400V SERIES

TRANSISTOR INVERTER

FRENIC 5000G3

FRENIC 5000P3

INSTRUCTION MANUAL

FUJI ELECTRIC CO., LTD.

INR HF 5526

CONTENTS

1. General items

1-1 Foreword

This FRENIC 5000G or FRENIC 5000P guarantees its full performance satisfactorily depending upon your proper operation and handling. You will be acquainted with procedures before using the equipment by reading this instruction manual deliberately.

1-2 Inspection upon reception

Upon receiving the equipment, be sure to check the following points:

(1) Make sure that the specifications and accessories the correct.

(2) Check for any damage to the equipment sustained in transit.

(3) Check on screws, nuts and connections for any loose fit.

Note : (1) When opening the package or carrying the equipment, handle it carefully to prevent any damage.

(2) When the equipment is to be left unused for a long period of time, store it as packed position in a enviroment of clean, dry and under moderate temperature. Avoid direct sunshine.

1-3 Installation

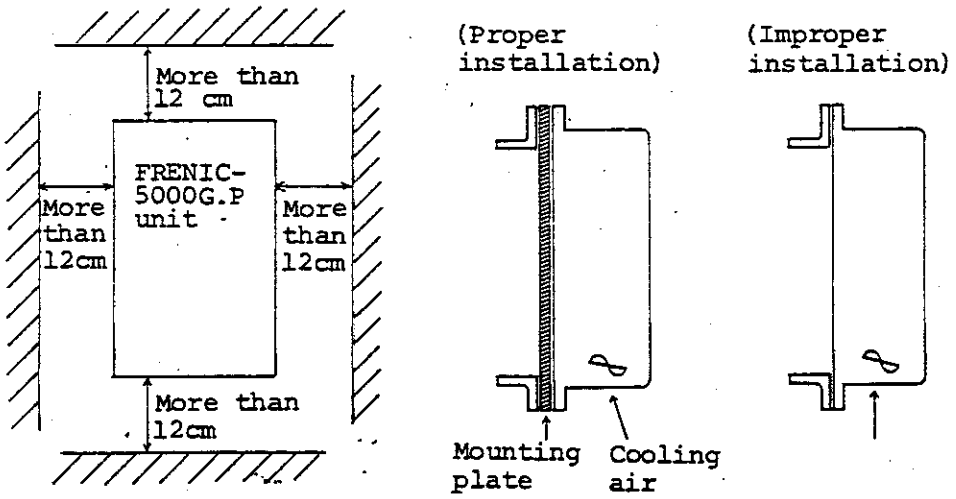
Improper installation of the equipment will really affect its service life. Be sure to observe the following points:

(1) Do not install the equipment in a place subjected to high temperature, moisture and vibration.

(2) Avoid dust, oil splashes and corrosive gases.

(3) Install the unit vertically.

(4) This equipment produces heat. To prevent danger from temperature rise of the unit, do not put it into a small, sealed box or do not place congeries of parts, heat generator members, etc. around the equipment. Install it on a flat surface with sufficient open space providing around the equipment as shown in the illustration below. If it is to be installed on an angle beam or the like, use a mounting plate (provided separately) to ensure cooling air supply.



1-4 Standard specifications

FRENIC 5000G system

Item	Individual specification									
Type of inverter	FRN006 G3-4	FRN009 G3-4	FRN014 G3-4	FRN018 G3-4	FRN022 G3-4	FRN033 G3-4	FRN044 G3-4	FRN056 G3-4	FRN066 G3-4	FRN084 G3-4
Motor output (KW)	3.7	5.5	7.5	11	15	18.5/22	30	37	45	55
Inverter capacity (KVA)	6	9	14	18	22	33	44	56	66	84
Rated output current (A)	8.5	12	18	23	29	43	58	73	87	110
Weight of unit (Kg)	16	17	17	18	18	21	36	52	52	120
Thermal loss of unit (KW)	0.3	0.4	0.5	0.6	0.85	1.2	1.7	2.1	2.5	3.0
Ventilation for panel installation (m/min	2.5	3.0	3.3	3.5	4	5	6	7	7.5	8

FRENIC 5000P system

Item	Individual specification									
Type of inverter	FRN006 P3-4	FRN009 P3-4	FRN018 P3-4	FRN022 P3-4	FRN028 P3-4	FRN033 P3-4	FRN056 P3-4	FRN066 P3-4	FRN084 P3-4	FRN104 P3-4
Motor output (KW)	3.7	5.5	7.5/11	15	18.5	22	30/37	45	55	75
Inverter capacity (KVA)	6	9	18	22	28	33	56	66	84	104
Rated output current (A)	8.5	12	23	29	37	43	73	87	110	137
Weight of unit (Kg)	16	16	17	18	18	21	36	52	52	120
Thermal loss of unit (KW)	0.3	0.4	0.6	0.85	1.1	1.2	2.1	2.5	3.0	4.0
Ventilation for panel installation (m/min	2.5	3.0	3.5	4	4.7	5	7	7.5	8	10

	Item	Common specification	Remarks
Power source	Input source voltage	3-phase AC 400/400-440V	
	Input source frequency	50/60 Hz	
	Allowable voltage variation	± 10%	
Environment	Allowable frequency variation	± 5%	
	Operating place		
	Altitude	Less than 1000m	
	Ambient temperature	0 - 40°C	0-50°C (for dismounting face cover)
	Humidity	Relative humidity 90% or less (to be free from dew condensation)	

	Item	Common specification	Remarks
Control specifications	Output voltage	3-phase AC 400/440V	Note 1
	Output frequency	1 - 50, 1 - 60 Hz 1 - 100, 1 - 120 Hz 1 - 150, 1 - 180 Hz 1 - 200, 1 - 240 Hz	Max. 105% adjustable
	Accuracy of output frequency	± 0.5% (25 ± 10°C)	
	Frequency resolution	0.03 Hz (at 1 - 60 Hz output frequency)	
	Voltage/ frequency ratio	V/F ratio changeover Changeover in 14 types	Changeover through FRE
		Voltage high/low changeover Changeover in 16 types	Changeover through TRQ
	Over current resistance	FRENIC 5000G3 150% 1 min.	
		FRENIC 5000P3 120% 1 min.	
	Preset input	0 - -10V 0 - +10V 4 - 20mA	Incoorporated with bias setter with upper/lower limiter.
	Speed regulating time	0.2 - 200 sec (at 60 Hz setting)	Adjustable with accelration/ deceleration invidually.
	Operation system	Reversible	
	Damping system	D.C. regenerative damping	Option
	Jogging	Operated at jogging speed only with contact made.	Note 2
	Inverter stop	Inverter stpps with contact made.	Free run stop
	Overvoltage protection	Inverter stops at overvoltage in D.C. intermediate voltage.	
	Overcurrent protection	Inverter stops at overcurrent or blown fuse.	OC
	Overload protection	Inverter stops at cooling fin overheat detection.	OL

	Item	Common specification	Remarks
Protection specifications	Thermal contact input	Inverter stops at contact opening.	MOL
	Electronic thermal	Inverter stops at overland	MOL
	Damping resistance overheat protection	Inverter stops at contact opening	RT
	Momentary stop protection	Inverter stops at abrupt power failure.	
	Short voltave protection	Inverter stops at shorting voltage detection	
Indication	Abnormality indication	OV. OC. OL. MOL. RT	Individual indication
	Movement indication	CHARGE. SET	

Note 1. Up to the capacity of FRN014G3-4, FRN018P3-4 : source voltage propotional correspondence

Over the capacity of FRN018G3-4, FRN022P3-4 : at 50Hz 400V at 60Hz 440V

Preset value at delivery from the factory is 440V

At lower value than above voltage : source voltage propotional correspondence

Note 2. Jogging operation using the terminal JOG only can be done at the starting point. (condition of without speed command)

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2. Composition and Wiring

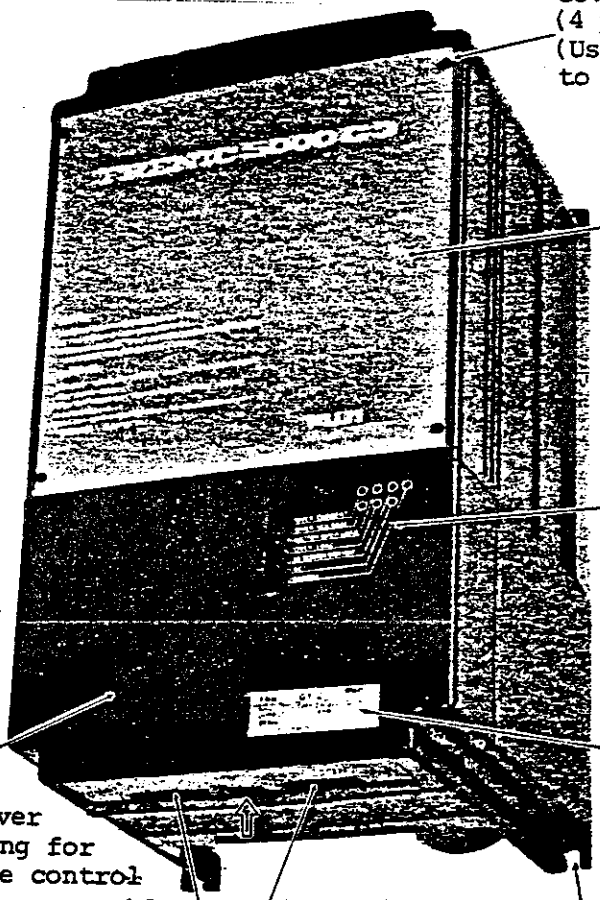
2-1 Composition of control unit

The names of parts of the control unit are given as follows:

(Appearance)

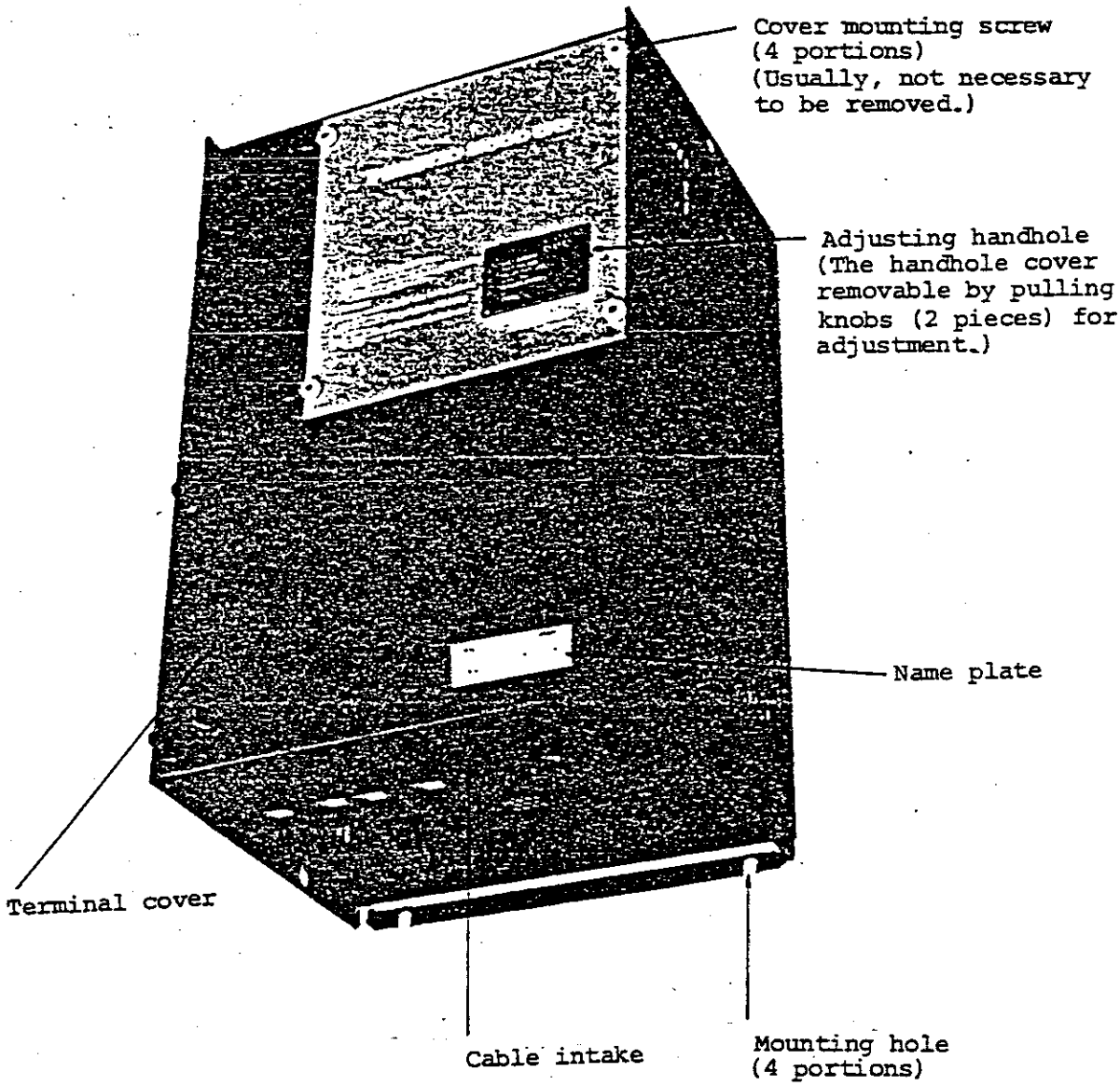
2-1-1 FRN006G3-4 ~FRN033G3-4

FRN006P3-4 ~FRN033P3-4



2-1-2 FRN044G3-4 ~FRN084G3-4

FRN056G3-4 ~FRN104G3-4



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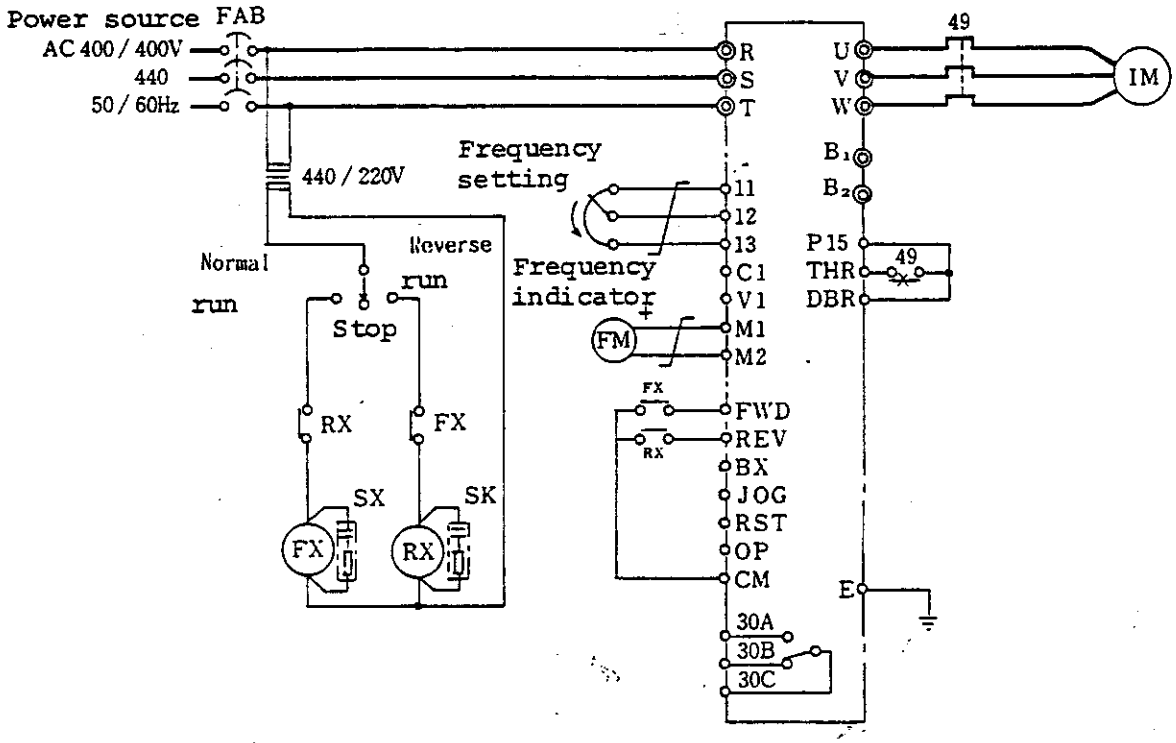
2-2 Wiring and connection

Proceed wiring making reference to the connection diagram given below, and note the following points:



1. Refer to the main circuit applicable equipment list for applications of FAB, 52, 49.
2. Use twist shielding wires or strand wires each other for the wiring marked ≠ .
3. Contact capacity for 30A, 30B and 30C is AC250V 3A.
4. Use the minute signal twin contact relay for the relay of FX and RX to prevent any defective connection.
5. No thermal relay is required for application within a protection agrea of electronic thermal relay (20 Hz or over).

Standard connection diagram

(1) In wiring use Fuji's recommending devices or equivalence for such items as pwoer source equipment (MCCB, MC, etc.), sequence RY, frequency setter and frequency indicator.

(2) When connecting ELB (earth leakage circuit breaker), use an impact wave resisting medium sensitivity type (e.g. Fuji's SG series, EG-A series (for inverter)).

(3) MC (magnetic contactor) or RY coils should be connected in parallel with a noise suppression CR filter (AC circuit) or a reverse parallel diode (DC circuit). Some examples of wiring are shown as follows:

a) Application of CR filter and diode.
(Circuit voltage : Lower than 250V)

Device		CR filter or diode
Magnetic contactor (main circuit)	AC	S2-A or equivalence
	DC	Diode or S2-A
Auxiliary relay	AC	S1-B or equivalence
	DC	Diode or S1-B
Fluorescent lamp		S1-B
Solenoid brake clutch	AC	S2-A
	DC	Diode

1) CR filter capacity

S2-A C : 0.2 uF, 500V DC

R : 500 (Nippon Tsushin Kogyo)

S1-B C : 0.1 uF, 500V DC

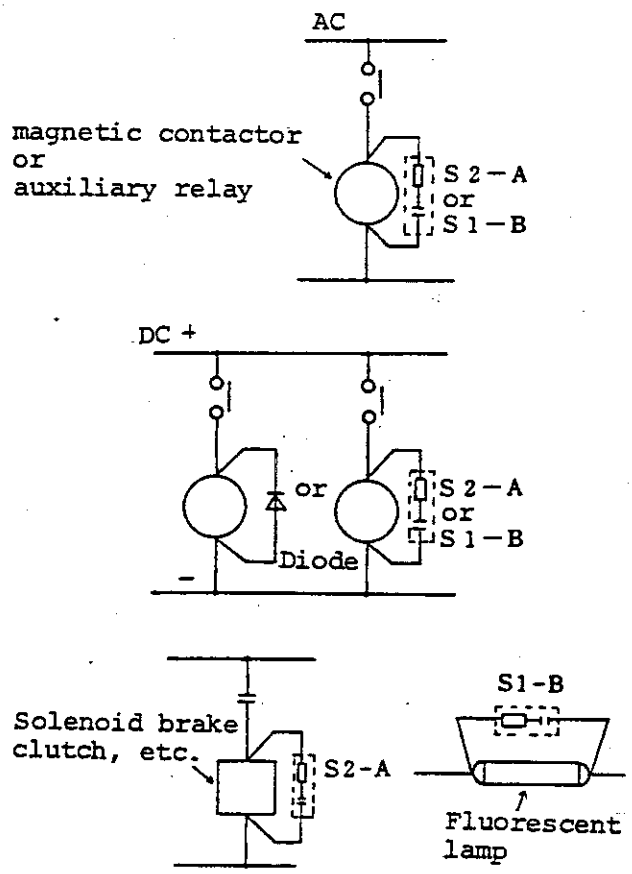
R : 200 (Nippon Tsushin Kogyo)

2) Diode capacity

(Operating coil current : Lower than 1A)

ERB24-06C : 600V 1A (Surge: 45A/10mS)

b) Example of wiring



CR filter or diode should be connected directly to the source of spark using short leads.

(4) Use motor circuit cables with source capacity that match the inverter capacity and motor output. (See item 2-5 "Main circuit devices and cables".)

(5) For wiring of the frequency setting circuit and the frequency indicator, use twisted shield-wires. These wires should be separated from the motor circuit and should not wired through the same duct.

(6) Before connecting the motor circuit cables, be sure to check the rotational direction. (The rotational direction of the motor may not be changed even if the phase sequence of the inverter input is reversed.)

(7) To prevent electrical shocks, the devices (including the motor) should be earthed without fail. Do not earth other parts and terminals.

(8) Do not connect a surge killer across the inverter output terminals, as it may cause misoperation. Use of the surge killer is not necessarily required.

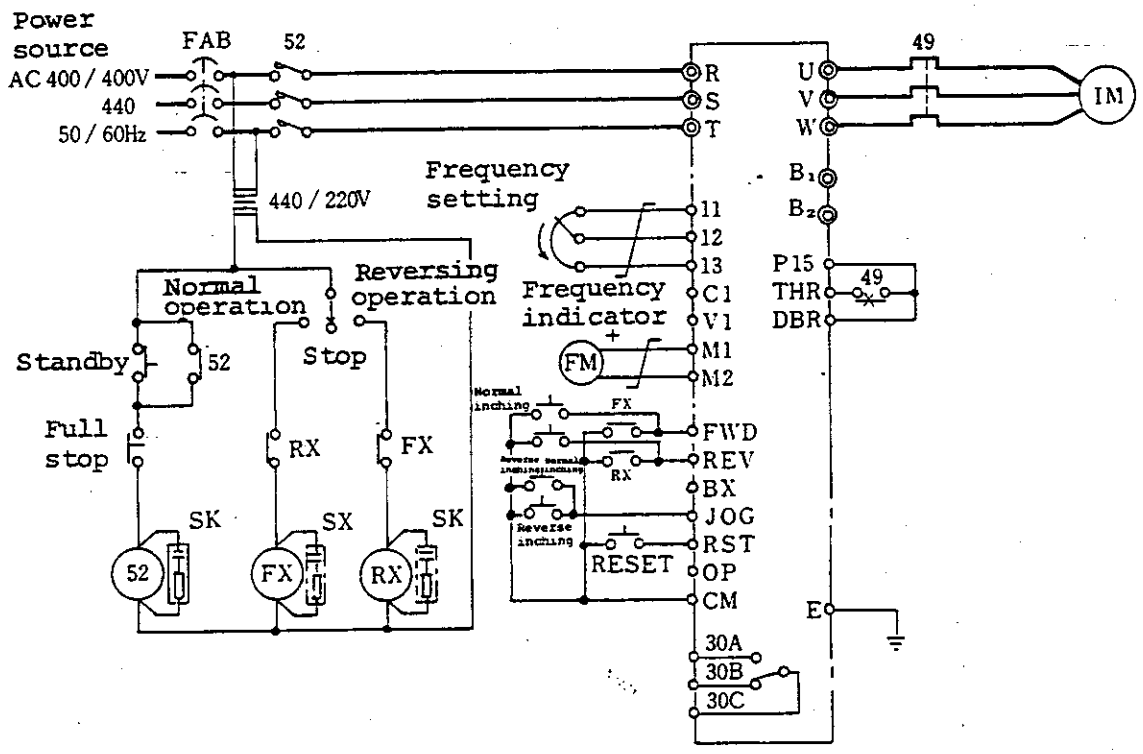
(9) Never connect a phase advancing capacitor to the inverter output terminal (load side).

(10) Do not use AC 400V source for the operating circuit. If any source other than 400V AC is not available, a reduced voltage through a reducing transformer should be used as the operating power source.

(11) Upon completion of the wiring, check it for correct connection. Incorrect connection may result in malfunction or damage to the system. (Connection of the power input terminals R, S, T and the motor output termals U, V, W must be made correct.)

Standard connection diagram (using connectors)

FRENIC-5000G3 (400V)



1. See "Main circuit applicable device list" for application of FAB. 52 and 49.
2. Use twist shielding wires or strand wires for the wiring marked ...
3. Contact capacity for 30A, 30B and 30C is AC 250V 3A.
4. Use the minute signal use twin contact relay for the relay of FX and RX to prevent any defective connection.
5. No thermal relay is required for application within a protection area of electrnoic thermal relay (20 Hz or over).

6. Use the frequency setter of over than 1/2W, 1 K .
7. For an inching operation, put the normal/reverse changeover switch into the stop psotion.

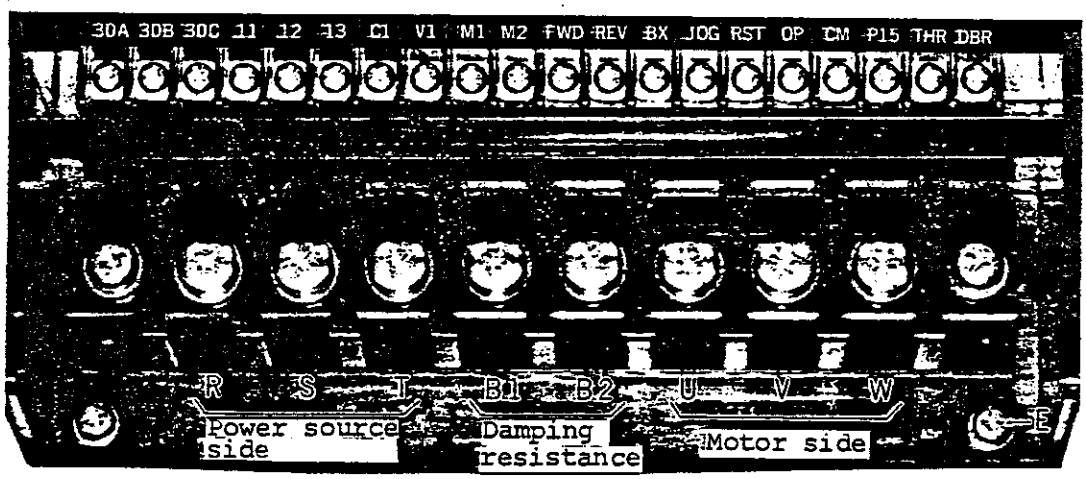
2-3 Input/output terminals

Terminal symbol	Application	Description
R. S. T.	Main circuit power source	3-phase 400/400-440V 50/60 Hz
U.V.W	Motor input terminals	
E	Earth terminal	
B1, B2	Damping resistance connection	A damping resistor is connected with for use of the damping unit (option).
11. 12. 13.	Frequency setting volume connection	DC-10V is appended between 11 and 13. 11 : 0V, 13 : -10V; 12 : input pin (center tap)
C1 (11)	Frequency setting auxiliary input (current input)	4 - 20mA signalling input (Input imedance : 250Ω) : 100% speed at 20mA
V1 (11)	Frequency setting auxiliary input (voltage input)	DC 0 - +10V signalling input : 100% speed at +10V (Input impedance : 22 KΩ)
M1, M2	Frequency indicator connection	M1 : +, M2 : -
FOR, REV, JOG, RST, CM	Operation order terminals	FWD-CM connection set up the normal rotation order. REV-CM connection sets up the reverse rotation order. Both FWD and REV to be turned open for STOP. JOG-CM connection sets up the inching operation order. Changeover of normal/reverse inching to be made by FWD and REV signals. RST-CM connection release protective function and the indicator lamp goes out. (Contact capacity : 15V DC 10mA or over)
OP (CM)	Option signal input	To be connected for optional application.

Terminal symbol	Application	Description
BX (CM)	Stopping signal	Inverter free run stops with BX-CM connection.
THR(P15)	Thermal relay connecting terminal	To be connected with a contact opening at the thermal operation. (Contact capacity : 15V DC 10mA or over)
DBR(P15)	Damping resistance overheat signal terminal	A contact input to open at damping resistance overheat. To be shorted when unused. (Contact capacity : 15V DC 10mA or over)
30A, 30B, 30C	Abnormal signal terminals	Through aid of protectionl function, 30A and 30C changes from OPEN to MADE, and 30B and 30C from MADE to OPEN. (Contact capacity : AC 250V 3A)

2-4 Terminal layout

2-4-1 FRN006G3-4～FRN033G3-4
FRN006P3-4～FRN033P3-4



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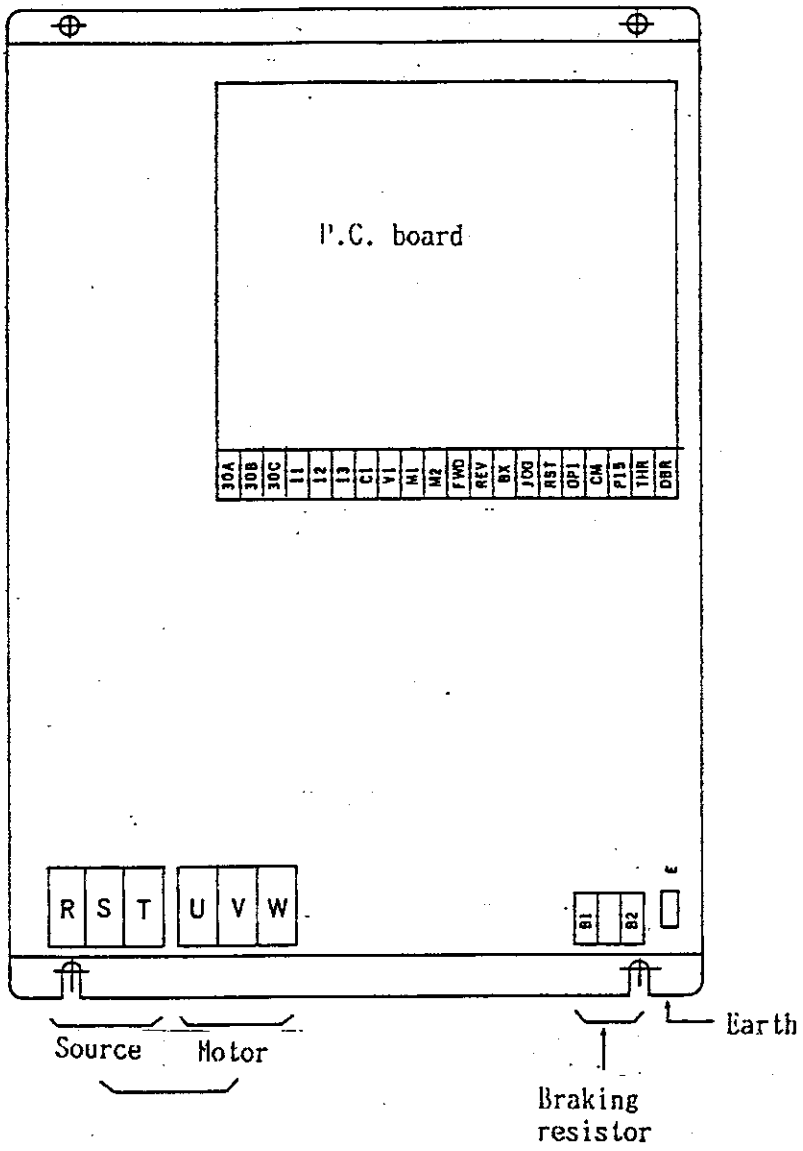
2-4-2 FRN044G3-4～FRN084G3-4, FRN056P3-4～FRN104P3-4



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2-5 Main circuit devices and cable application

Item	FRENIC 5000G3									
Type of inverter	FRN006 G3-4	FRN009 G3-4	FRN014 G3-4	FRN018 G3-4	FRN022 G3-4	FRN033 G3-4	FRN044 G3-4	FRN056 G3-4	FRN066 G3-4	FRN084 G3-4
Inverter capacity (KVA)	6	9	14	18	22	33	44	56	66	84
Rated output current (A)	8.5	12	18	23	29	43	58	73	87	110
Moter used (KW)	3.7	5.5	7.5	11	15	18.5/22	30	37	45	55
Main circuit cables (mm^2)	3.5	3.5	5.5	5.5	8 (14)	14(22)	22(30)	22(30)	22(50)	30(50)
Terminal screw size	M5	M5	M5	M5	M5	M5	M8	M8	M10	M10
Control circuit cables	1.25㎟ ≠ 0.5㎟									
Terminal screw size	M3									
Fuse in unit	60FH20	60FH30	60FH30	60FH75	60FH75	60FH110	60FH150	60FH200	60FH200	60FH300
F A B	SA33/15	SA33/30	SA33/30	SA53/50	SA63/60	SA103K/75 /SA103K/100	SA203K/125	SA203K/150	SA203K/175	SA203K/225
Magnetic contactor	SRC3631 -05	SRC3631 -05	SRC3631 -5-1N	SRC3631 -5-2	SRC3631 -2	SC-2S	SC-3	SC-4	SC-4S	SC-6
Terminal relay	TR-1S (6~9A)	TR-1S (9~13A)	TR-1S (13-20A)	TR-1S (20-26A)	TR-3 (24-36A)	TR-3(28-40A) /TR-3(34-50A)	TR-3 (45-67A)	TR-6 (54-80A)	TR-6 (65-95A)	TR-6 (85-125A)

Item	FRENIC 5000P3									
Type of inverter	FRN006 P3-4	FRN009 P3-4	FRN018 P3-4	FRN022 P3-4	FRN028 P3-4	FRN033 P3-4	FRN056 P3-4	FRN066 P3-4	FRN084 P3-4	FRN104 P3-4
Inverter capacity (KVA)	6	9	18	22	28	33	56	66	84	104
Rated output current (A)	8.5	12	23	29	37	43	73	87	110	137
Moter used (KW)	3.7	5.5	7.5/11	15	18.5	22	30/37	45	55	75
Main circuit cables (mm^2)	3.5	3.5	5.5	8 (14)	14(22)	14(22)	22(30)	22(50)	30(50)	38(80)
Terminal screw size	M5	M5	M5	M5	M5	M5	M6	M8	M8	M8
Control circuit cables	1.25㎟ ≠ 0.5㎟									
Terminal screw size	M3									
Fuse in unit	60FH20	60FH20	60FH30	60FH75	60FH75	60FH110	60FH150	60FH200	60FH200	60FH300
F A B	SA33/15	SA33/30	SA53K/50	SA63/60	SA103K/75	SA103K/100	SA203K/125 /SA203K/150	SA203K/175	SA203K/225	SA203K/225
Magnetic contactor	SRC3631 -05	SRC3631 -05	SRC3631 -5-2	SRC3631 -2	SC-2S	SC-2S	SC-3 /SC-4	SC-4S	SC-6	SC-8
Terminal relay	TR-1S (6-9A)	TR-1S (9-13A)	TR-1S (20~26A)	TR-3 (24-34A)	TR-3 (28-48A)	TR-3 (34-50A)	TR-3 (45-67A) /TR-6 (54-80A)	TR-6 (65-95A)	TR-6 (85-125A)	TR-10 (110-160A)

3. Trial operation

3-1 - Preparation for operation

Before operating the inverter, be sure to check the following points:

(1) Check that the input AC source is as specified value (3 Ø, 400/440V, 50/60Hz).

(2) Check that input and output of the motor circuit are properly connected (input source:R, S, T, motor:U,V,W).

(3) Check that the motor circuit and control circuit are not earthed or shorted.

(4) Check the panel interior for presence or sticking of foreign objects such as metal or wire chips.

(5) Check the external sequence circuit for proper operation.

3-2 Trial operation

The following items shall be strictly prohibited during trial operation.
o Connecting the power source to inverter output terminals (U, V, W).
o Earthing of live parts of the main circuit or control circuit.

To ensure safe operation, disconnect the coupling and belts between the motor and the mating machine so that the motor can be operated independently.

If the machine is left connected for operation, special care should be taken to avoid any possibility of hazards.

(1) Turn every operating switch off.
Set the output frequency changeover switch "FRE" into specified position referring to "FRE" in page ___. (It has been set into (1) Notch 60 Hz at the shop for shipment.)

(2) The frequency setter should be set into minimum.

(3) Make the wiring circuit breaker (the control circuit and the sequence circuit will be energized). After observing the condition for a few minutes, check the control circuit and the sequence circuit for any sign of abnormality (overheat, smoke, offensive odor, etc.).

(4) By pressing the operating push-button the main contactor is made. Make sure that the motor starts rotation by turning the frequency setter clockwise a little. Check to see the rotation under this condition for the correct direction. If the rotation is reversed, stop the motor and

turn off the power source, then reverse the phase sequence at the motor side or the inverter output side.

(5) After checking the rotating direction, turn up the frequency setter slowly to the maximum notch position. Under this condition, check the rotational speed of the motor conforms with the specification. Also check that the motor terminal voltage is identical with the specified value.

(6) After completion of these checks, set the frequency setter into somewhat higher position and make sure that the motor is accelerated and decelerated smoothly.
Now the trial operation completes so far.
Connect the load for practical operation of the inverter.
If readjustment is required as a result of the trial operation, refer to Item 4 "Adjustment and checking".

4. Adjustment and checking

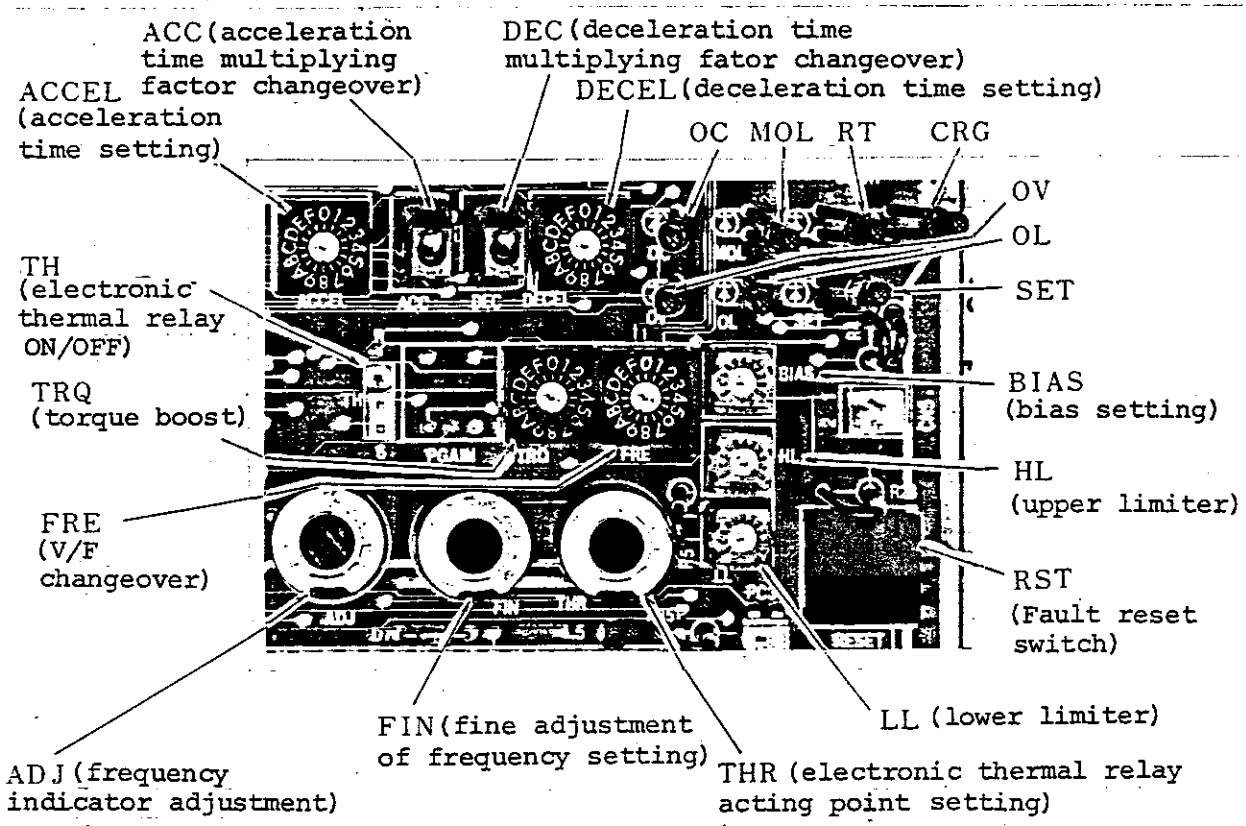
This transistor inverter has been fully adjusted at the factory prior to delivery and no further adjustments are required basically. If any readjustment is required due to change of operating condition, etc., be sure to observe the following points:

(1) Avoid to turn the adjusting VR easily during operation.

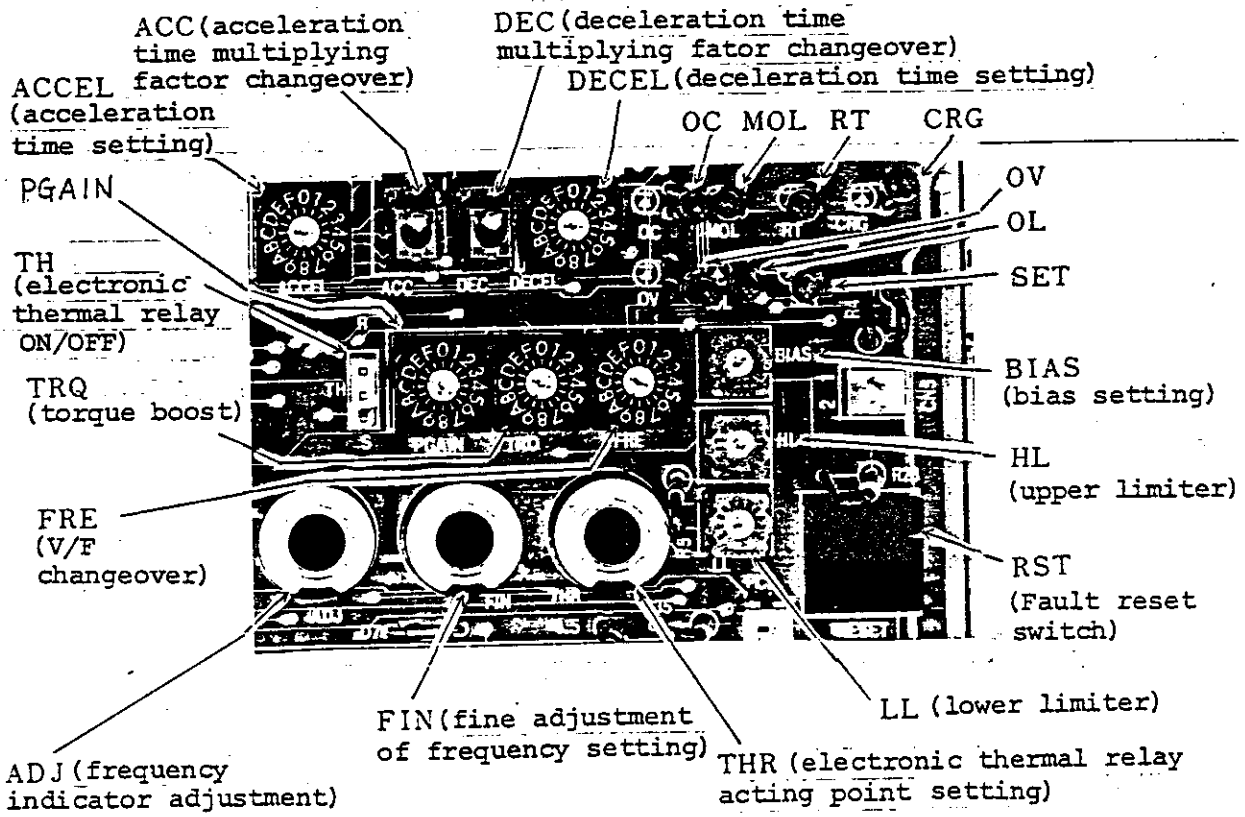
(2) When making adjustments for other than FIN (fine adjustment of frequency setting voltage), ADJ (frequency indicator adjustment), ACCEL (acceleration time adjustment), DECEL (deceleration time adjustment), ACC (acceleration time multiplying factor changeover), DEC (deceleration time multiplying factor changeover), FRE (V/F ratio changeover), TRQ (torque boost), BIAS) bias setting), HL (upper limiter), LL (lower limiter), TH (electronic thermal relay ON/OFF) and THR (electronic thermal relay acting point setting), contact Fuji for necessary advice.

4-1 Arrangement of adjusting parts

4-1-1 FRN006G3-4～FRN014G3-4
FRN006P3-4～FRN018G3-4



4-1-2 FRN018G3-4～FRN084G3-4
FRN022P2-4～FRN104P3-4



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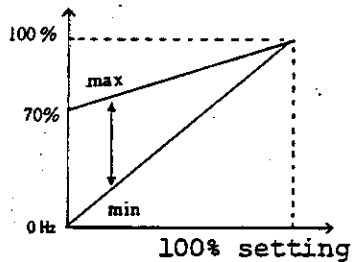
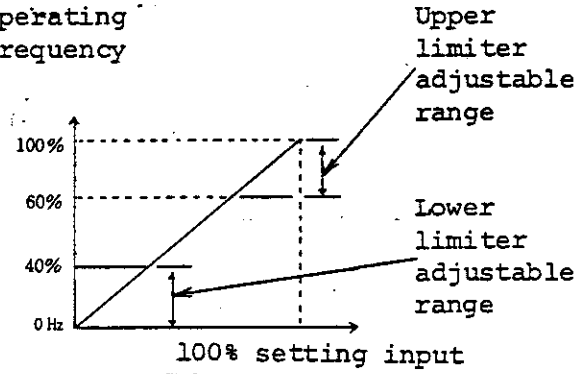
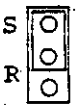
4-2 Adjustments

Symbol of volume switch	Application	Description	Remarks
FIN	Maximum frequency fine adjustment volume	Adjust the volume FIN according to the frequency command usually used. For frequency setter VR : Adjust so that the rated frequency is obtained when FREQ setting is at max. (value in clokwise turn) For 4 - 20mA signal : Adjust so that the rated frequency is obtained when FREQ signal is 20mA. For 0 - ±10V signal : Adjust so that the rated frequency is obtained when FREQ signal is + 10V.	Frequency raised up by clockwise turn.
ADJ	Frequency indicator adjusting volume	Adjusts so that the indication of the frequency indicator conforms with the output frequency. If the maximum frequency changed by changing over the FRE switch, change of adjustment is required.	Has been adjusted into 60 Hz full scale at delivery from the factory.
BIAS	Bias setting volume	Adjusts the bias volume. Operating frequency  	Bias volume increases by turning BIAS clockwise.
HL LL	Upper limiter, Lower limiter	Adjusts the limit value. Operating frequency  	Limiter value increases by turning HL clockwise. Limiter value increases by turning LL clockwise.

Symbol of volume switch	Application	Description	Remarks
ACCEL DECEL	Acceleration time adjusting switch	Selectable in 32 types between 0.23 - 23 sec. (L/S changeover switch in S side) (at 60 Hz) and 25-200 sec. (L/S changeover switch in L side) (at 60 Hz), with time adjusting digital switch and L/S changeover switch.	See page
FRE	Rated output voltage, rated output frequency selecting switch	Selectable in 14 types with digital switch.	See page
TRQ	Torque boost	Makes changeover V/F ratio : constant, higher and lower, with the digital switch.	See page
TH	Electronic thermal relay ON/OFF switch	To be used for selecting Yes or No of utilizing the electrnoic thermal relay.	 for using electronic thermal  for disusing electronic thermal
THR	Electronic thermal relay acting point setting volume	To be used for setting acting point of the electronic thermal relay. Adjust this in accordance with rated current of the motor.	
RST	Fault reset switch	To be used for resetting the inverter stopped due to the protective circuit (external thermal overload, DB resistance overheat, overcurrent and faulty acceleration time). This function is same as for the terminal RST.	
PGAIN	PGAIN AVR minor loop gain adjusting switch	PGAIN has been Adjusted at the factory prior to delivery and no further adjustments are required in case of combination with standard motor. When the motor of other kind is combined, sometimes the fluctuation of motor current will be observed under some condition. Adjust PGAIN to high or low so that the fluctuation of motor current will be weakned.	Clockwise : gain up. FRN006G3-4 FRN009G3-4 FRN014G3-4 FRN006G3-4 FRN009G3-4 FRN018G3-4 have no PGAIN

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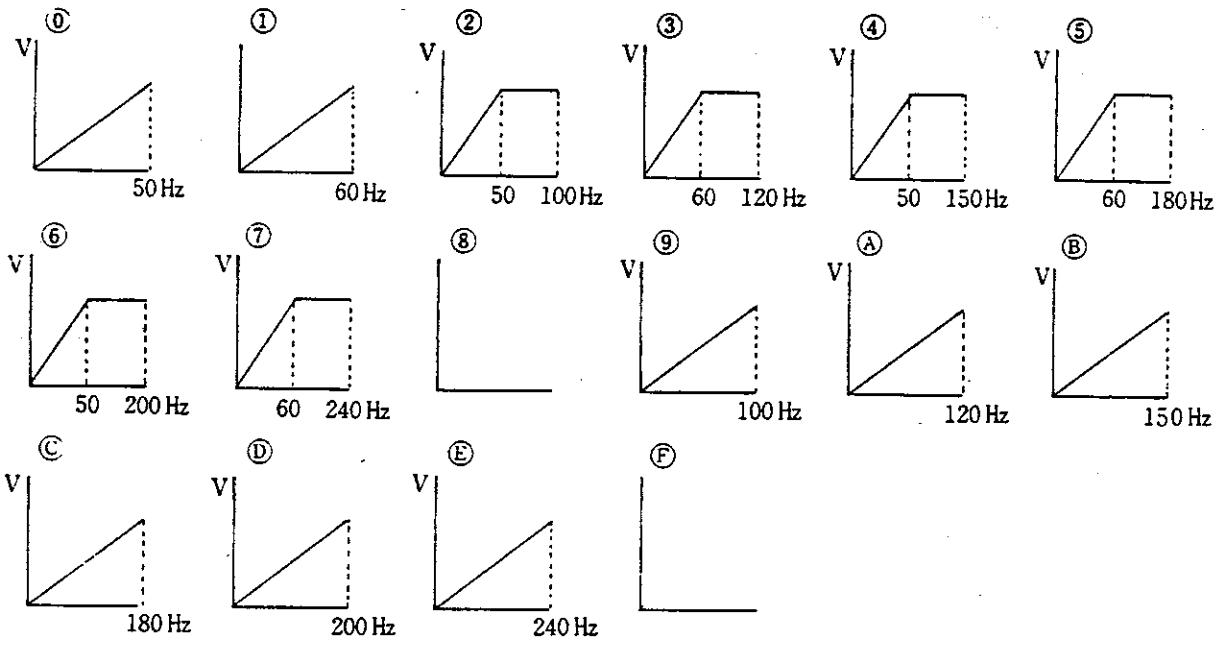
FRE V/F ratio changeover mode diagram



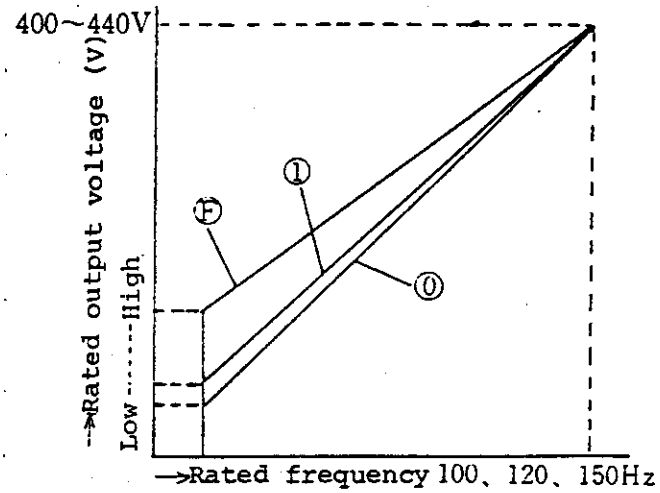
Note 1) (0) - (F) correspond with graduation of FRE switch.

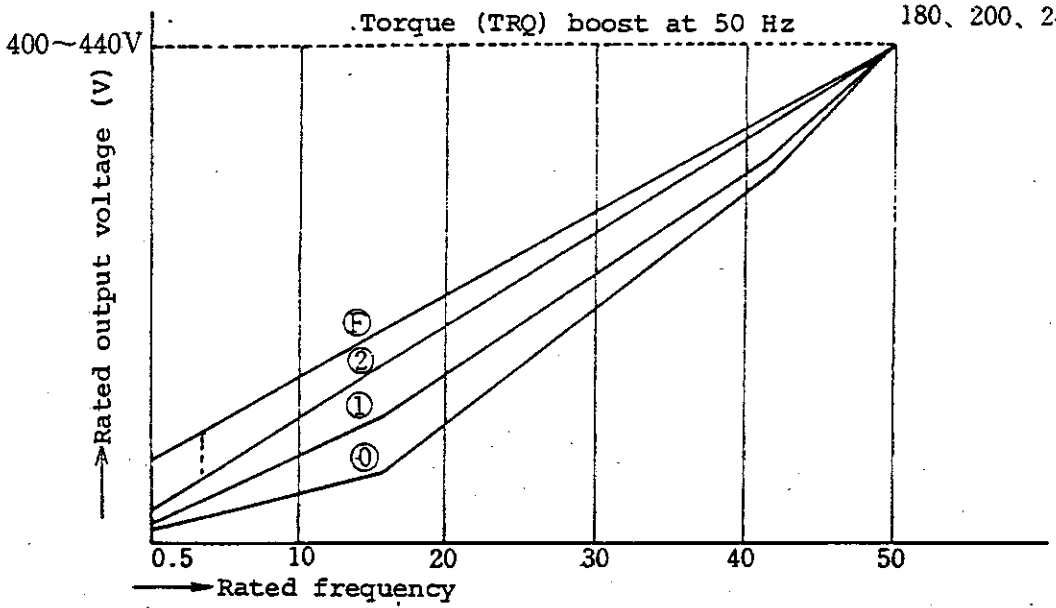
2) Preset value at delivery from the factory : (1)

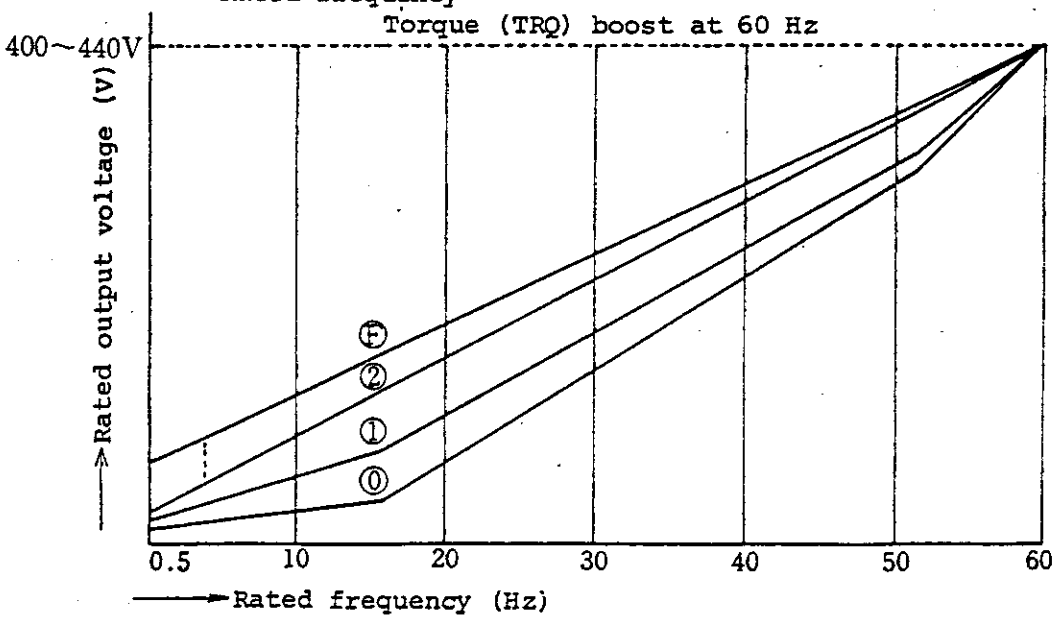
TRQ

Selecting method for constant, higher and lower of V/F ratio

TRQ switch	(0), (1), (2)...(E), (F) Lower ⟷ Higher (V/F ratio)







Note) Preset value at delivery from the factory : 2

INR HF 5526

ACCEL DECEL Acceleration/deceleration time setting

SW position	S (Short)		L (Long)	
	50 Hz	60 Hz	50 Hz	60 Hz
0	0.19 sec	0.23 sec	21 sec	25 sec
1	0.38 sec	0.45 sec	30 sec	31 sec
2	0.75 sec	0.90 sec	41 sec	41 sec
3	1.5 sec	1.8 sec	51 sec	50 sec
4	3.0 sec	3.6 sec	60 sec	61 sec
5	4.5 sec	5.4 sec	71 sec	70 sec
6	6.0 sec	7.2 sec	81 sec	81 sec
7	7.5 sec	9.0 sec	90 sec	90 sec
8	9.0 sec	11 sec	101 sec	101 sec
9	11 sec	13 sec	111 sec	112 sec
A	12 sec	14 sec	120 sec	121 sec
B	14 sec	16 sec	131 sec	131 sec
C	15 sec	18 sec	141 sec	140 sec
D	17 sec	20 sec	150 sec	151 sec
E	18 sec	22 sec	180 sec	180 sec
F	20 sec	23 sec	201 sec	202 sec

Note 1) The time setting is between starting to 50/60 Hz.

Note 2) For selection of 100 Hz, 150 Hz and 200 Hz, the value may be threefold, fivefold and sevenfold of the value at 50 Hz shown in this table, respectively.
For 120 Hz, 180 Hz and 240 Hz, it may be threefold, fivefold and sevenfold of the value at 60 Hz, respectively.

Note 3) ACCEL : Acceleration time setting

DECEL : Deceleration time setting

Note 4) ACC is a switch used for S/L changeover of ACCEL, and DEC for S/L changeover of DECEL.

Note 5) Preset value at delivery from the factory:

ACCEL (F)

ACC (S)

DECEL (F)

DEC (S)

5. Maintenance

5-1 Daily maintenance

Daily maintenance and inspection is necessary to ensure satisfactory performance and continued reliable operation of the inverter preventing possible occurrence of troubles.

When carrying out maintenance and inspection, be sure to observe the following points:

(1) Turn off the power source without fail.

(2) The smoothing capacitors (large capacity electrolytic capacitors) do not discharge so soon after the power source is turned off. For inspection, turn off the power source and wait for more than several minutes to ensure that the charge lamp (CERGE) goes off.

(3) When connecting and disconnecting the connectors, be sure to hold the connector housing.

(4) Inspection items

No.	Inspection item	Cycle	Description	Remedy
1	Magnetic contactor, relay	Every 1 year	• Check contacts for wear. • Check for smooth operation	Replace
2	Transistor, diode, smoothing capacitor PC board	Every 1 or 1.5 year	• Check for discoloration and offensive odor. • Check for entry of metal or wire chips.	Check and replace defective parts
3	Unit cooling fan	Every 1 week	• Check for powered and proper operation. • Check bearings for unusual noise.	Replace fan
4	Terminal connector	Every 1 or 1.5 year	• Check for loose fit.	Retighten

Note : To remove accumulated dusts, use compressed air making sure that no shocks are given to the parts. To remove conductive dust or metalic dust which may cause poor contact of relay, etc., however, suck off them using an electric vaccum cleaner.

5-2 Troubleshooting

Should any trouble arise with the inverter during operation, observe the following precautions without being flurried, then take necessary steps referring to the table of troubleshooting. If trouble can not be removed or damage to the parts is apparent, contact us for necessary advice.

(1) Precautions

a) Do not repair or adjust the unit unless authorized.

b) For checking circuits, use appropriate instruments such as a tester, digital voltmeter, synchroscope, etc.

c) Do not connect or disconnect any live cables, which may cause possible short-circuit.

d) Do not attempt to adjust the preset VR's. If any adjustment necessarily required, take record of the preset positions (notch) so that they can be set back to the original positions.

5-3 Table of troubleshooting

Fault indicating lamp lights on

Note) Prior to access into the unit for check and remedy, turn off the MCCB and wait for several minutes to ensure that the charge lamp goes off.

Name of indicating lamp	Cause of malfunction	Check point	Remedy
OC	Overcurrent	Fuse blown	Diode or transistor may be damaged. Check them according to the item separately given.
		Output shorted	Remove the cause of short-circuit.
		Abrupt acceleration	Increase acceleration time.
OV	Intermediate circuit overvoltage	Abrupt decelerating operation.	Increase deceleration time. (Adjust to match the load GD^2)
		Rotated by load side.	Not applicable to continuous damping load.
		Instantaneous stop during operation.	Check that motor and inverter are in stop position and then restart.

Name of indicating lamp	Cause of malfunction	Check point	Remedy
OL	Inverter overload	Overload operation of inverter.	Remove the cause of overload.
		Improper operation of the unit cooling fan.	Replace the unit cooling fan.
		Abnormal temperature inside the panel	If temperature is abnormally high, provide ventilation holes.
MOL	Motor thermal operation Electronics thermal operation	Overload operation of motor.	Remove the cause of overload.
RT	Damping resistor overheat	Overload operation of damping ciurcuit. Improper operating cycles of damping circuit.	Reduce the operating cycle fo damping circuit.

Note 1) When above-mentioned protective indicating lamp lgiths on and the protective function operates, the motor makes free run stop and the abnormality alarm relay 30 operates.

Trouble	Check point	Remedy
MCCB trips when input MCCB is turned on.	• Incorrect external wiring.	Correct wiring.
	• Short-circuit in secondary side of MCCB due to entry of wire chips, etc.	Remove the shorted circuit.
	• Input source voltage should be AC 400/440V ± 10%.	Note) Incorrect input may cause damage to the unit.
MCCB trips when operation push-button pressed after MCCB is turned on.	• Check current capacity of MCCB.	See specifications classified by types.
	• Short-circuit of secondary side of 52. Short-circuit or ground fault of inverter output. Blown fuse in inverter.	
	• Discolored or damaged parts inside the inverter.	Notify us of the
Motor does not run even if the start button pressed.	• Incorrect wiring of circuit (specially note to connectors)	Correct wiring, or reinstall connector.
	• The switch provided between output and inverter.	Close the switch after making sure any voltage may be imposed on inverter output through the switch.

To resume the operation, take above measures (remove the cause of abnormality) and operate the reset switch RST.
If the protective indication lamp still lights on even if the reset switch pressed, out off the power source once to recheck and remove the cause, and then supply the power source again.

Note 2) OL, MOL and RT will automatically go off when the cause of abnormality resets automatically. However, the abnormality alarm relay 30 retains operation.

Note 3) When the power source is cut off, the indication lamp goes off and the alarm relay becomes immovalbe.

Trouble	Check point	Remedy
	• Removal of motor	Attach a plug bolt after removing the lock bolt.
	• Motor is locked ..... at load side (heavy load.)	Reduce the load.
Motor rotates in reverse direction.	• Incorrect phase..... sequence of inverter output.	Reverse 2 phases of output. (U-W-V U-V-M)
Motor does not accelerate	• Improper frequency .... setting voltage.	CH1 can be increased by turning setting VR clockwise.
	• Excessively ..... heavy load.	Reduce the load.
Motor does not accelerate smoothly.	• HLR acceleration ..... time is too short.	With setting VR turning slowly by hand, check available of acceleration and then adjust acceleration time longer. (See page for time setting of ACCEL.)
Motor speed is high or low.	• Number of poles and ... voltage specification of motor.	Check with specifications and name plate.
	• Improper gear reduction ratio.	
	• Incorrect ..... frequency setting voltage.	Adjust with FIN.

Trouble	Check point	Remedy
	• Very low voltage between motor terminals.	Specially take care to output transformer, ACL, etc.
	• V/F pattern is not as per specification.	Check FRE switch operation. (See page)
Speed fluctuates during operation →	• Improper frequency setting voltage.	
	• Faulty operating signal contact (FX)	Replace relay.
	• Too heavy load.	Reduce the load.
	• Oscillating output of HLR	Confirm and contact us.
Motor stops of itself. →	• Overload operation	Remove the cause of overload.
	• Interference of load.	
	• The failure has occurred during decelerating operation.	Increase deceleration time. (See page for time setting DECEL)
	• Failure of power source.	Restart motor after stop it once.
Input MCCB trips during operation. →	• Discoloration or damage to internal parts of inverter.	Transistor or diode may be damaged. Check them according to the item separately give.

Trouble	Check point	Remedy
	• Abnormally high temperature inside the panel.	Provide some ventilation holes.
	• Check on operation of the unit cooling fan.	
	• Short-circuit or ground fault on output side.	Check the elements.
	• Load other than inverter on secondary side of MCCB.	
Motor does not stop even by pressing the stop button. →	• Incorrect external sequence circuit.	Correct the wiring.
	• Faulty operating signal (FX).	Replace the relay.