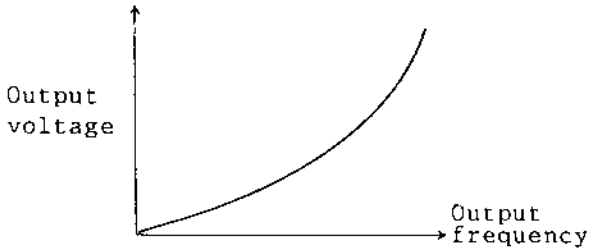
Explanation of respective functions

(1) V/f pattern

V/f pattern presents relation of output frequency and voltage of inverter. Since torque supplied by motor changes by this characteristic, 2nd power reduction torque V/f pattern and constant torque V/f pattern for load machine driven are shown below.

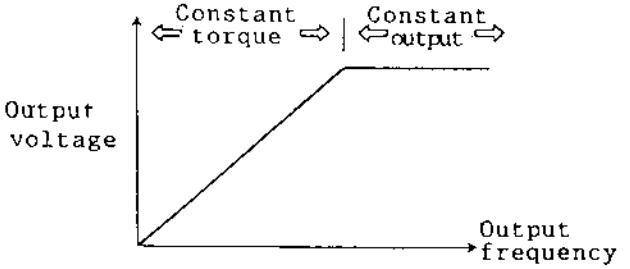
a) 2nd power reduction torque V/f pattern

This pattern is applied to the use that load torque changes by 2nd power of speed like the load driven of fan or pump.
Output voltage of inverter changes similar to load torque as shown in following drawing.



b) Constant torque V/f pattern

This pattern is applied when the load requires constant torque if the speed of the machine driver varies. Voltage and frequency is shown in the following drawing.
Also in constant output characteristic (output kW is constant despite change of speed), voltage becomes constant despite change of frequency.

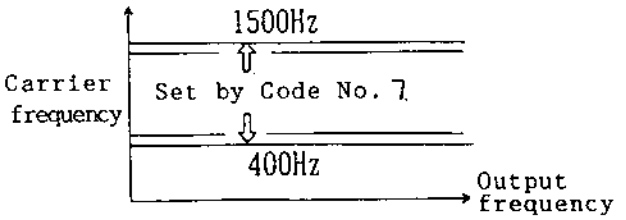


(2) PWM modulation system

VF5100HG adopts PWM (Pulse Width Modulation) system frequency as the method of controlling output voltage. Setting of PWM . . is the function of select the relation of switching frequency (carrier frequency) and output frequency.
This setting offers impact on motor noise reduction.

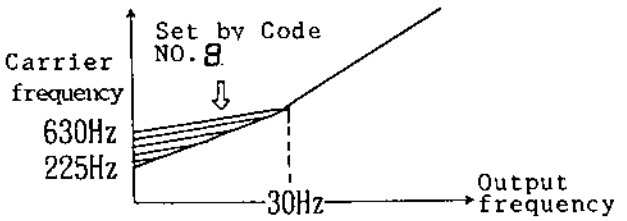
a) Entire area asynchronous PWM system

Irrespective to output frequency of inverter, carrier frequency is set constant. Despite change of motor speed, noise stemming from PWM becomes constant approximately. This carrier frequency can be set by Code No. 7 (see following drawing).
When setting over 1250Hz, output current must be reduced by 10%.



b) Asynchronous/synchronous changeover PWM system

Although asynchronous same as above-mentioned is available up to 30Hz output frequency of inverter, carrier frequency is let to rise in proportion to output frequency over the above. (see following drawing)
Motor noise stemming from PWM offers change of tone quality by speed.
Carrier frequency up to 30Hz can be set by Code No. 8



c) Low noise modulation and fixed modulation

Low noise modulation causes motor noise from PWM to become simple tone as regarding hearing. Fixed modulation does not vary modulation for noise reduction.

Setting range

(1) Setting data changes to → direction described below by Δ key and to ← direction described below by ∇ key.
000(standard setting at shipment)→001←→010←→011←→100←→101←→110←→111

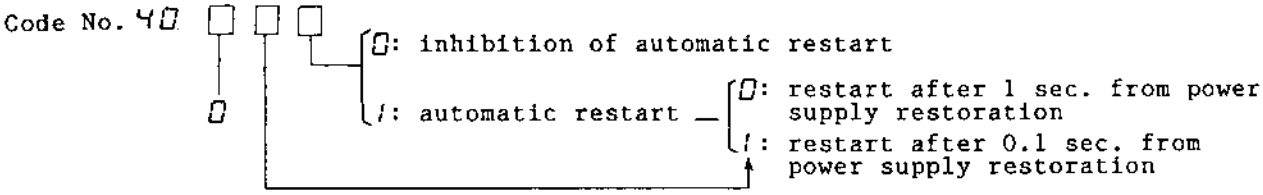
Caution at setting

(1) Setting of PWM system should be selected and adjusted with consideration extended to noise of the machine transmitted from carrier frequency.

Code No.	Indication of function symbol	Content of function	Standard setting at shipment	Setting change during running
40	554	Function of setting treatment method after instant power outage	000	impossible

Explanation of function

Setting is performed by this Code as regards performance at restoration of power supply after occurrence of instant power outage of inverter AC input including incident of lightening strike



Explanation of respective functions

VF5100HG stops because control power source falls short when less than 80% of rating of AC input continuous over 15m sec. This Code provides a setting whether to conduct automatic restart by power restoration of VF5100HG that has stopped by instant power outage.

Since automatic restart starts the motor from the speed during rotation by inertia of load, despite occurrence of instant power outage, impact to plant can be reduced.

Setting range

(1) Setting data changes to direction → described below by Δ key and to direction ← described below by ∇ key
000(standard setting at shipment)←→001←→010←→011

Caution at setting

(1) When selecting automatic restart function, there is the need to input running command inverter at the time of power supply restoration (inverter does not start despite conducting power supply restoration unless running command is switched on).

(2) As regards selection of restart after 1 sec. from power supply restoration and/or restart after 0.1 sec. from power supply restoration, please set to restart after 1 sec. from power supply restoration for single drive system that drives one set of motor and to restart after 0.1 sec. from power supply restoration for multidrive system that drives plural no. of sets of motor (Note).

Note: Since there may be the case that intermediate DC part of inverter at power supply restoration provides over voltage, please jointly use dynamic brake option.

(3) Relay 52MA (contact is provided at terminal block (21), (22), (23)) that outputs running condition of inverter switches OFF during period of power outage. Please pay attention when using this information for external controls.

Caution

As power outage of over about 10 seconds occurs at the setting of automatic restart function, inverter does not start despite conducting power supply restoration when running is operated by console or inverter keypad (DIR mode). When running in REM mode & operated from terminal block (4)~(6), as power supply restoration takes place starting is initiated by starting method set by Code No. 37.

Code No.	Indication of function symbol	Content of function	Standard setting at shipment	Setting change during running
41	555	Function of setting of torque boost compensating method	000	impossible

Explanation of function

This is the function to selecting or automatic for torque boost which compensates motor output torque in the low area of output frequency.

Code No. 41 □ □ □
- 0 0
- □: 0: manual boost — boost amount is set by Code No. 5
- □: 1: auto boost — boost amount is set by Code No. 5 at rated load

↑

Either of above can change the set value during running.

Explanation of respective functions

(1) Manual boost

Function to adjust torque boost manually in low speed area.

(2) Auto boost

Maximum torque boost amount in low speed area is set by Code No. 5.
And when selecting Code No. 41 to Auto boost, boost amount is automatically adjusted complying to load amount of motor.
Please input (motor rated voltage) - (set value of Code No. 5) for Code No. 6 (function symbol UAdU).

Setting range

(1) Set data changes to direction → described below by Δ key and to direction ← by ∇ key.
000 (standard setting at shipment) ←→ 001

Caution at setting

(1) Selection of Manual boost/Auto boost should be set with the following set as the target.

(a) Select Manual boost at multidrive system that drives plural motors.

(b) In single drive system that drives one set of motor, V/f characteristic of Code No. 39 should be set to:

i) 2nd power reduction torque characteristic

(i) Manual boost should be set when setting accelerating and decelerating time of Code Nos. 10, 11 less than 2 sec.

(ii) Auto boost should be set when setting accelerating and decelerating time of Code Nos. 10, 11 above 2 sec.

ii) Manual boost when setting constant torque characteristic.

Note: Since Auto boost controls boost amount after detecting load amount of motor, when using for application involving severe load variance its effect can not be exhibited.

Code No.	Indication of function symbol	Content of function	Standard setting at shipment	Setting change during running
42	556	Function of setting of output content of output terminal block for meter	000	impossible

Explanation of function

Output content of output current and output frequency (terminal block ⑧, ⑨, ⑫) connected to external devices can be changed by this Code.

Code No. 42 □ □ □

□ (□: Output of terminals (terminal block ⑫ ~ ⑨) for external ammeter should be set as total rms value current
1: Output of terminals (terminal block ⑫ ~ ⑨) for external ammeter should be set as motor effective component current

□ (□: Output of terminals (terminal block ⑧ ~ ⑨) for external frequency meter should be set as running frequency
1: for calibration of meter

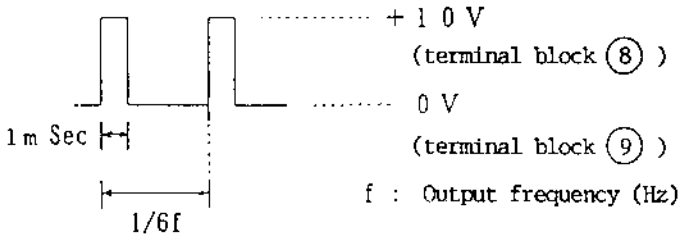
Explanation of respective functions

(1) Terminals for external ammeter

Select total rms current (total output current) of inverter output current or select effective component that outputs respective amounts of powering and regeneration amounts that separate motor output condition from the output current.
Refer to Code No. 53, 54 for output level etc.

(2) Terminals of external frequency meter

Following drawing outputs to terminal block ⑧ ~ ⑨.



(3) Calibration of meter

Setting this Code,
terminal block ⑫ ~ ⑨ outputs inverter rated current or motor effective component current of rating.
terminal block ⑧ ~ ⑨ outputs maximum frequency set by Code No. 1.

Setting range

(1) Set data changes to direction → described below by Δ key and to direction ← by ∇ key.
000 (standard setting at shipment) ←→ 010 ←→ 011 ←→ 000

Caution at setting

(1) After completing the calibration of external frequency meter and ammeter, be sure to restore to running frequency side (000 or 010).

Code No.	Indication of function symbol	Content of function	Standard setting at shipment	Setting change during running
43	557	Setting function at the time of RS232C control	000	impossible

Explanation of function

When controlling VF5100HG by RS232C, RS232C port is open by this Code.

Code No. 43 □ □ □
- 0 0
- □: RS232C control is not allowed.
- 1: RS232C control is allowed.

Explanation of respective functions

Refer to Code Nos.47~51, 53 for the details.

Setting range

(1) Set data changes to direction → described below by Δ key and to direction ← by ∇ key.
000 (standard setting at shipment) ←→ 001

Code No.	Indication of function symbol	Content of function	Standard setting at shipment	Setting change during running
44	558	Function to set relation between frequency setting of external and output frequency	000	impossible

Explanation of function

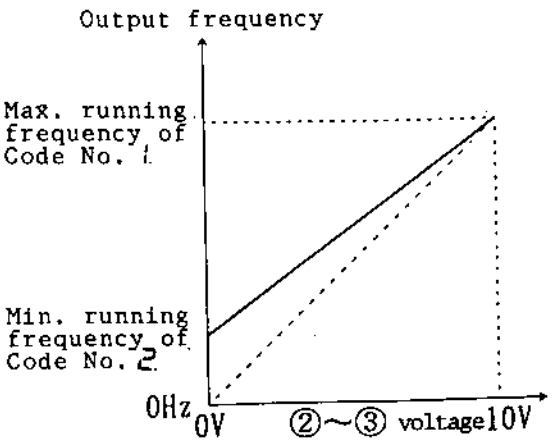
Relation between output frequency setting signal from external and frequency outputted actually is set by this Code.

Code No. 44 □ □ □
- 0 0
- □: stack up system
- 1: insensitive band system

Explanation of respective functions

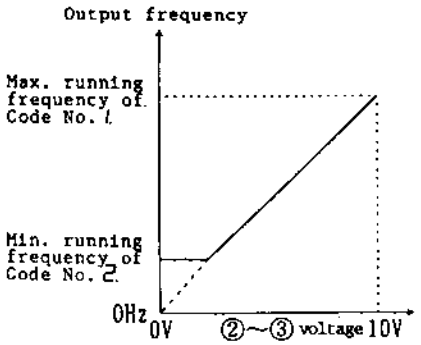
When supplying analogue signal to terminal block ②, ③ and when setting running frequency of inverter, relation between signal amount supplied and output frequency can be selected by following 2 systems.

(1) Stack up system
As shown in following drawing, the relation between voltage supplied to ②, ③ and output frequency is such that setting 0V as minimum running frequency of Code No. 2 and 10V as maximum running frequency of Code No. 1, the system to connect the section between above-mentioned.



(2) Insensitive band system

While maintaining voltage between ②~③0V as 0 Hz and 10V as maximum running frequency of Code No. 1, as shown in the following drawing, the system of not enabling set below minimum running frequency of Code No. 2.



Note: For either stack up system and insensitive band system, as start command is supplied to inverter, rise is conducted by the rate set for accelerating time of Code No. 10 from starting frequency set by Code No. 16 to minimum running frequency of Code No. 2.

Setting range

(1) Set data changes to direction → described below by Δ key and to direction ← by ∇ key.
000 (standard setting at shipment) ←→ 001

Code No.	Indication of function symbol	Content of function	Standard setting at shipment	Setting change during running
45	SS9	Not used	000	impossible

Explanation of function

This code is not used.

Code No.	Indication of function symbol	Content of function	Standard setting at shipment	Setting change during running
46	SSA	Selecting function of output frequency setting system by console or external up/down signal	000	impossible

Explanation of function

When setting output signal by up-down signal from console of VF5100HG or from external , the setting method can be selected as described below.

Code No. 46 data □□□

- 000: Output frequency is set by preset system
- 001: Output frequency is set by interlock system and forward/reverse running is designated by console of terminal block
- 011: Output frequency is set by interlock system and forward/reverse running is changed over automatically by up-down signal.

Explanation of respective functions

(1) At 000 setting: Preset system

(a) When operating mode is selected to DIR:
As Code No. OFSET selected by MODE key and as SET key is depressed, function symbol FSET changes to current running frequency. After Δ, ∇ keys are depressed at this condition and at the setting the new running frequency, when SET key is depressed, frequency changes to the frequency set by accelerating or decelerating time.

(b) When operating mode is selected to REM:
Output frequency is set by voltage supplied between terminal block ② ~ ③.

(c) As regards Forward/Reverse run changeover, FOR/REV key or ④⑥ terminals become effective by DIR/REM of console.

(2) At 00 1 setting: Interlock setting system
(designation of FOR/REV selection)

(a) When operating mode is selected to DIR:
After selecting Code No. OFSET by MODE key and until depressing SET key, the system is same as preset system. However in interlock system, by depressing Δ key or ∇ key next, frequency changes by the setting of accelerating time or decelerating time.
Δ key: frequency rises while this key is depressed.
∇ key: frequency drops while this key is depressed.

(b) When operating mode is selected to REM:
When terminal block ⑭ ~ ⑮ is closed, frequency rises during this closure and when ⑭ ~ ⑯ is closed, frequency drops during this closure.

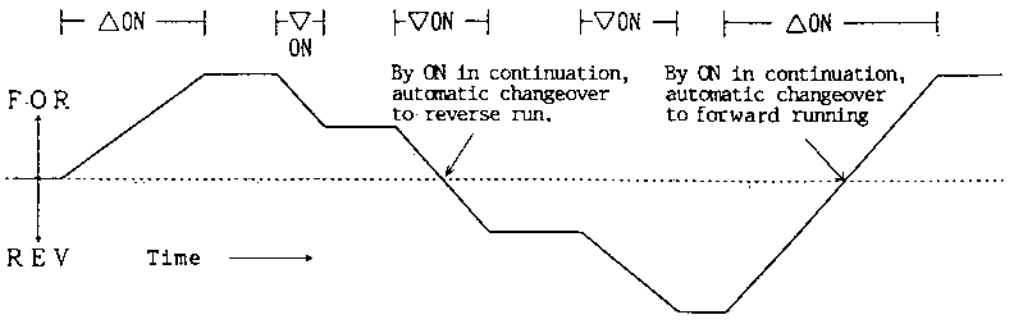
(c) Changeover of FOR/REV running is same above (1) (c).

(3) At 011 setting: Interlock setting system (designation of FOR/REV selection)

(a) When operating mode is selected as DIR → Same as above (2) (a).

(b) When operating mode is selected as REM → Same as above (2) (b).

(c) FOR/REV running changeover
Against Δ key of console, close signal of terminal block ㉔ - ⑮, ∇ key of console and close signal of terminal block ⑭ - ⑯, output frequency becomes as shown in the following drawing.



Reference: Refer to Code No. 50.

Setting range

(1) Set data is changed to direction → described below by Δ key and to direction ← described below by ∇ key.
000 (standard setting at shipment) ←→ 001 ←→ 010 ←→ 011

Caution at setting

(1) When selecting changeover of FOR/REV running by interlock running, due attention should be paid to variance of frequency and rotating direction.

Code No.	Indication of function symbol	Content of function	Standard setting at shipment	Setting change during running
47.	556	Function for selecting operating mode of output frequency	0	impossible

Explanatin of function

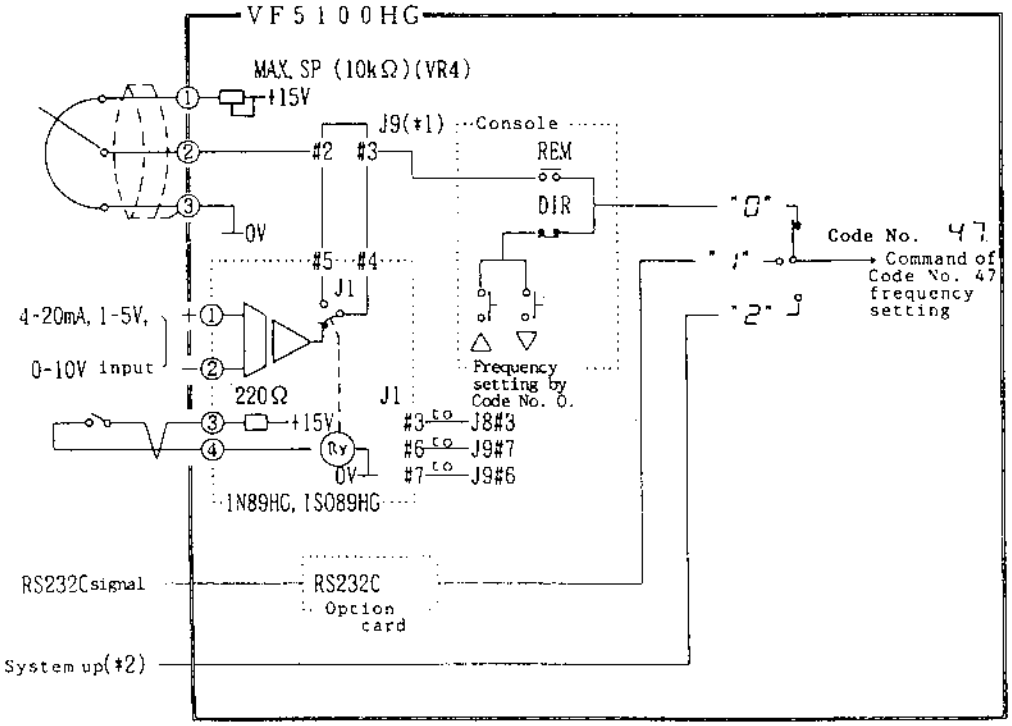
Selection can be made by the following:

Code No. 47 □ □ □

- 0: Method of setting output frequency is selected by DIR/REM key of console
- 1: Method of setting output frequency is controlled by RS232C signal
- 2 We use VF5100HG series in an engineered system up.

Explanation of respective functions

Following drawing is available to explain this function.



(*1) Without IN89HG, ISO89HG options the section between #2 - #3 of connector J9 of printed board VFC51HG is short-circuited.

(*2) This is used when we conduct engineered system up design.

Note: Setting place of output frequency can be fixed by write protect switch. Refer to Chapter 16.

Setting range

(1) Set data is changed to direction → described below by Δ key and to direction ← by Δ key.
0 (standard setting at shipment)←→ 1←→2

Caution at setting

(2) When setting " 2 ", change of frequency setting becomes impossible.

Code No.	Indication of function symbol	Content of function	Standard setting at shipment	Setting change during running
48	55c	Function for selecting operating mode of Start/Stop	0	impossible

Explanation of function

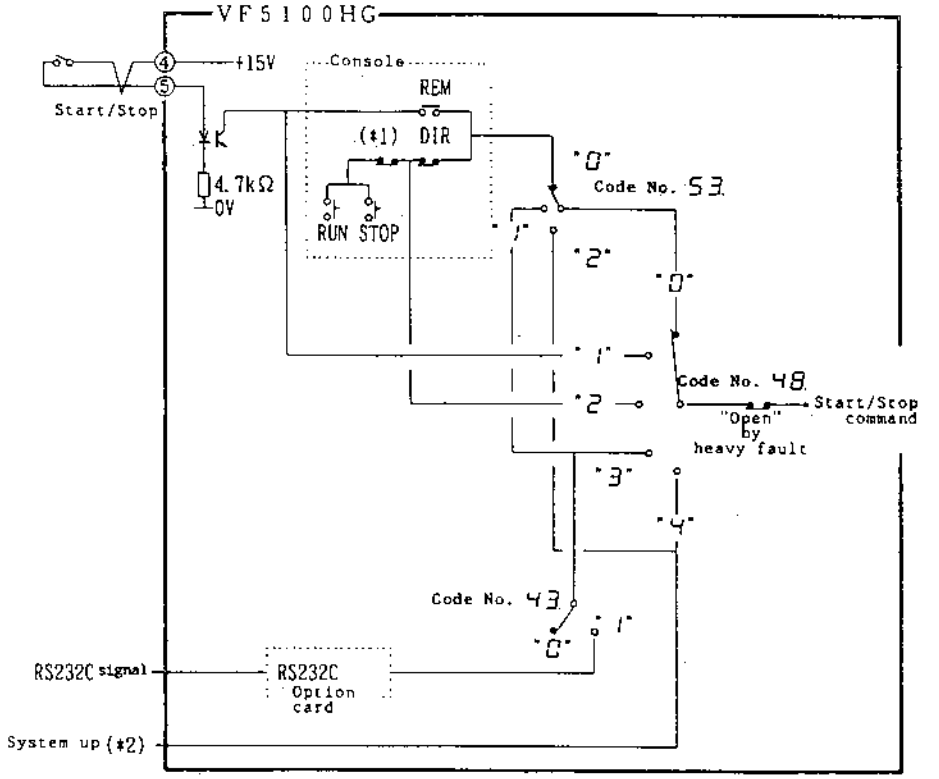
Selection can be conducted by the following as to what to do with the operating mode of Start/Stop.

Code No. 48 □ □ □

- 0 : Start/Stop operation is selected by DIR/REM key or console.
- 1 : Start/Stop is operated from terminal block (Operation can not be conducted from console)
- 2 : Start/Stop is operated from console (Operation can not be conducted from terminal block)
- 3 : Start/Stop is controlled by RS232C signal.
- 4 : This is used in engineered design or system-up

Explanation of respective functions

Following drawing presents the explanation of this function.



*1. By condition of write protect SW2, operation by console can be inhibited.

*2. This is used when conducting system-up design by Drivecon.

Setting Range

(1) Set data changes to the direction → described below by Δ key and to direction ← by ∇ key.
0 (standard setting at shipment) ⟷ 1 ⟷ 2 ⟷ 3 ⟷ 4

Caution at setting

(1) When "4" is set, selection of Start/Stop can not be made.

Code No.	Indication of function symbol	Content of function	Standard setting at shipment	Setting change during running
49	55d	Function to select operating mode of Jog	0	impossible

Explanation of function

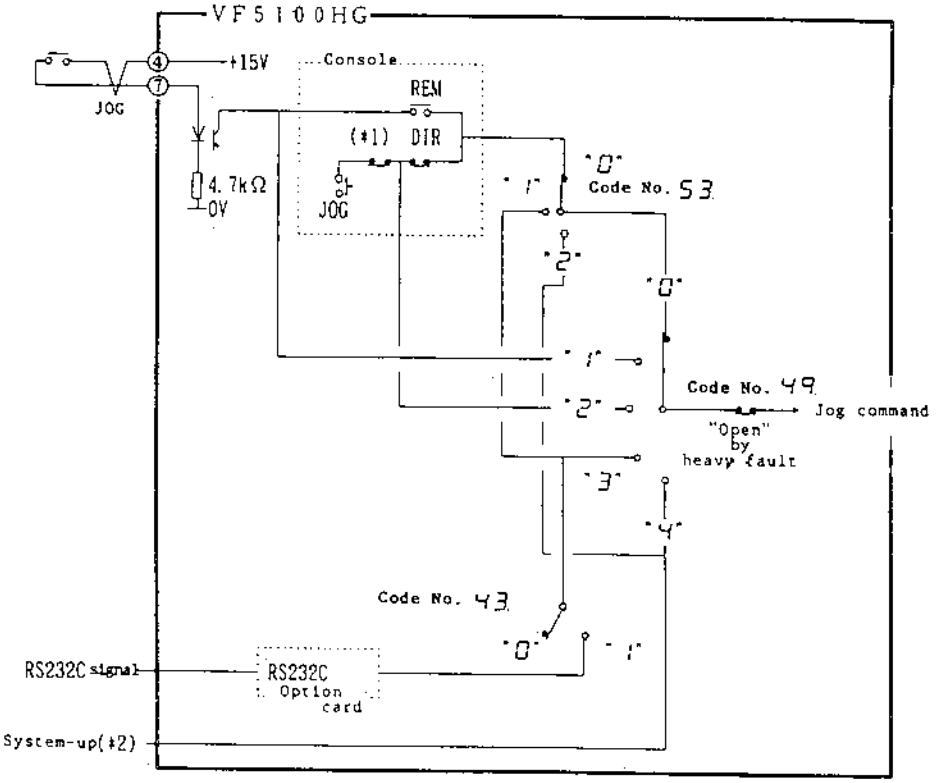
Selection is made by the following as to what to do with operating mode of Jog.

Code No. 49 □ □ □

- 0: Jog operation is selected by DIR/REM key of console
- 1: Jog operation is conducted from terminal block (Operation from console can not be conducted)
- 2: Jog operation is conducted from console (Operation from terminal block can not be conducted)
- 3: Jog operation is controlled by RS232C signal.
- 4: This is used when conducting system-up of VF5100HG design.

Explanation of respective functions

Following drawing presents the explanation of this function.



*1. By the condition of write protect switch 2, operation from console can be inhibited. Refer to Chapter 16.

*2. This is used when using system-up Drivecon design.

Setting range

(1) Set data changes to direction → described below by Δ key and to direction ← by ∇ key.
0 (standard setting at shipment) ⟷ 1 ⟷ 2 ⟷ 3 ⟷ 4

Caution at setting

(1) When "4" is set, Jog operation can not be made.

Code No.	Indication of function symbol	Content of function	Standard setting at shipment	Setting change during running
50	55E	Function to select operating mode of reverse running	0	impossible

Explanation of function

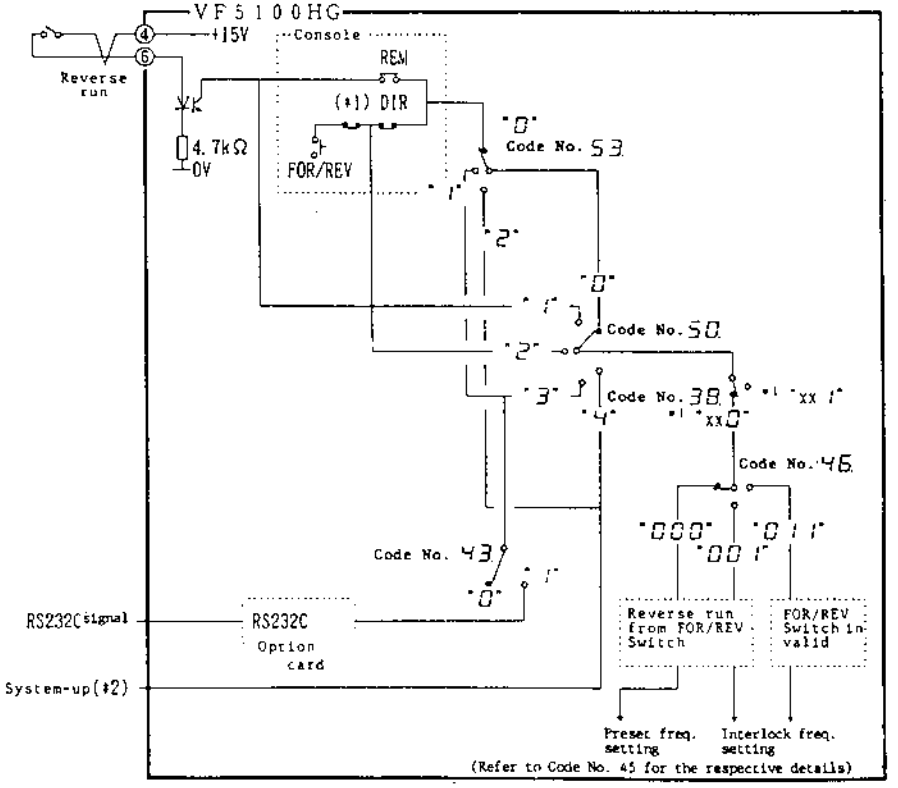
Selection can be made by the following as to what to do with operating mode of reverse operation.

Code No. 50 □ □ □

- 0: Operation of reverse running is selected by DIR/REM key of console.
- 1: Operation of reverse running is conducted from terminal board (Operation from console can not be conducted)
- 2: Operation of reverse running is conducted from console (Operation from terminal block can not be conducted)
- 3: Reverse running is controlled by RS232C signal.
- 4: This is used by our company when conducting system-up of VF5100HG series.

Explanation of respective functions

Following drawing presents the explanation of this function.



*1. lowest position (at most right) data of Code No. 38

(*1) From the condition of write protect SW2, operation from console can be inhibited. Refer to Chapter 16.

(*2) This is used by our company when using system-up design.

Setting range

(1) Set data changes to direction → described below by Δ key and to direction ← by ∇ key.
0 (standard setting at shipment) ⟷ 1 ⟷ 2 ⟷ 3 ⟷ 4

Caution at setting

(1) As "4" is set, reverse operation can not be made.

Code No.	Indication of function symbol	Content of function	Standard setting at shipment	Setting change during running
51.	55F	Function to select operating mode of reset	0	impossible

Explanation of function

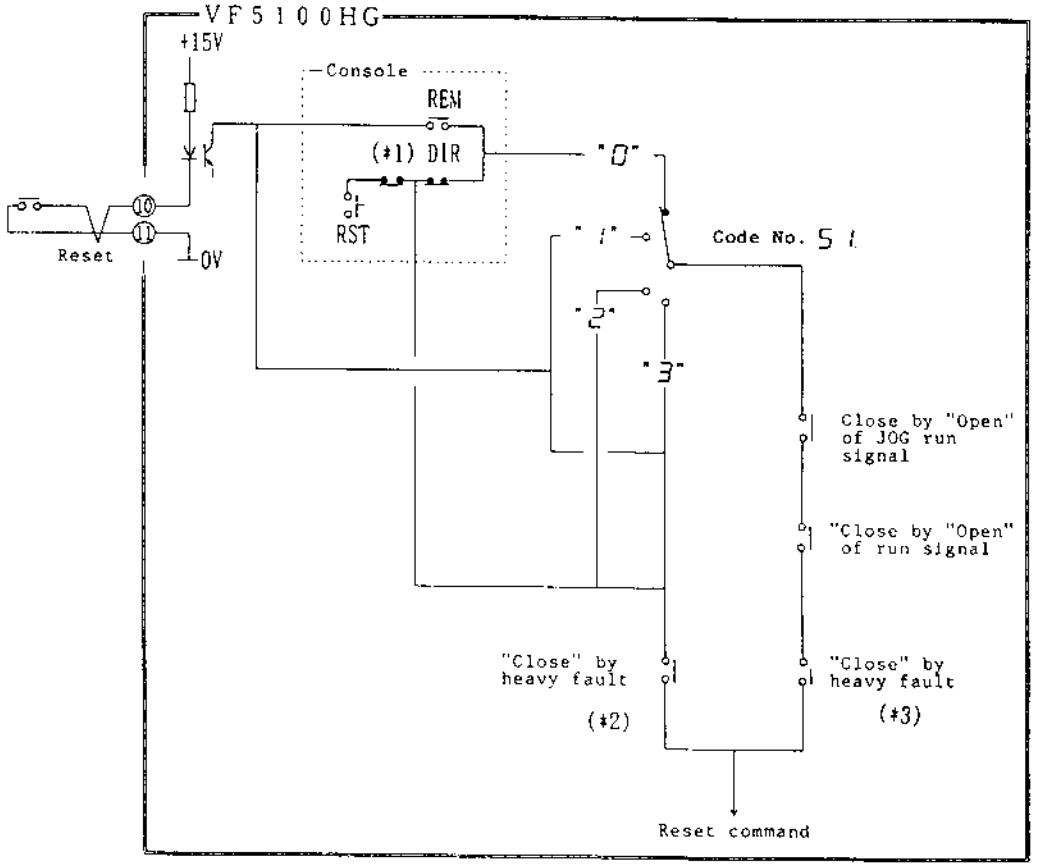
Selection can be made by the following as to what to do with the operating mode of reset.

Code No. 51 □ □ □

- 0: Reset operation is selected by DIR/REM key of console.
- 1: Reset is conducted from terminal block (Operation from console can not be conducted)
- 2: Reset is conducted from console (Operation from terminal block can not be conducted)
- 3: Reset is conducted from both terminal block and console.

Explanation of respective functions

Following drawing presents the explanation of this function.



(*1) By condition of write protect SW2, operation from console can be inhibited. Refer to Chapter 16.

(*2) Fault that fault relay (86A) actuates by Chapter 17.

(*3) Fault that fault relay (86A) does not actuate by Chapter 17.

Setting range

(1) Set data changes to direction → described below by Δ key and to direction ← by ∇ key.

0 (standard setting at shipment) ⟷ 1 ⟷ 2 ⟷ 3

Code No.	Indication of function symbol	Content of function	Standard setting at shipment	Setting change during running
52.	SSC	Function to select and set speed control system of VF5100HG	0	impossible

Explanation of function

As to what speed system is set for VF5100HG, setting is made by this Code.

Code No. 52□□□

- 0: Running by V/f control.
- 1: Running by droop control —— droop amount is set by Code No. 31.
- 2: Running by slip compensating control —— slip amount is set by Code No. 32.
- 3: Running by automatic speed control (ASR) —— ASR option is required.

Setting range

(1) Set data changes to direction → described below by Δ key and to direction ← by ∇ key.
0 (standard setting at shipment) ⟷ 1 ⟷ 2 ⟷ 3

Code No.	Indication of function symbol	Content of function	Standard setting at shipment	Setting change during running
53.	SSH	Function to select and set whether to control entire running operation by RS232C	0	impossible

Explanation of function

As to what operating system is set for VF5100HG, setting is made by this Code.

Code No. 53□□□

- 0: Interlock to console
- 1: Enbloc RS232C control
- 2: This is used by Drivecon when setting system-up for VF5100HG series.

Explanation of respective functions

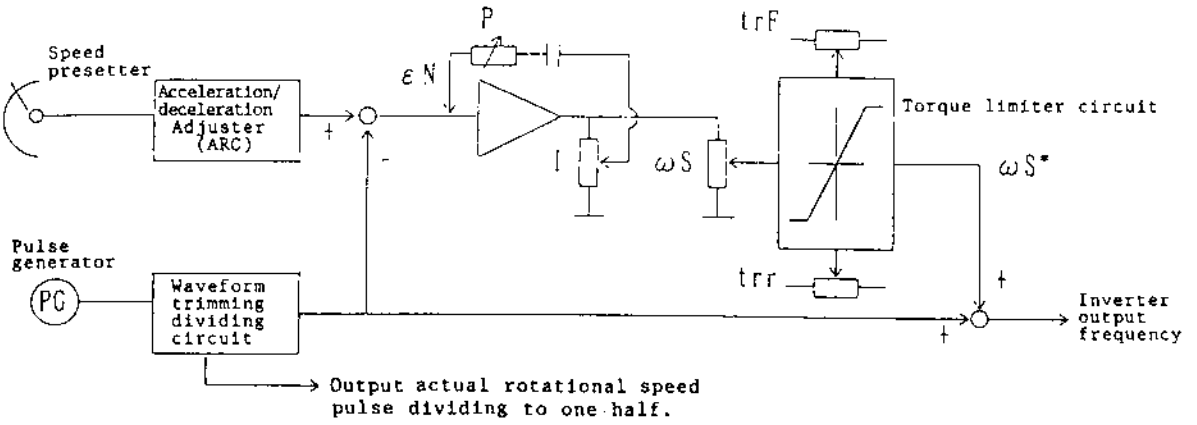
Refer to Code Nos. 47, 48, 49, 50.

Code No.	Indication of function symbol	Content of function	Standard setting at shipemnt	Setting change during running
54.	- - -	Not used	0	-
55.	- - -	"	0	-
56.	- - -	"	0	-
57.	- - -	"	0	-
58.	- - -	"	0	-

Code No.	Indication of function symbol	Content of function	Standard setting at shipment	Setting change during running
59	— P	Function to set proportional amount when using ASR option	20 %	possible
60	— I	Function to set integrating amount when using ASR option	20 %	possible

Explanation of function

These are the functions of adjustment when conducting automatic speed control (ASR) by combining UF motor used for our inverter to VF5100HG series.
Code Nos.59, 60 adjust P, I amount of above ASR block diagram.



Setting range

(1) Code No.59 can input 0 ~ 100% by 1% pitch.
(2) " No.60 " " " " " " .
(3) " No.69 " " 0 ~ 150% " " " .
(4) " No.70 " " " " " " .

Caution at setting

(1) As P is set closer to 100% side response becomes faster.
100% of P is such that by 2.5Hz of speed difference εN, ASR output is arranged as the value that becomes ωS* of 255%.

(2) As I is set closer to 100% side, response becomes faster.
100% of I is such that by 2.5Hz of speed difference εN, ASR output until becoming 0 → 255% is arranged as the value that becomes about 1.4 sec.

(3) Although the setting of torque limit of Code Nos.69, 70 is adjusted by your system, the setting of current limit of Code Nos.29, 30 must always be 150%.

Code No.	Indication of function symbol	Content of function	Standard setting at shipment	Setting change during running
61.	- - -	Not used	0	-
62.	- - -	Not used	0	-

Code No.	Indication of function symbol	Content of function	Standard setting at shipment	Setting change during running
63.	0AJ	0 point adjustment of ammeter connected externally	0	possible

Explanation of function

By Code No.42, output of terminal block ⑫ ~⑨ for ammeter connected externally can conduct the changeover to

- total rms current of VF5100HG
  and
- motor running condition discriminating powering and regeneration.

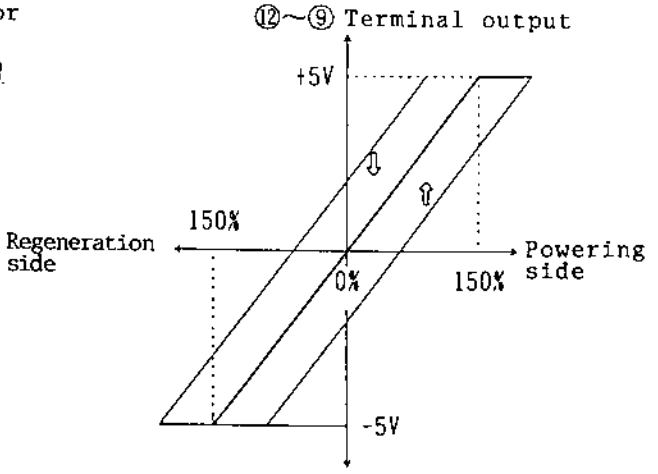
When setting by Code No. 42 to motor running condition that discriminates powering and/or regeneration, terminal block ⑫ ~⑨ for ammeter connected externally outputs DC voltage of +(plus) during powering and -(minus) during regeneration with ⑨ set as 0V (by setting of "total rms current", output by +(plus) side only).
Code No. 63 conducts 0 point adjustment as regards ⑫ ~⑨ terminals output by "motor running condition that discriminates powering and/or regeneration".

0 point adjustment

At no-load of motor (condition of motor single unit without connecting load), adjustment is conducted by Code No. 63 so that output of terminals ⑫ ~⑨ becomes 0V.

By ↑ of right drawing, setting is programmed to + side.

By ↓ of right drawing, setting is programmed to - side.



Note 1.: 100% of powering side and/or regeneration is such that,

- When selecting total rms current by Code No.42, rated current of VF5100HG becomes 100%.
- When selecting motor effective component current by Code No.42, motor at rated output (at rated torque by rated speed) becomes approximately 100%.

Note 2.: Accuracy of ⑫ ~ ⑨ terminal block output is ± 10%. (Whereas when (1) of following "Caution at setting" is set precisely).

Setting range

Code No. 53 is possible to input -500 ~ +500 by 1 pitch.

Caution at setting

(1)When adjusting this Code No., please perform this adjustment after setting "IR compensation of Code No. 33 and "Power factor correction of Code No. 34".

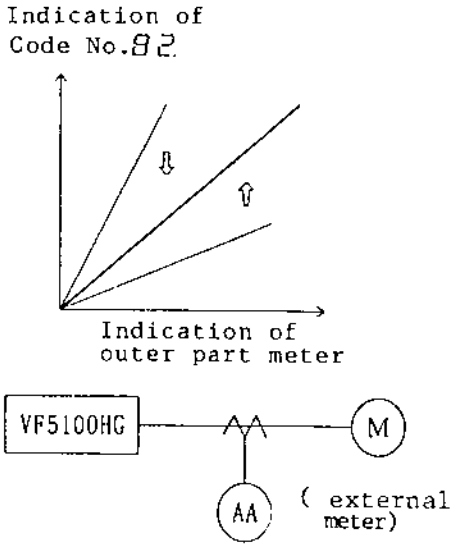
Code No.	Indication of function symbol	Content of function	Standard setting at shipment	Setting change during running
54	AGn	Console current monitor calibration	100%	possible

Explanation of function

Although output current can be monitored by Code No.82, calibration is conducted by Code No. 54 so that indicating value matches with the meter of good accuracy connected externally.

Calibration

In order that indication of Code No. 82 matches with the indicating value of meter fitted externally, as shown in the following drawing, ↑ raises the setting of Code No. 54 and ↓ lowers the said setting.



Setting Range

Code No. 54 can range 60 ~ 140% by 1% pitch.

Code No.	Indication of function symbol	Content of function	Standard setting at shipment	Setting change during running
65.	- - -	Not used	0	-
66.	- - -	Not used	0	-
67.	- - -	Not used	0	-
68.	- - -	Not used	0	-

Code No.	Indication of function symbol	Content of fucntion	Standard setting at shipment	Setting change during running
69.	trr	When using automatic speed control option, function to set power mode torque limit	150%	possible
70.	trF	When using automatic speed control option, function to set regeneration modetorque limit	150%	possible

Explanation of functions

There are setting functions when conducting ASR running combining UF motor for our inverter to VF5100HG series. Refer to Code Nos.59,60 for the details.

Code No.	Indication of function symbol	Content of function	Standard setting at shipment	Setting change during running
71.	- - -	Not used	0	-
72.	- - -	Not used	0	-
73.	- - -	Not used	0	-
74.	- - -	for our adjustment	0	-
75.	- - -	for our adjustment	0	-
76.	En1	for our adjustment (do not change)	0000	-
77.	En2	for our adjustment (do not change)	0000	-
78.	En3	for our adjustment (do not change)	0000	-
79.	En4	for our adjustment (do not change)	0000	-
80.	non	for our adjustment (do not change)	Not determined	-

Code No.	Indication of function symbol	Content of function	Unit indicating lamp	Monitor changeover
81.	Fo	Running frequency indication (Monitor)	Hz	possible
82.	Io	Total rms current indication (Monitor)	A	possible
83.	Uo	Output voltage indication (Monitor)	V	possible
84.	Ir	Effective component indication of output current (Motor) (Motor output indication)	%	possible
85.	Udc	Intermediate DC voltage indication (Monitor)	V	possible
86.	rPn	Indication of actual rms of motor (Monitor) * Indication when using ASR option	rpm	possible

Explanation of functions

Above points can be monitored regarding VF5100HG during operation.

Selection of indication

To select indication of above items.

Depress MODE key and set to condition of selecting function

↓

Set Code Nos.(81~85) that lets to indicate by Δ , ∇ keys.

↓

Depress SET key ← (Depress MODE key twice)

↓

Set data of monitor point is indicated.

Note: (1) When any of Code Nos. 81~85 is set once, data of monitor point is always indicated during running.

(2) When changing set data other than monitor during running, after a few seconds from completing change, automatic change to monitor data set takes place. As an example, when monitor selection is set by Code No.81, despite changing output frequency by Code No. 0, console automatically indicates output frequency.

19. Option

Following is made available as the option exclusively used for VF5100HG series.

Current input setting option:

This is the I/V converter (current/voltage converter) which is used when industrial use general standard signal DC4 ~ 20mA (or DC1 ~ 5V) is offered as frequency setting input of VF5100HG. This option consists of input/output insulation mode (ISO89HG) and non-insulation mode (IN89HG).

Dynamic brake option:

VF5100HG itself does not have the function as an example to absorb braking force produced at the time of decelerating load of large inertia in a short time. Dynamic brake option converts braking force produced at the time of running VF5100HG to heat by resistance.

Automatic speed control (ASR) option:

In the standard system of VF5100HG series, motor speed changes a few % (for the slip portion of motor) by load variance. Automatic speed control option is such that actual speed of motor is detected and the speed set irrespective to load condition of motor is always maintained.

RS232C control option:

This is the option to control VF5100HG by RS232C which is the means of communication of a variety of control equipment including sequencer and computer.

Output grounding option:

This is the grounding detection option of VF5100HG output wiring.

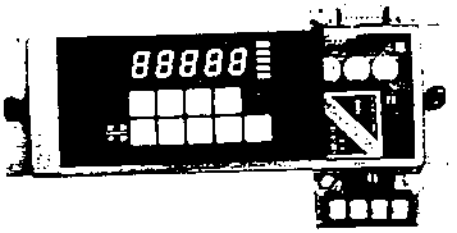
Division by built in to main body of VF5100HG and by separate installation and restriction of combination are as arranged as shown in the following table.

Name of OPTION		Fitting division	Option possible for addition furthermore					
			Current input setting		Dynamic brake	Auto. speed control	RS232C control	Output grounding
			ISO89HG	IN89HG				
Current input setting	Input/output insulation (ISO89HG)	Built-in	-	Impossible	Possible	Possible to fit either one side		Possible
	Input/output non-insulation (IN89HG)	Built-in	Impossible	-	Possible	Possible to fit either one side		Possible
Dynamic brake		Separate	Possible to fit either one side		-	Possible to fit either one side		Possible
Auto. speed control		Built-in	Possible to fit either one side		Possible	-	Impossible	Possible
RS232C control		Built-in	Possible to fit either one side		Possible	Impossible	-	Possible
Output grounding		Built-in	Possible to fit either one side		Possible	Possible to fit either one side		-

19-1 Analog input and conditioning option

19-1-1 Mounting location

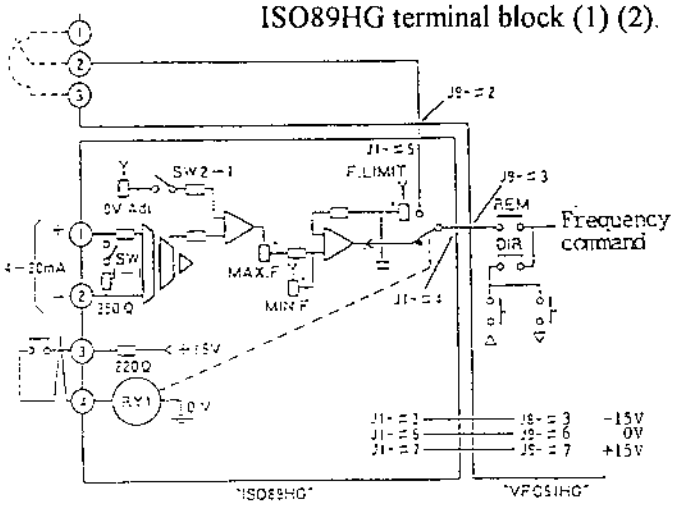
Analog input option (both input/output isolation and non-isolation) is such that the printed board is mounted to the console bracket of VF5100HG.
(Refer to drawing at right)



19-1-2 Circuit drawing

Circuit drawing respectively of input/output isolated model (part number ISO89HG) and non-isolated model (part number IN89HG) are shown below. Refer to Code No. 46 in Chapter 18, "Explanation of Function" regarding operation with VF5100HG.

(A) Input/output isolated model (Part number ISO89HG) type of input signal applied to ISO89HG terminal block (1) (2). And condition of SW1-1,2 on printed board.



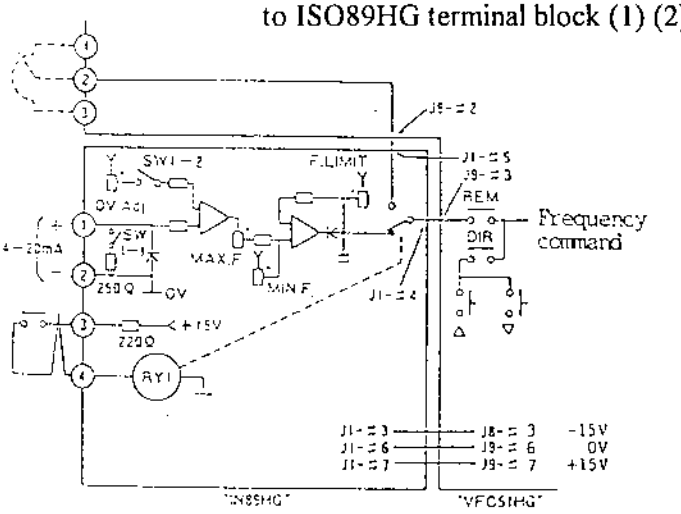
Type of input signal	SW1-1	SW2-1
DC4~20mA	ON	ON
DC1~5V	OFF	ON
DC0~10V	OFF	OFF

Standard settings at shipment: SW1-1=ON
SW2-1=ON

(SW1-2,SW2-2 are not used)

Note: J _____ - # _____ show connector number and pin number.

(B) Input/output non-isolated model (Part number IN89HG) type of input signal applied to ISO89HG terminal block (1) (2). And condition of SW1-1,2 on printed board.



Type of input signal	SW1-1	SW1-2
DC4~20mA	ON	ON
DC1~5V	OFF	ON
DC0~10V	OFF	OFF

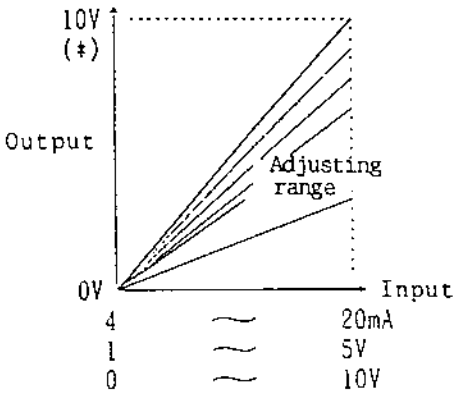
Standard settings at shipment: SW1-1=ON
SW1-2=ON

Note: J _____ - # _____ show connector number and pin number.

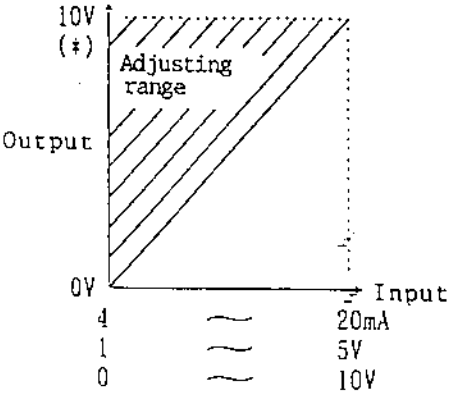
19-1-3 Adjusting function and range

For both input/output isolated model and input/output non-isolated models, adjustment is possible in the range described below by potentiometer on printed circuit board.

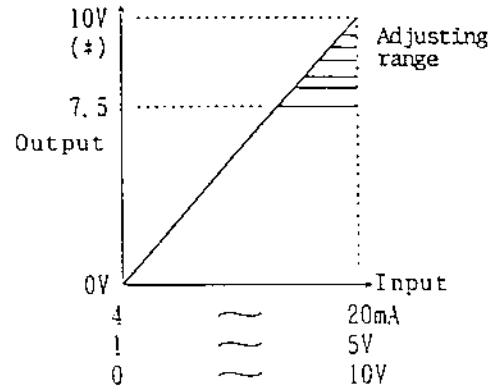
Pot device No.: MAX. F
Adjusting valve: Input/output ratio adjustment.
Adjusting range: 0-10V output at max. input.



Pot device No.: MIN. F
Adjusting valve: Input/output ratio adjustment.
Adjusting range: 0-10V output bias adjustment.

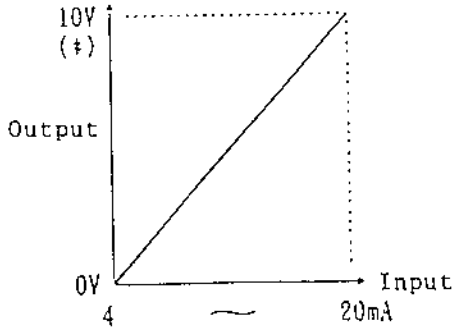


Pot device No.: F. LIM
Adjusting valve: Input/output ratio adjustment.
Adjusting range: Sets top limit for max. frequency.



Pot device No.: 0V Adj.
Adjusting content: for 0V adjustment
Factory preset - do not re-adjust.

(Standard setting at shipment)
Standard setting by Drivecon at shipment.



(*) : Maximum frequency set by Code No. 1 and 10V is supplied.

19-1-4 Relationship with respective functions of VF5100HG.

Refer to Chapter 18 Code No. 47 for cross linked functions.

19-2. Dynamic brake option

19-2-1 Fitting place

Although dynamic brake option consists of resistor (dynamic brake resistor) that provide heat disposal of regeneration power, overload detecting thermal and brake unit that controls regeneration power. VF5100HG type of relatively small output capacity, brake unit is built-in.

19-2-2 Specification

Specification including built in type and separate installing type of brake unit is shown in the following table.

200/230V SERIES VF5120HG DYNAMIC BRAKE SIZING TABLE A

VFD MODEL	DB MODULE PART #	DB RESISTOR & OVERLOAD KIT PART #	RESISTOR SIZE H x W x D (IN)	FULL LOAD THERMAL O.L. RATING	THERMAL HEATER #
VF5120HG-3	INTEGRATED	DBK1-70-400-*	4 x 4 x 4	2.2A	FH23
VF5120HG-5	INTEGRATED	DBK1-46-800-*	5 x 7 x 12	4.2A	FH30
VF5120HG-7.5	INTEGRATED	DBK1-30-800-*	5 x 7 x 12	5.2A	FH33
VF5120HG-10	INTEGRATED	DBK1-20-800-*	5 x 7 x 12	6.2A	FH34
VF5120HG-15	INTEGRATED	DBK1-15-1K-*	5 x 10 x 12	8.0A	FH37
VF5120HG-25	VFDB302	DBK1-9-1.6K-*	5 x 13 x 12	12.6A	FH42
VF5120HG-30	VFDB302	DBK1-9-1.6K-*	5 x 13 x 12	12.6A	FH42
VF5120HG-50	VFDB502	DBK1-7-2.4K-*	5 x 10 x 18	16.0A	FH45
VF5120HG-60	VFDB502	DBK1-7-2.4K-*	5 x 10 x 18	16.0A	FH45
VF5120HG-100	VFDB1002	DBK2-7-2.4K-*	10 x 10 x 18	2x 16.0A	2x FH45
Consult factory above 100HP					
Dynamic brake resistor overload kit: DBKX-X-X. Normally closed contact only.					
Dynamic brake resistor and overload kit: DBKCX-X-X. Form 'C' contact. (Optional)					

Thermal overload of specified amperage rating is supplied for each resistor and provided loose for customer panel mounting. Enclosed units are also available, consult factory. A magnetic line disconnect on the input side of the VF5100 is to be opened if thermal overload trips. Consult Drivecon on rating of line disconnect.

a) Dynamic brakes are sized for the 100% braking torque for a maximum of 10% duty cycle - consult Drivecon for higher torques or higher cycle rates.

*-O: OPEN *-P: PERFORATED *-L: LOUVERED

400/480V SERIES VF5140HG / VF5148HG DYNAMIC BRAKE SIZING TABLE A

VFD MODEL VF5140HG VF5148HG	DB MODULE PART #	DB RESISTOR & OVERLOAD KIT PART #	RESISTOR SIZE H x W x D (IN)	FULL LOAD THERMAL O.L. RATING	THERMAL HEATER #
-3	INTEGRATED	DBK1-300-400-*	4 x 4 x 14	1.1A	FH16
-5	INTEGRATED	DBK1-160-500-*	5 x 7 x 12	1.7A	FH20
-7.5	INTEGRATED	DBK1-120-500-*	5 x 7 x 12	2.0A	FH22
-10	INTEGRATED	DBK1-90-500-*	5 x 7 x 12	2.5A	FH25
-15	INTEGRATED	DBK1-60-1.2K-*	5 x 10 x 12	4.6A	FH31
-25	INTEGRATED	DBK1-40-1.6K-*	5 x 13 x 12	6.3A	FH35
-30	VFDB304/305	DBK1-30-2.4K-*	5 x 10 x 18	9.0A	FH38
-50	VFDB304/305	DBK1-28-3.2K-*	5 x 13 x 18	10.7A	FH40
-75	VFDB504/505	DBK1-20-3.6K-*	5 x 10 x 26	13.4A	FH43
-100	VFDB504/505	DBK1-16-4.8K-*	5 x 13 x 26	17.3A	FH46
-150	VFDB1004/1005	DBK2-20-3.6K-*	10 x 10 x 26	2X 13.4A	2X FH43
Consult factory above 150HP					
Dynamic brake resistor and overload kit: DBKX-X-X. Normally closed contact only.					
Dynamic brake resistor and overload kit: DBKCX-X-X. Form 'C' contact. (Optional)					

(1) Max. brake power P_B is calculated from the following equation.

$$P_B = \frac{T_B \times N}{974} \quad (kW)$$

T_B: Decelerating torque (Kg-m) obtained from GD^2 converted to motor shaft, decelerating time and load torque

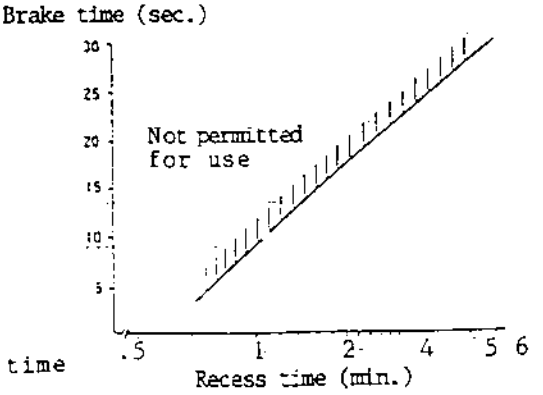
N : Motor speed (rpm) at starting deceleration

The result of this calculation enables the selection of dynamic brake option within maximum brake power of above table.

Note: When dynamic brake option is built-in VF5100HG and when brake power falls short, reenforcement can be made by connecting dynamic brake option installed separately. However brake unit built-in can not be used with seperate modle.

Note: When performance cannot be meet by single brake unit installed separate ly multiple of units are used in parallel.

(2) Recess time between braking time until next braking time is required to be as shown in the following drawing.



Brake time vs. required recess time

Table 6-3: Dynamic Brake Wire Size

A) 200-230V Inverters (Use 600V rated wire) (AWG)

MODEL		VF5120HG									
HP		3	5	7.5	10	15	25	30	50	60	100
VFDB MODEL		N/A	N/A	N/A	N/A	N/A	302	302	502	502	1002
DRIVE TERMINALS	P1 P2	14	14	14	14	12	12	10	8	8	4
	B	14	14	14	14	12	--	--	--	--	--
VFDB TERMINALS	N	14	14	14	14	12	12	10	8	8	4
	0, 2, 4	16	16	16	16	16	16	16	16	16	16
	P	16	16	16	16	16	16	16	16	16	16
	PR, N	14	14	14	14	12	12	16	8	8	4

Dynamic brake module is integrated in inverter chassis in 200V models up to 15HP. Should VFDB unit be required for models below 15HP due to braking capacity, follow wire size given for individual drive.

B) 380-480V Inverters (Use 1000V rated wire) (AWG)

MODEL		VF5140HG / VF5148HG										
HP		3	5	7.5	10	15	25	30	50	75	100	150
VFDB MODEL		N/A	N/A	N/A	N/A	N/A	N/A	304 305	304 305	504 505	504 505	1004 1005
DRIVE TERMINALS	P1 P2	14	14	14	14	12	12	10	8	8	4	2
	B	14	14	14	14	12	12	--	--	--	--	--
VFDB TERMINALS	N	14	14	14	14	12	12	10	8	8	4	2
	0, 2, 4	16	16	16	16	16	16	16	16	16	16	16
	P	16	16	16	16	16	16	16	16	16	16	16
	PR, N	14	14	14	14	12	12	10	8	8	4	2

Dynamic brake module is integrated in inverter chassis in 400V models up to 25HP. Should VFDB unit be required for models below 25HP due to braking capacity, follow wire size given for individual drive.

Note:
Verification of dynamic brake unit and resistor is required for the specification described below.

(1) Load is other than constant torque characteristic (such as characteristic of constant output and 2nd power reduction torque).

(2) Load is lifting/lowering transport machine.

(3) Brake time and recess time fall in the area not permitted for use as shown in above drawing.

Also in the case of use described below, verification is required including capacity of VF5100HG.

(1) When result of calculation (P_B) of max. brake power mentioned above exceeds 1.5 fold of capacity of standard motor applied of VF5100HG undergoing use.

Caution

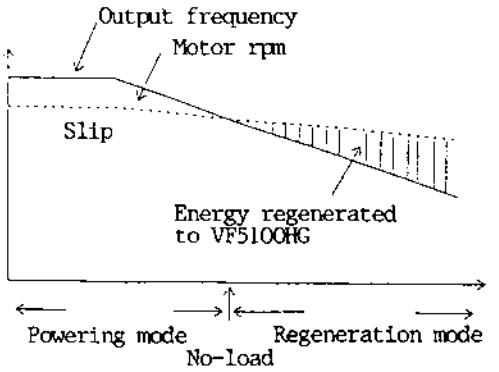
Dynamic brake option can not be used continuously because of the overheating of regenerative resistor encountered. Consult Drivecon for continuous regenerative converter.

19-2-3 Performance

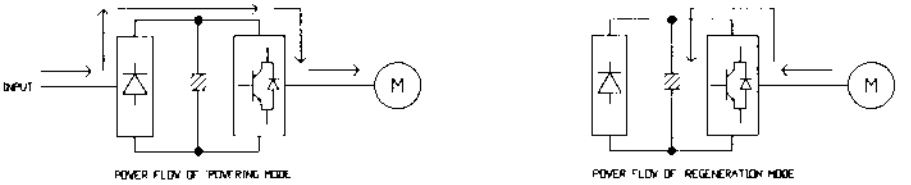
As motor switches to regeneration mode (Note 1), regenerated energy returns to VF5100HG. However since there is no regeneration function to power supply source, intermediate DC potential is let to rise.
As intermediate DC voltage rises from regenerated energy, dynamic brake option is such that voltage is detected, transistor is activated and regenerated energy is consumed in resistor used for dynamic brake. As regeneration is completed and intermediate DC voltage restores to normal value and transistor becomes inactive.

Note 1. Regeneration mode

When machine is driven by VF5100HG, running is operated as such that motor rpm drops equivalent to slip by load torque amount (this condition is powering mode ··· refer to following drawing)



WHEN LOAD OF A LARGE INERTIA AS AN EXAMPLE IS SET TO DECELERATE IN SUCH CONDITION THAT FREQUENCY DROPS FASTER THAN NATURAL DECELERATION AS SHOWN IN THE PREVIOUS DRAWING. ROTATIONAL SPEED OF MOTOR BECOMES HIGHER THAN OUTPUT FREQUENCY IS CALLED A REGENERATION MODE AND THE LOAD'S ENERGY CORRESPONDING TO SPEED DIFFERENCE IS RETURNED (REGENERATED) TO VFS100HG



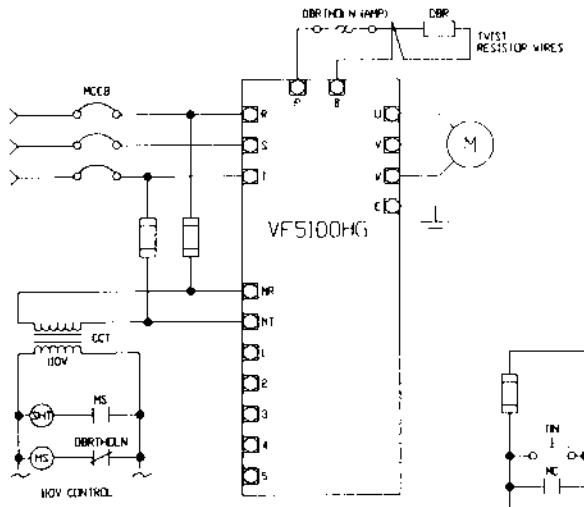
19-2-4 EXAMPLES OF CONNECTION

CAUTION:
WHEN THE THERMAL OVERLOAD (OBRTHOLN-(AMP) IN FOLLOWING DRAWINGS) OF DYNAMIC BRAKE CIRCUIT IS ACTIVATED, BE SURE TO INCLUDE CONTROLS SO THAT MAIN AC SUPPLY CIRCUIT OF VFS100HG IS OPENED

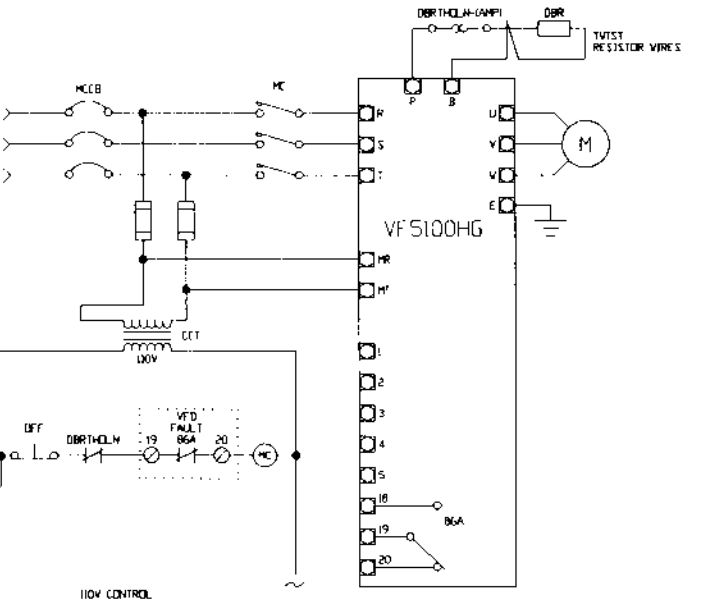
EXAMPLES OF CONNECTIONS OF DYNAMIC BRAKE OPTION ARE SHOWN BELOW

(1) DRIVE INTEGRATED TYPE DYNAMIC BRAKE UNIT
(BRAKE UNIT IS INTERNAL TO VFS100HG INVERTER UNIT)

A) WITH SHUNT-TRIP CIRCUIT BREAKER INPUT



B) WITH MAGNETIC CONTACTOR INPUT



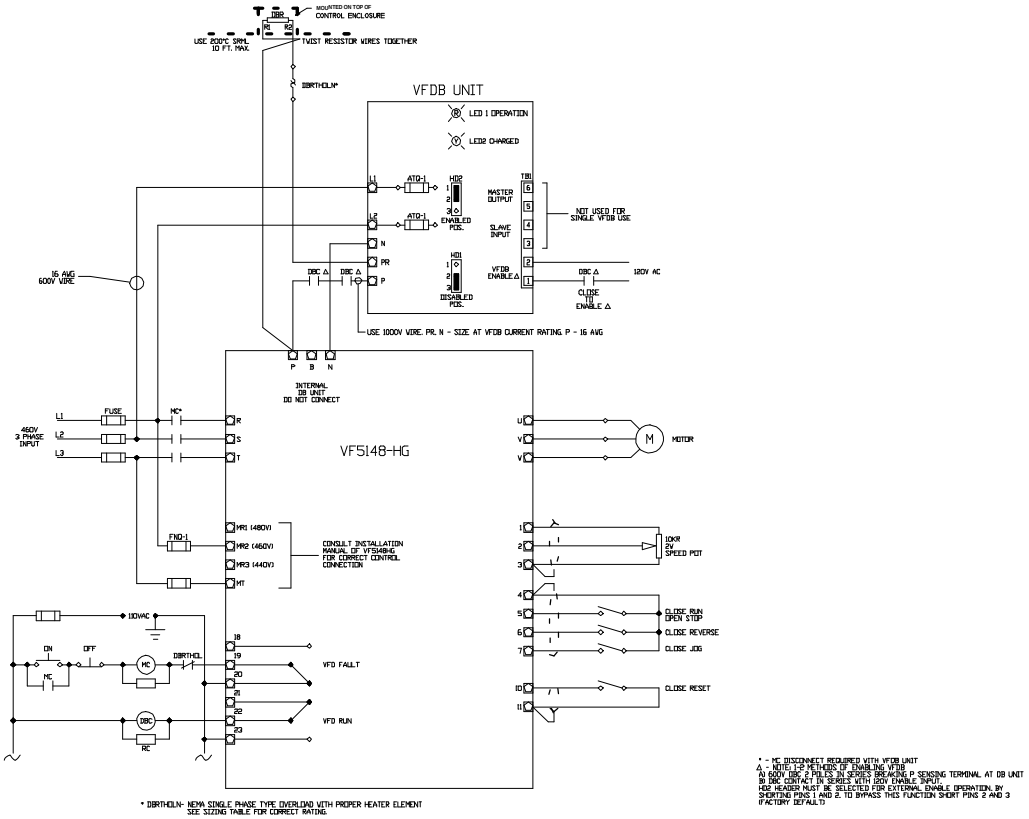


FIGURE A VF5100HG 3-25 WITH INTERNAL DB CONTROL (NOT USED)
AND EXTERNAL VFDB MODULE EXAMPLE
SEE VFDB INSTRUCTION MANUAL FOR FURTHER INSTRUCTION.

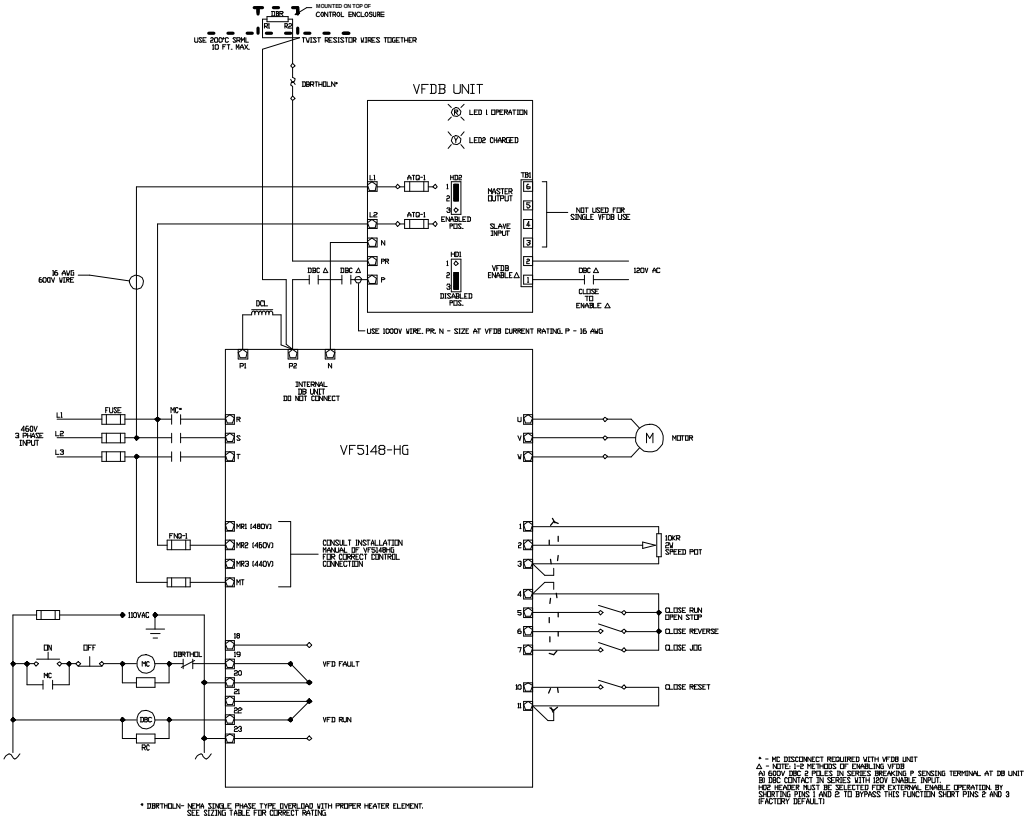
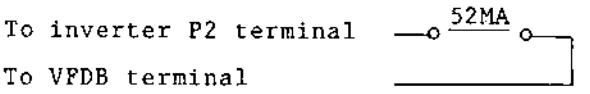


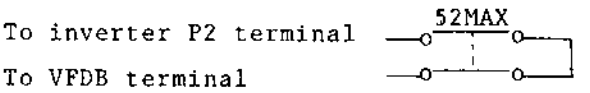
FIGURE B VF5100HG 30-150 WITH EXTERNAL DB CONTROL EXAMPLE
SEE VFDB INSTRUCTION MANUAL FOR FURTHER INFORMATION

Note 1. In the circuit that prevents activation of dynamic brake circuit accompanied with abnormal rise of AC input voltage at the time of stopping VF5100HG, ON/OFF is conducted at the same timing as VF5100HG running or running command from outer part (command to terminals 4 , 5).
Since DC voltage of (AC input voltage x $\sqrt{2}$) is imposed between these contacts, pay attention to the selection of auxiliary relay.
Examples of using Mitsubishi product SR-K6 series for 52MAX are shown in the following drawing.

Δ 200V series



Δ 400V series



Note 2. Connect between ⓪ - ② for AC input 200V system.
Connect between ⓪ - ④ for AC input 400V system.
Please connect the end of this input to identical with VF5100HG main input ⓇⓈⓉ or control power source input (MR, MT, MR1 ···).

19-2-5 Items to be noted for wiring

1. Twist wiring should be made to 二点 of connection example and conduct the equipment layout and wiring so that wiring length becomes short as practical as possible.

Caution

1. Since brake resistor generates heat, please install it at location where ventilation is good. Do not place near flammable article in the surrounding of this resistor.

2. When braking frequency is severe, pay attention because the surface of brake resistor may reach 200°C.

3. Pay attention to heat transmitted to brake resistor wiring due to heat generation of brake resistor. Use 200 degrees C SRML wire.

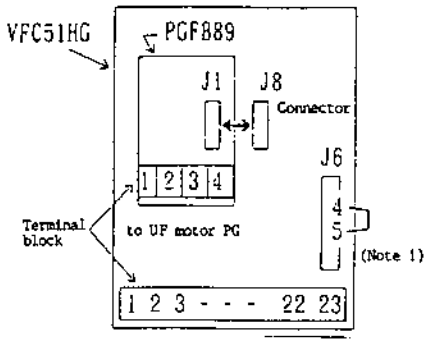
19-2-6 Setting change of VF5100HG function

As the setting change of VF5100HG function by connecting dynamic brake option, set value of Code No. 30 "regeneration mode current limit" setting (function symbol " CLb ") can be raised.

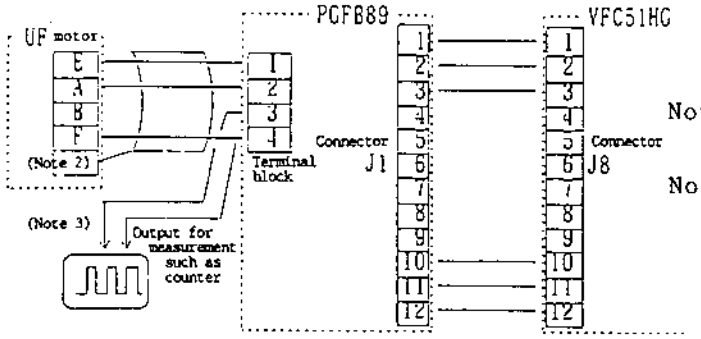
19-3. Automatic speed control (ASR) option

19-3-1 Mounting place

Although automatic speed control option uses in combination with our UF motor for inverter, VF5100HG side has the printed board (type "PGFB89") fitted as shown in the following drawings.



Note 1: At the time of ASR option, remove short-circuit wire of 8 ~ 9 pins of connector J6 and pins 4 ~ 5 are short-circuited.



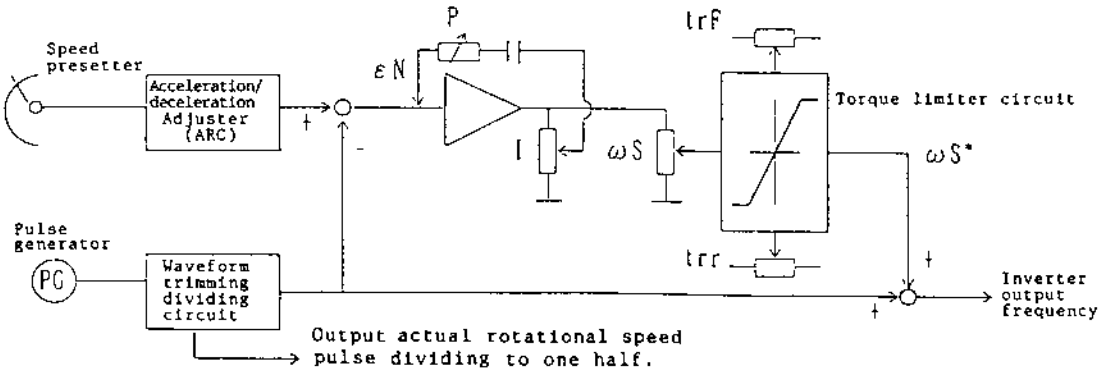
Note 2: Please connect shield part to terminal block without symbol.

Note 3: Item 19-3-4, (3), 1/2 of nos. of pulse of PG used are outputted (4) terminal: 0V, (3) terminal: +13 ~ 15V, duty 1:1.

(Connector, terminal block connection diagram)

19-3-2 Circuit diagram

As control system of automatic speed control is shown in the following drawing, difference between speed setting signal (output of acceleration/deceleration adjuster) and actual speed signal from PG (pulse generator) fitted to UF motor is converted to "slip frequency" through PI control circuit by "slip frequency correction control system" and speed control is conducted by adding this slip frequency to PG output signal.



Speed control circuit block diagram

Note 1: Actual control is processed by computer (software process) in entirety excluding waveform trimming and dividing circuit. Above drawing shows this software process hardware-wise.

Note 2: Refer to Code No. 59 for adjusting items P, I, ωS, trF, trr of above drawing.

19-3-3 Standard connection

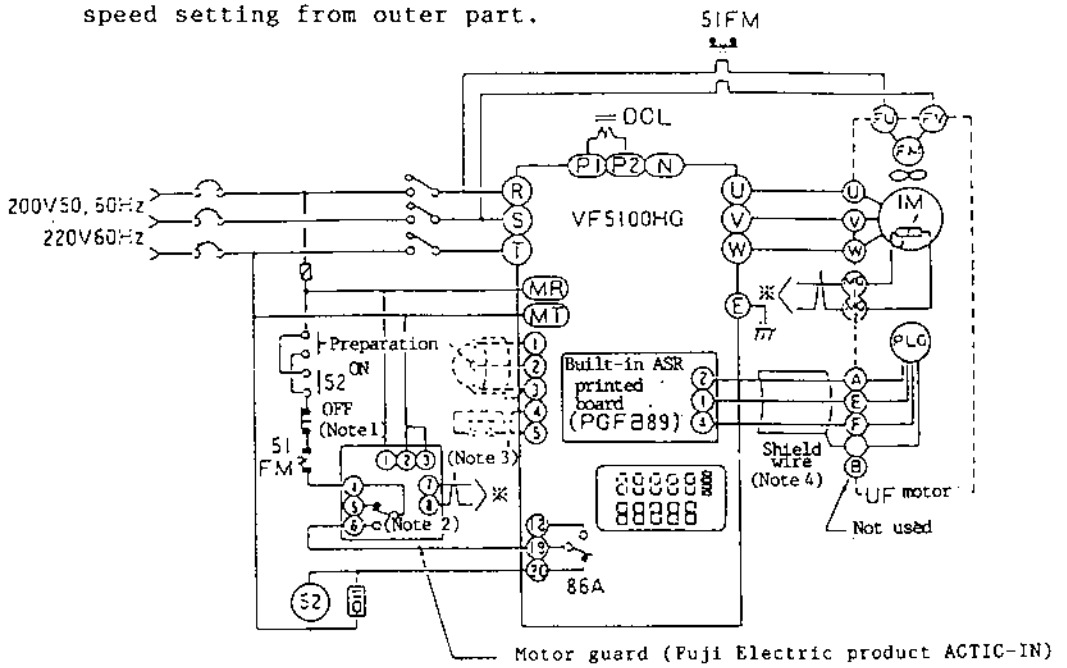
Standard connection example of automatic speed control option is shown hereunder.

Caution

1. Motor guard for detecting motor temperature attached should always be wired. At activation of motor guard, VF5100HG stops.
2. Starting of fan motor for cooling UF motor is once at hot condition of fan motor and twice at cold condition.
3. Wiring length from pulse generator should be set within 100 meter.

Note: Following drawing shows the connection example of 200V 22kVA. As voltage and capacity change, no. of phase of intermediate DC terminals and power supply source of cooling fan motor for UF motor changes.

Note: Dotted line shows the example when conducting start/stop and speed setting from outer part.



Note 1: When power source voltage is 200V, connection is made to ① ~ ② terminals. When this voltage is 220V, connection is made to ① ~ ③ terminals. Also when power source voltage is other than above, voltage should be dropped to 200V ~ 220V by transformer.

Note 2: Activation of contacts is as described below.

Terminal	When applying electricity		When electricity is not applied
	Reset condition	Activation condition	
④ ~ ⑤	OFF	ON	ON
④ ~ ⑥	ON	OFF	OFF

Reset system is automatic reset.

Note 3: Twist wire should be used for the wiring between terminals 7 , 8 of motor guard and terminals MG1, MG2 of UF motor.

19-3-4 Adjustment

Although items described below are set at the time of our shipment, please confirm once again.

(1) Setting of slip frequency

By ωS setting of block diagram shown above, slip frequency is inputted by Code No. 32 (function symbol uS). Slip frequency to be inputted is obtained from the following items of nameplate of UF motor rating.

$$\text{Code No. 32 input value} = \text{basic frequency (Hz)} - \frac{\text{basic rpm} \times \text{no. of poles}}{120} \text{ (Hz)}$$

(2) System

Setting of Code No. 52 (function symbol SSC) when using automatic speed control option must be changed to "3". (refer to Code No. 52 of Chapter 18, "Details of function")

(3) Setting of No. of pulse of motor

No. of poles of motor	Max. output frequency	No. of pulses of PG used	"PGFB89" SW1-1,2
2	60Hz	300P/R	ON for both 1,2
4	60Hz 120Hz	600P/R	ON for both 1,2
6	60Hz 120Hz	600P/R	OFF for both 1,2
8	60Hz 120Hz	1200P/R	ON for both 1,2

Switch SW1 fitted to automatic speed control printed board "PGFB89" is set as ON/OFF as shown above by no. of poles of motor and no. of pulses generated from PG (pulse generator).

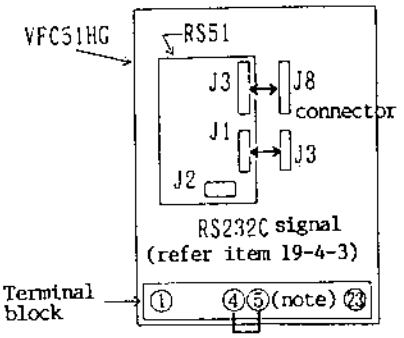
Following should be readjusted by load condition used. Refer to Code No. 59 of Chapter 18, "Details of function" for explanation against details respectively.

Adjusting symbol of above block diagram	Name of adjustment	Function setting code no.	Function symbol	Standard set value at shipment	Setting range
P	Adjustment of Proportional amount	59	P	20%	0 150%
I	Adjustment of integrating amount	60	I	20%	"
trF	Adjustment of pouesing side torque limit	69	trF	150%	0 150%
trn	Adjustment of rageneration side torque limit	70	trr	150%	"

19-4. RS232C Control option

19-4-1 Mounting place

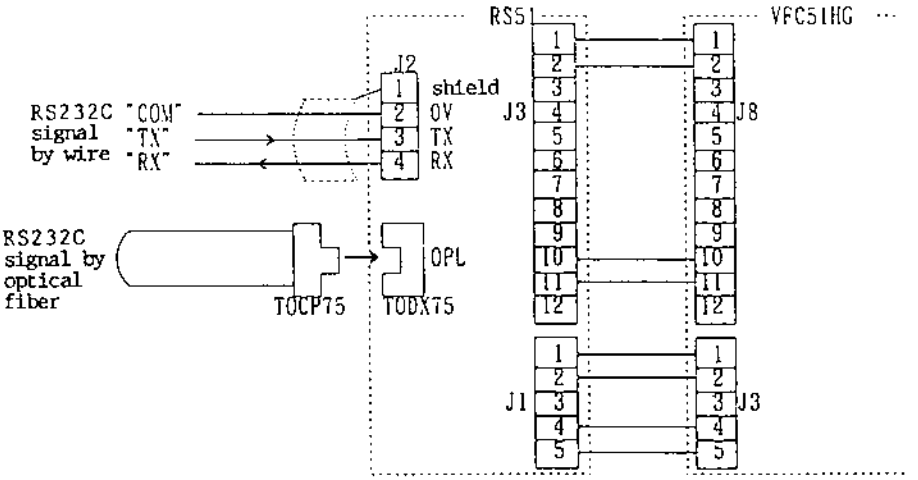
Printed board for RS232C control is fitted as following drawing.



Note:
When controlling Start/Stop by RS232C signal, be sure to short circuit ④⑤ terminals. (VF5100HG stops when opening ④⑤ terminals)

19-4-2 Connection diagram

Connection diagram of RS232C control is shown as described below.



19-4-3 Content of control

Following method is available for VF5100HG control by RS232C communication.

(1) As the means of communication of RS232C signal, selection of wired system by shield wire and optical fiber cable system can be conducted. Selection respectively is conducted by changing over dip switch "DS1" fitted to printed board "RS51", as per the following table.

	#1 of DS1	#2 of DS1
Wired communication (Photo coupler input)	OFF	OFF
Optical fiber communication	ON	ON when over 10 meter

Note: As for the coupler of optical fiber communication, Toshiba product "TODX75" is fitted to printed board "RS51". As the counter part side, "TOCP75" (Toshiba product) should be fitted to optical fiber cable by your company.

Caution

As regards target of selection of wired cable and/or optical fiber cable, wired cable should be used for cable length less than 5 meter and optical fiber cable for cable length of 5 ~ 25 meter.

(2) Communication system

Following communication can be conducted by RS232C signal.

One side direction communication:

RS232C signal from sequencer and computer is received by VF5100HG and following control items can be controlled. (running condition from VF5100HG is impossible to be transmitted to sequencer and computer)

Both sides directions communication:

RS232C signal from sequencer and computer is received by VF5100HG. Then following control items are controlled and following running condition is transmitted by RS232C signal from VF5100HG to sequencer and computer.

One side direction communication or both sides directions communication can be selected by condition of dip switch #3 located on console. (refer to Chapter 15, "Write protect")

	Dip switch #3 on VF5100HG console
One side direction communication	OFF
Both sides directions communication	ON

(3) Control items

Following shows the items possible to control VF5100HG by RS232C signal and items of conditions possible for transmittance.

Items possible for control:

Run/Stop, Forward/Reverse running, Jog running, Output frequency setting and Emergency stop. (control can be conducted by RS232C signal for instance Run/Stop only, as to set condition downward from Code No. 47 of Chapter 18, "Details of function")

(4) Outline of transmitting format

Outline of transmitting method by RS232C signal is as described below.

The case of one side direction communication:

8 bit, without parity, STOP bit 1.

(Outline of transmitting method)

Attached meaning of data - Selection of operation of Run/Stop or frequency setting is inputted.

↓

Designation of control item - Symbol relevant to operation and value for frequency setting are inputted.

↓

Transmittance - VF5100HG is controlled by content of transmittance (content received by VF5100HG)

The case of both sides directions communication:

Half double, 8 bit, without parity, STOP bit 1.

(Outline of transmitting method)

Attached meaning of data - Selection of transmittance or receiving is inputted.

↓

Data sum check

↓

Designation of control item - Item to transmit/receive is inputted.

↓

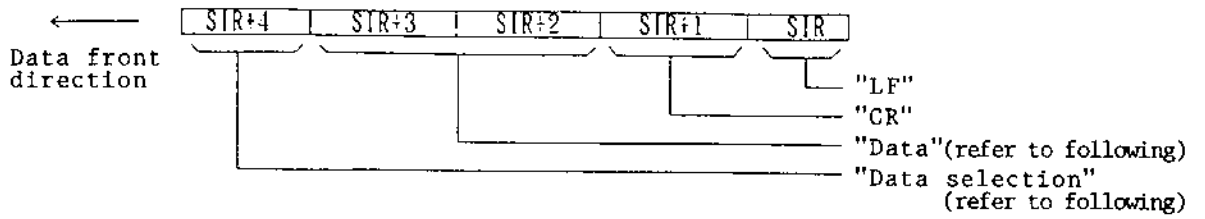
Transmittance or receiving - Designated data is transmitted by VF5100HG transmitting mode. VF5100HG is controlled by data input for VF5100HG receiving mode.

(5) Transmitting boud rate

Boud rate at VF5100HG side is 9600BPS.

19-4-4 Transmittance format

The case of one side direction communication



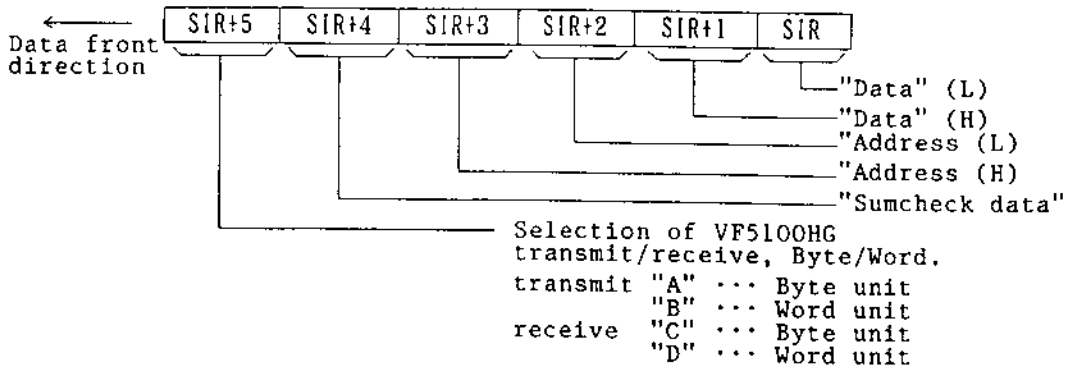
Note: When "F" is inputted by "SIR+4", the value set as 256 fold of running frequency of over decimal point by "SIR+3" and of less than decimal point by "SIR+2" is inputted to VF5100HG.

Example: At 30.5Hz of running frequency, the following value are inputted to VF5100HG
Data of "SIR+3" is 30 x 256 = 7680
Data of "SIR+2" is 0.5 x 256 = 128

Note: When inputting "C" by "SIR+4", VF5100HG is controlled by following symbols (letters) which are inputted by "SIR+3".

"S"	Start	"R"	Reverse running
"T"	Stop	"E"	Emergency stop
"F"	Forward running	"J"	Jog

The case of both directions communication



Note: By "SIR+3", "SIR+2", address of transmitting data is designaged.

Note: By "SIR+1", "SIR", data of designated data is transmitted.

Note: Sum check data of "SIR+4" inputs following data.
"SIR+4" = "SIR+5" + "SIR+3" + "SIR+2" + "SIR+1" + "SIR".

Caution

As regards character code of letters to be inputted, capital letters of ASCII Code are inputted (small letters are not accepted).

19-5. Option of output grounding protection control

This is the option of detection and protection when VF5100HG output line is grounded as to power distribution system grounded at one line or neutral point of VF5100HG AC input. Detection circuit is built-in VF5100HG main control.

Caution

1. This protection option is not the leakage detection circuit which has human protection set as the objection.

2. When this protection circuit activates, VF5100HG stops by output overcurrent.

3. When detecting leakage current of output side of VF5100HG, please provide leakage detection circuit at input side of VF5100HG.

20. Option of peripheral equipment

Option of peripheral equipment of VF5100HG is explained hereunder.

20-1. Speed potentiometer

This is a variable resistor to set output frequency connected to terminal block ①②③ of VF5100HG.
Its specification is as described below.

Type: RV30YN20SB
Rating: 10k 2W (resistance value variance against rotating angle is linear)

Refer to Chapters 5, 6 for the wiring of speed presetter.

20-2. Frequency (Rotation) meter

This is the meter that indicates analogically the output frequency (rotation) conducted to terminal block ⑧⑨ of VF5100HG.
Its specification is as described below.

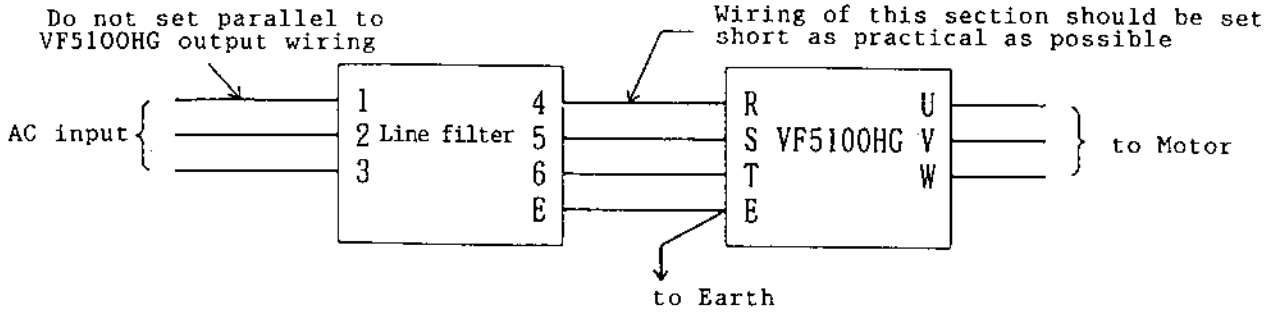
Type: LXK-8VR
Rating: 80mm normal angle
Scale : 4 kinds viz. 0 ~ 75Hz, 0 ~ 150Hz, 0 ~ 1800rpm are prepared.
Adjustment: Presetter for calibration of meter main body is built in (fitted to meter rear part).

Refer to Chapter 5, 6 for the wiring of frequency (rotation) meter.

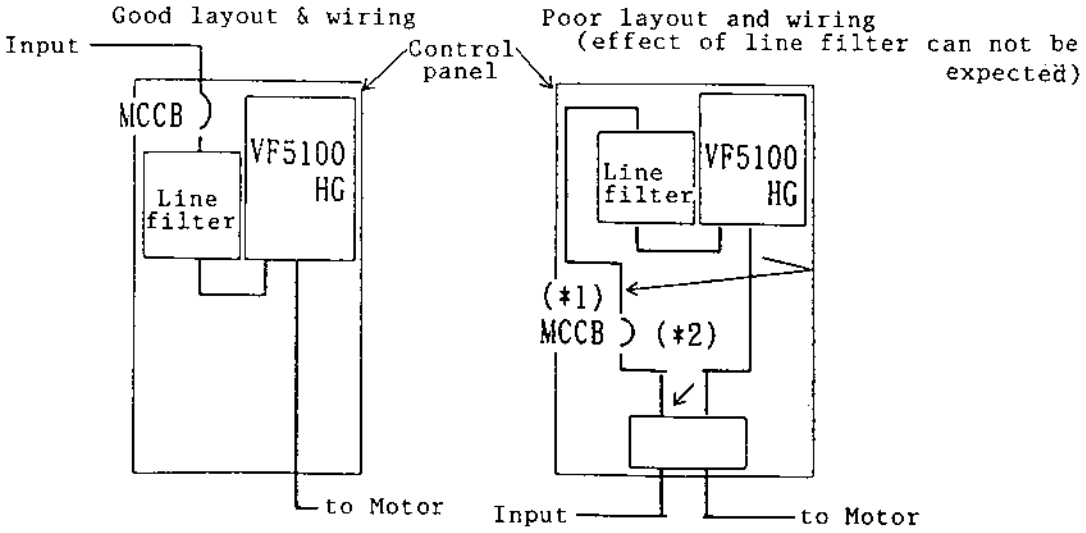
20-3. Line filter

When running motor by VF5100HG, noise electric wave is produced from input/output wirings of VF5100HG. Especially at AM band, it may offer interference to communication equipment such as radio. Line filter is the device to suppress noise electric wave produced from input/output wiring of VF5100HG, please pay attention to the following description when fitting it to wiring.

20-3-1 Wiring



20-3-2 Layout



(*1): Noise electric wave emitted directly in the panel is induced to input wiring (inhibition of installing around of input wiring).

(*2): Noise electric wave of output wiring is induced to input wiring (inhibition of parallel input/output wiring and common terminal block of input/output).

Caution

1. Please consult with Drivecon when line filter to suppress noise electric wave of VF5100HG output is required when output wiring is wired using conduit pipe, effect is made available to suppress noise electric wave due to direct emission from output side. Whereas, please select output cable of sufficiently large size paying attention to temperature rise.

2. Method is also available to reduce the impact by connecting noise-cut transformer to the power supply source of communication equipment which is receiving the impact.

21. list of specification

Output control function	Control system	Equivalent sinusoidal wave PWM, V/f control (with function to change carrier frequency and to changeover synchronous/asynchronous PWM)
	Maximum frequency	127 Hz
	Frequency range	2 ~ 127Hz
	Basic frequency range	Adjustable between 30 ~ 120Hz
	Starting frequency	Adjustable between 0 ~ 10Hz
	Frequency accuracy	When setting digital console: Within ±0.01% of max. frequency " " analogue " : Within ±0.5 % of max. frequency (20°C ±10°C)
	Frequency setting resolution	0.04Hz
	V/f characteristic	Constant torque V/f or 2nd power reduction torque V/f (slip compensation and AVR function attached)
	Torque compensation (torque boost)	Adjustable for 0 ~ 20% of max. output voltage (with Auto-Boost, IR-Drop function)
	Acceleration/ deceleration time	Setting of 0.5 ~ 600 sec. possible individually.
	Overload durability	150% rated current for one minute.
	Running direction	Reversible running by contact signal (with function to inhibit reverse running).
	Starting method	Motor rotating frequency synchronous start (free start) or minimum frequency start.
	Stop method	Deceleration stop (rpm drops by deceleration time setting until about 1Hz after stop operation) or free stop (inverter stop by stop operation)
	Dynamic brake	Transistor used for dynamic brake is built-in for 200: 3 ~ 15kVA, 400/480V: 3 ~ 25kVA. Others are option for both dynamic brake unit and resistor.
	DC brake	Possible for actuation between 0 ~ 5 sec. for 0 ~ 20% of rated output voltage (adjustable individually)
	Frequency setting signal	DC0 ~ 10V (rated freq.) By option, possible to cope with DC1 ~ 5V, DC4 ~ 20mA.
Protective function	Current limit	During motor acceleration, deceleration and constant speed running, as overload occurs, V/f is controlled and stall is prevented (current limit value is possible set below 150% of rated current individually for acc. and dec.
	Overload	When current of over 150% continues over 1 minute, activation is conducted (VF5100HG stops and actuating current setting is possible to change)
	Overcurrent	Activation is conducted when abnormal current by motor short-circuit flows (VF5100HG stops)
	Detection of under voltage & power supply interruption	When AC input voltage of less than 80% rating continues over 15m sec., actuation is conducted (VF5100HG stops. Whereas, by power restoration, automatic restart is possible)
	Overvoltage	Activation (VF5100HG stop) is conducted when intermediate DC voltage becomes overvoltage by motor short-circuit etc.
	Overfrequency	Activation by frequency output of over set values. Activation frequency can be set optionally (VF5100HG stops)
	Sluggishness of staring	Activation when starting is not conducted despite input of running signal.
	Fin overheat	Activation by overheat of fan for cooling semiconductor (only forced wind cooling unit type) (VF5100HG stops)
	Fuse melting off	Activation by OFF of fuse of intermediate DC circuit (VF5100HG stops)
	Control auxiliary power source abnormality	Activation by control power source abnormality (VF5100HG stops. Whereas automatic restart is possible by power supply restoration.
	ROM, RAM Check sum abnormality	Activation by CPU activations abnormality of control circuit. (VF5100HG stops)
	Serial communication abnormality	
	Battery abnormality	Activation by abnormality of battery for storing set data (at ordinary condition of use, replacement not for about 10 years).
Inverter efficiency		Over 95% (at rated output)
Contact output	Running	Activation by running (Contact IC, AC 220V 0.5A)
	Fault	Activation by fault enbloc (Contact IC, AC 220V 0.5A)
Ambient condition	Temperature	0 ~ 50°C
	Humidity	below 90%
	Elevation	below 1000m
Protective construction		IP00 (Open type)
Console	Condition indication	Run/Stop, operating place (DIR/REM), Forward run/Reverse run, Jog
	Running indication (monitor)	Output frequency, motor current, output voltage, motor rotating direction (+,- indication), function selection & set data, fault output.
	Touch key	RUN/STOP, DIR/REM, FOR/REV, JOG, MODE, SET, Δ(UP), ∇(DOWN), RST(Reset)

200V Series

	Type	VF5120HG-□□□												
		3	5	7.5	10	15	22	30	45	60	90	120	180	270
Rated output	Motor applied (kW) (Note 2)	2.2	3.7	5.5	7.5	11	15	22	30	45	55	90	135	200
	Capacity (kVA)	3	5	7.5	10	15	22	30	45	60	90	120	180	270
	Current (A)	10	16	24	32	45	64	87	130	173	260	346	520	780
	Max. output voltage (V)	200V or 220V (corresponding to input voltage)												
Input	Rated voltage/ frequency	3 phase 3 wire 200V +0, -15%, within 50Hz ±5% 3 phase 3 wire 200, 220V +10, -15%, within 60Hz ±5%												
	Input power factor (lag) (Note 3)	About 0.7		Over 0.9										
	Input capacity (kVA) (Note 4)	4.1	6.8	8.3	11	16.7	24.5	33	50	66	100	132	200	300
DC reactor (DCL)		None		Built-in unit			Installed in separate					Delivery made by accommodating in cubicle.		
							2L-25P	2L-30P	2L-50P	2L-60P	2L-100P			
Weight (Kg)	Inverter unit	9.5	10	16	16.5	24.5	22.5	40	43	69	80			
	DC reactor	—	—	—	—	—	6	6	11	10	22			
Cooling system		Self-cooling		Forced wind cooling										

400V Series

	Type	VF5140HG-□□□																
		3	5	7.5	10	15	25	37	50	75	100	150	200	300	450	600	750	900
Rated output	Motor applied (kW) (Note 2)	2.2	3.7	5.5	7.5	11	18.5	22	37	55	75	110	150	220	315	450	560	670
	Capacity (kVA)	3	5	7.5	10	15	25	37	50	75	100	150	200	300	450	600	750	900
	Current (A)	5	8	12	16	22.5	37	53.5	72.2	108	144	217	288	434	651	868	1085	1302
	Max. output voltage (V)	380, 480V or 440V (corresponding to input voltage)																
Input	Rated voltage/ frequency	3 phase 3 wire 380, 400V +10, -15%, within 50Hz ±5% 3 phase 3 wire 400, 440V +10, -15%, within 60Hz ±5%																
	Input power factor (lag) (Note 3)	About 0.7				Over 0.9												
	Input capacity (kVA) (Note 4)	4.5	7.5	11	14.3	19	28	44.5	55	84	110	167	220	334	501	668	835	1002
DC reactor (DCL)		None				Built-in unit		Installed in separate					Delivery made by accommodating in cubicle.					
								4L-40P	4L-50P	4L-75P	4L-100	4L-150P						
Weight (Kg)	Inverter unit	14	13.5	13.5	17	30	30	33	50.5	52	101	104						
	DC reactor	—	—	—	—	—	—	7	7	11	16	23						
Cooling system		Self-cooling		Forced wind cooling														

480V Series

	Type	VF5148HG-□□□																
		3	5	7.5	10	15	25	37	50	75	100	150	200	300	450	600	750	900
Rated output	Motor applied(kW) (Note 2)	1.5	3.7	5.5	7.5	11	18.5	22	37	55	75	110	150	220	315	450	560	670
	Capacity (kVA)	3	5	7.5	10	15	25	37	50	75	100	150	200	300	450	600	750	900
	Current (A)	4.4	7.6	11	14.6	21	34	46.5	65	96	125	189	250	378	567	756	945	1134
	Max. output voltage (V)	460V or 480V (corresponding to input voltage)																
Input	Rated voltage/ frequency	3 phase 3 wire 460V +10, -15%, within 50Hz ±5% 3 phase 3 wire 480V +10, -15%, within 60Hz ±5%																
	Input power factor (lag) (Note 3)	About 0.7				Over 0.9												
	Input capacity (kVA) (Note 4)	4.5	8.1	11.5	15	20.4	29.6	44.5	57	86	110	167	220	334	501	668	835	1002
DC reactor (DCL)		None				Built-in unit		4L-40P	4L-50P	4L-75P	4L-100	4L-150P	Delivery made by accommodating in cubicle.					
Weight (Kg)	Inverter unit	14	13.5	13.5	17	30	30	33	50.5	52	101	104						
	DC reactor	—	—	—	—	—	—	7	7	11	16	23						
Cooling system		Self-cooling		Forced wind cooling														

Note 1: Delivery is made by cubicle.
Note 2: For generic 4 pole motor indication.
Note 3: To be changed by power supply source impedance.
Note 4: At the time of rated output of motor applied.

POWER SUPPLY VOLTAGE	APPLICABLE MOTOR HP	CAPACITY kVA	INVERTER UNIT TYPE	DIMENSIONS (in.)									WGT (LBS)
				W1	W2	W3	H1	H2	H3	H4	J	DEPTH	
200V SERIES	3	3	VF5120HG–3	10.47	9.84	0.31	15.43	11.81	1.81	1.81	4–.25	8.26	20.90
	5	5	VF5120HG–5	10.47	9.84	0.31	15.43	11.81	1.81	1.81	4–.25	8.26	22.00
	7.5	7.5	VF5120HG–7.5	11.26	10.63	0.31	17.80	13.78	2.00	2.00	4–.25	8.26	35.20
	10	10	VF5120HG–10	11.26	10.63	0.31	17.80	13.78	2.00	2.00	4–.25	8.26	36.30
	15	15	VF5120HG–15	13.62	12.76	0.43	20.55	17.72	1.42	1.42	4–.312	9.45	53.90
	25	22	VF5120HG–25	15.20	14.33	0.43	20.94	17.72	1.61	1.61	4–.312	9.45	49.50

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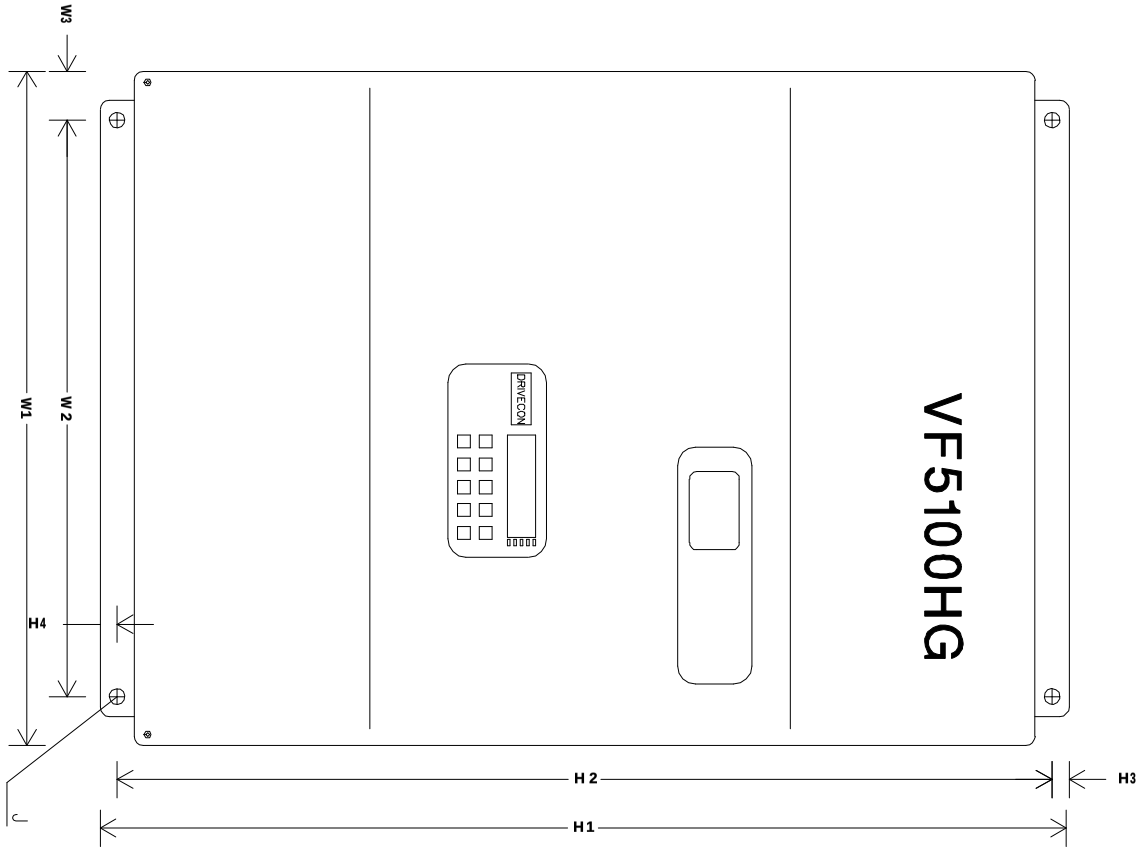
REVISION	NO.	REVISION	DATE

SHEET # 001 OF 001

TITLE: VF5120HG 3-25 PHYSICAL DIMENSIONS
CLIENT:
LOCATION:
DESIGNER: RMP
DRAWING : VF51203-25MD
DRAWING VERSION FINAL
DATE: 04/26/93
START-UP DATE:

POWER SUPPLY VOLTAGE	APPLICABLE MOTOR HP	CAPACITY kVA	INVERTER UNIT TYPE	DIMENSIONS (in.)									
				W1	W2	W3	H1	H2	H3	H4	J	DEPTH	WGT (LBS)
200V SERIES	30	30	VF5120HG-30	14.88	11.81	1.54	26.54	25.59	0.47	0.47	4-.43	12.60	88.00
	50	45	VF5120HG-50	14.88	11.81	1.54	28.50	27.56	0.47	0.47	4-.43	12.60	94.60
	60	60	VF5120HG-60	14.88	11.81	1.54	38.35	37.40	0.47	0.47	4-.43	13.39	151.80
	100	90	VF5120HG-100	14.88	11.81	1.54	44.25	43.31	0.47	0.47	4-.43	13.39	176.00



TITLE: VF5120HG 30-100 PHYSICAL DIMENSIONS		DRAWING VERSION FINAL	REVISION NO. / REVISION DATE
CLIENT:			
LOCATION:		DATE: 04/26/93	
DESIGNER: RMP	DRAWING : VF512030-100MD	START-UP DATE:	SHEET # 001 OF 001

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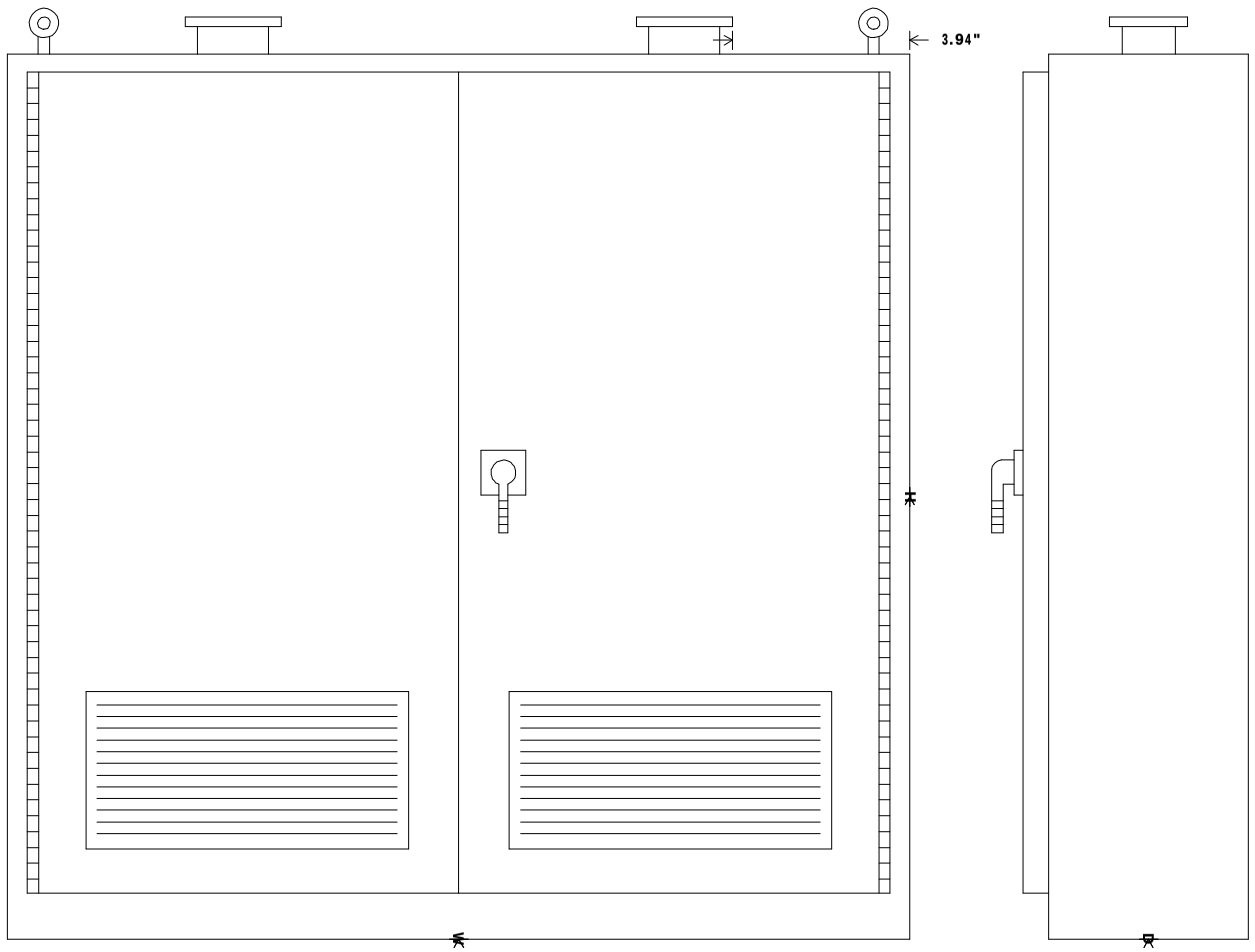

200V SERIES					
APPLICABLE MOTOR (HP)	CAPACITY (KVA)	DIMENSIONS (in.) W	H	D	WGT (LBS)
125	120	48.00	90.00	24.00	1200
200	180	72.00			1600
300	270	96.00*			2000

* 3 DOOR ENCLOSURE

TITLE: VF5120HG 125-300 PHYSICAL DIMENSIONS		DRAWING VERSION FINAL	REVISION NO. / REVISION DATE	Drivecon Corporation
CLIENT:				820 Lakeside Drive
LOCATION:		DATE: 04/26/93		Gurnee, IL 60031
DESIGNER: RMP	DRAWING : VF5120125-300MD	START-UP DATE:	SHEET # 001 OF 001	Phone: (847) 855-9150
				Fax: (847) 855-9650

POWER SUPPLY VOLTAGE	APPLICABLE MOTOR HP	CAPACITY kVA	INVERTER UNIT TYPE	DIMENSIONS (in.)									WGT (LBS)
				W1	W2	W3	H1	H2	H3	H4	J	DEPTH	
400V/480V SERIES	3	3	VF5140, 5148HG–3	10.47	9.84	0.31	15.75	11.81	2.00	2.00	4–.25	8.26	30.80
	5	5	VF5140, 5148HG–5	11.26	10.63	0.31	17.80	13.78	2.00	2.00	4–.25	9.06	30.80
	7.5	7.5	VF5140, 5148HG–7.5	11.26	10.63	0.31	17.80	13.78	2.00	2.00	4–.25	9.06	30.80
	10	10	VF5140, 5148HG–10	11.26	10.63	0.31	19.76	15.75	2.00	2.00	4–.25	9.06	37.40
	15	15	VF5140, 5148HG–15	13.62	12.76	0.43	21.73	17.72	2.00	2.00	4–.312	10.23	66.00
	20/25	25	VF5140, 5148HG–25	13.62	12.76	0.43	21.73	17.72	2.00	2.00	4–.312	10.23	66.00
	30	37	VF5140, 5148HG–30	14.96	14.17	0.39	21.18	17.72	1.61	1.61	4–.312	12.40	72.60

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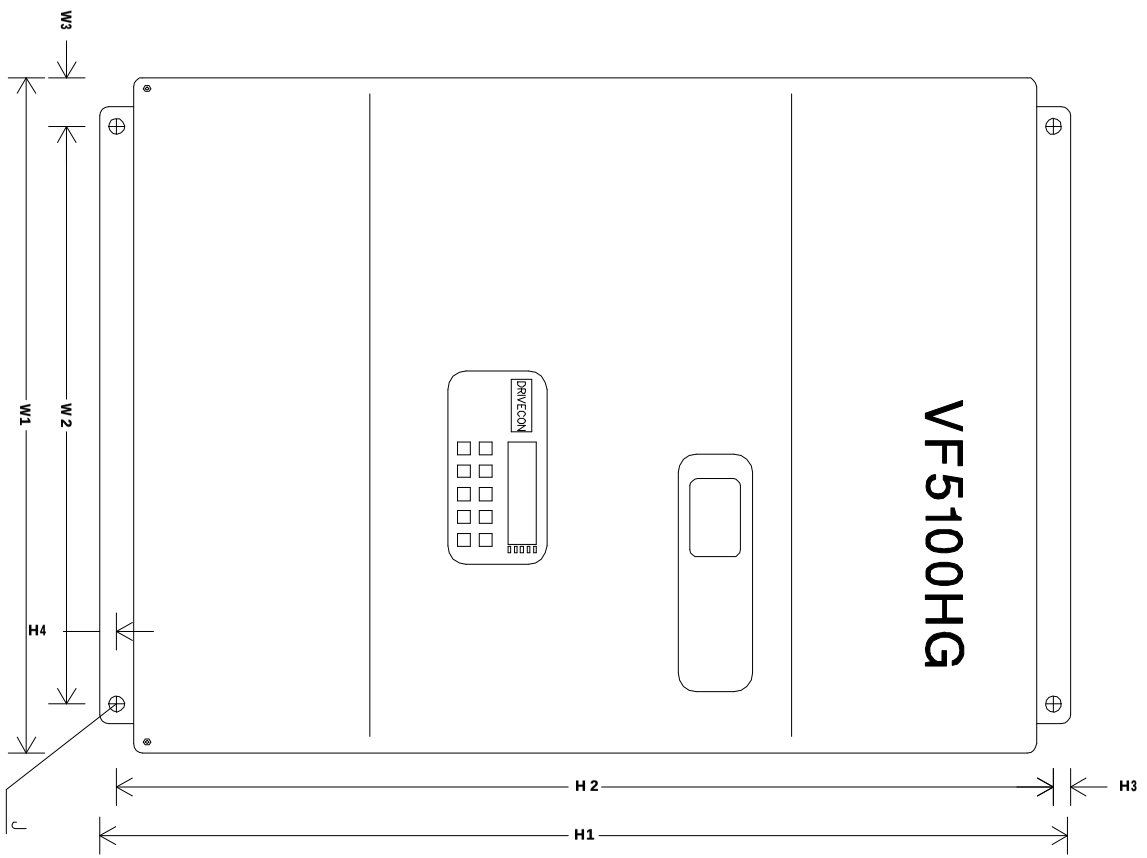
REVISION	NO.	REVISION	DATE

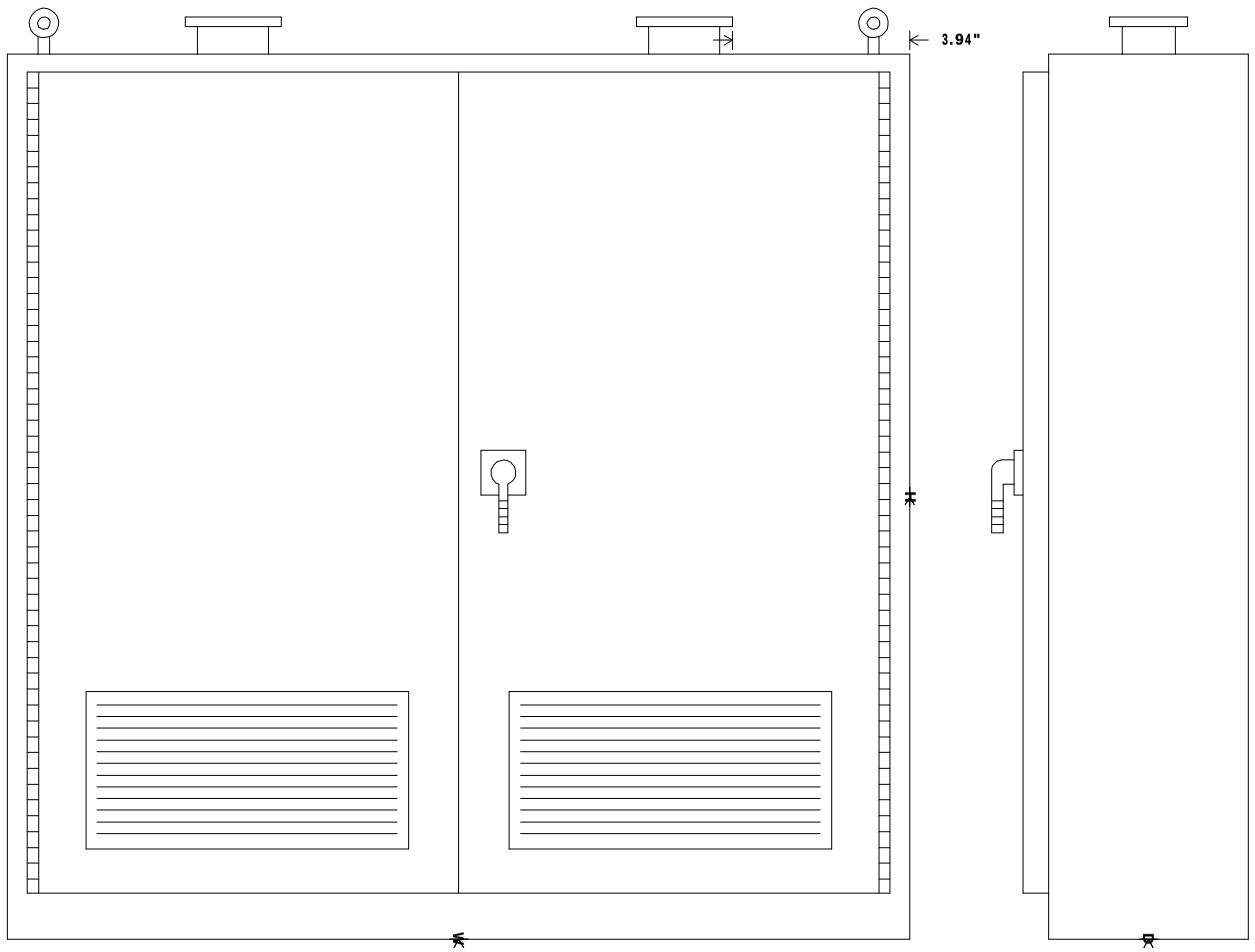
SHEET # 001 OF 001

TITLE: VF5140HG VF5148HG 3-30 PHYSICAL DIMENSIONS
CLIENT:
LOCATION:
DESIGNER: RMP
DRAWING : VF513-30MD
DRAWING VERSION FINAL
DATE: 10/17/92
START-UP DATE: MM/DD/YY

POWER SUPPLY VOLTAGE	APPLICABLE MOTOR HP	CAPACITY kVA	INVERTER UNIT TYPE	DIMENSIONS (in.)								
				W1	W2	W3	H1	H2	H3	H4	J	WGT (LBS)
400V/480V SERIES	50	50	VF5140, 5148HG-50	18.43	15.75	1.34	26.54	25.59	0.47	12.99	4-M11	111.10
	75	75	VF5140, 5148HG-75	18.43	15.75	1.34	42.28	41.34	0.47	13.58	4-M11	222.20
	100	100	VF5140, 5148HG-100	18.43	15.75	1.34	42.28	41.34	0.47	13.58	4-M11	222.20
	150	150	VF5140, 5148HG-150	18.43	15.75	1.34	42.28	41.34	0.47	13.58	4-M11	228.80



TITLE: VF5140HG VF5148HG 50-150	DRAWING VERSION FINAL	REVISION NO. / REVISION DATE	Drivecon Corporation 820 Lakeside Drive Gurnee, IL 60031 Phone: (847) 855-9150 Fax: (847) 855-9650
CLIENT:			
LOCATION:	DATE: 10/17/92		
DESIGNER: RMP / PROJECT: VF515015	START-UP DATE: MM/DD/YY	SHEET # 001 OF 001	



400V/480V SERIES					
APPLICABLE MOTOR (HP)	CAPACITY (KVA)	DIMENSIONS (in.) W	H	D	WGT (LBS)
200	200	48.00	90.00	24.00	1400
300	300	48.00			1420
450	450	72.00			2100
600	600	96.00*			2400
750	750	118.00*			3200
900	900	149.00**			3700

* 3 DOOR ENCLOSURE

** 4 DOOR ENCLOSURE

TITLE: VF5140HG VF5148HG 200-900 PHYSICAL DIMENSIONS		DRAWING VERSION FINAL	REVISION NO. / REVISION DATE
CLIENT:			
LOCATION:		DATE: 10/15/92	
DESIGNER: RMP	DRAWING : VF51200-900MD	START-UP DATE: MM/DD/YY	SHEET # 001 OF 001

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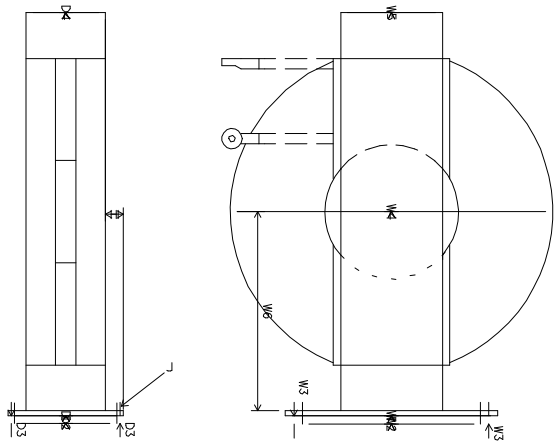
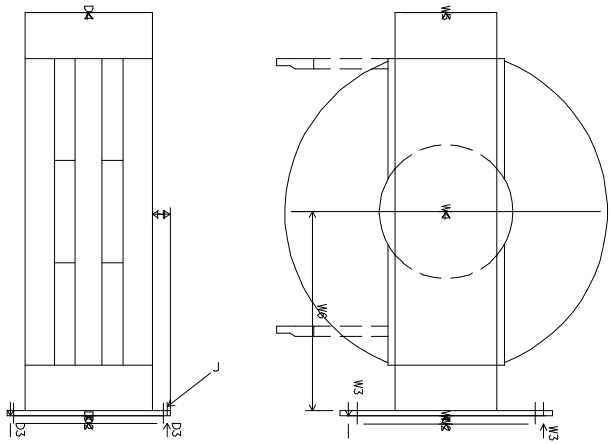
VIEW A



VIEW B



POWER SUPPLY VOLTAGE	APPLICABLE MOTOR HP	CAPACITY kVA	INVERTER DCL TYPE	DIMENSIONS (in.)													TERMINAL BLOCK	WGT (LBS)
				VIEW	W1	W2	W3	W4	W5	W6	H1	D1	D2	D3	D4	J		
200V SERIES	25	22	2L-25P	A	4.72	3.94	0.39	6.77	2.36	3.54	8.50	2.36	1.57	0.39	1.85	4-0.28	0.31	13.20
	30	30	2L-30P	A	4.33	3.54	0.39	7.17	1.97	3.54	8.90	2.36	1.57	0.39	1.97	4-0.28	0.31	13.20
	50	45	2L-50P	B	4.72	3.94	0.39	7.87	2.36	3.94	9.45	3.35	2.76	0.39	3.11	4-0.28	0.39	24.20
	60	60	2L-60P	B	4.72	3.94	0.39	7.17	2.28	3.94	8.90	3.35	2.76	0.39	3.19	4-0.28	0.39	22.00
	100	90	2L-100P	B	5.31	4.53	0.39	8.62	2.95	3.94	10.47	5.31	4.53	0.39	4.84	4-0.28	0.47	48.40

TITLE: DC LINE INDUCTOR FOR VF5120 SERIES VF DRIVES		DRAWING VERSION FINAL	REVISION NO. / REVISION DATE
CLIENT:			
LOCATION:		DATE: 04/26/93	
DESIGNER: RMP	PROJECT: VFDCL-200MD	START-UP DATE:	SHEET # 001 OF 001

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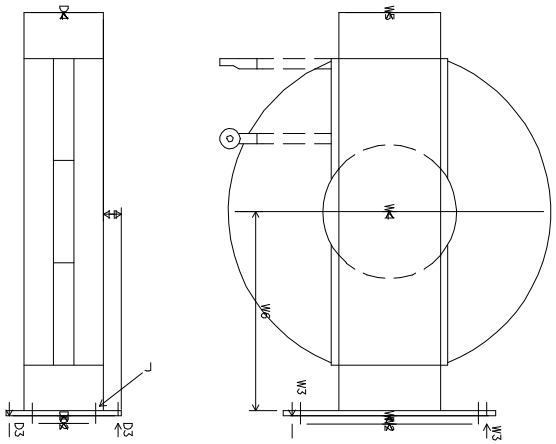
VIEW A



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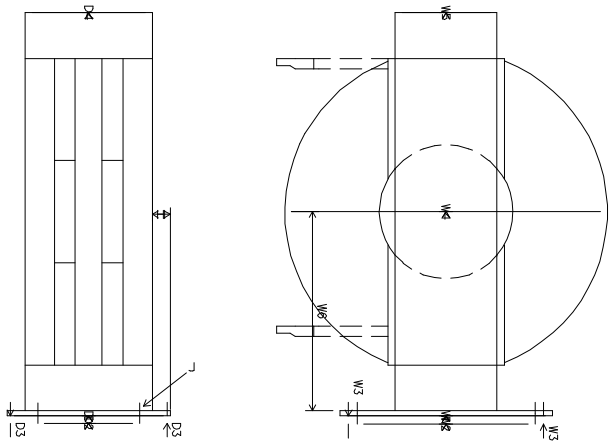

POWER SUPPLY VOLTAGE	APPLICABLE MOTOR HP	CAPACITY kVA	INVERTER DCL TYPE	DIMENSIONS (in.)													TERMINAL BLOCK	WGT (LBS)
				VIEW	W1	W2	W3	W4	W5	W6	H1	D1	D2	D3	D4	J		
400V/480V SERIES	30	37	4L−40P	A	4.92	4.13	0.39	7.48	2.56	3.54	9.21	2.36	1.57	0.39	1.85	4−0.28	0.31	15.4
	50	50	4L−50P	A	4.92	4.13	0.39	7.48	2.36	3.54	9.21	2.36	1.57	0.39	1.89	4−0.28	0.31	15.4
	75	75	4L−75P	B	5.12	4.33	0.39	7.83	2.76	3.54	9.57	3.35	2.56	0.39	2.95	4−0.28	0.39	24.2
	100	100	4L−100P	B	4.92	4.13	0.39	8.98	2.56	3.94	11.10	4.33	3.54	0.39	3.62	4−0.28	0.39	35.2
	150	150	4L−150P	B	5.71	4.92	0.39	9.25	3.35	3.94	11.38	4.72	3.94	0.39	4.21	4−0.28	0.47	50.6

TITLE: DC LINE INDUCTOR FOR VF5140/VF5148HG SERIES VF DRIVES

CLIENT:

LOCATION:

DESIGNER: RMP PROJECT: VFDCL-MD

DRAWING VERSION FINAL

DATE: 09 / 19 / 94

START-UP DATE: MM/DD/YY

REVISION NO.	REVISION DATE

SHEET # 001 OF 001

Drivecon Corporation
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Table 1. Table showing rated power factor of motor

Motor output (KW)	No. of poles	Rated power factor of standard motor (%)						Rated power factor UF motor for our inverter (totally enclosed)	
		Open drip-proof type			Totally enclosed type				
		Rated voltage/frequency			Rated voltage/frequency			Rated volt./freq.	
		200V 50Hz	200v 60Hz	220V 60Hz	200V 50Hz	200v 60Hz	220V 60Hz	200V 60Hz	400V 60Hz
0.75	2	80~85	88~90	83~88	83~86	88~90	85~88		
	4	75~78	81~84	76~79	75~78	81~84	76~78	80.4	78.5
	6	65~73	72~79	65~75	64~73	72~79	64~73		
	8	58~63	63~67	51~59	63~62	67~69	62~67		
1.5	2	87~90	90~92	87~90	86~90	90~92	87~90		
	4	81~84	86~88	82~86	80~83	84~86	81~83	80.1	84
	6	70~75	76~80	70~76	70~78	77~83	72~78		
	8	60~62	66~69	59~63	58~60	66~70	59~65		
2.2	2	84~90	91~93	85~91	84~92	90~94	86~92		
	4	82~85	85~87	84~88	81~84	86~88	83~85	80	82
	6	75~80	80~83	75~81	76~80	80~84	76~81		
	8	62~70	69~75	63~71	68~71	74~77	68~76		
3.7	2	87~91	91~93	90~93	90~93	92~95	90~94		
	4	83~85	87~89	84~86	84~87	87~90	85~89	83.9	83.9
	6	79~82	83~86	79~81	79~81	83~85	79~82		
	8	67~71	73~75	68~72	68~75	74~79	68~78		
5.5	2	87~91	90~94	88~93	87~93	91~94	89~93		
	4	82~85	85~87	85~88	82~85	87~89	83~85	83.6	83.6
	6	76~82	82~86	78~83	77~81	72~85	78~82		
	8	68~71	74~77	71~77	70~75	75~79	68~78		
7.5	2	85~92	90~94	87~92	89~93	91~95	90~94		
	4	83~88	87~90	84~88	84~88	88~92	85~88	84.5	84.5
	6	77~83	83~86	79~85	77~81	82~85	79~83		
	8	66~72	73~77	69~73	64~75	72~79	65~79		
11	2	86~92	88~93	90~94	89~93	90~94	90~93		
	4	82~89	89~91	86~89	85~88	86~91	86~88	83.9	83.9
	6	79~85	83~86	81~85	79~82	83~86	80~83		
	8	61~73	71~76	65~73	64~68	72~77	65~77		
15	2	88~93	91~94	89~94	90~93	92~94	90~94		
	4	86~89	89~92	84~89	85~87	89~91	87~89	84.6	84.6
	6	80~84	84~87	81~85	78~83	84~86	80~83		
	8	69~73	75~78	71~74	68~74	75~80	75~75		
18.5	2	90~95	92~95	90~95	87~92	91~93	89~91		
	4	88~90	90~92	89~91	86~89	88~91	87~90	81.9	81.9
	6	80~84	84~87	81~85	81~85	84~88	83~86		
	8	72~75	79~82	74~78	76~78	77~82	78~80		

Motor output (KW)	No. of poles	Rated power factor of standard motor (%)						Rated power factor UF motor for our inverter (totally enclosed) Rated volt./freq.	
		Open drip-proof type			Totally enclosed type				
		Rated voltage/frequency			Rated voltage/frequency				
		200V 50Hz	200v 60Hz	220V 60Hz	200V 50Hz	200v 60Hz	220V 60Hz	200V 60Hz	400V 60Hz
22	2	89～95	91～95	90～95	89～93	91～94	90～94		
	4	87～90	90～92	89～91	86～89	87～91	87～90	84.5	84.5
	6	81～84	84～86	82～86	82～85	84～88	82～86		
	8	73～76	75～90	74～76	75～78	76～80	76～80		
30	2	89～94	92～95	91～95	90～94	92～96	90～96		
	4	88～91	90～93	89～91	87～91	90～93	88～92	82.7	82.7
	6	81～85	87～88	82～87	83～85	86～89	84～87		
	8	75～79	78～83	77～81	77～81	80～84	80～83		
37	2	88～93	90～93	90～93	89～91	91～93	91～93		
	4	86～89	88～93	88～91	85～89	87～93	85～91	84.6	84.6
	6	81～85	84～89	82～87	80～88	85～90	83～89		
	8	75～77	80～84	77～79	77～79	80～84	78～80		
45	2	89～93	90～94	90～93	90～92	92～94	91～93		
	4	87～91	89～93	89～92	85～90	88～93	86～92	88.2	88.2
	6	81～87	85～91	84～88	85～87	87～89	85～87		
	8	76～78	82～84	78～81	81～88	79～85	89～82		
55	2	89～94	90～95	89～94	89～93	89～93	87～90		
	4	86～90	88～93	89～91	～	～	～	88.6	88.6
	6	81～87	84～90	84～90	～	～	～		
	8	～	～	～	～	～	～		
75	2	～	～	～	～	～	～		
	4	～	～	～	～	～	～	90.1	90.1
	6	～	～	～	～	～	～		
	8	～	～	～	～	～	～		
90	2	～	～	～	～	～	～		
	4	～	～	～	～	～	～	90.3	90.3
	6	～	～	～	～	～	～		
	8	～	～	～	～	～	～		
110	2	～	～	～	～	～	～		
	4	～	～	～	～	～	～	89.5	89.5
	6	～	～	～	～	～	～		
	8	～	～	～	～	～	～		
	2	～	～	～	～	～	～		
	4	～	～	～	～	～	～		
	6	～	～	～	～	～	～		
	8	～	～	～	～	～	～		

VF5100HG Programming Chart

Model VF51_____ SN:_____

Code No.	Function Abbrev.	Function setting item	Description	Unit	Setting range (Setting Resolution)	Change during operation	Default	User value
0	Fset	Output frequency	Command of operating frequency with console	Hz	0~127Hz (0.1Hz pitch)	Possible	0Hz	
1	toPF	Maximum frequency	Maximum operating frequency of inverter.	Hz	30~127Hz (0.1Hz pitch)	Impossible	60Hz	
2	botF	Minimum frequency	Minimum operating frequency of inverter.	Hz	Between 0Hz and set value of code No. 1 (0.1Hz pitch)	Possible	0Hz	
3	FLin	Frequency setting input voltage limit	Limit of frequency analog input voltage	V	5~15V (0.1V pitch)	Possible	10.3V	
4	JoGF	Jog frequency	Jogging frequency	Hz	0~30Hz (0.1Hz pitch)	Possible	5Hz	
5	boSt	Torque compensation	Torque boost volume at low frequency	%	0~20% (0.1% pitch)	Possible	0%	
6	UAdJ	Rated output voltage	Output voltage adjustment at base frequency	%	-30~+30% (0.1% pitch)	Possible	0%	
7	Fch1	Asynchronous carrier frequency	PWM carrier frequency,during operation	Hz	400~1500Hz (1 Hz pitch)	Possible	833Hz	
8	Fch2	Carrier frequency at start	PWM carrier frequency at start	Hz	225~610Hz (1Hz pitch)	Possible	225Hz	
9	CAP	Inverter capacity	Inverter capacity, voltage	-	200V 3kVA~480V 900kVA	Impossible	Capacity at delivery	
10	Acc	Acceleration time	Rate of frequency increase	Sec	0.5~100sec setting (0.1sec pitch) 100~600sec setting (1 sec pitch)	Possible	30sec	
11	dEc	Deceleration time	Rate of frequency decrease	Sec		Possible	30sec	
12	SAS	S-function rise time	S-function acceleration start time (SAS)	Sec	0.60sec (0.1 sec pitch)	Possible	0sec	
13	SAE	S-function setting time (acceleration)	S-function acceleration ending time (SAE)	Sec		Possible	0sec	
14	SdS	S-function fall time	S-function deceleration fall time (SDS)	Sec		Possible	0sec	
15	SdE	S-function setting time (deceleration)	S-function deceleration reaching time (SDE)	Sec		Possible	0sec	
16	StF	Start frequency	Inverter output frequency at start	Hz	0~10Hz (0.1Hz pitch)	Possible	0.5Hz	
17	oFS	Over frequency operating value	Over-frequency protective operation value	Hz	35~127Hz (1Hz pitch)	Possible	65Hz	
18	PcF	Base frequency	Base frequency	Hz	Between 30Hz ~ set value of code No .1 (0.1Hz pitch)	Possible	60Hz	
19	FS1	Multistage setting (1)	1st stage output frequency	Hz	Between set values of code Nos.1 and 2 (0.1Hz pitch)	Possible	0Hz	
20	FS2	Multistage setting (2)	2nd stage output frequency	Hz		Possible	0Hz	
21	FS3	Multistage setting (3)	3rd stage output frequency	Hz		Possible	0Hz	
22	FJ1	Jump frequency (1)	1st critical avoidance frequency	Hz	Between 0Hz and set values of code Nos. 1 and 2 (0.1Hz pitch)	Possible	0Hz	
23	FJ2	Jump frequency (2)	2nd critical avoidance frequency	Hz		Possible	0Hz	
24	FJ3	Jump frequency (3)	3rd critical avoidance frequency	Hz		Possible	0Hz	
25	FdF	Jump range	Avoidance frequency range	Hz	0.1~5Hz (0.1Hz pitch)	Possible	0Hz	
26	dcb	DC braking voltage	Voltage level of DC braking	%	0~20% (0.1% pitch)	Possible	0%	
27	dct	DC braking time	DC brake operating time	Sec	0~5sec (0.1sec pitch)	Possible	0sec	
28	oLS	Overload operating value	Overload protective operation value (time limit characteristic)	%	20~110% (1% pitch)	Possible	100%	
29	CLd	Current limit (powering)	Current limit value in powering mode	%	20~150% (1% pitch)	Possible	150%	
30	CLb	Current limit (regenerating)	Current limit value in regenerating mode	%	0~150% (1% pitch)	Possible	150%	
31	drP	Drooping amount	Drooping amount when drooping control is used	%	0~30% (1% pitch)	Possible	0%	
32	uS	Slip frequency	Slip frequency of motor	Hz	0~5Hz (0.01Hz pitch)	Possible	0Hz	
33	ird	IR drop amount	Wiring drop to motor, motor primary impedance compensating amount	-	0~5000 (1 pitch)	Possible	0	
34	PF	Power factor correction	Motor power factor	%	30~97% (.1% pitch)	Possible	75%	
59	-P	Proportional amount	Proportional amount of automatic speed regulation	%	0~100% (1% pitch)	Possible	20%	
60	-I	Integral amount	Integrated amount of control system	%	0~100% (1% pitch)	Possible	20%	
69	trF	Torque limit on powering side	Torque limit on powering side	%	0~150% (1% pitch)	Possible	150%	
70	trr	Regeneration side torque limit	Regeneration side torque limit	%	0~255% (1% pitch)	Possible	150%	

Set when ASR option is issued

VF5100HG Programming Chart

Model VF51_____ SN:_____

Cod No.	Function abbrev.	Function Setting item	Setting method and function description		Default	User value
			Setting abbreviation	Function		
37	SS1	Starting/stopping method	000	0: Starting from minimum frequency 1: Starting into spinning motor	Starting from minimum frequency	
				0: Deceleration stop 1: Coast to stop	Decelerating stop	
				0: DC brake not used 1: DC brake activated	DC brake Not-used	
38	SS2	Reverse inhibition and current limiting activation	000	0: Forward/Reverse operation 1: Reverse inhibition	Forward/reverse operation	
				0: Motoring-side current limit activated 1: Motoring-side current limit deactivated	activation	
				0: Regeneration-side current limit, activated 1: Regeneration-side current limit, deactivated	activation	
39	SS3	V/f ratio and PWM modulation method	000	0: Constant torque V/f pattern 1: Square reduced torque V/f pattern	Constant torque V/f pattern	
				0: Asynchronous / synchronous PWM modulation 1: All area synchronous PWM	Asynchronous / synchronous changeover PWM modulation	
				0: Fixed modulation 1: Low noise modulation	Fixed modulation	
40	SS4	Processing method at momentary power failure	000	0: Automatic restarting prohibited 1: Automatic restarting activated	Restarting prohibited	
				0: Restarting in automatic restarting mode, and after 1 sec., 1: Restarting in automatic restarting mode, and after 0.1 sec.	Restarting after 1 sec.	
41	SS5	Torque compensation method	000	0: Manual boost 1: Automatic boost	Manual boost side	
42	SS6	Meter terminal output change	000	0: Terminals 12 & 9 for ammeter output of effective current 1: Terminals 12 & 9 for ammeter output of motor / regen. 0: Terminals 8 & 9 for frequency output current 1: Terminals 8 & 9 output of max. frequency for scaling	All effective current side	
					Operating frequency side	
43	SS7	RS232C control	000	0: RS232C control. Not operational. 1: RS232C control is in use. (option)	No RS232C control not used	
44	SS8	Relationship between external frequency setting and output frequency	000	0: Minimum speed increase slope change 1: Dead band system	Slope change	
45	SS9	Not used				
46	SSA	Frequency setting system through digital console	000	0: Preset system (If SET key is pressed after frequency is set with up/dwn. keys, the frequency is changed) 1: Interlock system (Frequency is changed interlocking with up/dwn. keys)	Preset system	
				0: Reversed by direction change in interlock position. 1: Reversed by continuous lowering of speed.	Reversed by direction change	
47	SSb	Frequency setting selection		0: Selection of operating place by DIR/REM 1: Setting through RS232C control (optional) 2: For system-up option	interlock to console DIR/REM	
48	SSc	Start/stop selection		0: Selection of operating place by DIR/REM of console 1: Operation possible only through terminal block (console operation impossible) 2: Operation possible only through console (operation impossible from terminal block) 3: Setting through RS232C control (optional) 4: For system-up option	interlock to console DIR/REM	
49	SSd	Jog operation selection		0: Selection of operating place by DIR/REM of console 1: Operation possible only through terminal block (console operation impossible) 2: Operation possible only through console (operation impossible from terminal block) 3: Setting through RS232C control (optional) 4: For system-up option	interlock to console DIR/REM	
50	SSE	Reverse operation selection		0: Selection of operating place by DIR/REM of console 1: Operation possible only through terminal block (console operation impossible) 2: Operation possible only through console (operation impossible from terminal block) 3: Setting through RS232C control (optional) 4: For system-up option	interlock to console DIR/REM	
51	SSF	Reset operation selection		0: Selection of operating place by DIR/REM of console 1: Operation possible only through terminal block (console operation impossible) 2: Operation possible only through console (operation impossible from terminal block) 3: Operation possible through both terminal block and console	interlock to console DIR/REM	
52	SSG	Selection of VF5100HG control system		0: V/f control (open loop) 1: Droop control 2: Slip compensation control 3: ASR control (option)	V/f control	
53	SSH	Operation selection changeover		0: Interlock to console DIR/REM 1: RS232C setting (code Nos. 47-50 are set for RS232C operation) 2: For system-up option	Interlock to console DIR/REM	

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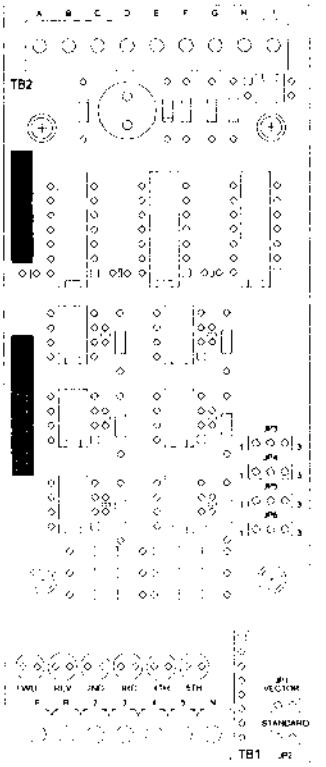
D61276 Revision 2

5 speed 110v Input Isolation Board
Instruction and Installation Manual

For use with Drivecon VF5100HG Standard and VF5100HGVII / SII Flux Vector Series Inverters.



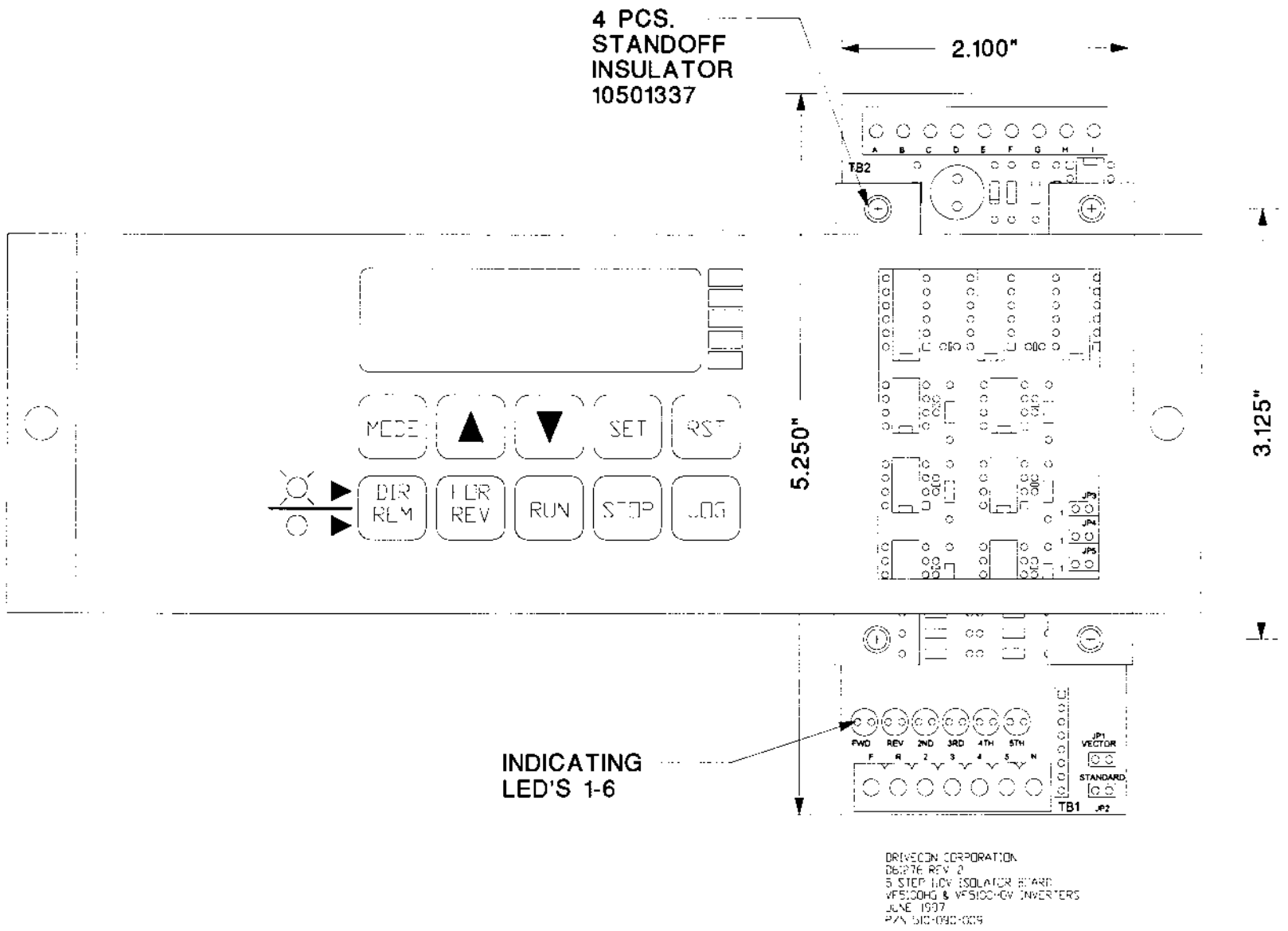
The D61276 is a 110vac Input Isolation Board requiring no external power supply. This option board provides 5 speed reversing control and optical isolation from the 110vac input. Each direction / speed input has an LED indicator for positive visual verification of signal input. Opto isolated outputs provide excellent input signal isolation and noise immunity. The outputs are used for the sequencing and control signals at the drive main control board terminals. The speeds are easily adjusted to best suit the application at hand through the operator keypad on the drive. The D61276 is jumper configurable for use as a 6 channel straight through isolator.

External 110v wiring from the pendant or master switch to the control panel terminal strip should be limited to approximately 300 feet. Longer distances will require oversizing the wire to prevent excessive voltage drop. Consult Drivecon on input wire runs of more than 300 feet.

Mounting of the D61276 is provided for to the right of the operators keypad with four nylon PCB supports provided. The 110vac input wiring enters at terminal strip TB1. The board should be oriented so TB1 is at the bottom. The upper terminal strip TB2 connects to the +15 vdc logic level of the drive.

Refer to Drivecon Drawing 61276R2.VCD for connection and programming information and drawing 61276R2D.VCD for mounting / installation information.

CAUTION: This solid state isolator will be damaged if the output (connection to drive terminals) are wired in parallel with any external circuits.



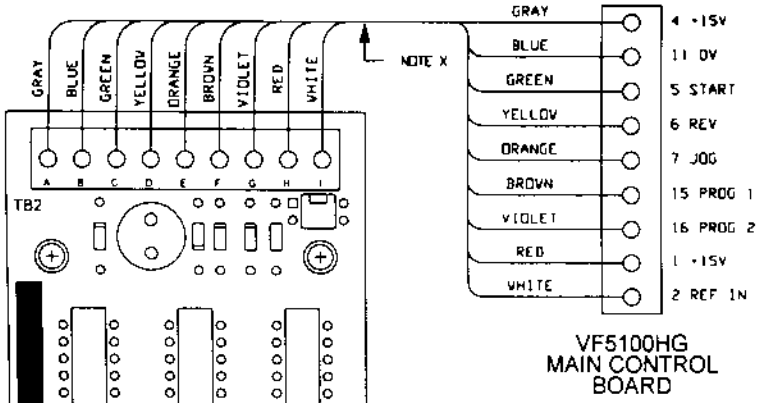
DRIVECON CORPORATION
DB1276 REV 2
5 STEP HOV ISOLATOR BOARD
VFS100HG & VFS100HGV INVERTERS
JUNE 1997
P/N 510-090-005

TITLE: DB1276 REV 2, 110V INPUT ISOLATOR BOARD
FOR USE WITH VFS100HGVII/SII OR AS A
6 CHANNEL STRAIGHT THROUGH ISOLATOR

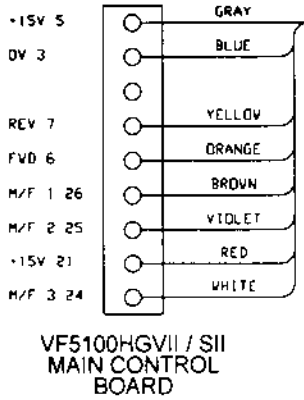
CLIENT
LOCATION
PROJECT 61276R2D.VCD
STARTUP DATE: XX/XX/XX
SHEET # 001 OF 001

VERSION AS BUILT
REVISION # REV DATE
DIMENSIONS B 10 97
DATE 8/18/97
DESIGNER RMP
DRAWN BY MW CHECKED BY:

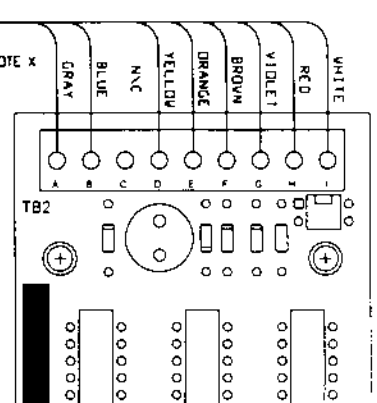
Drivecon Corporation
820 Lakeside Drive
Gurnee, IL 60031
Phone (847) 855-9150
Fax (847) 855-9650



VF5100HG
MAIN CONTROL
BOARD



VF5100HGVII / SII
MAIN CONTROL
BOARD



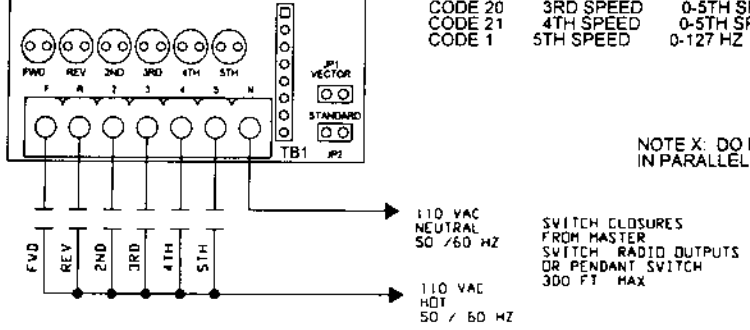
JUMPER CONFIGURATION TABLE

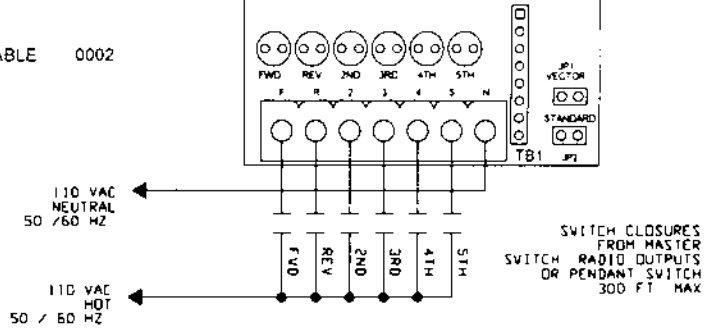
VF5100HG SERIES	VF5100HGVII / SII SERIES	6 CHANNEL STRAIGHT ISOLATOR
JP1 OUT	JP1 IN	JP1 IN
JP2 IN	JP2 OUT	JP2 OUT
JP3 2-3	JP3 2-3	JP3 1-2
JP4 2-3	JP4 2-3	JP4 1-2
JP5 2-3	JP5 2-3	JP5 1-2
JP6 2-3	JP6 2-3	JP6 1-2

PROGRAMING CODES

VF5100HG SERIES			VF5100HGVII / SII SERIES		
CODE 4	F/R IST SPEED	0-30 HZ	CODE 01	1ST SPEED	
CODE 19	2ND SPEED	0-5TH SPEED	CODE 50	2ND SPEED	
CODE 20	3RD SPEED	0-5TH SPEED	CODE 51	3RD SPEED	
CODE 21	4TH SPEED	0-5TH SPEED	CODE 52	4TH SPEED	
CODE 1	5TH SPEED	0-127 HZ	CODE 53	5TH SPEED	
			CODE 26	5 SPEED ENABLE	0002

NOTE X: DO NOT MAKE ANY EXTERNAL CONNECTIONS
IN PARALLEL WITH ISOLATOR PCB'S OUTPUT.





Title: D61276 REVISION 2 110V INPUT ISOLATOR BOARD FOR USE WITH VF5100HG, VF5100HGVII / SII OR AS A 6 CHANNEL STRAIGHT THROUGH ISOLATOR.	Date: 08-18-97 Start-up Date XX/XX/XX	REV. # / DATE / COMMENTS 2 / 08-18-97 / REFERENCE DOCUMENT	DRIVECON CORPORATION 820 Lakeside Drive Gurnee, IL 60031 Phone: (847) 855-9150 Fax: (847) 855-9650
Client:	Designer: RMP		
Location:	Job Number: 61276R2.VCD	DRAWN BY: CHECKED BY:	A

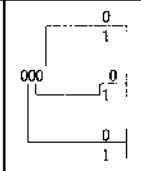
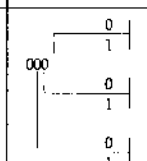
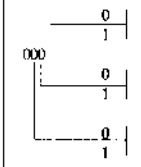
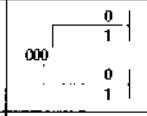
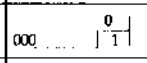
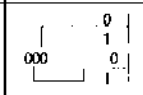
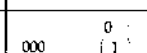
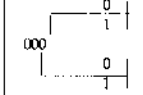
VF5100HG Programming Chart for crane & hoist use with D61276

Model VF51_____ SN:_____

Code No.	Functi Abbrev	Function setting item	Description		Unit	Setting range (Setting Resolution)	Change during operation	Default	User value
0	Fset	Output frequency	Command of operating frequency with console		Hz	0~127Hz (0.1Hz pitch)	Possible	0Hz	
1	toPF	5th speed	Maximum operating frequency of inverter. (fixed)		Hz	30~127Hz (0.1Hz pitch)	Impossible	60Hz	
2	botF	Minimum frequency	Minimum operating frequency of inverter.		Hz	Between 0Hz and set value of code No.1 (0.1Hz pitch)	Possible	0Hz	
3	FLin	Frequency setting input voltage limit	Limit of frequency analog input voltage		V	5~15V (0.1V pitch)	Possible	10.3V	
4	JoGF	1st speed	1st speed point (fixed)		Hz	0~30Hz (0.1Hz pitch)	Possible	5Hz	
5	boSt	Torque compensation	Torque boost volume at low frequency		%	0~20% (0.1% pitch)	Possible	0%	
6	UAdJ	Rated output voltage	Output voltage adjustment at base frequency		%	-30~+30% (0.1% pitch)	Possible	0%	
7	Fch1	Asynchronous carrier frequency	PWM carrier frequency during operation		Hz	400~1500Hz (1Hz pitch)	Possible	833Hz	
8	Fch2	Carrier frequency at start	PWM carrier frequency at start		Hz	225~630Hz (1Hz pitch)	Possible	225Hz	
9	CAP	Inverter capacity	Inverter capacity, voltage		-	200V 3kVA~480V 900kVA	Impossible	Capacity at delivery	
10	Acc	Acceleration time	Rate of frequency increase		Sec	0.5~100sec setting (0.1sec pitch) 100~600sec setting (1 sec pitch)	Possible	30sec	
11	dEc	Deceleration time	Rate of frequency decrease		Sec		Possible	30sec	
12	SAS	S-function rise time	S-function acceleration start time (SAS)		Sec	0.60sec (0.1 sec pitch)	Possible	0sec	
13	SAE	S-function setting time (acceleration)	S-function acceleration ending time (SAE)		Sec		Possible	0sec	
14	SdS	S-function fall time	S-function deceleration fall time (SDS)		Sec		Possible	0sec	
15	SdE	S-function setting time (deceleration)	S-function deceleration reaching time (SDE)		Sec		Possible	0sec	
16	StF	Start frequency	Inverter output frequency at start		Hz	0~10Hz (0.1Hz pitch)	Possible	0.5Hz	
17	oPS	Over frequency operating value	Over-frequency protective operation value		Hz	35~127Hz (1Hz pitch)	Possible	65Hz	
18	PcF	Base frequency	Base frequency		Hz	Between 30Hz ~ set value of code No.1 (0.1Hz pitch)	Possible	60Hz	
19	FS1	2nd speed	2nd speed set point (fixed)	This function can not be used when selecting interlock operation	Hz	Between set values of code Nos.1 and 2 (0.1Hz pitch)	Possible	0Hz	
20	FS2	3rd speed	3rd speed set point (fixed)		Hz		Possible	0Hz	
21	FS3	4th speed	4th speed set point (fixed)		Hz		Possible	0Hz	
22	FJ1	Jump frequency (1)	1st critical avoidance frequency		Hz	Between 0Hz and set values of code Nos. 1 and 2 (0.1Hz pitch)	Possible	0Hz	
23	FJ2	Jump frequency (2)	2nd critical avoidance frequency		Hz		Possible	0Hz	
24	FJ3	Jump frequency (3)	3rd critical avoidance frequency		Hz		Possible	0Hz	
25	FdF	Jump range	Avoidance frequency range		Hz	0.1~5Hz (0.1Hz pitch)	Possible	0Hz	
26	dcb	DC braking voltage	Voltage level of DC braking		%	0~20% (0.1% pitch)	Possible	0%	
27	dct	DC braking time	DC brake operating time		Sec	0~5sec (0.1sec pitch)	Possible	0sec	
28	oLS	Overload operating value	Overload protective operation value (time limit characteristic)		%	20~110% (1% pitch)	Possible	100%	
29	CLd	Current limit (powering)	Current limit value in powering mode		%	20~150% (1% pitch)	Possible	150%	
30	CLb	Current limit (regenerating)	Current limit value in regenerating mode		%	0~150% (1% pitch)	Possible	150%	
31	drP	Drooping amount	Drooping amount when drooping control is used		%	0~30% (1% pitch)	Possible	0%	
32	uS	Slip frequency	Slip frequency of motor		Hz	0~5Hz (0.01Hz pitch)	Possible	0Hz	
33	ird	IR drop amount	Wiring drop to motor, motor primary impedance compensating amount		-	0~5000 (1 pitch)	Possible	0	
34	PF	Power factor correction	Motor power factor		%	30~97% (1% pitch)	Possible	75%	
59	-P	Proportional amount	Proportional amount of automatic speed regulation	Set when ASR option is issued	%	0~100% (1% pitch)	Possible	20%	
60	-I	Integral amount	Integrated amount of control system		%	0~100% (1% pitch)	Possible	20%	
69	trF	Torque limit on powering side	Torque limit on powering side		%	0~150% (1% pitch)	Possible	150%	
70	trr	Regeneration side torque limit	Regeneration side torque limit		%	0~255% (1% pitch)	Possible	150%	

VF5100HG Programming Chart for crane & hoist use with D61276

Model VF51_____ SN:_____

Cbd No.	Function abbrev.	Function Setting item	Setting method and function description		Default	User value
			Setting abbreviation	Function		
37	SS1	Starting/stopping method		Starting from minimum frequency Starting into spinning motor	Starting from minimum frequency	
				Deceleration stop Coast to stop	Decelerating stop	
				DC brake not used DC brake activated	DC brake Not-used	
38	SS2	Reverse inhibition and current limiting activation		Forward/Reverse operation Reverse inhibition	Forward/reverse operation	
				Motoring-side current limit activated Motoring-side current limit deactivated	activation	
				Regeneration-side current limit, activatied Regeneration-side current limit, deactivated	activation	
39	SS3	V/f ratio and PWM modulation method		Constant torque V/f pattern Square reduced torque V/f pattern	Constant torque V/f pattern	
				Asynchronous / synchronous PWM modulation All area synchronous PWM	Asynchronous / synchronous changeover PWM modulation	
				Fixed modulation Low noise modulation	Fixed modulation	
40	SS4	Processing method at momentary power failure		Automatic restarting prohibited Automatic restarting activated	Restarting prohibited	
				Restarting in automatic restarting mode, and after 1 sec. Restarting in automatic restarting mode, and after 0.1 sec.	Restarting after 1 sec.	
41	SS5	Torque compensation method		Manual boost Automatic boost	Manual boost side	
42	SS6	Meter terminal output change		Terminals 12 & 9 for ammeter output of effective current Terminals 12 & 9 for ammeter output of motor / regen. Terminals 8 & 9 for frequency output current Terminals 8 & 9 output of max. frequency for scaling	All effective current side	
					Operating frequency side	
43	SS7	RS232C control		RS232C control. Not operational. RS232C control is in use. (option)	No RS232C control not used	
44	SS8	Relationship between external frequency setting and output frequency		Minimum speed increase slope change Dead band system	Slope change	
45	SS9	Not used				
46	SSA	Frequency setting system through digital console		Preset system (If SET key is pressed after frequency is set with up/dwn. keys, the frequency is changed) Interlock system (Frequency is changed interlocking with up/dwn. keys)	Preset system	
				Reversed by direction change in interlock position. Reversed by continuous lowering of speed.	Reversed by direction change	
47	SSb	Frequency setting selection	0 1 2	Selection of operating place by DIR/REM Setting through RS232C control (optional) For system-up option	interlock to console DIR/REM	
48	SSc	Start/stop selection	0 1 2 3 4	Selection of operating place by DIR/REM of console Operation possible only through terminal block (console operation impossible) Operation possible only through console (operation impossible from terminal block) Setting through RS232C control (optional) For system-up option	interlock to console DIR/REM	
49	SSd	Jog operation selection	0 1 2 3 4	Selection of operating place by DIR/REM of console Operation possible only through terminal block (console operation impossible) Operation possible only through console (operation impossible from terminal block) Setting through RS232C control (optional) For system-up option	interlock to console DIR/REM	
50	SSE	Reverse operation selection	0 1 2 3 4	Selection of operating place by DIR/REM of console Operation possible only through terminal block (console operation impossible) Operation possible only through console (operation impossible from terminal block) Setting through RS232C control (optional) For system-up option	interlock to console DIR/REM	
51	SSF	Reset operation selection	0 1 2 3	Selection of operating place by DIR/REM of console Operation possible only through terminal block (console operation impossible) Operation possible only through console (operation impossible from terminal block) Operation possible through both terminal block and console	interlock to console DIR/REM	
52	SSG	Selection of VF51001G control system	0 1 2 3	V/f control (open loop) Droop control Slip compensation control ASR control (option)	V/f control	
53	SSH	Operation selection changeover	0 1 2	Interlock to console DIR/REM RS232C setting (code Nos. 47-50 are set for RS232C operation) For system-up option	Interlock to console DIR/REM	

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Code # and Abbreviation	Description	Unit	Set range	Value at shipment	Set value	chan	Ref. page
00.oPS	Selection of operation region		0~3	1		O	33
01.nSt	Setting of rotation speed	rpm	0~12000 #2	1800		O	33
02.tPF	Maximum rotation speed of forward rotation	rpm	284~12000 #2	1800		X	33
03.tPr	Maximum rotation speed of reverse rotation	rpm	0~ -12000 #2	-1800		X	33
04.btn	Minimum rotation speed	rpm	0~10800 #2	24		O	33
05.JGF	Rotation speed at forward jogging	rpm	0~300 #2	24		O	34
06.JGr	Rotation speed at reverse jogging	rpm	0~ -300 #2	-24		O	34
07.S-P	Proportional gain	%/%*	3~100	15		O	34
08.tcA	Integral time	ms*	10~10000	40		O	34
09.dJ#1	System moment of inertia	gm2*	1~32767			O	34
10.PG2#1	Proportional gain - 2	%/%*	3~100	15		O	34
11.PSG#1	Synchronization control proportional gain		0~32767	0		-	35
12.SS1	Memory switch 1		0000~2121 #2	1001		X	35
13.SS2	Memory switch 2		0000~3302 #2	0001		X	38
14.SS3	Memory switch 3		0000~1111 #2	1001		X	36
15.LFP	Torque limit - forward rotation powering	%	0~150 #2	150		O	36
16.LFG	Torque limit - forward rotation braking	%	0~150 #2	150		O	36
17.LrP	Torque limit - reverse rotation powering	%	0~150 #2	150		O	36
18.LrG	Torque limit - reverse rotation braking	%	0~150 #2	150		O	36
19.FrF	Magnetic flux level	%	25~100	100		O	36
20.Fr2	Field weakening flux level	%	50~100	100		O	36
21.nln	Rotation speed setting limit	%	10~105	105		O	36
22.tGJ	Torque setting analog gain	%	-50.0~100.0	0.0		O	37
23.nGJ	Rotation speed setting analog gain	%	-50.0~100.0	0.0		O	37
24.AoF#1	ISOV 4-20mA offset		-50~50	0		O	37
25.SS4	Memory switch 4		0000~2211	0001		X	37
26.SS5	Memory switch 5		0000~1333	0000		X	37
27.SS6	Memory switch 6		0000~5121 #2	0010		X	37
28.Ac0	Acceleration time - 0	sec*	0.1~3600.0	30.0		O	37
29.dE0	Deceleration time - 0	sec*	0.1~3600.0	30.0		O	37
30.Ac1	Acceleration time - 1	sec*	0.1~3600.0	30.0		O	37
31.dE1	Deceleration time - 1	sec*	0.1~3600.0	30.0		O	37
32.SAS	S type acceleration start	sec*	0.0~60.0	0.0		O	37
33.SAE	S type acceleration end	sec*	0.0~60.0	0.0		O	37
34.SdS	S type deceleration start	sec*	0.0~60.0	0.0		O	37
35.SdE	S type deceleration end	sec*	0.0~60.0	0.0		O	37
36.oSF	Forward overspeed limit	rpm	#2	1900		X	37
37.oSr	Reverse overspeed limit	rpm	#2	-1900		X	37
38.Fch	Carrier frequency	Hz	500~1300	1000		O	38
39.OAJ	Zero adjustment of current/torque meter		-50~50	0		O	38
40.dCb#1	DC injection brake flux level	%	20~140	20		O	38
41.dCt#1	DC injection brake time	sec*	0.5~5.0	0.5		O	38
42.F-d#1	Electronic gear ratio for synchronized drives		01.01~49.49	01.01		-	38
43.SS7	Memory switch 7		1000~3121	1000		X	38
44.SS8	Memory switch 8		1000~AAAA #2	2000		X	38
45.SS9	Memory switch 9		0000~0077	0010		X	38
46.drP#1	Speed drooping rate	%	0.0~50.0	0.0		X	39
47.drt#1	Drooping starting torque	%	0.0~90.0	0.0		X	39
48.drn#1	Drooping rate switching speed	%	0.0~100.0	0.0		X	39
49.drS#1	Drooping starting speed	%	0.0~100.0 #2	1.3		X	39
50.nS1#1	Preset rotation speed 1	rpm	0~12000 #2	24		O	39
51.nS2#1	Preset rotation speed 2	rpm	0~12000 #2	24		O	39
52.nS3#1	Preset rotation speed 3	rpm	0~12000 #2	24		O	39
53.nS4#1	Preset rotation speed 4	rpm	0~12000 #2	24		O	39
54.nS5#1	Preset rotation speed 5	rpm	0~12000 #2	24		O	39
55.nS6#1	Preset rotation speed 6	rpm	0~12000 #2	24		O	39
56.nS7#1	Preset rotation speed 7	rpm	0~12000 #2	24		O	39
57.Pt0#1	Preset time 0	sec/min*	0~1.9999	0		O	39

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Code # and Abbreviati	Description	Unit	Set range	Value at shipment	Set value	change	Ref. pag
58.Pt#1	Preset time 1	sec/min*	0~1.9999	0		O	39
59.Pt2#1	Preset time 2	sec/min*	0~1.9999	0		O	39
60.Pt3#1	Preset time 3	sec/min*	0~1.9999	0		O	39
61.Pt4#1	Preset time 4	sec/min*	0~1.9999	0		O	39
62.Pt5#1	Preset time 5	sec/min*	0~1.9999	0		O	39
63.Pt6#1	Preset time 6	sec/min*	0~1.9999	0		O	39
64.Pt7#1	Preset time 7	sec/min*	0~1.9999	0		O	39
65.brt	Serial communication baud rate	bps*	1200~19200	9600		X	40
66.Stn	Drive switch off speed	rpm	0~300 #2	24		O	41
67.F-C	Minimum frequency for parallel operation	Hz	0.0~1.5	1.2		O	41
68.SSA	Memory switch A		0000~1111 #2	0000		X	41
69.trc	Trace back count after trigger		1~90	50		O	41
70.trp	Trace back sample pitch	ms*	1~100	1		O	41
71.oL 1	Electronic thermal current	%	20~100	100		O	41
72.oLt#1	Electronic thermal torque	%	#2	150		O	41
73.out	Base torque, overtorque	%	20~140	105		O	41
74.oAt	Electronic thermal prealarm	%	1~100	80		O	42
75.LCb#1	Mechanical loss - offset	%	0.0~100.0	0.0		O	42
76.LCA#1	Mechanical loss - slope	%\%*	0.000~32.767	0.000		O	42
77.nHS	Up to speed output hysteresis	rpm	5~600	10		O	42
78.SSb	Memory switch B		0001~0111	0001		X	42
79.	M correction factor		00.00~7F.7F	00.00		X-	42
80.CAP	Inverter capacity		3.2~2000.4			X	43
81.icP	Motor capacity	kW*	.75~1480.0			X	43
82.uur	Rated motor voltage	V	150~480 #2			X	43
83.icr	Rated motor current	A	1.0~3381.6			X	43
84.PcS	Rated motor speed	rpm	400~3600	1800		X	43
85.FFr	Rated motor frequency	Hz	#2			X	43
86.PoL	Motor pole count		2~8	4		X	43
87.LL	Leakage inductance	mH*	0.001~327.67			X-	43
88.nn	Mutual inductance	mH*	0.001~327.67			X-	43
89.r1	Primary resistance	mOHM*	0.01~32767			O-	43
90.r2	Secondary resistance	mOHM*	0.01~32767			O-	43
91.PGP	PG pulse number		60~2400	600		X	43
92.FrJ	Magnetic flux control adjustment		-20~50	0		-	43
93.t-G	Fine adjustment of torque gain	%	-5.0~10.0	0.0		O	43
94.F-1	Conductance	mMHO*	0.0~600.0			O-	43
95.F-2	UTL			0.0		-	43
96.F-3	Standard voltage adjustment			98.0		-	44
97.F-4	Voltage gain detection level	V	0~2	0		X	44
98.F-5	FCL Setting	%	210~270	270		-	44
99.F-6	D.B. turn on voltage	V	320~360	340		-	44
A0.F-7	Starting current	%	1~100	100		-	44
A1.F-8	Magnetic flux P. Gain			1000		-	44
A2.F-9	Magnetic flux Z. Gain			250		-	44
A3.F-A	H67 Central P. Gain	%		1000		-	44
A4.F-B	H67 Central Z. Gain	sec*		1000		-	44
A5.dA1	DSP Internal monitor address 1			0100		-	44
A6.dA2	DSP Internal monitor address 2			0100		-	44
A7.En1	Analog monitor address 1			0000		-	44
A8.En2	Analog monitor address 2			0000		-	44
A9.non	Digital monitor address			0000		-	44

Note 1: Items with #1 in the column of code No. and abbreviation may not have abbreviation indicated depending on contents of memory switches (1~8).
Note 2: Items with #2 in the column of set range may have different set range depending on other set values.
Note 3: Units with mark * in unit column has no unit indication on console.
Note 4: Each mark in the column of change represents the following.
O: Possible to change during operation.
X: Not possible to change during operation.
-: Never change set value.
O-,X-: Do not change set value after auto-tuning of motor's constants have been set (See section 7.6)