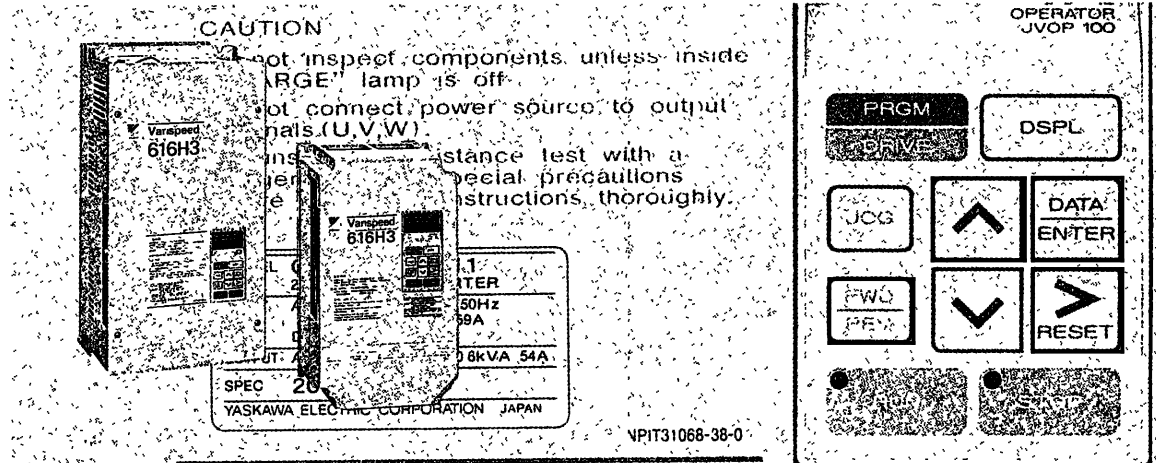


Varispeed-616H3

HIGH-PERFORMANCE ALL-DIGITAL SUPER LOW-NOISE
GENERAL-PURPOSE INVERTER DRIVES

200 TO 230V, 0.5 TO 30HP (0.4 TO 22kW) 1.4 TO 41kVA
380 TO 460V, 0.5 TO 60HP (0.4 TO 45kW) 1.4 TO 82kVA



Before initial operation, read these instructions thoroughly, and retain for future reference.



YASKAWA

What is an “inverter”?

An inverter is a device to convert a three-phase AC commercial power supply to DC with an inverter section to produce AC variable frequency voltage from this converted DC. This AC variable frequency voltage can then be used for speed control of three-phase squirrel-cage induction motors.

WARNING

- 1) After turning off the main circuit power supply, do not touch circuit components until “CHARGE” lamp is extinguished. The capacitors are still charged and can be quite dangerous.
- 2) Do not connect or disconnect wires and connectors while power is applied to the circuit.
- 3) Do not check signals during operation.
- 4) Be sure to ground VS-616H3 using the ground terminal **G** (**E**).
- 5) Never connect main circuit output terminals **T1** (**U**), **T2** (**V**), **T3** (**W**) to AC main circuit power supply.

CAUTION

- 1) All the potentiometers of VS-616H3 have been adjusted at the factory. Do not change their settings unnecessarily.
- 2) Do not make withstand voltage test on any part of the VS-616H3 unit. It is electronic equipment using semi-conductors and vulnerable to high voltage.
- 3) Control PC board employs CMOS ICs which are easily damaged by static electricity. Do not touch the CMOS elements.

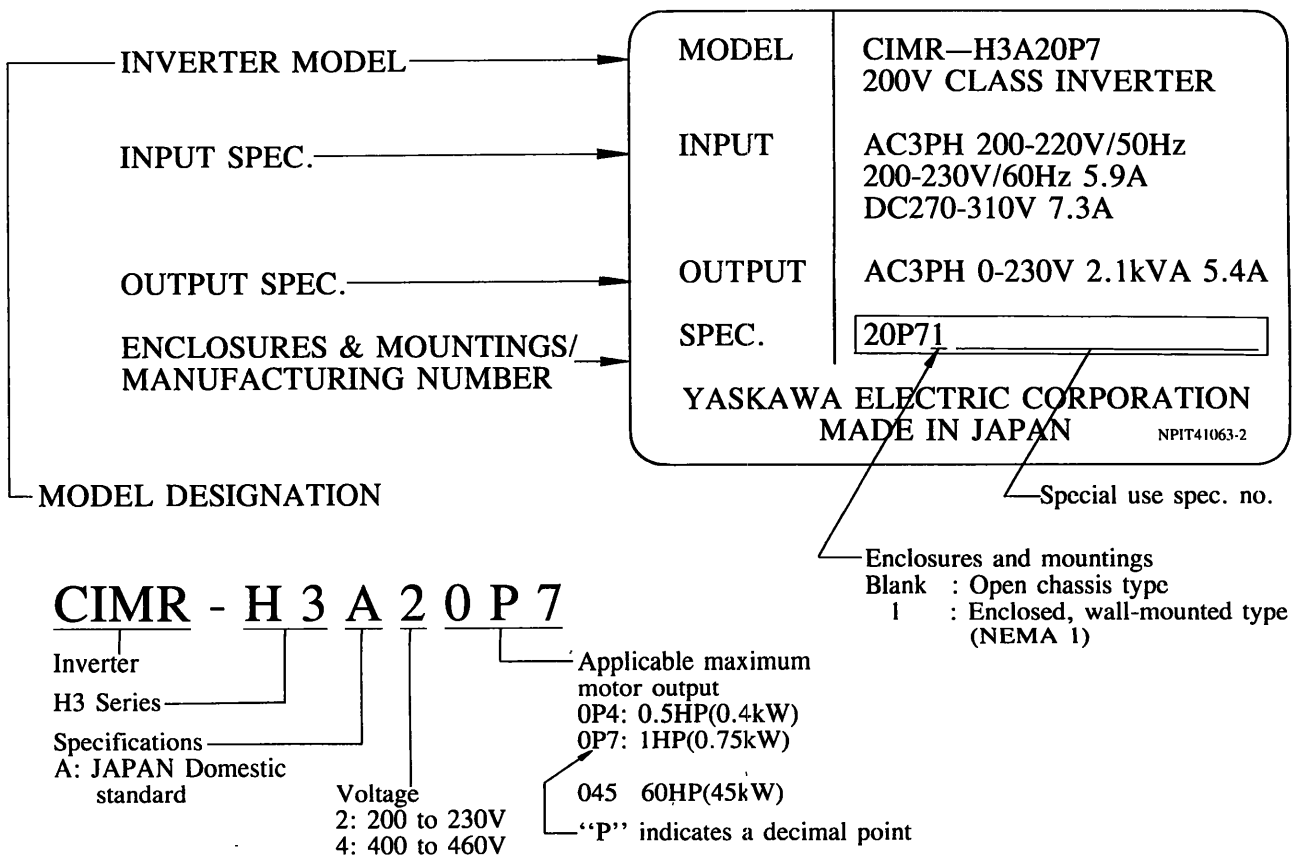
RECEIVING

This VS-616H3 has been put through demanding tests at the factory before shipment. After unpacking, check for the following.

- Verify the part numbers with the purchase order sheet and/or packing slip.
- Transit damage.

If any part of VS-616H3 is damaged or lost, immediately notify the shipper.

NAMEPLATE DATA



INSTALLATION

CAUTION

Never move, lift or handle the VS-616H3 cabinet by front cover or terminal stands. Lift the cabinet from the bottom.

LOCATION

Location of the equipment is important to achieve proper performance and normal operating life. The VS-616H3 units should be installed in areas where the following conditions exist.

- Ambient temperature: -10 to $+40^{\circ}\text{C}$, $+14$ to 104°F (For enclosed type),
 -10 to $+45^{\circ}\text{C}$, $+14$ to 113°F (For open chassis type)
- Protected from rain or moisture.
- Protected from direct sunlight.
- Protected from corrosive gases or liquids.
- Free from airborne dust or metallic particles.
- Free from vibration.
- Free from magnetic noise.

CAUTION

To house multiple VS-616H3s in a switchgear, install a cooling fan or some other means to cool the air entering the inverter below 45°C (113°F).

MOUNTING SPACE

Install VS-616H3 vertically and allow sufficient space for effective cooling as shown in Fig. 1.

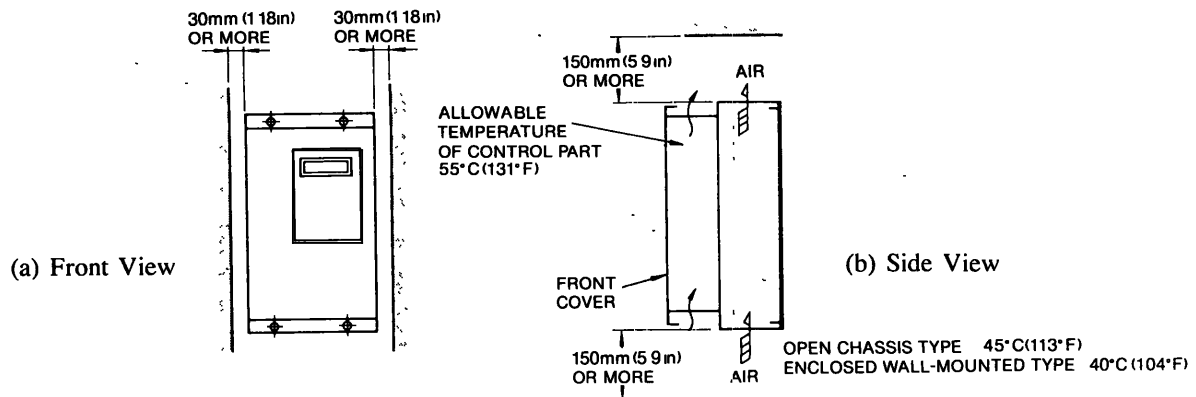


Fig. 1 Mounting Spaces

* Allowable temperature up to 50°C (122°F) when front cover is removed

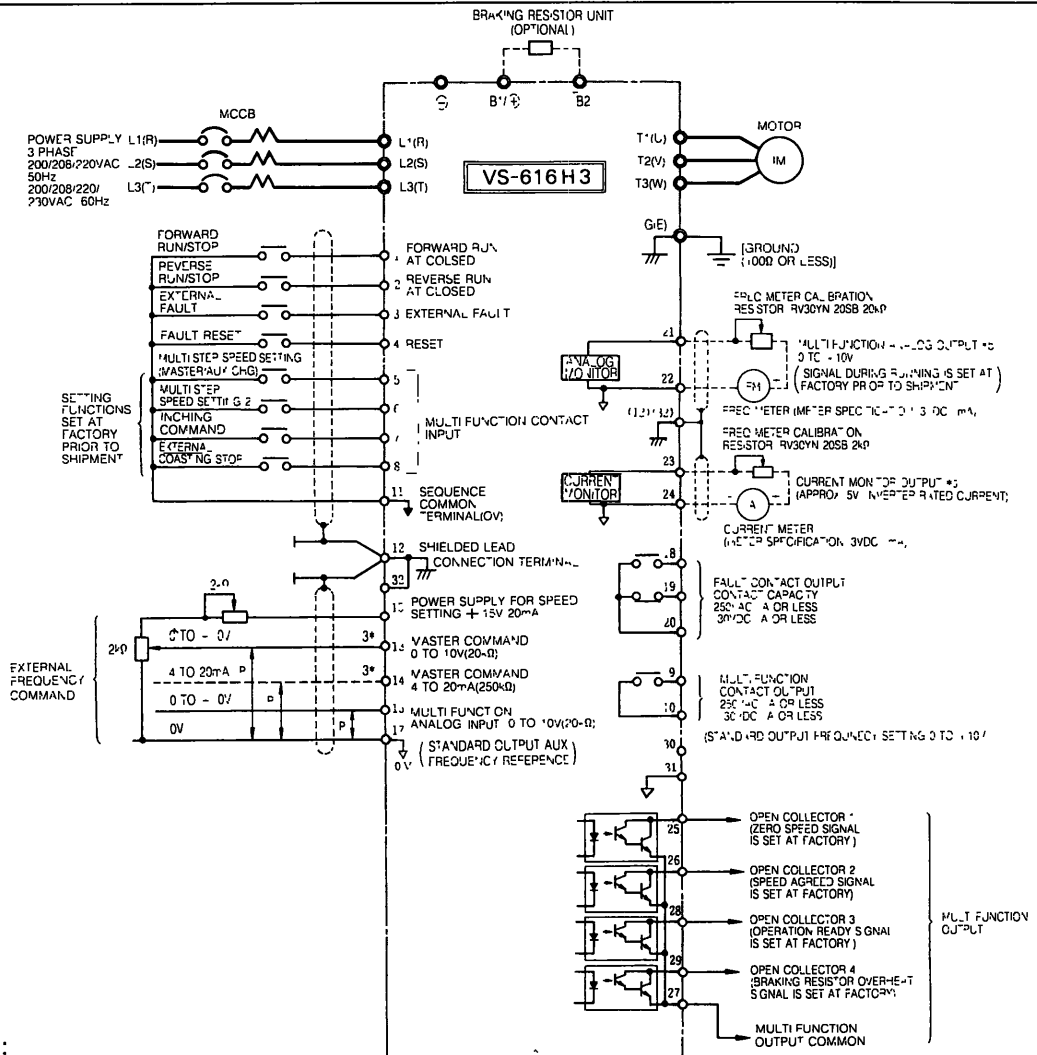
WIRING

The following shows an interconnection diagram. With digital operator, the motor can be operated by wiring the main circuit only. (Terminal ① shows main circuit and ② control circuit)

CAUTION

The connections of control circuit terminals ① through ⑳ do not follow the terminal numbering order. To connect them properly, follow the figure below.

11	12	13	14	15	16	17	25	26	27	28	29	30	18	19	20
1	2	3	4	5	6	7	8	21	22	23	24	31	32	9	10



Notes:

- ① indicates shielded leads and ② twisted-pair shielded leads.
- External terminal ⑬ of +15V has maximum output current capacity of 20mA.
- Either external terminal ⑬ or ⑭ can be used. (For Simultaneous input, two signals are internally added in the unit.)
- Multi-function analog output is an exclusive meter output such as frequency meter etc. and not available for the feedback control system. Use analog monitor cards (Model AO-08 or AO-12) for the control system.
- External terminal ⑳ is for future use.

Fig. 2 Interconnections

MOLDED-CASE CIRCUIT BREAKER (MCCB) AND POWER SUPPLY MAGNETIC CONTACTOR (MC)

Be sure to connect MCCBs between power supply and VS-616H3 input terminals (L1) (R), (L2) (S), (L3) (T). Recommended MCCBs are listed in Table 1.

When a ground fault interrupter is used, select the one with no influence for high frequency, and setting current should be 200mA or over and operating time, 0.1 sec or over to prevent malfunction.

Table 1 Molded-Case Circuit Breakers and Magnetic Contactors

VS-616H3	Model CIMR-	200 to 230V										
		H3A20P4	H3A20P7	H3A21P5	H3A22P2	H3A23P7	H3A25P5	H3A27P5	H3A2011	H3A2018	H3A2018	H3A2022
	Capacity kVA	1.4	2.1	2.7	4.1	6.9	10.3	13.7	20.6	27.4	34	41
	Rated Output Current A	3.2	4.8	6.4	9.6	16	24	32	48	64	80	96
Molded-Case Circuit Breaker	Rated Current	5A	10A	20A	20A	30A	50A	60A	100A	100A	150A	150A
Yaskawa Magnetic Contactors Model		HI-7E	HI-7E	HI-10-2E	HI-10-2E	HI-20E	HI-30E	HI-50E	HI-50E	HI-80E	HI-100E	HI-100E

380 to 460V													
H3A40P4	H3A40P7	H3A41P5	H3A42P2	H3A43P7	H3A45P5	H3A47P5	H3A4011	H3A4015	H3A4018	H3A4022	H3A4030	H3A4037	H3A4045 H3A4L45
1.4	2.2	3.4	4.1	6.9	10.3	13.7	20.6	27.4	34	41	54	68	82
1.6	2.6	4.0	4.8	8	12	16	24	32	40	48	64	80	96
5A	5A	10A	10A	20A	20A	30A	50A	60A	75A	100A	100A	150A	150A
HI-7E	HI-7E	HI-10-2E	HI-10-2E	HI-20E	HI-20E	HI-20E	HI-30E	HI-50E	HI-50E	HI-50E	HI-80E	HI-100E	HI-100E

SURGE SUPPRESSOR

For the surge suppressors should be connected to the coils of relays, magnetic contactors, magnetic valves, or magnetic relays. Select type from Table 2.

Table 2 Surge Suppressors

Coils of Magnetic Contactor and Control Relay		Surge Suppressor*		
		Model	Specifications	Code No.
200 to 230V	Large-size Magnetic Contactors	DCR2- 50A22E	250 VAC 0.5 μ F + 200 Ω	C002417
	Control Relay LY-2, -3(OMRON) HH-22, -23(Fuji) MM-2, -4(OMRON)	DCR2- 10A25C	250 VAC 0.1 μ F + 100 Ω	C002482
380 to 460V Units		DCR2- 50D100B	1000 VDC 0.5 μ F + 220 Ω	C002630

*Made by MARCON Electronics.

WIRE SIZES

The wire sizes and types are shown in Tables 3 and 4.

Refer to Table 5 for the placement of the round solderless terminals.

Table 3 200V Class Wire Size

Circuit	VS-616H3 Model	Inverter Capacity kVA	Terminal Symbol	Terminal Screw	AWG	Wire Size mm ²	Wire Type
Main	CIMR-H3A20P4	1.4	L1 (R) L2 (S) L3 (T) ⊕ B1/⊕ B2 T1 (U) T2 (V) T3 (W)	M 4	14 - 10	2 - 5.5	Power cable: 600V vinyl sheathed lead or equivalent
			G (E)			2 - 5.5	
	CIMR-H3A20P7	2.1	L1 (R) L2 (S) L3 (T) ⊕ B1/⊕ B2 T1 (U) T2 (V) T3 (W)	M 4	14 - 10	2 - 5.5	
			G (E)			2 - 5.5	
	CIMR-H3A21P5	2.7	L1 (R) L2 (S) L3 (T) ⊕ B1/⊕ B2 T1 (U) T2 (V) T3 (W)	M 4	12 - 10	3.5 - 5.5	
			G (E)			2 - 5.5	
	CIMR-H3A22P2	4.1	L1 (R) L2 (S) L3 (T) ⊕ B1/⊕ B2 T1 (U) T2 (V) T3 (W)	M 4	12 - 10	3.5 - 5.5	
			G (E)			2 - 5.5	
	CIMR-H3A23P7	6.9	L1 (R) L2 (S) L3 (T) ⊕ B1/⊕ B2 T1 (U) T2 (V) T3 (W)	M 4	12 - 10	3.5 - 5.5	
			G (L)			14 - 10	
	CIMR-H3A25P5	10.3	L1 (R) L2 (S) L3 (T) ⊕ B1/⊕ B2 T1 (U) T2 (V) T3 (W)	M 5	10 - 8	5.5 - 8	
			G (L)			14 - 10	
	CIMR-H3A27P5	13.7	L1 (R) L2 (S) L3 (T) ⊕ B1/⊕ B2 T1 (U) T2 (V) T3 (W)	M 5	10 - 8	5.5 - 8	
			G (E)			14 - 10	
	CIMR-H3A2011	20.6	L1 (R) L2 (S) L3 (T) ⊕ B1/⊕ B2 T1 (U) T2 (V) T3 (W)	M 6	6	14	
G (E)			M 8	14 - 10	2 - 5.5		
ℓ1 (r) ℓ2 (s)			M 4	14 - 10	2 - 5.5		
CIMR-H3A2015	27.4	L1 (R) L2 (S) L3 (T) ⊕ B1/⊕ B2 T1 (U) T2 (V) T3 (W)	M 8	4 - 1/0	22 - 60		
		G (E)	M 8	14 - 10	2 - 5.5		
		ℓ1 (r) ℓ2 (s)	M 4	14 - 10	2 - 5.5		
CIMR-H3A2018	34	L1 (R) L2 (S) L3 (T) ⊕ B1/⊕ B2 T1 (U) T2 (V) T3 (W)	M 8	3 - 1/0	30 - 60		
		G (L)	M 8	14 - 10	2 - 5.5		
		ℓ1 (r) ℓ2 (s)	M 4	14 - 10	2 - 5.5		
CIMR-H3A2022	41	L1 (R) L2 (S) L3 (T) ⊕ B1/⊕ B2 T1 (U) T2 (V) T3 (W)	M 8	2 - 1/10	38 - 60		
		G (E)	M 8	14 - 10	2 - 5.5		
		ℓ1 (r) ℓ2 (s)	M 4	14 - 10	2 - 5.5		
Control	Common to all models		1 - 32	M 3.5	20 - 14	0.5 - 2	Twisted shielded lead for instrumentation

IMPORTANT

Lead size should be determined considering voltage drop of leads.

Table 4 400V Class Wire Size

Circuit	VS-616H3 Model	Inverter Capacity	Terminal Symbol	Terminal Screw	AWG	Wire Size mm ²	Wire Type
Main	CIMR-H3A4 0P4	1.4	L1 (R) L2 (S) L3 (T) B1/B2 B1 (U) T2 (V) T3 (W) G (E)	M 4	14 - 10	2 - 5.5	Power cable: 600V vinyl sheathed lead or equivalent
	CIMR-H3A40P7	2.2	L1 (R) L2 (S) L3 (T) B1/B2 B1 (U) T2 (V) T3 (W) G (E)	M 4	14 - 10	2 - 5.5	
	CIMR-H3A41P5	3.4	L1 (R) L2 (S) L3 (T) B1/B2 B1 (U) T2 (V) T3 (W) G (E)	M 4	14 - 10	2 - 5.5	
	CIMR-H3A42P2	4.1	L1 (R) L2 (S) L3 (T) B1/B2 B1 (U) T2 (V) T3 (W) G (E)	M 4	14 - 10	2 - 5.5	
	CIMR-H3A43P7	6.9	L1 (R) L2 (S) L3 (T) B1/B2 B1 (U) T2 (V) T3 (W) G (E)	M 4 M 5	14 - 10	2 - 5.5	
	CIMR-H3A45P5	10.3	L1 (R) L2 (S) L3 (T) B1/B2 B1 (U) T2 (V) T3 (W) G (E)	M 4 M 5	12 - 10 14 - 10	3.5 - 5.5 2 - 5.5	
	CIMR-H3A47P5	13.7	L1 (R) L2 (S) L3 (T) B1/B2 B1 (U) T2 (V) T3 (W) G (E)	M 4 M 5	12 - 10 14 - 10	3.5 - 5.5 2 - 5.5	
	CIMR-H3A4011	20.6	L1 (R) L2 (S) L3 (T) B1/B2 B1 (U) T2 (V) T3 (W) G (E) L1 (R) L2 200 (S200) L2 400 (S400) X Y	M 5 M 8 M 4	10 - 8 14 - 10 14 - 10	5.5 - 8 2 - 5.5 2 - 5.5	
	CIMR-H3A4015	27.4	L1 (R) L2 (S) L3 (T) B1/B2 B1 (U) T2 (V) T3 (W) G (E) L1 (R) L2 200 (S200) L2 400 (S400) X Y	M 5 M 8 M 4	8 14 - 10 14 - 10	8 2 - 5.5 2 - 5.5	
	CIMR-H3A4018	34	L1 (R) L2 (S) L3 (T) B1/B2 B1 (U) T2 (V) T3 (W) G (E) L1 (R) L2 200 (S200) L2 400 (S400) X Y	M 6 M 8 M 4	6 - 4 14 - 10 14 - 10	14 - 22 2 - 5.5 2 - 5.5	
	CIMR-H3A4022	41	L1 (R) L2 (S) L3 (T) B1/B2 B1 (U) T2 (V) T3 (W) G (E) L1 (R) L2 200 (S200) L2 400 (S400) X Y	M 6 M 8 M 4	6 - 4 14 - 10 14 - 10	14 - 22 2 - 5.5 2 - 5.5	
	CIMR-H3A4030	54	L1 (R) L2 (S) L3 (T) B1/B2 B1 (U) T2 (V) T3 (W) G (E) L1 (R) L2 200 (S200) L2 400 (S400) X Y	M 8 M 4	4 - 1/0 14 - 10	22 - 60 2 - 5.5	
	CIMR-H3A4037	68	L1 (R) L2 (S) L3 (T) B1/B2 B1 (U) T2 (V) T3 (W) G (E) L1 (R) L2 200 (S200) L2 400 (S400) X Y	M 8 M 4	3 - 1/0 14 - 10	30 - 60 2 - 5.5	
	CIMR-H3A4045	82	L1 (R) L2 (S) L3 (T) B1/B2 B1 (U) T2 (V) T3 (W) G (E)	M 8	2 - 1/0 14 - 10	38 - 60 2 - 5.5	
	CIMR-H3A4L45		L1 (R) L2 200 (S200) L2 400 (S400) X Y	M 4	14 - 10	2 - 5.5	
	Control	Common to all models		I - 32	M 3.5	20 - 14	

Table 5 Closed-Loop Connectors

Wire Size		Terminal Screw	Closed-Loop Connectors
AWG	mm ²		
20	0.5	M 3.5	1.25 - 3.5
18	0.75	M 4	1.24 - 4
16	1.25		
14	2	M 4	2 - 4
		M 5	2 - 5
12	3.5	M 4	3.5 - 4
		M 5	3.5 - 5
10	5.5	M 4	5.5 - 4
		M 5	5.5 - 5
8	8	M 5	8 - 5
		M 6	8 - 6
6	14	M 6	14 - 6
4	22	M 6	22 - 6
4	22	M 8	22 - 8
3	30	M 8	30 - 8
2	38	M 8	38 - 8
1	50	M 8	50 - 8
1/0	60	M 8	60 - 8

CONTROL CIRCUIT

The external interconnection wiring must be performed with following procedures.

After completing VS-616H3 interconnections, be sure to check that connections are correct. Never use control circuit buzzer check.

(1) Separation of control circuit leads and main circuit leads

Signal leads ① through ③② must be separated from main circuit leads ①(L) (R), ②(S), ③(T), ④(B1/+) , ⑤(B2) , ⑥(T1)(U), ⑦(T2)(V), ⑧(T3)(W), ⑨(N) and other power cables to prevent erroneous operation caused by noise interference.

(2) Control circuit leads ⑨ ⑩ ⑱ ⑲ ⑳ (contact output) must be separated from leads ① to ⑧, ⑪ to ⑱ and ㉑ to ㉒.

Use the twisted shielded or twisted-pair shielded lead for the control circuit line and connect the shield sheath to the inverter terminal ⑫. See Fig. 3.

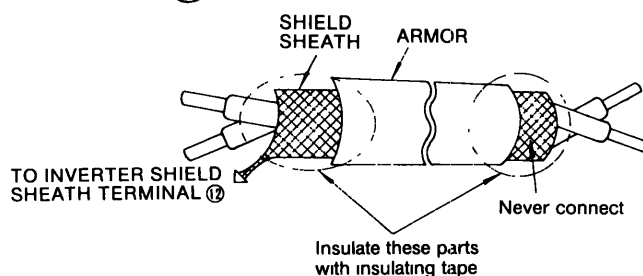


Fig. 3 Shielded Lead Termination

(3) Wiring distance

It is recommended that the wiring distance of the signal leads (① - ③②) be 50 meters (164 feet) or below.

MAIN CIRCUIT INPUT/OUTPUT

(1) Phase rotation of input terminals ①(L) (R), ②(S), ③(T) is available in either direction, clockwise and counterclockwise.

(2) When inverter output terminals ④(T1) (U), ⑤(T2) (V), and ⑥(T3) (W) are connected to motor terminals ④(T1) (U), ⑤(T2) (V), and ⑥(T3) (W), respectively, motor rotates counterclockwise, viewed from opposite drive end, upon forward operation command. To reverse the rotation interchange any two of motor leads.

(3) Never connect AC main circuit power supply to output terminals ④(T1) (U), ⑤(T2) (V), and ⑥(T3) (W).

(4) Care should be taken to prevent contact of wiring leads with VS-616H3 cabinet, for short-circuit may result.

(5) Never connect power factor correction capacitor or noise filter to VS-616H3 output.

(6) Never open or close contactors in the output circuit unless inverter is properly sized.

GROUNDING

Ground the casing of the VS-616H3 using ground terminal \textcircled{G} (\textcircled{E}).

- (1) Ground resistance should be 100Ω or less.
- (2) Never ground VS-616H3 in common with welding machines, motors, and other large-current electrical equipment, or ground pole. Run the ground lead in a separate conduit from leads for large-current electrical equipment.
- (3) Use the ground leads which comply with AWG standards and make the length as short as possible.
- (4) Where several VS-616H3 units are used side by side, all the units should preferably be grounded directly to the ground poles. However, connecting all the ground terminals of VS-616H3 in parallel, and ground only one of VS-616H3 to the ground pole is also permissible (Fig. 4). However, do not form a loop with the ground leads.

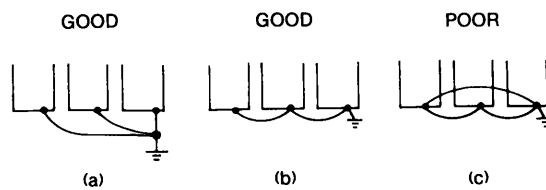


Fig. 4 Grounding of Three VS-616H3 Units

Test Operation

To assure safety, prior to test operation disconnect the coupling or belt which connects the motor with the machine so that motor operation is isolated. If an operation must be performed while the motor is directly connected to the machine, use great care to avoid any possible hazardous condition.

Check before turning power ON

After completion of installation and wiring, check for

- (1) proper wiring
- (2) short circuit due to wire clippings
- (3) loose screw-type terminals
- (4) proper load

Setting the line voltage selecting connector for 400V class 20.6kVA and above.

The line voltage selecting connector shown in Fig. 5 must be set according to the type of main circuit power source. Insert the connector at the position showing the appropriate line voltage. The unit is preset at the factory for 460 line voltage.

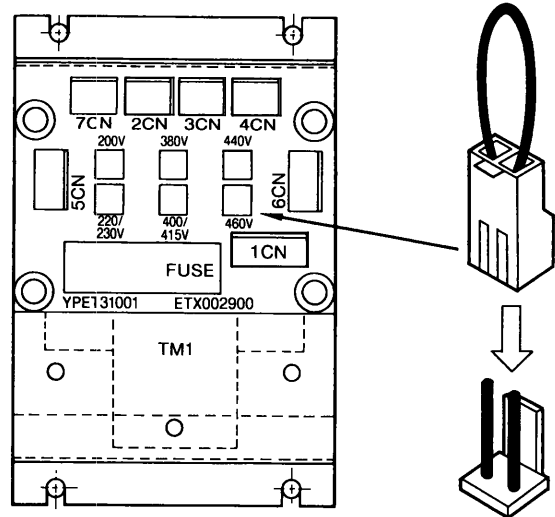
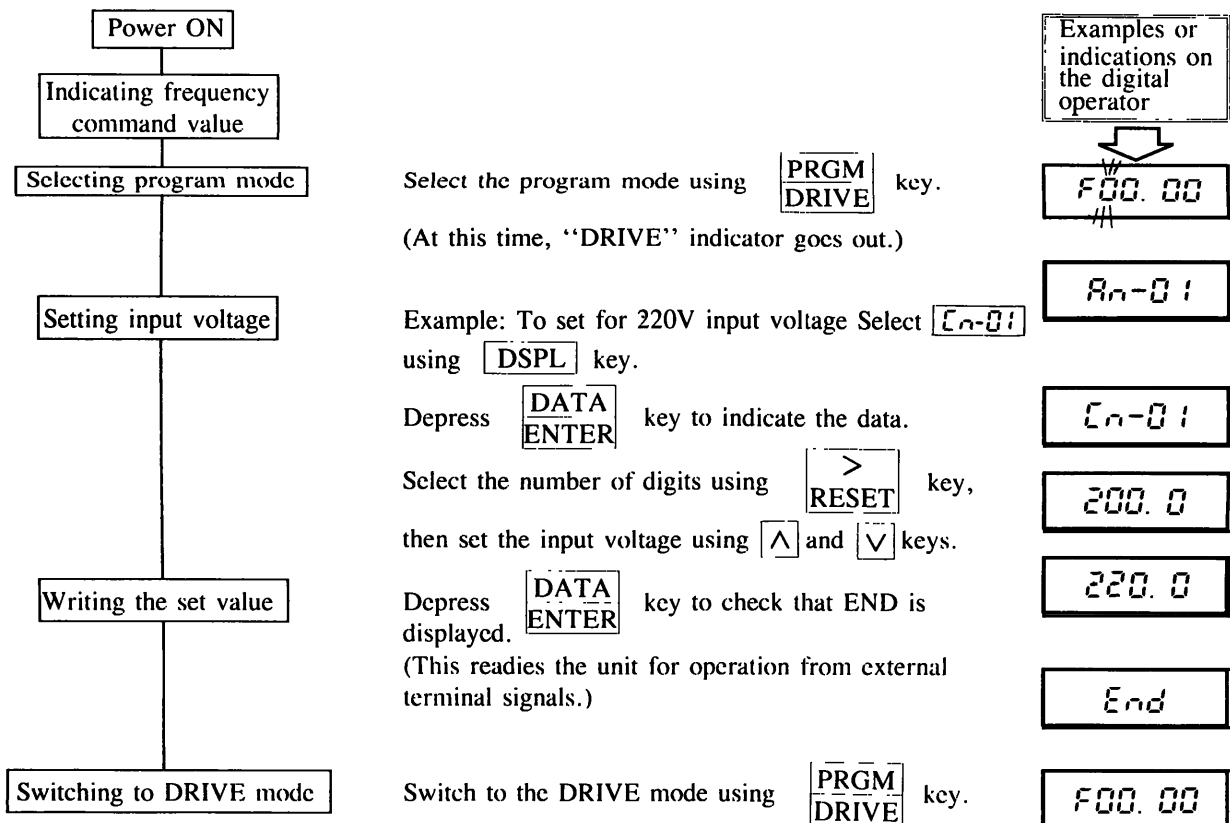


Fig. 5 Selection of Line Voltage

Setting the input voltage

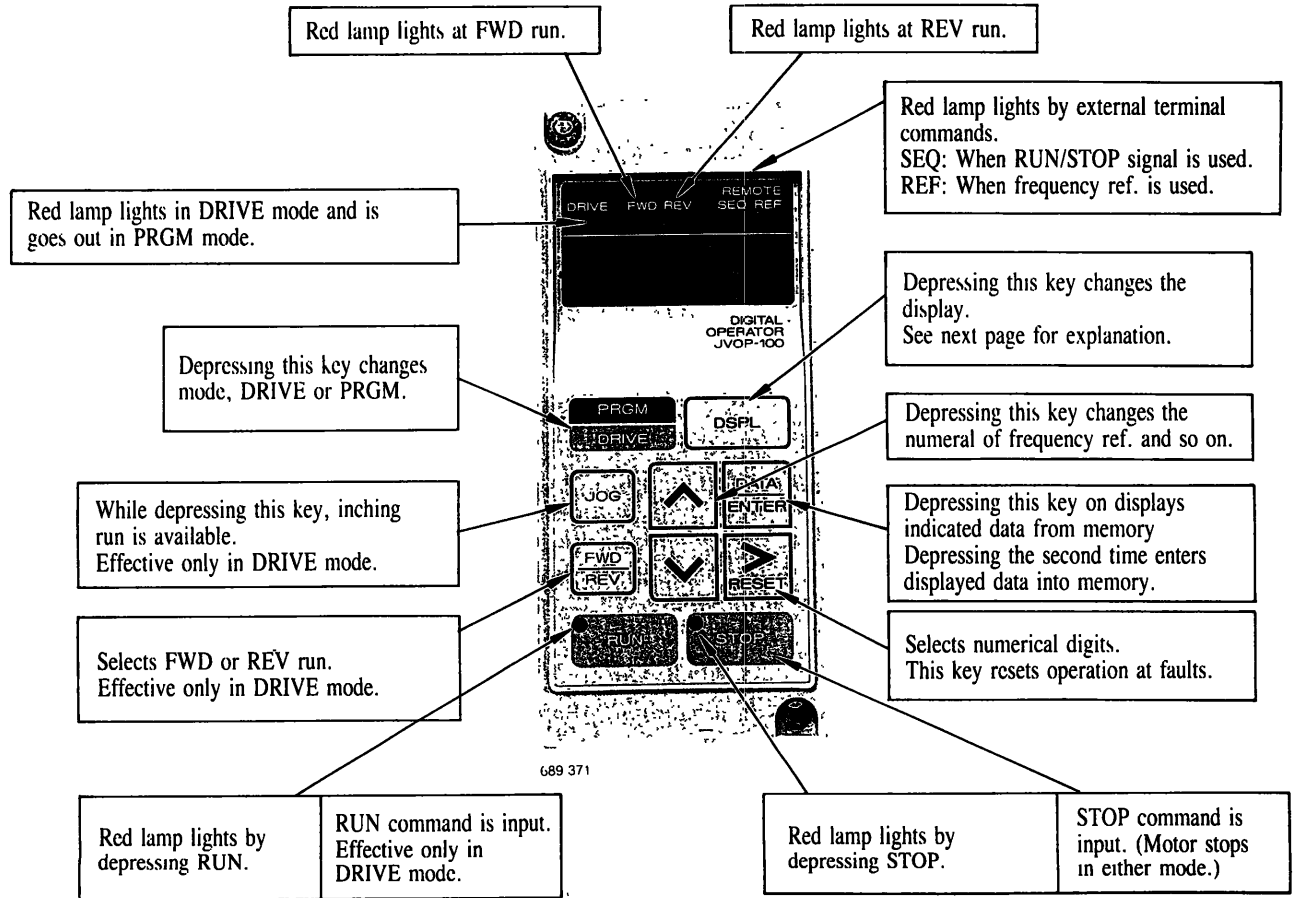
The factory setting for the 200V class is 200V, and for the 400V class it is 400V.



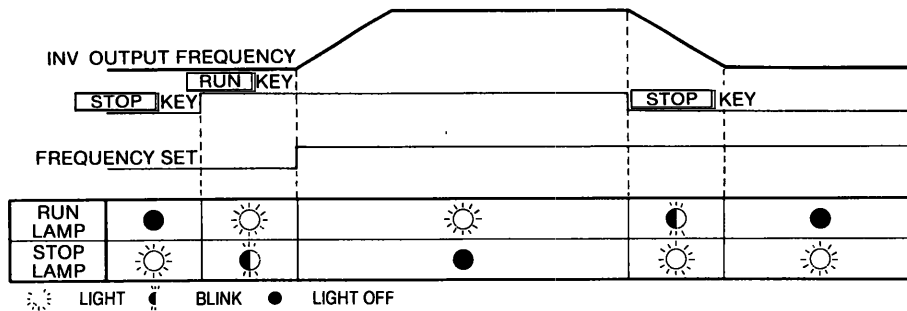
OPERATION

DIGITAL OPERATOR

Digital operator has DRIVE mode and PRGM mode. Selecting DRIVE mode enables the inverter to operate. PRGM mode enables the programs to be written-in. DRIVE and PRGM modes can be switched by DRIVE/PRGM key only when stopped.

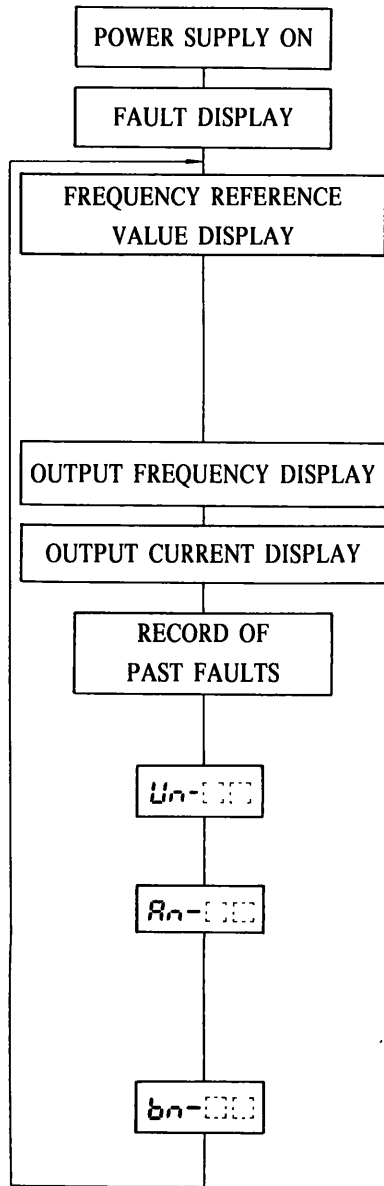


RUN or STOP lamp changes in accordance with the following operations.



DRIVE MODE

Depressing **DSPL** (display selection key) changes the display as follows:



- If a fault occurs before power off, its contents are displayed and blinks for 5 seconds.
- Set frequency is displayed. (If no fault occurs, this display is given immediately at power supply ON, in 4 digits.)
- Then the display changes as follows every time **DSPL** key is depressed.

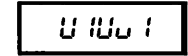
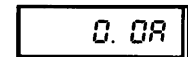
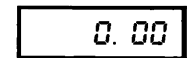
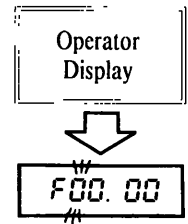
- Frequency being output at present is displayed.
- Inverter output current is displayed.

- If a fault occurred before power off, its contents are displayed again. (If no fault occurred, next constant is displayed.)

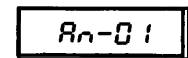
- Monitor numbers such as output power are displayed.*
5-digit monitor value is displayed by depressing **DATA**/**ENTER** key.

- Frequency set numbers such as master speed or inching are displayed.*
(5-digit monitor value is displayed by depressing **DATA**/**ENTER** key.)

- Constant numbers that can be changed during operation, (such as accel/decel time) are displayed.*
(Monitor value is displayed by depressing **DATA**/**ENTER** key.)



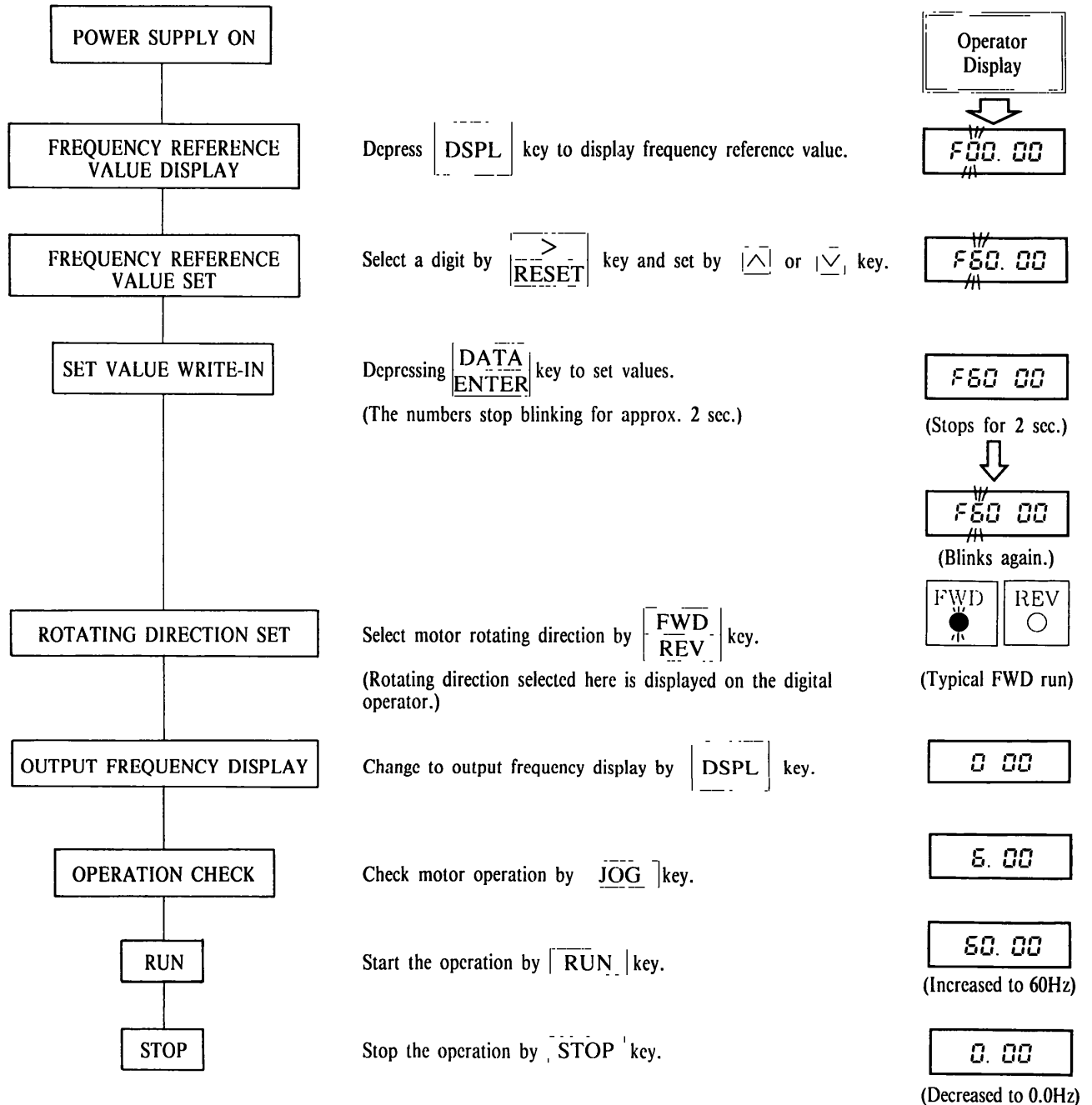
(Typical main circuit undervoltage trip)



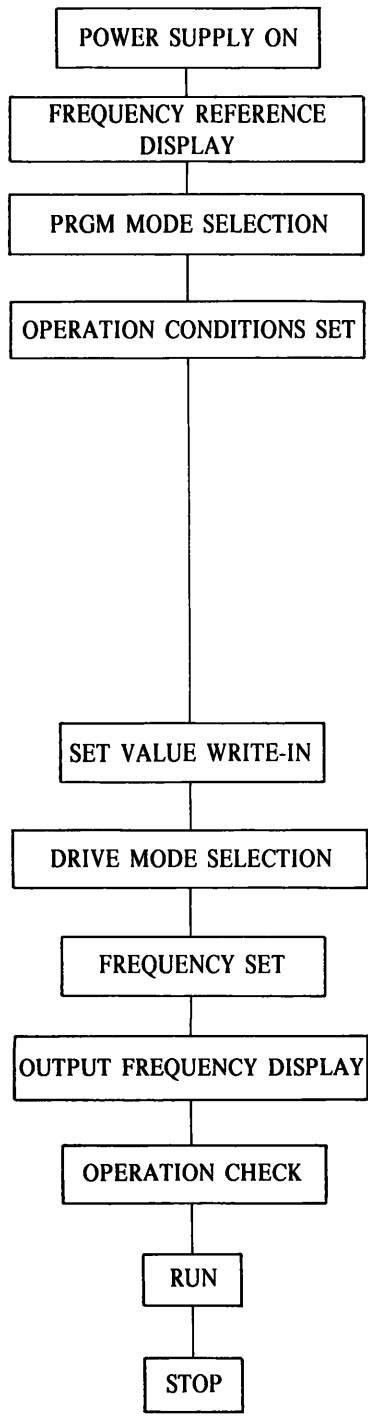
*Check for display constants in APPENDIX at end of this manual.

* * Display changes every time **DSPL** key is depressed.

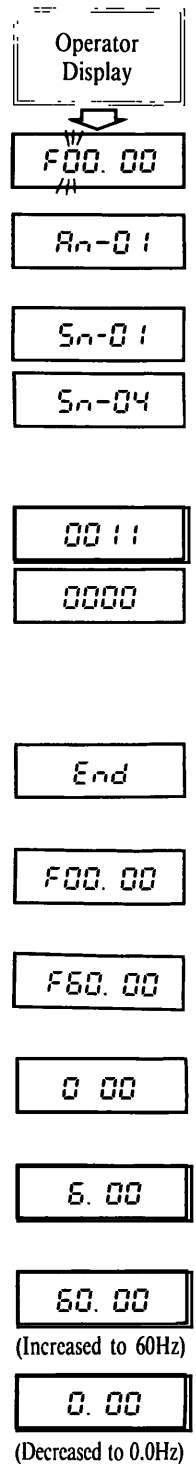
OPERATION BY DIGITAL OPERATOR (SET PRIOR TO SHIPMENT)



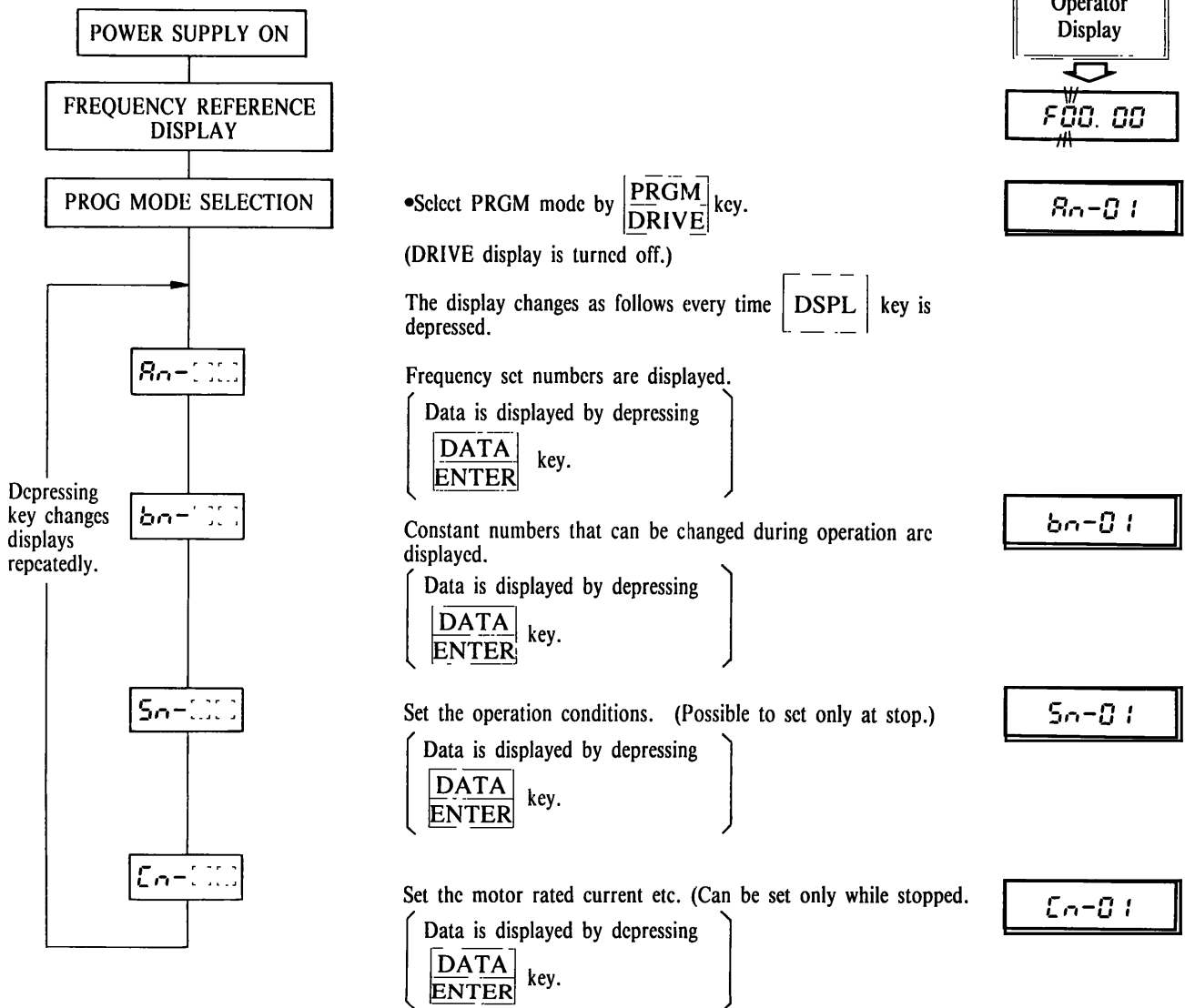
OPERATION BY EXTERNAL TERMINAL SIGNALS



- Select PRGM mode by **PRGM DRIVE** key.
(DRIVE display is turned off.)
- **Sn-01** is selected by **DSPL** key.
- Select a digit by **RESET** key and set **Sn-04** by **▲** or **▼** key.
- Depress **DATA ENTER** key to display data.
- Select a digit by **RESET** key and set the data to 0000 by **▲** or **▼** key.
- Depress **DATA ENTER** key to check for END display.
(Operation by external terminal signals enabled.)
- Change to the DRIVE mode by **PRGM DRIVE** key.
- Check for frequency reference value of external terminals ⑬ or ⑭.
- Change to output frequency display by **DSPL** key.
- Closed/open between terminals ① to ⑪ under closing the external terminals ⑦ to ⑪ to perform inching operation.
- After checking for normal operation, close between external terminals ① and ⑪ to perform FWD run.
- Open between external terminals ① to ⑪ to stop.



PROGRAM (PRGM) MODE



Typical Setting of Accel Time

Either DRIVE or PRGM mode can be selected.

(1) Depress **DSPL** key to select accel time constant **bn-01**.

(2) Depress **DATA** key to display internal data of accel time constant.

(Setting prior to shipment : **10.00**)

(3) Set required acceleration time by using **RESET** , **^** or **v** key.

The time can be set up to 6000 seconds in multiples of 0.1 second.

(Example of 12.5 seconds set: **12.5**)

(4) Depress **DATA** key to store the data. (If display reads end for approx. 1 sec, data has been accepted.)

MAINTENANCE

VS-616H3 requires very few routine checks. It will function longer if it is kept clean, cool and dry, while observing the precautions listed in "Location". Check for tightness of electrical connections, discoloration or other signs of overheating. Use Table 6 as the inspection guide. Before servicing, turn off AC main circuit power and be sure that CHARGE lamp is off.

Table 6 Periodical Inspection

Component	Check	Corrective Action
External terminals, unit mounting bolts, connectors, etc.	Loosened screws	Tighten
	Loosened connectors	Tighten
Cooling fins	Build-up of dust and dirt	Blow with a dry compressed air of 4 to 6kg·cm ² (57 to 85 lbs. in ²) pressure.
Printed circuit board	Accumulation of conductive dust or oil mist.	Clean the board. If dust and oil cannot be removed, replace the board.
Cooling fan	For abnormal noise and vibration. Whether the cumulative operation time exceeds 20,000 hours or not.	Replace the cooling fan.
Power elements	Accumulation of dust and dirt	Blow with a dry compressed air of 4 to 6kg·cm ² (57 to 85 lbs. in ²) pressure.
Smoothing capacitor	Discoloration or odor	Replace the capacitor or inverter unit.

Note: Operating conditions as follows:

- Ambient temperature : 30°C (86°F)/yearly mean
- Load factor : 80% or below
- Operation rate : 12 hours or below / day

SPARE PARTS

As insurance against costly downtime, it is strongly recommended that renewal parts to be kept on hand in accordance with the table below. When ordering renewal parts, please specify to Yaskawa Electric office or representative with: Part Names, Parts Code No. and Quantity.

Table 7-1 Spare Parts for 200V Class

VS-616H3 Model	Part Names Specifications	Control PC Board	Power Supply Board	Power Board or Gate Driver	Main Circuit Transistor	Main Circuit Diode	Fuse	Cooling Fan	Digital Operator
		Model	Code	Q'ty	Model	Code	Q'ty	Model	Code
CIMR-H3A20P4	Model	—	—	—	6MB110-060	10L6P44	CR2LS-10/UL	—	JVOP-100
	Code	ETC61601□-S004□	ETC67010□	ETP67001□	STR000335	SID000429	FU000823	—	CDR000070
	Q'ty	1	1	1	1	1	1	—	1
CIMR-H3A20P7	Model	—	—	—	6MB115-060	10L6P44	CR2LS-10/UL	—	JVOP-100
	Code	ETC61601□-S004□	ETC67010□	ETP67002□	STR000336	SID000429	FU000823	—	CDR000070
	Q'ty	1	1	1	1	1	1	—	1
CIMR-H3A21P5	Model	—	—	—	6MB120-060	20L6P44	CR2LS-10/UL	—	JVOP-100
	Code	ETC61601□-S004□	ETC67010□	ETP67023□	STR000343	SID000433	FU000823	—	CDR000070
	Q'ty	1	1	1	1	1	1	—	1
CIMR-H3A22P2	Model	—	—	—	6MB130-60	6R130E-080	CR2LS-20/UL	4710NL-05W-B49	JVOP-100
	Code	ETC61601□-S004□	ETC67010□	ETP67024□	STR000337	SID000430	FU000799	FAN000175	CDR000070
	Q'ty	1	1	1	1	1	1	1	1
CIMR-H3A23P7	Model	—	—	—	6MB150-60	6R130E-080	CR2LS-30/UL	4710NL-05W-B49	JVOP-100
	Code	ETC61601□-S004□	ETC67010□	ETP67025□	STR000338	SID000430	FU000791	FAN000175	CDR000070
	Q'ty	1	1	1	1	1	1	1	1
CIMR-H3A25P5	Model	—	—	—	MG75J2YS1	6R150F-080	CR2LS-50/UL	4710NL-05W-B49	JVOP-100
	Code	ETC61601□-S004□	ETC67010□	ETP67026□	STR000339	SID000431	FU000797	FAN000175	CDR000070
	Q'ty	1	1	1	3	1	1	1	1
CIMR-H3A27P5	Model	—	—	—	MG100J2YS1	6R175E-080	CR2LS-50/UL	4710NL-05W-B49	JVOP-100
	Code	ETC61601□-S004□	ETC67010□	ETP67027□	STR000340	SID000432	FU000797	FAN000175	CDR000070
	Q'ty	1	1	1	3	1	1	1	1
CIMR-H3A2011	Model	—	—	—	MG150J2YS1	100L6P41	CR2LS-75/UL	THA1V-7556XV	JVOP-100
	Code	ETC61601□-S004□	—	ETC67003□	STR000364	SID000291	FU000792	FAN000176	CDR000070
	Q'ty	1	—	1	3	1	—	1	1
CIMR-H3A2015	Model	—	—	—	MG200J2YS1	110L2G43	CR2LS-100	THA1V-7556XV	JVOP-100
	Code	ETC61601□-S004□	—	ETC67003□	STR000365	SID000412	FU000794	FAN000176	CDR000070
	Q'ty	1	—	1	3	3	1	1	1
CIMR-H3A2018	Model	—	—	—	CM300HA-12H	110L2G43	CR2L-150	THA1V-7556XV	JVOP-100
	Code	ETC61601□-S004□	—	ETC67004□	STR001022	SID000412	FU000750	FAN000176	CDR000070
	Q'ty	1	—	1	6	3	1	1	1
CIMR-H3A2022	Model	—	—	—	CM300HA-12H	110L2G43	CR2L-150	THA1V-7556XV	JVOP-100
	Code	ETC61601□-S004□	—	ETC67004□	STR001022	SID000412	FU000750	FAN000176	CDR000070
	Q'ty	1	—	1	6	3	1	1	1

Note: It is recommended the whole proper units be replaced for the part's faults in □□□□ area.

Table 7-2 Spare Parts for 400V Class

VS-616H3 Model	Part Names Specifications	Control PC Board	Power Supply Board	Power Board or Gate Driver	Main Circuit Transistor	Main Circuit Diode	Fuse	Cooling Fan		Digital Operator
CIMR-H3A40P4	Model	—	—	—	6MBI8-120	RM10TA-24	80LF15	4710NL-05W-B49		JVOP-100
	Code	ETC61601□□-S004□□	ETC67011□□	ETP67008□□	STR000344	SID000434	FU000760	FAN000175		CDR000070
	Q'ty	1	1	1	1	1	1	1		1
CIMR-H3A40P7	Model	—	—	—	6MBI8-120	RM10TA-24	80LF15	4710NL-05W-B49		JVOP-100
	Code	ETC61601□□-S004□□	ETC67011□□	ETP67008□□	STR000344	SID000434	FU000760	FAN000175		CDR000070
	Q'ty	1	1	1	1	1	1	1		1
CIMR-H3A41P5	Model	—	—	—	6MBI15-120	RM10TA-24	80LF15	4710NL-05W-B49		JVOP-100
	Code	ETC61601□□-S004□□	ETC67011□□	ETP67029□□	STR000345	SID000434	FU000760	FAN000175		CDR000070
	Q'ty	1	1	1	1	1	1	1		1
CIMR-H3A42P2	Model	—	—	—	6MBI15-120	RM10TA-24	80LF15	4710NL-05W-B49		JVOP-100
	Code	ETC61601□□-S004□□	ETC67011□□	ETP67029□□	STR000345	SID000434	FU000760	FAN000175		CDR000070
	Q'ty	1	1	1	1	1	1	1		1
CIMR-H3A43P7	Model	—	—	—	2MBI25-120	3CQ6P42	80LF25	4710NL-05W-B49		JVOP-100
	Code	ETC61601□□-S004□□	ETC67011□□	ETP67030□□	STR000367	SID000435	FU000761	FAN000175		CDR000070
	Q'ty	1	1	1	3	1	1	1		1
CIMR-H3A45P5	Model	—	—	—	2MBI50-120	3CQ6P42	80LF25	4710NL-05W-B49		JVOP-100
	Code	ETC61601□□-S004□□	ETC67011□□	ETP67031□□	STR000368	SID000435	FU000761	FAN000175		CDR000070
	Q'ty	1	1	1	3	1	1	1		1
CIMR-H3A47P5	Model	—	—	—	2MBI50-120	3CQ6P42	80LF25	4710NL-05W-B49		JVOP-100
	Code	ETC61601□□-S004□□	ETC67011□□	ETP67031□□	STR000368	SID000435	FU000761	FAN000175		CDR000070
	Q'ty	1	1	1	3	1	1	1		1
CIMR-H3A40I1	Model	—	—	—	MG75Q2YS1	5CQ6P43	80LF50	THA1V-HS4556MV		JVOP-100
	Code	ETC61601□□-S004□□	—	ETC67005□□	STR000353	SID000407	FU000762	FAN000180		CDR000070
	Q'ty	1	—	1	3	1	1	1		1
CIMR-H3A40I5	Model	—	—	—	MG100Q2YS1	75Q6P43	80LF50	THA1V-HS4556MV		JVOP-100
	Code	ETC61601□□-S004□□	—	ETC67005□□	STR000354	SID000443	FU000762	FAN000180		CDR000070
	Q'ty	1	—	1	3	1	1	1		1
CIMR-H3A40I8	Model	—	—	—	MG150Q2YS1	100Q6P43	CR6L-100	THA1V-7556XV		JVOP-100
	Code	ETC61601□□-S004□□	—	ETC67006□□	STR000355	SID000408	FU000758	FAN000176		CDR000070
	Q'ty	1	—	1	3	1	1	1		1
CIMR-H3A4022	Model	—	—	—	MG150Q2YS1	100Q6P43	CR6L-100	THA1V-7556XV		JVOP-100
	Code	ETC61601□□-S004□□	—	ETC67006□□	STR000355	SID000408	FU000758	FAN000176		CDR000070
	Q'ty	1	—	1	3	1	1	1		1
CIMR-H3A4030	Model	—	—	—	CM300HA-24H	110Q2G43	CR6L-100	THA1V-7556XV		JVOP-100
	Code	ETC61601□□-S004□□	—	ETC67020□□	STR001023	SID000409	FU000758	FAN000176		CDR000070
	Q'ty	1	—	1	6	3	1	1		1
CIMR-H3A4037	Model	—	—	—	CM300HA-24H	110Q2G43	CR6L-150	THA1V-7556XV		JVOP-100
	Code	ETC61601□□-S004□□	—	ETC67020□□	STR001023	SID000409	FU000756	FAN000176		CDR000070
	Q'ty	1	—	1	6	3	1	1		1
CIMR-H3A4045	Model	—	—	—	CM300HA-24H	110Q2G43	CR6L-150	THA1V-7556XV		JVOP-100
	Code	ETC61601□□-S004□□	—	ETC67026□□	STR001023	SID000409	FU000756	FAN000176		CDR000070
	Q'ty	1	—	1	6	3	1	1		1
CIMR-H3A4L45	Model	—	—	—	CM400HA-24	110Q2G43	CR6L-150	THA1V-756XV	THA1V-HS4556MV	JVOP-100
	Code	ETC61601□□-S004□□	—	ETC67019□□	STR000385	SID000409	FU000756	FAN000176	FAN000180	CDR000070
	Q'ty	1	—	1	6	3	1	2	1	1

Note: It is recommended the whole proper units be replaced for the part's faults in [] area.

FAILURE INDICATION AND DETAILS

As Table 8 shows, the failures that the VS-616H3 detects are classified into troubles and alarms. If a problem occurs, the fault contact is output and the unit coasts to a stop. When an alarm is issued, the digital operator indicates the alarm for warning.

CAUTION

Do not replace the DC bus fuse without first checking the output transistors.

Table 8 Failure Indication and Details

Indication	Failure Indication Item	Description	Corrective Action
U _{U1}	Low voltage (PUV)	Two seconds are counted after the detection of low voltage.	<ul style="list-style-type: none"> • Check the wiring of line units. (at power supply side) • Correct the power supply voltage.
U _{U2}	Low voltage (CUV)	Control circuit becomes low voltage during operation.	
U _{U3}	Low voltage (MC-ANS fault)	Main circuit magnetic contactor does not operate correctly.	
oC	Overcurrent	Inv. output current > 120% of transistor rated current	<ul style="list-style-type: none"> • Check the motor winding resistance and ground. • Increase the accel time.
oV	Overvoltage	Detection level: Approx. 400V for 200V class Approx. 800V for 400V class (Input voltage > 400V) Approx. 700V (Input voltage ≤ 400V)	Increase the decel time and/or add a braking resistor.
FU	Fuse blown	—	Check short-circuit at load and ground fault etc.
oH	Radiation fin overheated	Fin temperature 90°C (194°F)	Check fan or ambient temperature (less than 45°C, 113°F).
oL1	Overload	Protect the motor.	Measure motor temperature-rise and reduce load, then reset V/f.
oL2	Overload	Protect the inverter.	Reduce load, and increase the accel time, then reset V/f.
oL3	Overtorque	For inv. output current > overtorque detection level and coasting stop selection at overtorque detection	—
rr	Regenerative transistor failure	—	Replace transistor.
rH	Braking resistor overheated	Protect the braking resistor incorporating in inverter unit.	Increase the decel time, or use the other resistor unit separately installed.
FRn	Cooling fan fault	Cooling fan stops during operation	Replace cooling fan.
oS	Overspeed	A fault which occurs when PG speed control card (option) is added.	—
PGo	PG disconnection	Refer to PG speed control card (option) instruction manual for details.	—
dEU	Excessive speed deviation	—	—

Table 8 Failure Indication and Details (Cont'd)

Indication	Failure Indication Item	Description	Corrective Action
EF3	External terminal ③ failure	Stop mode selection possible	Check the state of input terminal with data U _n -Q 7. (Replace inverter if “?” is indicated as the state of open terminal.)
EF5	External terminal ⑤ failure		
EF6	External terminal ⑥ failure		
EF7	External terminal ⑦ failure		
EF8	External terminal ⑧ failure		
EF0	External fault from CP-213 interface card (option)		
CPF00	Operator transmission error	Transmission between H3 and operator is not established 5 seconds after the power supply is turned on.	<ul style="list-style-type: none"> • Insert operator connector again. • Replace control board.
CPF01	Operator transmission error	Transmission error occurs for 2 seconds after transmission between H3 and operator is once established after the power supply is turned on.	<ul style="list-style-type: none"> • Insert operator connector again. • Replace control board.
CPF02	Control circuit failure	Inverter failure	<ul style="list-style-type: none"> • Replace control PC board. • Check and secure the optional card connector
CPF03	NV-RAM (S-RAM) failure		
CPF04	NV-RAM (BCC, Access Code) failure		
CPF05	A/D convertor failure in CPU		
CPF06	Optional connection failure	—	—
CPF20	Fault of A/D converter built in analog speed reference card (option)	Option card fault	Replace option card.
CPF21	Self-analysis fault of CP-213 transmission interface card (option)		
CPF22	Model code fault of CP-213 transmission interface card (option)		
CPF23	Mutual analysis fault of CP-213 transmission interface card (option)		

APPENDIX

The constants described here are those required for basic operation.

Un-000 (Monitor Type)

No.	Item	Display	Unit
Un-01	Frequency reference	120 00	Hz
Un-02	Output frequency	120 00	Hz
Un-03	Output current	4 88	A
Un-04	Voltage reference	2000	V
Un-05	DC voltage (V.P-N)	Pn270	V
Un-06	Output power/("—" displayed at regeneration)	0 75	kW

Rn-000 (Frequency Setting)

No.	Item	Display	Unit
Rn-01	Master frequency	120 00	Hz
Rn-09	Inching frequency	6 00	Hz

bn-000 (Constant to be Changed during Operation)

No.	Item	Display	Unit
bn-01	Acceleration time	10 0	sec
bn-02	Deceleration time	10 0	sec
bn-11	Frequency meter output gain	1 00	—

Sn-000 (Operation Conditions Setting at Stopping)

No.	Operation Conditions		Data (digits)				Setting prior to Shipment
			1	2	3	4	
Sn-04	RUN MODE	Master frequency reference: External terminal ⑬, ⑭ input	—	—	—	0	0011
		Master frequency reference: Digital operator (Rn-01)	—	—	—	1	
		Operated by external terminal run command.	—	—	0	—	
		Operated by run command from the digital operator.	—	—	1	—	
	STOP MODE	Frequency deceleration to stop	0	0	—	—	
		Coasting to stop	0	1	—	—	
		Full range DC injection braking to stop	1	0	—	—	
		Coasting to stop (restart possible after the time set in bn-02)	1	1	—	—	

En-000 (Constant Setting at Stopping)

No.	Item	Display	Unit
En-09	Motor rated current (to agree to motor NP)	3 3	A
En-11	DC injection braking current	50	%
En-12	DC injection braking time at stopping	0 5	sec
En-14	Frequency reference (upper limit)	100	%
En-15	Frequency reference (lower limit)	12	%
En-36	No. of retry operations at fault	5	times

■ SPECIFICATIONS

Inverter Model CIMR-H3A □	200 to 230V												380 to 460V													
	20P4	20P7	21P5	22P2	23P7	25P5	27P5	2011	2015	2018	2022	40P4	40P7	41P5	42P2	43P7	45P5	47P5	4011	4015	4018	4022	4030	4037	4045	4145
Max. Applicable Motor Output Hp(kW) ^a	0.5 (0.4)	1 (0.75)	2 (1.5)	3 (2.2)	5 (3.7)	7.5 (5.5)	10 (7.5)	15 (11)	20 (15)	25 (18.5)	30 (22)	0.5 (0.4)	1 (0.75)	2 (1.5)	3 (2.2)	5 (3.7)	7.5 (5.5)	10 (7.5)	15 (11)	20 (15)	25 (18.5)	30 (22)	40 (30)	50 (37)	60 (45)	
Output Characteristics	Inverter Capacity KVA	1.4	2.1	2.7	4.1	6.9	10.3	13.7	20.6	27.4	34	41	1.4	2.2	3.4	4.1	6.9	10.3	13.7	20.6	27.4	34	41	54	68	82
	Rated Output Current A	3.2	4.8	6.4	9.6	16	24	32	48	64	80	96	1.6	2.6	4.0	4.8	8	12	16	24	32	40	48	64	80	96
	Max. Continuous Output Current [†] A	3.6	5.4	7.2	10.8	18	27	36	54	72	90	108	1.8	2.9	4.5	5.4	9	13.5	18	27	36	45	54	72	90	108
	Max. Output Voltage	3-Phase, 200/208/220/230V (Proportional to input voltage)											3-Phase, 380/400/415/440/460V (Proportional to input voltage)													
Rated Output Frequency	50, 60, 72, 90, 120, 180 Hz (up to 400 Hz available)																									
Power Supply	Rated input Voltage and Frequency	3-Phase 200/208/220V, 50 Hz 200/208/220/230V, 60 Hz											3-Phase 380/400/415/440/460V, 50/60 Hz													
	Allowable Voltage Fluctuation	± 10%																								
	Allowable Frequency Fluctuation	± 5%																								
Control Characteristics	Control Method	Sine wave PWM																								
	Frequency Control Range	0.1 to 400 Hz																								
	Frequency Accuracy	Digital command: 0.01% +14 to 104°F -10 to 40°C											Analog command: 0.1% 77 ± 18°F 25 ± 10°C													
	Frequency Resolution	Digital operator reference: 0.1 Hz. Analog reference: 0.06 Hz/60 Hz																								
	Output Frequency Resolution	0.01 Hz (1/30000)																								
	Overload Capacity	150% rated output current for one minute																								
	Frequency Setting Signal	0 to 10 VDC (20 kΩ), 4-20 mA (250 Ω) 0-± 10V (OPTIONAL)																								
	Accel/Decel Time	0.1 to 6000 sec (Accel/Decel time setting independently)																								
	Braking Torque	Approx. 20%																								
	No. of V-f Patterns (Total of 16)	4: For general purpose				4: For high starting torque:				1: For adjustable pattern																
Protective Functions	Motor Overload Protection	Electric thermal overload relay																								
	Instantaneous Overcurrent	Motor coasts to a stop at approx. 200% rated current.																								
	Fuse Blown Protection	Motor coasts to a stop by blown-fuse.																								
	Overload	Motor coasts to a stop for 1 minute at 150% rated output current.																								
	Overvoltage	Motor coasts to a stop if converter output voltage exceeds 400V.											Motor coasts to a stop if converter output voltage exceeds 800V.													
	Undervoltage	Motor coasts to a stop if converter output voltage drops to 210V or below. [‡]											Motor coasts to a stop if converter output voltage drops to 420V or below. [‡]													
	Momentary Power Loss	Immediately stop by 15 ms and above momentary power loss. (Continuous system operation during power loss less than 2 sec is equipped as standard.) [‡] Setting made before shipment.																								
	Fin Overheat	Thermostat																								
	Stall Prevention	Stall prevention at acceleration/deceleration and constant speed operation																								
	Ground Fault	Provided by electronic circuit																								
	Power Charge Indication	Charge lamp stays ON until bus voltage drops below 50V.																								
	Environmental Conditions	Location	Indoor (protected from corrosive gases and dust)																							
Ambient Temperature		+4 to 104°F (-10 to +40°C) (not frozen)																								
Storage Temperature [#]		-4 to 140°F (-20 to +60°C)																								
Humidity		90% RH (non - condensing)																								
Vibration		9.8m/s ² (1G) less than 20Hz, up to 2m/s ² (0.2G) at 20 to 50Hz																								

* Our standard 4-pole motor is used for max applicable motor output.

† Allowable values for the applications not required overload.

‡ For Models of 4.1 kVA or less, continuous system operation during power loss less than 1 sec, for models with back up capacitor (option), less than 2 seconds.

Temperature during shipping (for short period)

TERMINAL FUNCTIONS

■ MAIN CIRCUIT

Model CIMR- H3A Max Applicable Motor Output Terminals	20P4-27P5 40P4-47P5	2011, 2022	4011, 4015	4018-4045
	200V 0.5 ~ 10Hp (0.4-7.5kW) 400V 0.5 ~ 10Hp (0.4-7.5kW)	200V 15Hp-30Hp (11kW-22kW)	400V 15Hp 20Hp (11kW), (15kW)	400V 25Hp-60Hp (18.5kW-45kW)
L1 (R)	Main circuit input power supply			
L2 (S)				
L3 (T)				
T1 (U)				
T2 (V)	Inverter output			
T3 (W)				
B1/⊕ (B1/P)				
B2	<ul style="list-style-type: none"> • Braking resistor unit (B1-B2) • DC power supply (⊕-⊖) 	—	<ul style="list-style-type: none"> • Braking resistor unit (B1-B2) 	—
⊖ (N)		<ul style="list-style-type: none"> • Braking unit (⊕1-⊖) • DC power supply (⊕1-⊖) • Main circuit capacitor (⊕3-⊖) 	<ul style="list-style-type: none"> • DC power supply (⊕-⊖) • Main circuit capacitor (⊕3-⊖) 	<ul style="list-style-type: none"> • Braking unit (⊕1-⊖) • DC power supply (⊕1-⊖) • Main circuit capacitor (⊕3-⊖)
⊕ 3 (P3)	—	—	—	—
⊕ 1 (P1)		<ul style="list-style-type: none"> • Cooling fan power supply 	—	—
ℓ ₁ (r)	—	—	<ul style="list-style-type: none"> • Cooling fan power supply (control power supply) ℓ₁-ℓ₂ 200: 200-300V input ℓ₁-ℓ₂ 400: 380-460V input 	<ul style="list-style-type: none"> • Cooling fan power supply (control power supply) ℓ₁-ℓ₂ 200: 200-300V input ℓ₁-ℓ₂ 400: 380-460V input
ℓ ₂ (s)			<ul style="list-style-type: none"> • External power supply (220VAC, 10VA) 	<ul style="list-style-type: none"> • External power supply (220VAC, 10VA)
ℓ: 200 (S200)	Ground terminal			
ℓ: 400 (S400)				
x				
y				
G (L)				

■ CONTROL CIRCUIT

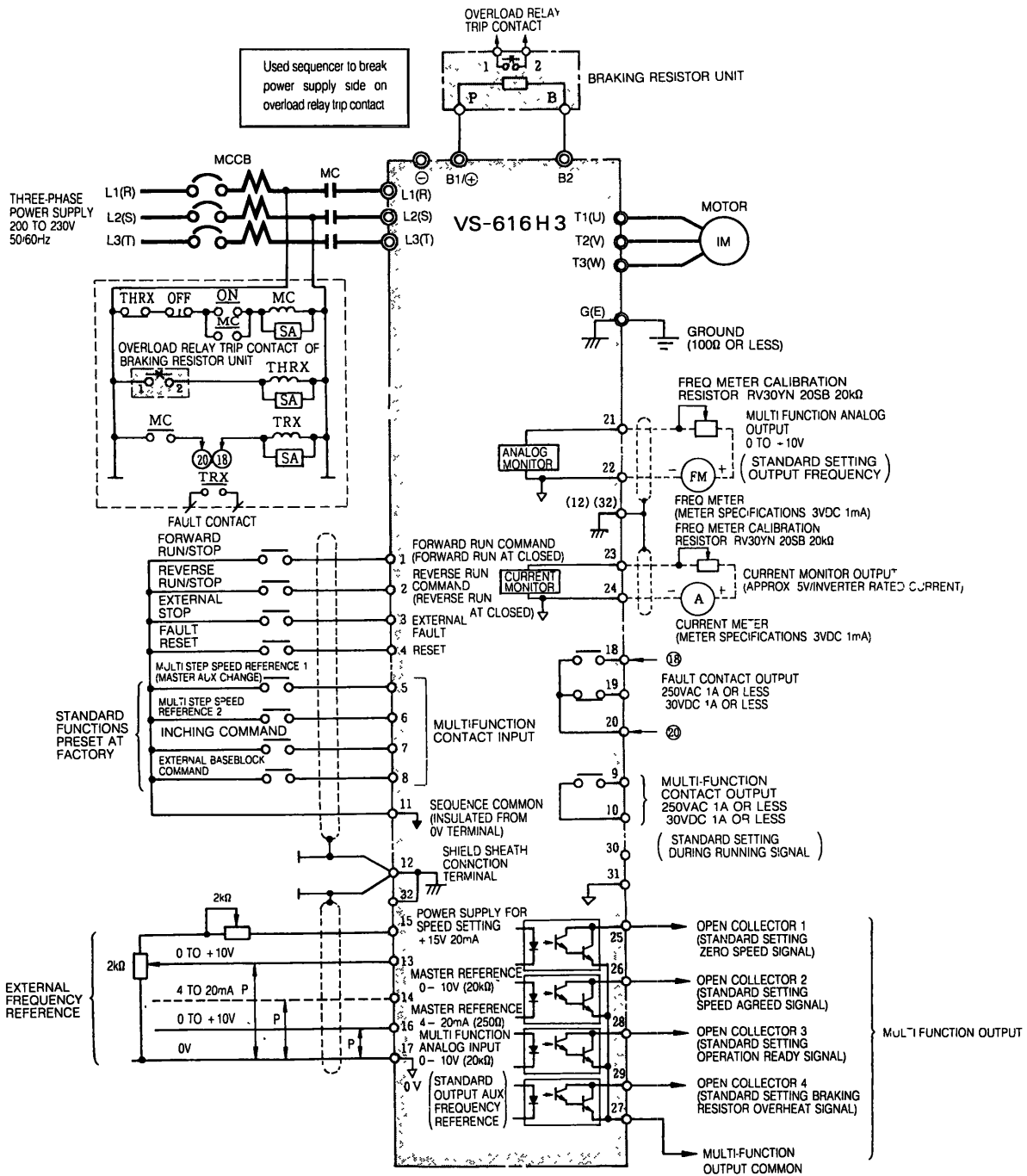
Terminal	Functions	Signal
1	Forward operation (at closed)-stop signal (at open)	Photo-coupler insulation input + 24V, 8mA
2	Reverse operation (at open)-stop signal (at open)	
3	External fault input fault at closed, normal at open	
4	Fault reset at closed	
5	Multifunction contact input: the following signals available to select. Forward/reverse select, run mode select, multispeed select, inching frequency select, accel/decel time select, external fault, external coasting stop, hold command, inverter overheat prediction, DB command, aux. input effective, speed search, energy-saving operation speed control select, speed control integral value reset	
6		
7		
8		
9	Multifunction contract output: one of the following signals available to output. During running output, zero speed, synchronized speed, arbitrary synchronized speed, speed detection, inverter operation ready, overtorque, undertorque, run mode, coasting stop, (baseblock), speed reference missing, braking resistor overheat, alarm, fault, reset signal input (contact output 1a)	Contact capacity: 250 VAC 1A or less 30 VDC 1A or less
10		
11	Sequence control input common	Sequence control input 0V
12	Connection to shield sheath of single lead	—
13	Main speed frequency reference	Voltage signal: 0 to +10V (20kΩ)
14		Current signal: 4 to 20mA (250kΩ)
15	Frequency reference power supply terminal	+15V (Internal power supply 20mA max.)
16	Multifunction analog input: one of the following signals available to select. Frequency command, frequency gain, frequency bias, overtorque detection level, voltage bias, accel/decel rate, DB current	0 to +10V/100% (20kΩ)
17	Common for control	0V
18	Closed at fault	Fault contact output (1c) Contact capacity 250 VAC or less 30 VDC or less
19	Open at fault	
20	Common	
21	Multifunction analog monitor (+)	Either output current or output frequency can be selected Monitor output: 0 to +11V
22	Multifunction analog monitor (-)	
23	Current monitor output (+)	Approx 5V/inverter rated current
24	Current monitor output (-)	
25	Multifunction PHC output 1	The same as terminals ⑨ and ⑩ Photo-coupler insulation output: +48V 50mA or less
26	Multifunction PHC output 2	
27	Multifunction PHC output common	
28	Multifunction PHC output 3	
29	Multifunction PHC output 4	
30	Not used	—
31	Common terminal for control circuit	0V
32	Connection to shield sheath of single lead	—

VS-616H3 V/F PATTERN SELECTION

Application	Specification	Sn-02	V/f Pattern	Application	Specification	Sn-02	V/f Pattern
General Purpose	50Hz	①		High Starting Torque	50Hz	Starting Torque Low ⑧	
	60Hz	60Hz Saturation ① ②			Starting Torque High ⑨		
		50Hz Saturation ②			Starting Torque Low A		
	Starting Torque High B						
Variable Torque Operation (Fans and Pumps)	72Hz	③		Constant HP Operation (Machine Tools)	90Hz	C	
	50Hz	Variable Torque 1 ④			120Hz	D	
		Variable Torque 2 ⑤					
	60Hz	Variable Torque 1 ⑥			180Hz	E	
		Variable Torque 2 ⑦					

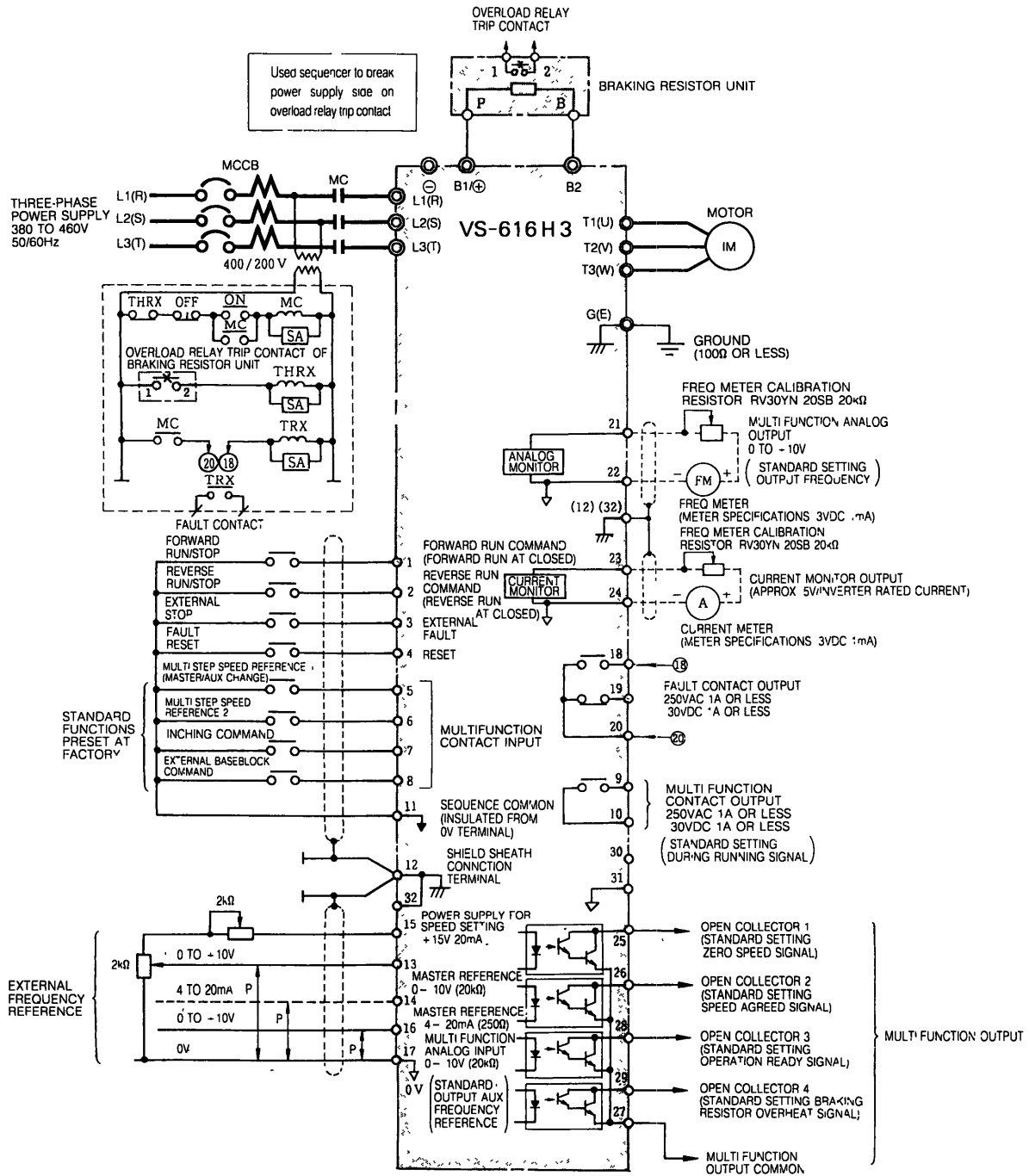
INTERCONNECTION

For Models CIMR-H3A20P4 to H3A27P5 (200V class, 0.5 to 10HP (0.4 to 7.5kW))



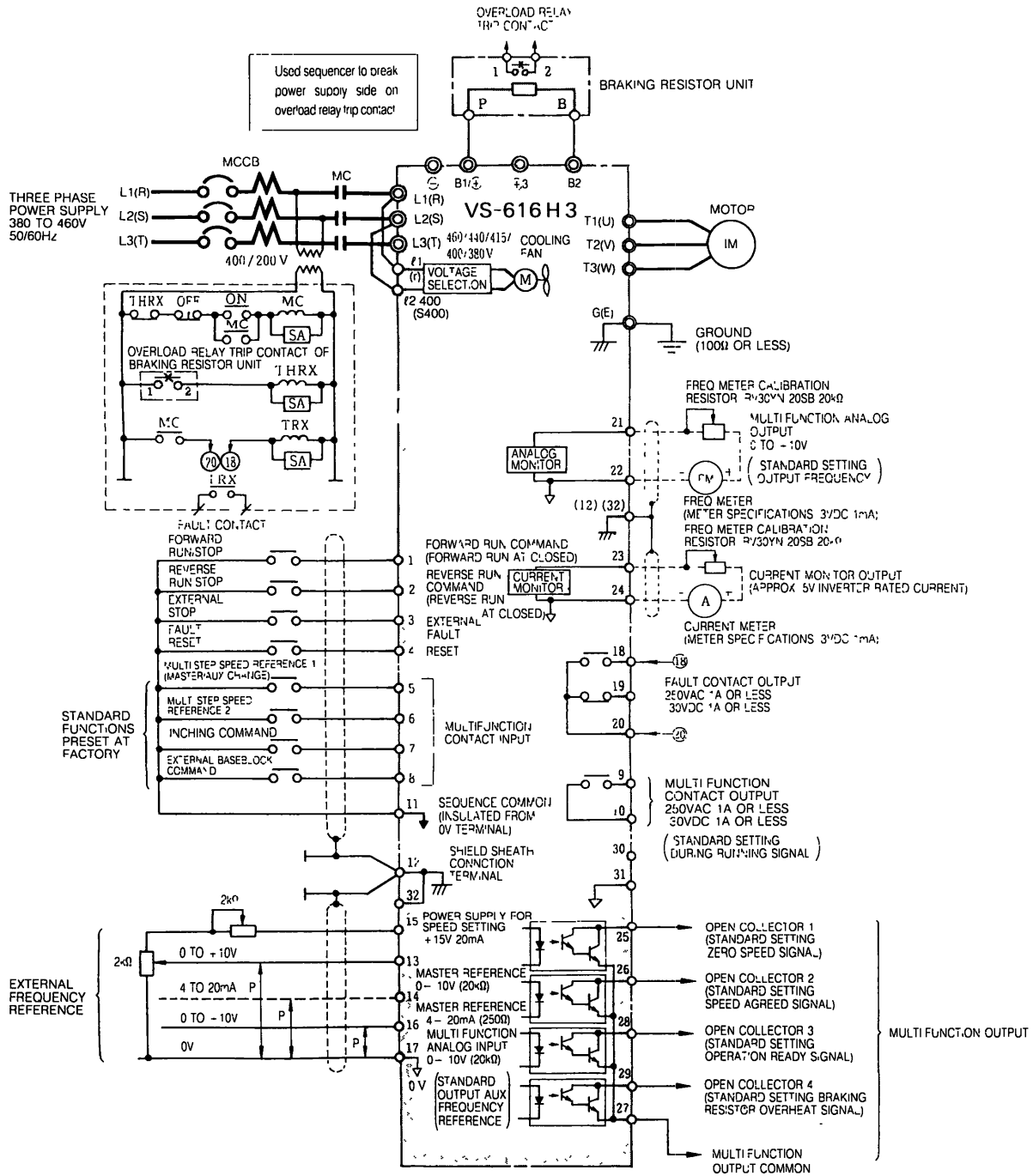
- Notes:
1. indicates shielded leads and twisted-pair shielded leads.
 2. External terminal (15) of +15V has maximum output current capacity of 20mA.
 3. Either external terminal (13) or (14) can be used.
 4. Terminal symbols: ⊙ shows main circuit; ○ shows control circuit.

For Models CIMR-H3A40P4 to-H3A47P5 (400V class, 0.4 to 7.5kW)



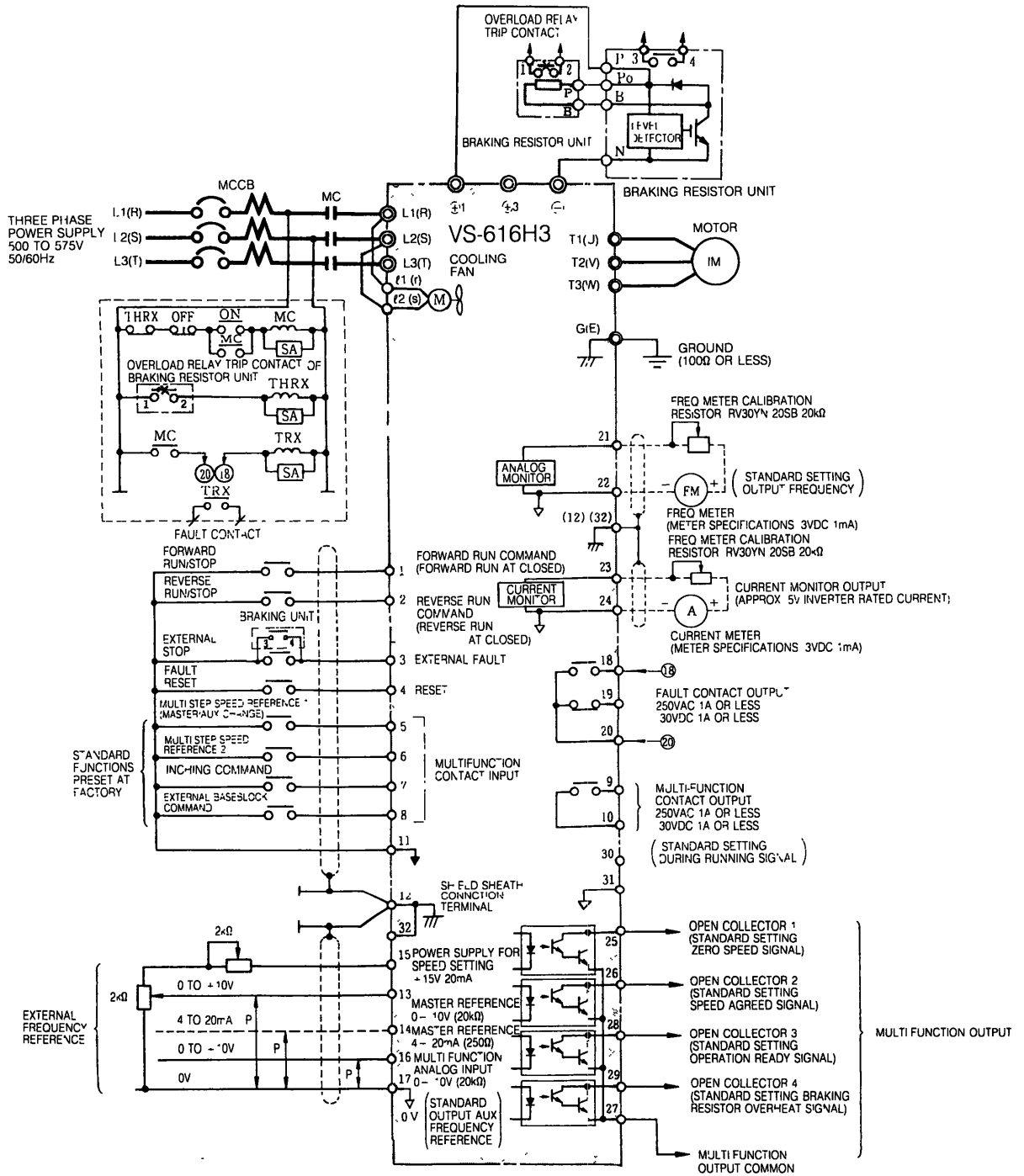
- Notes:
1. indicates shielded leads and twisted-pair shielded leads.
 2. External terminal ⑮ of +15V has maximum output current capacity of 20mA.
 3. Either external terminal ⑬ or ⑭ can be used.
 4. Terminal symbols: ○ shows main circuit; ◯ shows control circuit.

For Models CIMR-H3A4011 to-H3A4015 (400V class, 11kW and 15kW)



- Notes:
1. indicates shielded leads and twisted-pair shielded leads.
 2. External terminal ⑮ of +15V has maximum output current capacity of 20mA.
 3. Either external terminal ⑬ to ⑭ can be used.
 4. Terminal symbols: ● shows main circuit; ○ shows control circuit.

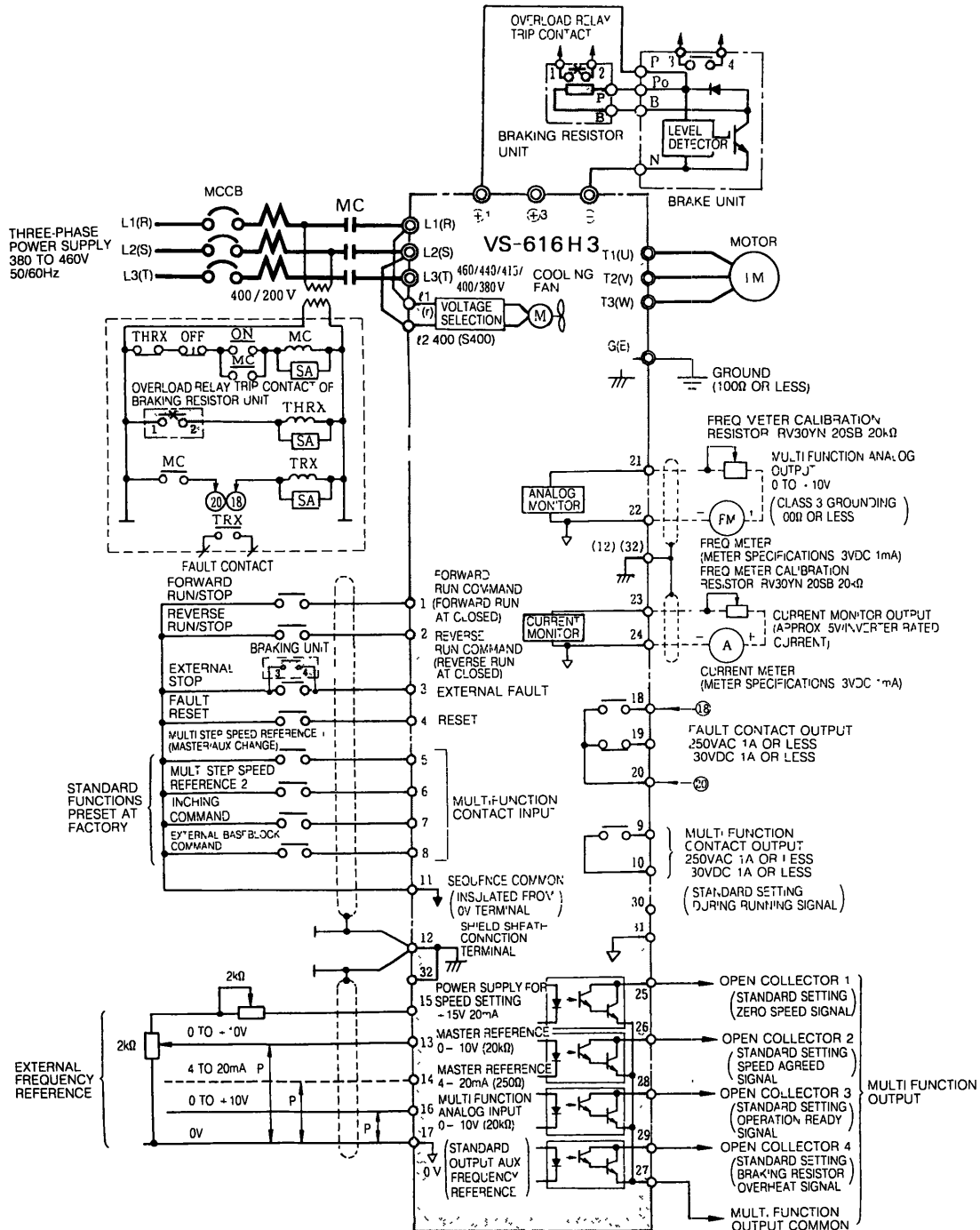
For Models CIMR-H3A2011 to -H3A2022 (200V class, 11 to 22kW)



- Notes:
1. indicates shielded leads and twisted-pair shielded leads.
 2. External terminal ⑮ of +15V has maximum output current capacity of 20mA.
 3. Either external terminal ⑬ or ⑭ can be used.
 4. Terminal symbols: ● shows main circuit; ○ shows control circuit.

Brake Unit, Braking Resistor Unit

For Models CIMR-H3A4018 to -H3A4022 (400V class, 18.5 to 45kW)



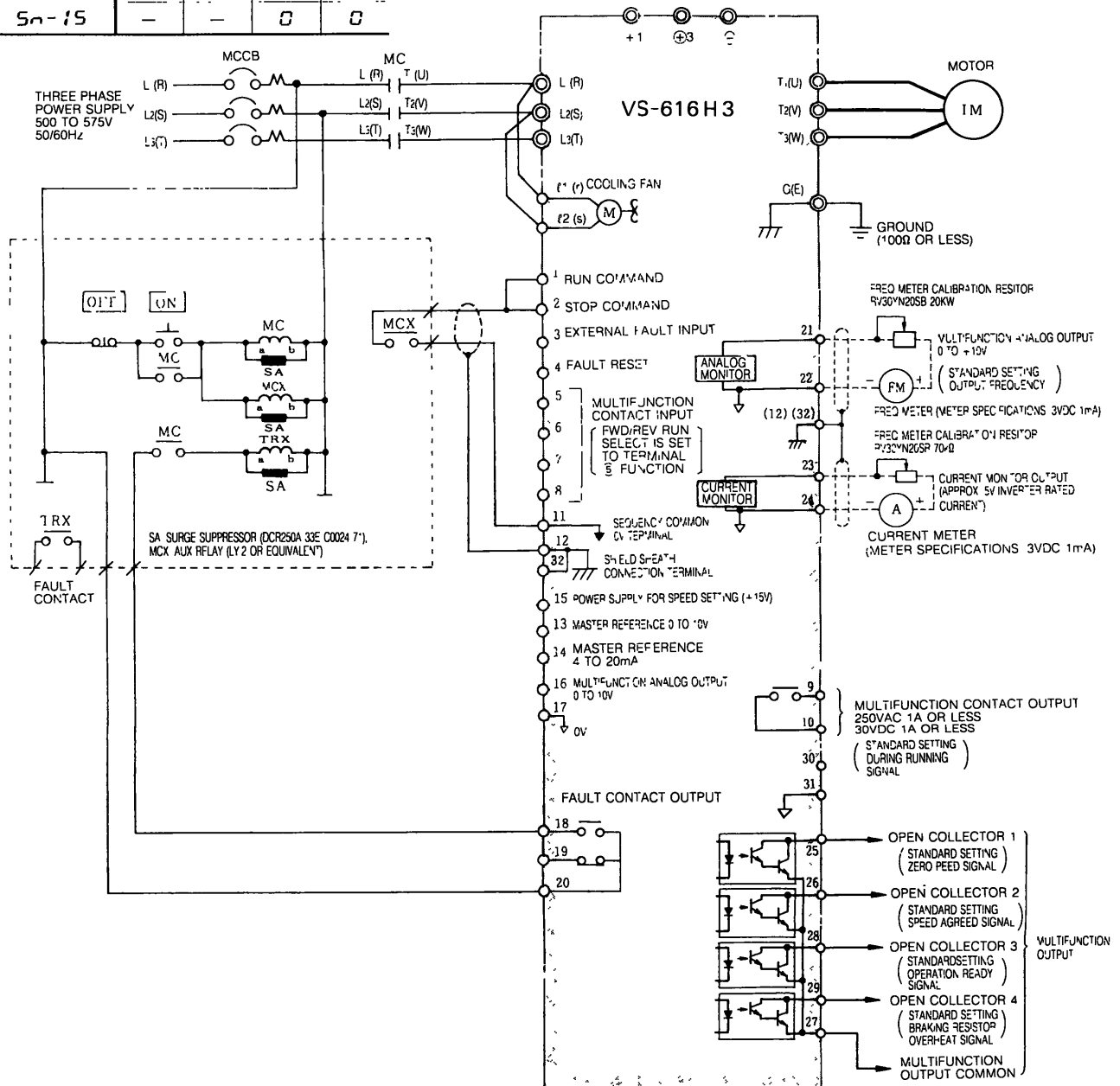
- Notes:
1. indicates shielded leads and twisted-pair shielded leads.
 2. External terminal ⑮ of +15V has maximum output current capacity of 20mA.
 3. Either external terminal ⑬ or ⑭ can be used.
 4. Terminal symbols: ⊙ shows main circuit; ○ shows control circuit.

Run/Stop by Main Circuit Power Supply Magnetic contactor (For Models CIMR-H3A2022 (200V class, 11 to 22kW))

Turn on the power supply after checking that the motor has stopped. This circuit cannot be used for an application with frequent run-stop (repeating frequency: within 1 hour).

System Constant Setting

System Constant No.	Data			
	4th digit	3rd digit	2nd digit	1st digit
Sn-04	—	—	0	0
Sn-15	—	—	0	0



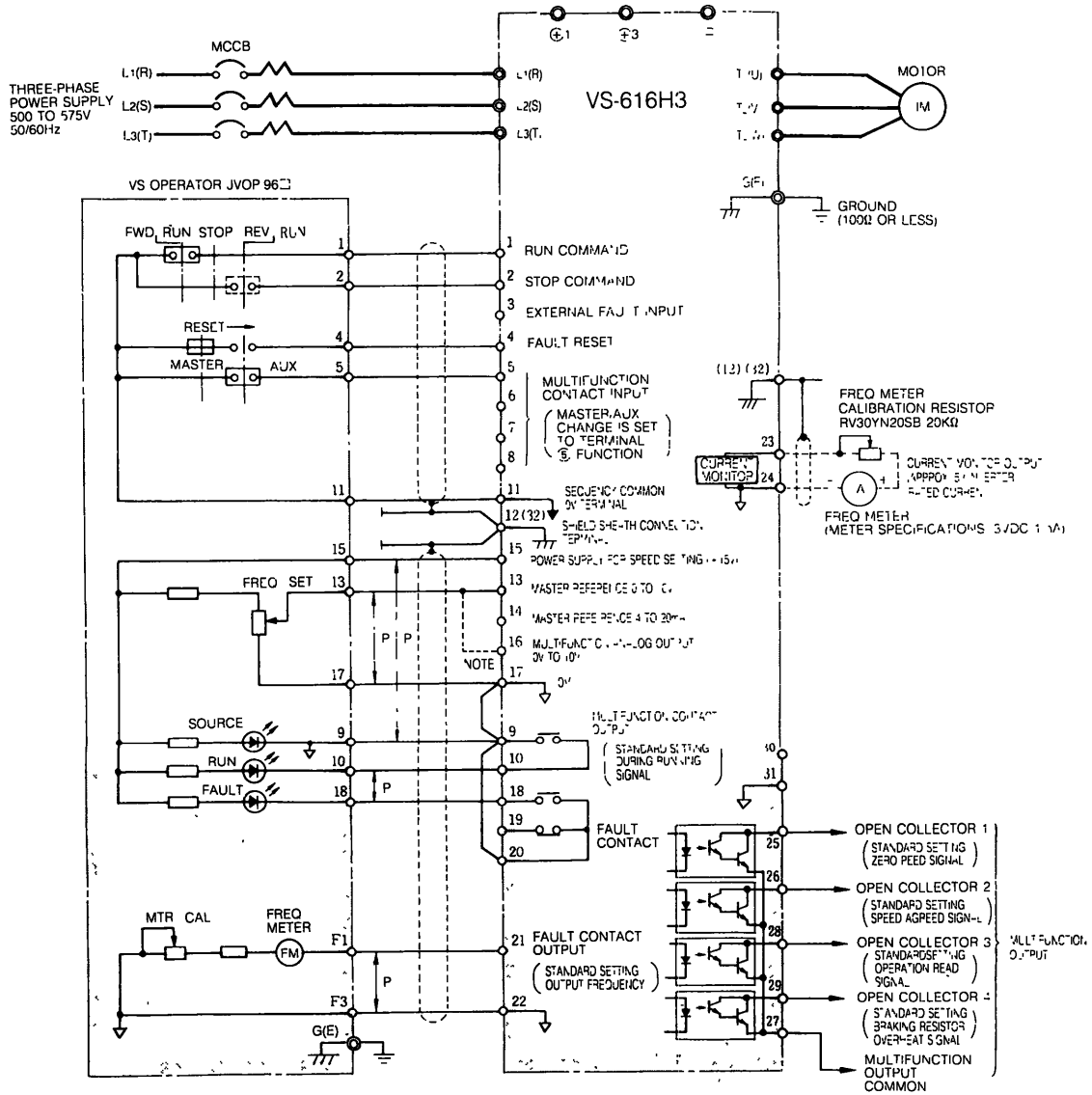
- Notes:
1. indicates shielded leads and twisted-pair shielded leads.
 2. External terminal ⑮ of +15V has maximum output current capacity of 20mA.
 3. Either external terminal ⑬ or ⑭ can be used.
 4. Terminal symbols: ⊙ shows main circuit; ○ shows control circuit.

With VS Operator Models JVOP - 95 • □

System Constant Setting

System Constant No.	Data			
	4th digit	3rd digit	2nd digit	1st digit
S _n -04	—	—	0	0
S _n -05	0	—	0	—
S _n -15	—	—	0	3
S _n -19	—	—	0	0*
S _n -20	—	—	0	0

* Connect to external terminal (13) or (16) according to the application. For terminal (16), set S_n-19 = x × 0.0



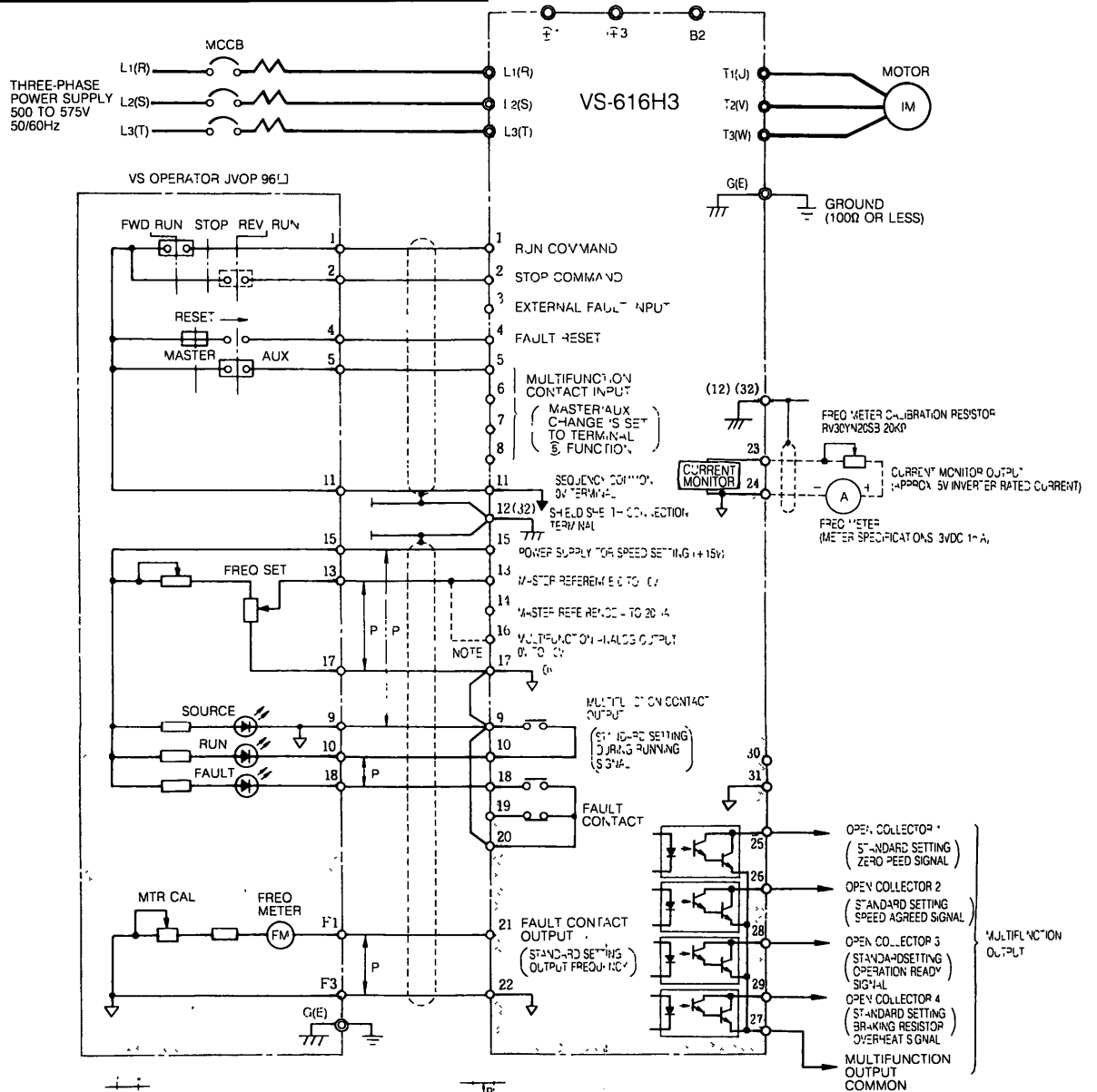
- Notes:
1. indicates shielded leads and twisted-pair shielded leads.
 2. External terminal (15) of +15V has maximum output current capacity of 20mA.
 3. Either external terminal (13) or (14) can be used.
 4. Terminal symbols: ⊙ shows main circuit; ○ shows control circuit.

With VS Operator Models JVOP - 96 • □

System Constant Setting

System Constant No.	Data			
	4th digit	3rd digit	2nd digit	1st digit
S _n -04	—	—	0	0
S _n -05	0	—	0	—
S _n -15	—	—	0	3
S _n -19	—	—	0	0*
S _n -20	—	—	0	0

* Connect to external terminal ⑬ or ⑭ according to the application. For terminal ⑭, set S_n-19 = × × 0.0.

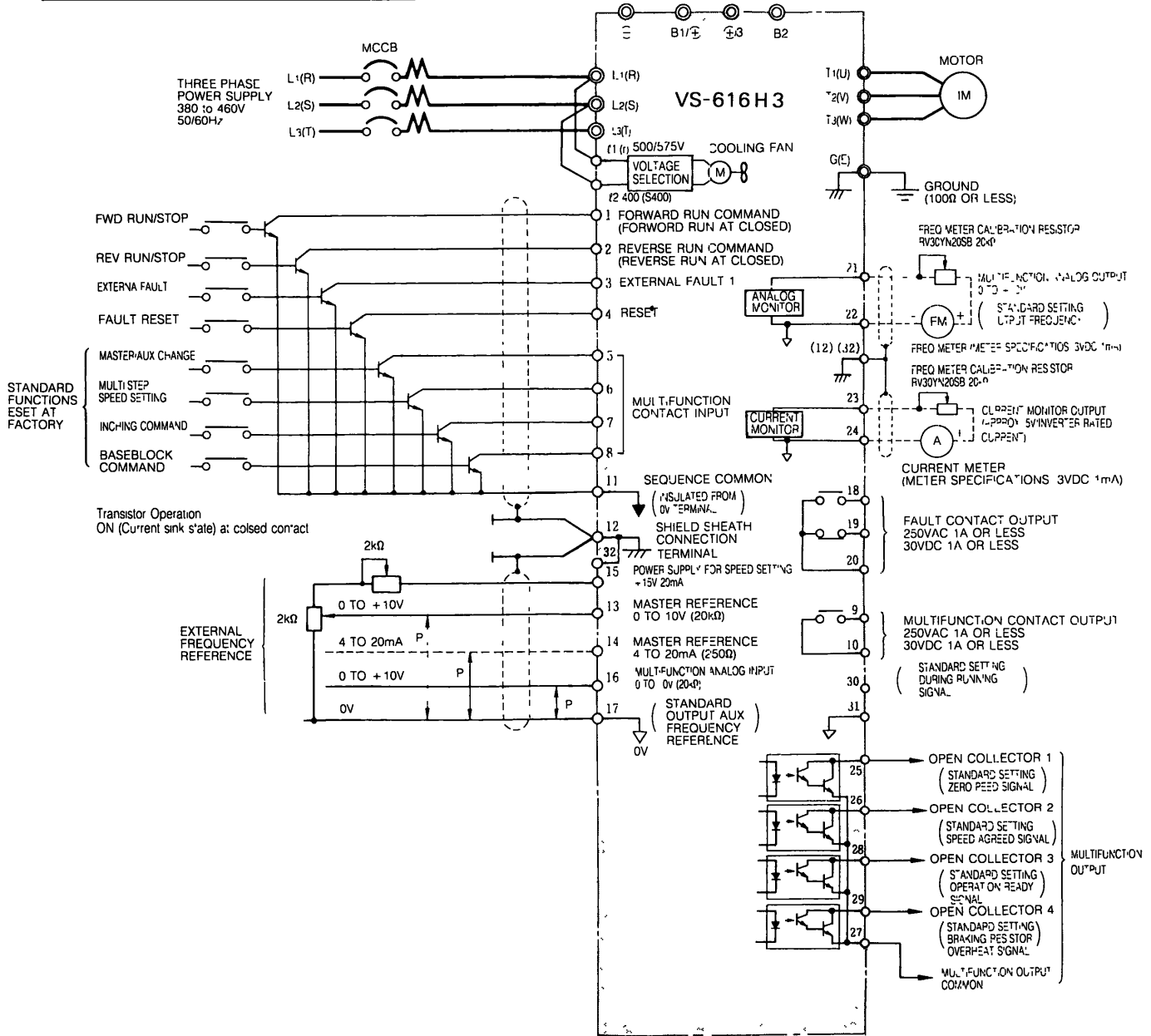


- Notes:
- ① indicates shielded leads and ② twisted-pair shielded leads.
 - External terminal ⑮ of +15V has maximum output current capacity of 20mA.
 - Either external terminal ⑬ or ⑭ can be used.
 - Terminal symbols: ⊙ shows main circuit; ○ shows control circuit.

With Transistor Open Collector for Operation Signal

System Constant Setting

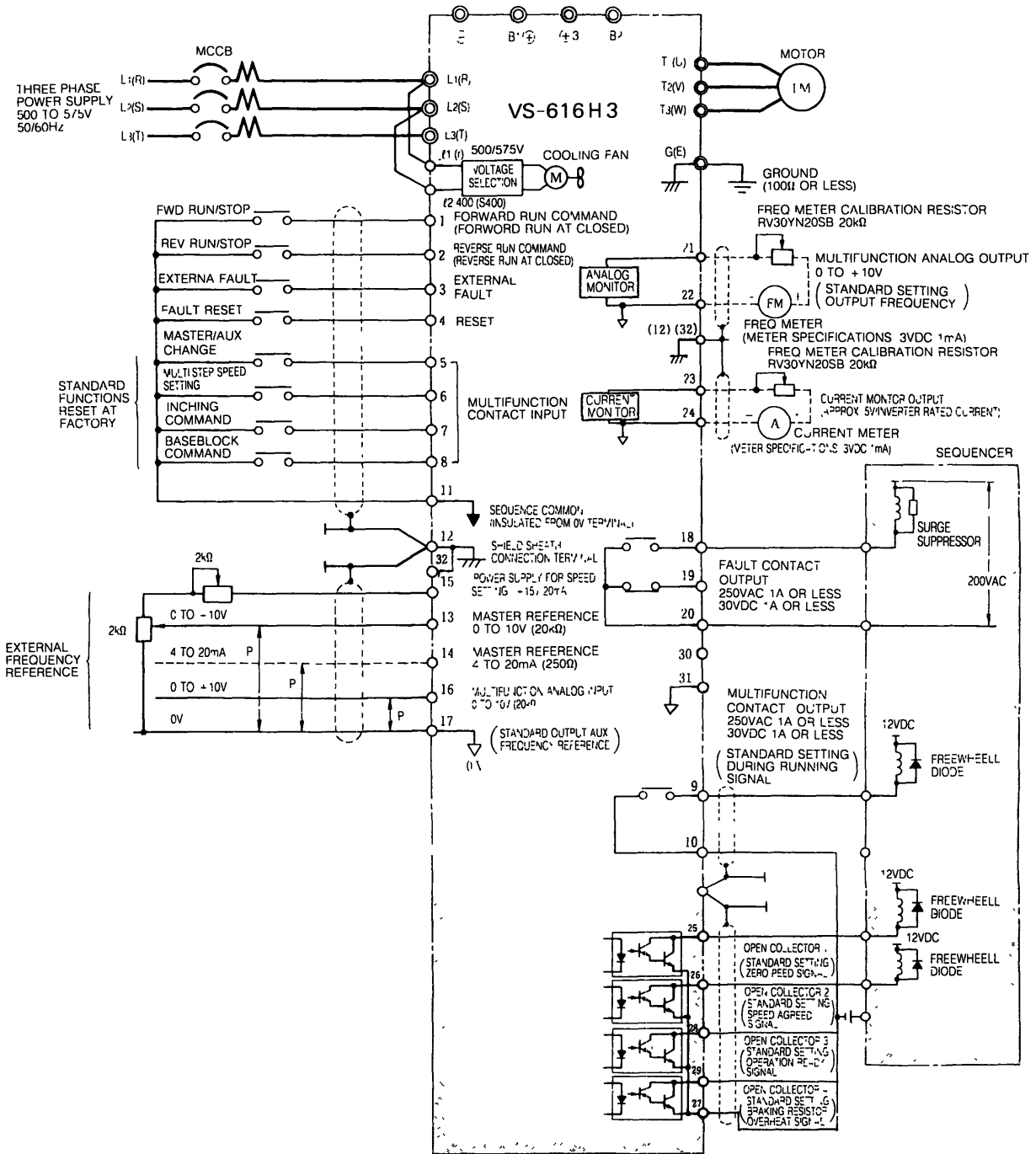
System Constant No.	Data			
	4th digit	3rd digit	2nd digit	1st digit
50-04	-	-	0	0





- Notes:
- indicates shielded leads and twisted-pair shielded leads.
 - External terminal ⑮ of +15V has maximum output current capacity of 20mA.
 - Either external terminal ⑬ or ⑭ can be used.
 - Terminal symbols: ⊙ shows main circuit; ○ shows control circuit.

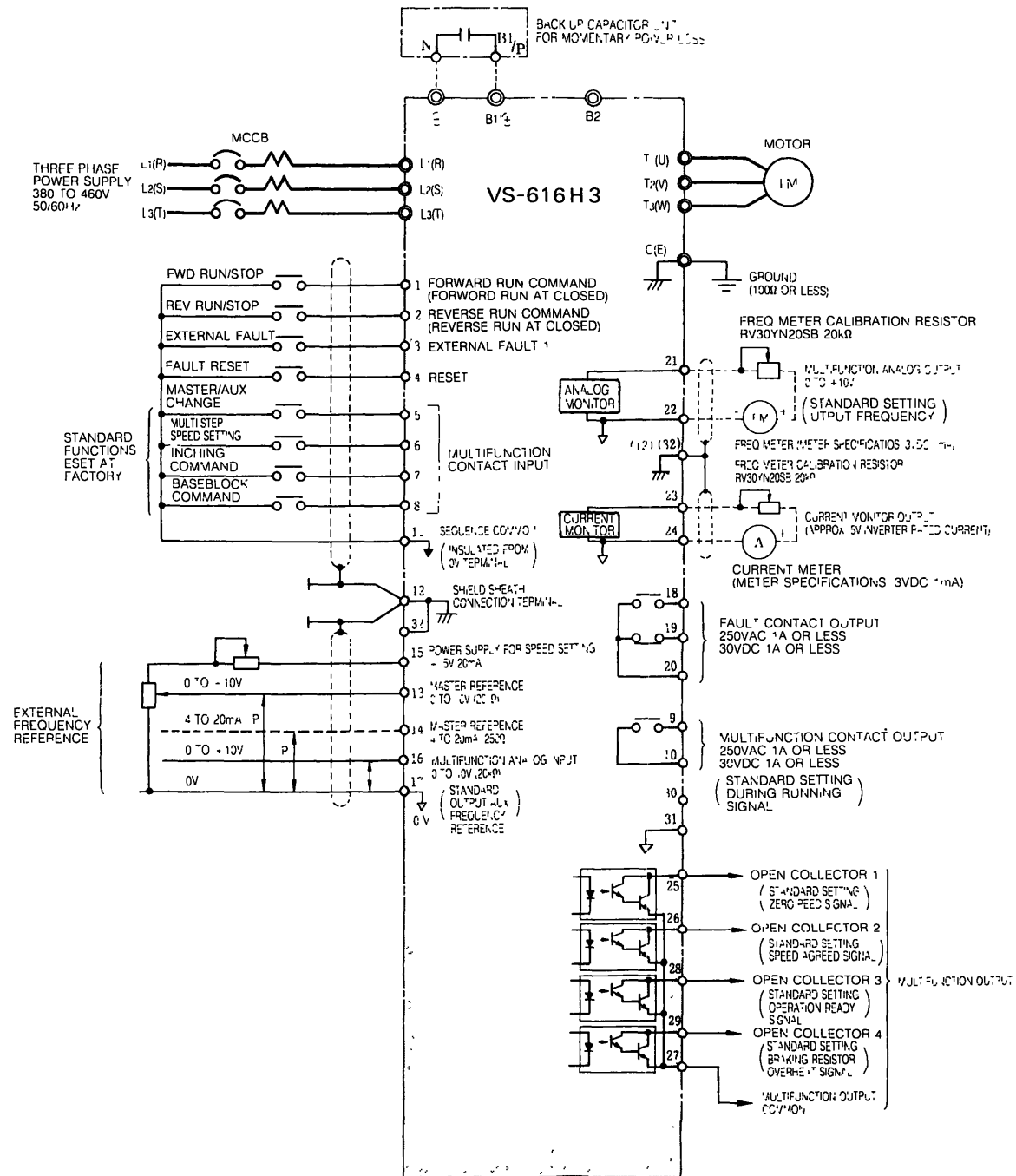
Backup Capacitor for Momentary Power Loss

(200V class—2.2kW and below)
(400V class—2.2kW and below)



- Notes:
-  indicates shielded leads and  twisted-shielded leads.
 - External terminal ⑮ of +15V has maximum output current capacity of 20mA.
 - Either external ⑬ or ⑭ can be used.
 - Terminal symbols: ● shows main circuit; ○ shows control circuit.

With Contact Output, Photo - coupler Output



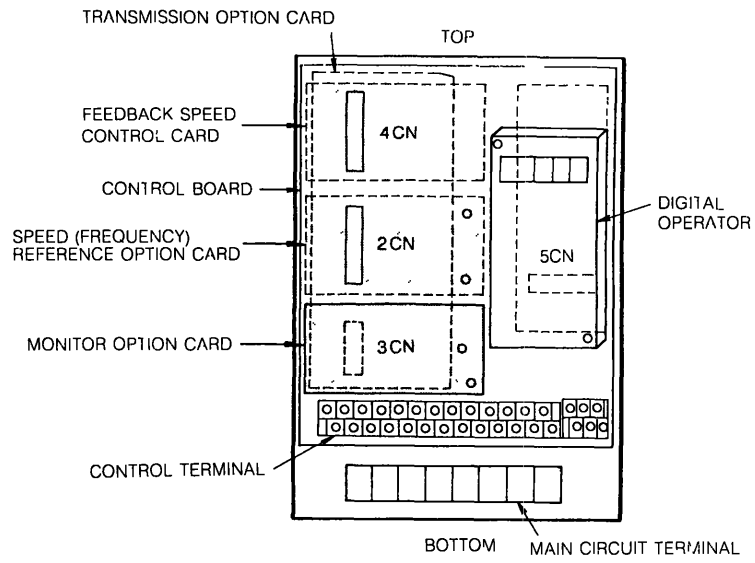
- Notes:
1. indicates shielded leads and twisted-pair shielded leads.
 2. External terminal ⑮ of +15V has maximum output current capacity of 20mA.
 3. Either external terminal ⑬ or ⑭ can be used.
 4. Terminal symbols: ⊙ shows main circuit; ○ shows control circuit.

OPTION CARDS

OPTION CARDS

	Name	Code No.	Function	Installing Position	Document No.
Speed Reference	Analog Speed Reference Card AI-14U	73600-C001X	Permits setting a high-accuracy, high-resolution analog speed reference <ul style="list-style-type: none"> • Input signal level: 0 to +10VDC (20kΩ) 1 channel 4 to 20mA DC (250Ω) 1 channel • Input signal level: 14 bits (1/16384) 	Attach the card at 2CN on the control circuit board. (See Note 1)	
	Analog Speed Reference Card AI-14B (See Note 3)	73600-C002X	Permits setting a high-accuracy, high-resolution analog speed reference <ul style="list-style-type: none"> • Input signal level: 0 to ±10VDC (20kΩ), 4 to 20mA DC (250Ω) 3 channels • Input resolution: 13 bits + sign (1/8192) 	Attach the card at 2CN on the control circuit board. (See Note 1)	
	Digital Speed Reference Card DI-08	73600-C003X	Permits setting an 16-bit digital speed reference <ul style="list-style-type: none"> • Input signal: Binary 16 bits/BCD 2 digits + Sign • Input voltage: +24V (insulated) • Input current: 8mA 	Attach the card at 2CN on the control circuit board. (See Note 1)	
	Digital Speed Reference Card DI-16H	73600-C004X	Permits setting 16-bit digital speed reference. <ul style="list-style-type: none"> • Input signal: Binary 16 bits/BCD 4 digits + sign • Input voltage: +24V (insulated) • Input current: 8mA 	Attach the card at 2CN on the control circuit board. (See Note 1)	
	CP-213 Transmission Interface card SI-A	73600-C005X	Permits operation or constant setting by command from master controller via CP-213 FA bus.	Attach the card at 2CN on the control circuit board. (See Note 1)	
Monitor	Analog Monitor Card AO-08	73600-D001X	Provides an analog signal for monitoring the output state (output frequency, output current, etc.) of the inverter. <ul style="list-style-type: none"> • Output resolution: 8 bits (1/256) • Output voltage: 0 to +10V (not insulated) • Output channel: 2 channels 	Attach the card at 3CN on the control circuit board. (See Note 2)	
	Analog Monitor Card AO-12	73600-D002X	Provides an analog signal for monitoring the output state (output frequency, output current, etc.) of the inverter. <ul style="list-style-type: none"> • Output resolution: 11 bits (1/2048) • Output voltage: 0 to +10V (not insulated) • Output channel: 2 channels 	Attach the card at 3CN on the control circuit board. (See Note 2)	
	Pulse Monitor Card PO-36F	73600-D003X	Provides a pulse string signal corresponding to the output frequency of the inverter. <ul style="list-style-type: none"> • Output pulse: 1F, 6F, 10F, 12F, 36F (F: Output frequency) • Output voltage: +12V ±10% (insulated) • Output current: 20mA max. 	Attach the card at 3CN on the control circuit board. (See Note 2)	
	Digital Output Card DO-08	73600-D004X	Extends multifunction output signal output status. Output method : Open collector output × 6 points (48 VDC 50mA or less) : Relay contact (1a) (250VAC 1A or less) output × 2 points (30VDC 1A or less)	Attach the card at 3CN on the control circuit board. (See Note 2)	
Feedback Speed Control Card	PG Speed Control Card PG-A	73600-A001X	Permits compensation of speed variation caused by slip, by speed feedback using a pulse generator (PG) provided to the motor. <ul style="list-style-type: none"> • Phase A (single pulse) input • PG frequency range: 50 to 32767 Hz • Pulse monitor output: +12V, 20mA 		

- Notes: 1. Only one of the speed (frequency) reference option cards can be attached at 2CN.
 2. Only one of the monitor option cards can be attached at 3CN.
 3. Only one of the feedback speed control cards can be attached at 4CN.



Option Card Installing Position

OPTIONAL UNIT

Name	Model (Code No.)	Function	Installing Position	Document No.	Remarks
Digital Monitor	JVOP - 101 (73041 - 0911X)	Permits display of frequency and current by digital monitor and indication of a problem. Not equipped with key pads for RUN/STOP operation and setting a constant so that it can be safely used at the site.	*1 On the inverter front cover		
Operator/Monitor Adapter	JVOP - 109 (73041 - 0919X)	This removable adapter panel can be used on the inverter cover with an extension cable when the digital operator or digital monitor needs to be removed from the inverter cover.	*1 On the inverter front cover		
Adapter Panel Exclusive Use Extension Cable	1m Cable (72616-W3001-01) 3m Cable (72616-W3003-01)	Used for remote operation of digital operator/monitor using adapter panel (JVOP-109)	*1 On the inverter front cover		
VS Operator (Small Plastic Version)	JVOP - 95* (73041 - 0905X -)	An exclusive control panel for remotely setting frequency and for starting and stopping a inverter using analog commands (distance up to 50 meters). Scale on the frequency indicator: 60/120Hz, 90/180Hz	Separately installed		
VS Operator (Standard Version)	JVOP - 95* (73041 - 0905X*)	An exclusive control panel for remotely setting frequency and for starting and stopping a inverter using analog commands (distance up to 50 meters). Scale on the frequency indicator, 75Hz, 150Hz, 220Hz	Separately installed		
Exclusive Extension Cable for Digital Operator or Monitor	1-meter cable (72616-W3001) 3-meter cable (72616-W3003)	This extension cable is used when the digital operator or digital monitor is used after removing from the inverter front cover. The cable is available in 1- and 3-meter lengths. The package of the extension cable includes a simple blind panel. Depending on the application, the use of the operator/monitor adapter JVOP-109 is recommended.	*1 On the inverter front cover (Blind panel)		
Braking Unit	CDBR - (73600 - R)	Used in combination with the braking resistor unit to reduce motor deceleration time.	Separately installed		
Braking Resistor Unit	LKEB - (73600 - K)	Shortens the motor deceleration time by causing the regenerative energy to be consumed through the resistor.	Separately installed		
Back up Capacitor Unit for Momentary Power Loss	P00 (73600 - P00)	Designed for momentary loss of control power. (Backup time: 2sec.)	Separately installed		

*1 Only one of the options, JVOP-101 and -109, used on the front cover of the inverter can be installed at a time. When attaching such an option on the front cover, the digital operator (JVOP-100, provided as a standard feature) must be removed.

*2 The type of frequency indicator is to be shown in the box after the model name and the code number.

In Case of VS Operator

Frequency Indicator (max. scale)	Model	Code No.
60/120/75Hz	1	01
90/180/150Hz	2	02
220Hz	3	03

*3 Exclusive extension cables with blind cover can not be removed on the inverter front cover. When digital operator/monitor is operated remotely (1m, 3m), use exclusive use extension cable (with blind cover) or adapter panel and adapter panel exclusive use extension cable.

Varispeed-616H3

HIGH-PERFORMANCE ALL-DIGITAL SUPER LOW-NOISE
GENERAL-PURPOSE INVERTER DRIVES

200 TO 230V, 0.5 TO 30HP (0.4 TO 22kW) 1.4 TO 41kVA
380 TO 460V, 0.5 TO 60HP (0.4 TO 45kW) 1.4 TO 82 kVA

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YASKAWA

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