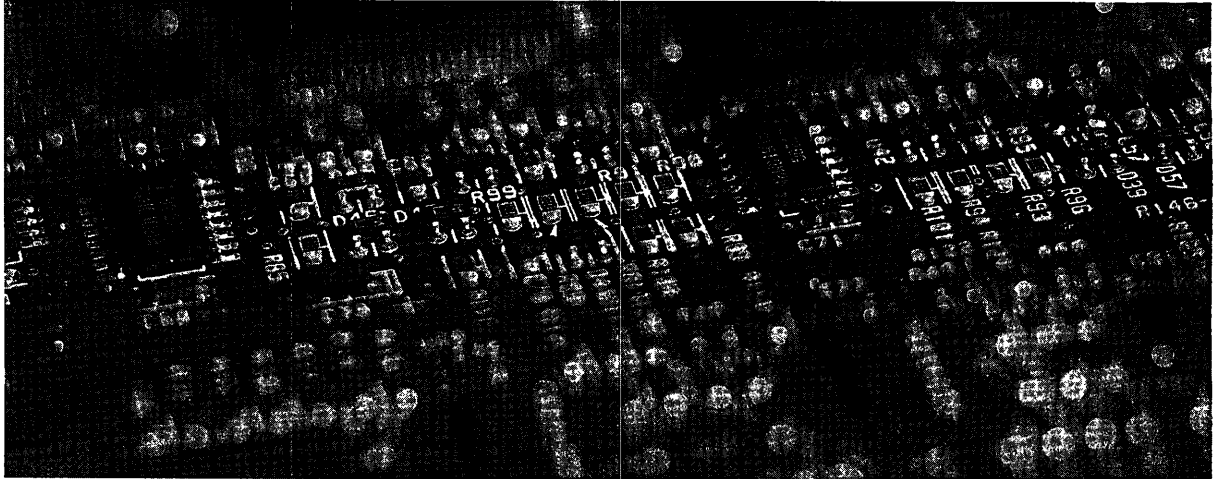


Varispeed-616G3

GENERAL-PURPOSE INVERTER

500 to 600V, 2 to 200HP (1.5 to 160kW) 2 to 200kVA



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



YASKAWA

An inverter is a device to convert 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-616G3 using the ground terminal G.
- 5) Never connect main circuit output terminals T1, T2, T3 to AC main circuit power supply.

CAUTION

- 1) All the potentiometers of VS-616G3 have been adjusted at the factory. Do not change their settings unnecessarily.
- 2) Do not perform any dielectric test on any part of the VS-616G3 unit. It is electronic equipment using semi-conductors and vulnerable to damage from high voltage.
- 3) Control PC board employs CMOS ICs which are easily damaged by static electricity. Do not touch the CMOS elements.
- 4) Make sure to tighten screws on the main circuit and control circuit terminals.

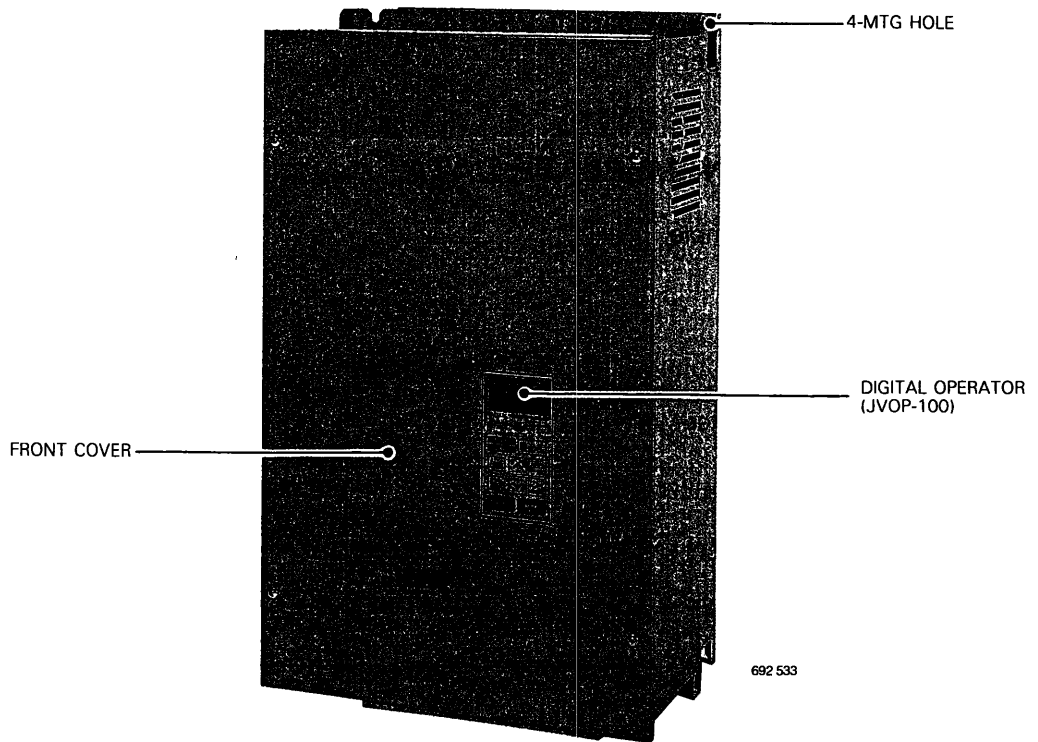
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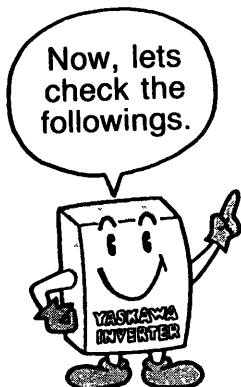
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VS-616G3 CONFIGURATION



VS-616G3

RECEIVING



This VS-616G3 has been put through demanding tests at the factory before shipment. After unpacking, check the followings.

- Verify the received product with the purchase order sheet (invoice) and/or packing slip.
- Transit damage.

If any part of VS-616G3 is damaged or lost, immediately notify the shipper.

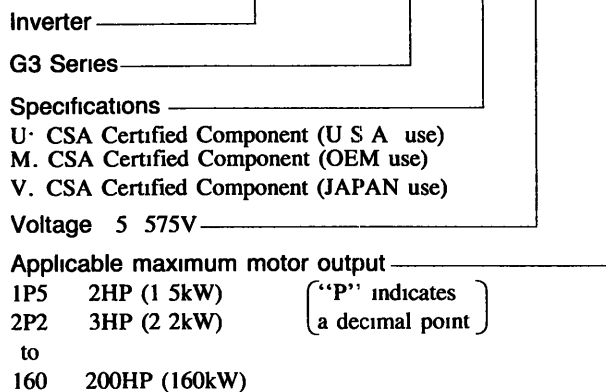
NAMEPLATE DATA

Example

Inverter Model		Input Spec		Enclosure		
MODEL CIMR-G3U51P5		SPEC 51P51F		0 Open Chassis Type		
				1 NEMA1 (Enclosed wall-mounted Type)		
				only for 2 to 100HP (1.5 to 75kW)		
				Revision Order		
				Output Spec		
A C INPUT		A C OUTPUT				
VOLTS 500-600	HZ 50/60	VOLTS 0-600V MAX	HZ 0-400	PHASE 3		
		VARIABLE TORQUE CONT	AMPS 39	HP 3		
PHASE 3	AMPS 4.3	CONSTANT TORQUE CONT	AMPS 35	HP 2		

MODEL DESIGNATION

CIMR - G3 U 5 1P5



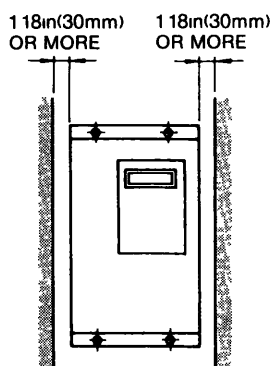
INSTALLATION

CAUTION

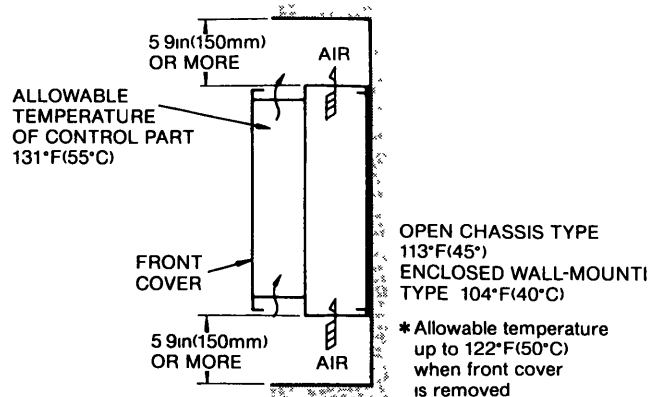
- Never move, lift or handle the VS-616G3 cabinet by the front cover.
- Lift the cabinet from the bottom.
- Do not drop the inverter.

MOUNTING SPACE

Install VS-616G3 vertically and allow sufficient space for effective cooling as shown in Fig. 1.



(a) Front View



(b) Side View

Note For product external dimensions and mounting dimensions, refer to APPENDIX B "DIMENSIONS" on page 33

Fig. 1 Mounting Spaces

LOCATION

Location of the equipment is important to achieve proper performance and normal operating life. The VS-616G3 units should be installed in areas where the following conditions exist.

- 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 (e.g. welding machines, power units)
- Ambient temperature:
+ 14 to 104°F, - 10 to + 40°C (For enclosed type),
+ 14 to 113°F, - 10 to + 45°C (For open chassis type)
- Free from combustible materials, gases, etc.

CAUTION

When mounting units in a common enclosure, install a cooling fan or some other means to cool the air entering the inverter below 113°F (45°C).

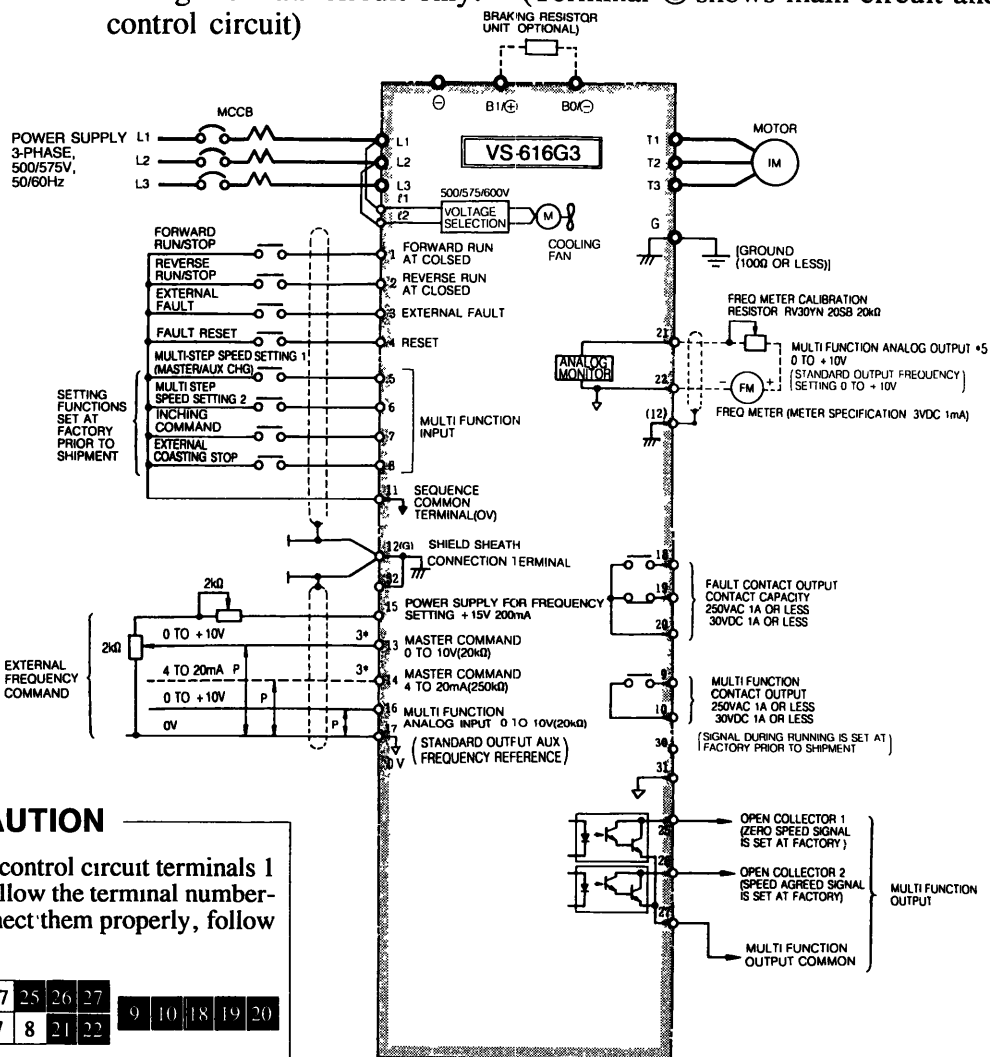
WIRING

CONNECTION DIAGRAM

IMPORTANT

Use CSA Certified closed-loop (ring) connectors sized for the wire gauge involved. Connectors are to be installed using the correct crimp tool specified by the connector manufacturer.

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



CAUTION

The connections of control circuit terminals 1 through 27 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	9	10	18	19	20
1	2	3	4	5	6	7	8	21	22					

- Notes
- 1 indicates shielded leads and twisted-pair shielded leads
 - 2 Control circuit terminal 15 of +15V has maximum output current capacity of 20mA
 - 3 Either external terminal 13 or 14 can be used (For Simultaneous input, two signals are internally added in the unit)
 - 4 Multi-function analog output is an exclusive meter output such as frequency meter etc and not available for the feed back control system Use analog monitor cards (Model AO-08 or AO-12) for the control system
 - 5 Control circuit terminal 12 (G) is frame ground of the unit
 - 6 Switching between master frequency command at external terminal 13 or 14 and aux frequency command at 16 corresponds to the master/aux selection contact input

Fig. 2 Connection Diagram

MAIN CIRCUIT

MAIN CIRCUIT TERMINALS

575V Class

Model CIMR- Max Applicable Motor Output	G3□51P5 to 57P5	G3□5011 to 5022	G3□5030 to 5160
Terminals	2 to 10HP (1.5 to 7.5kW)	15 to 30HP (11 to 22kW)	40 to 200HP (30 to 160kW)
L1	Main circuit input power supply		
L2			
L3			
T1	Inverter output		
T2			
T3			
B0/⊖	—	• Braking resistor unit (B1/⊕ - B0/⊖)	
B1/⊕	• Braking unit (B1/⊕ - ⊖) • Braking resistor unit (B1/⊕ - B2)		
B2		—	
⊖			
ℓ1	—	Cooling fan power supply (Control power input)	
ℓ2			
x	—	External power supply (220VAC, 30VA)	
y			
G	Ground terminal		

MOLDED-CASE CIRCUIT BREAKER (MCCB)

Be sure to connect MCCBs between power supply and VS-616G3 input terminals L1, L2, L3. 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.

- (Example)
- Mitsubishi Electric NV series (manufactured in 1988 and after)
 - Fuji Electric EGSG series (manufactured in 1984 and after)

Table 1 Molded-Case Circuit Breakers

575V Class

VS-616G3	Model CIMR-G3□	51P5	52P2	53P7	55P5	57P5	5011	5015	5018	5022	5030
	Capacity kVA	2	3	5	7.5	10	15	20	25	30	40
	Rated Output Current A	3.5	4.1	6.3	9.8	12.5	17	22	27	32	41
Molded-Case Circuit Breaker or Fuse	Rated Current A	10	10	20	20	20	30	50	60	60	100

VS-616G3	Model CIMR-G3□	5037	5045	5055	5075	5090	5110	5160
	Capacity kVA	50	60	75	100	125	150	200
	Rated Output Current A	52	62	77	99	130	172	200
Molded-Case Circuit Breaker or Fuse	Rated Current A	100	100	150	225	225	300	400

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	Yaskawa Code No
200 to 230V	Large-size Magnetic Contactors	DCR2-50A22E	250 VAC 0.5μF + 200Ω	C002417
	Control Relay MY-2, -3(OMRON) HH-22, -23(Fuji) MM-2, -4(OMRON)	DCR2-10A25C	250 VAC 0.1μF + 100Ω	C002482
380 to 460V Units		DCR2-50D100B	1000 VDC 0.5μF + 220Ω	C002630

*Made by MARCON Electronics

WIRE AND TERMINAL SCREW SIZES

The wire sizes and types are shown in Table 3.

Refer to Table 4 for the placement of the closed-loop connectors.

Table 3 575V Class Wire Size

Circuit	VS-616G3 Model CIMR G3□	kVA	Terminal Symbol	Terminal Screw	75°C Copper Wire Range		Wire Type
					AWG	mm ²	
Main	51P5 52P2	2	L1, L2, L3, ⊖, B1/⊕, B2, T1, T2, T3	M4	14 - 10	2 - 5.5	(Note 3) Power cable 600V vinyl sheathed wire or equivalent
		3	G		14 - 10	2 - 5.5	
	53P7	5	L1, L2, L3, ⊖, B1/⊕, B2, T1, T2, T3	M4	14 - 10	2 - 5.5	
			G	M5	14 - 10	2 - 5.5	
	55P7	7.5	L1, L2, L3, ⊖, B1/⊕, B2, T1, T2, T3	M4	12 - 10	3.5 - 5.5	
			G	M5	12 - 10	3.5 - 5.5	
	57P5	10	L1, L2, L3, ⊖, B1/⊕, B2, T1, T2, T3	M4	12 - 10	3.5 - 5.5	
			G	M5	12 - 10	3.5 - 5.5	
	5011	15	L1, L2, L3, ⊖, B1/⊕, B2, T1, T2, T3	M5	10 - 8	5.5 - 8	
			G	*	12 - 2	3.5 - 30	
			ℓ1, ℓ2	M4	14 - 10	2 - 5.5	
	5015	20	L1, L2, L3, ⊖, B1/⊕, B2, T1, T2, T3	M6	8 - 6	8 - 14	
			G	*	12 - 2	3.5 - 30	
			ℓ1, ℓ2	M4	14 - 10	2 - 5.5	
	5018	25	L1, L2, L3, ⊖, B1/⊕, B2, T1, T2, T3	M6	8 - 6	8 - 14	
			G	*	10 - 2	5.5 - 30	
			ℓ1, ℓ2	M4	14 - 10	2 - 5.5	
	5022	30	L1, L2, L3, B0/⊖, B1/⊕, B2, T1, T2, T3	M6	8 - 6	8 - 14	
			G	*	10 - 2	5.5 - 30	
			ℓ1, ℓ2	M4	14 - 10	2 - 5.5	
	5030	40	L1, L2, L3, B0/⊖, B1/⊕, T1, T2, T3	M8	6 - 1	14 - 38	
			G	*	10 - 2	5.5 - 30	
			ℓ1, ℓ2, x, y	M4	14 - 10	2 - 5.5	
	5037	50	L1, L2, L3, B0/⊖, B1/⊕, T1, T2, T3	M8	4 - 1	22 - 38	
			G	*	8 - 2	8 - 30	
			ℓ1, ℓ2, x, y	M4	14 - 10	2 - 5.5	
	5045	60	L1, L2, L3, B0/⊖, B1/⊕, T1, T2, T3	M8	3 - 1/0	27 - 50	
			G	*	8 - 2	8 - 30	
ℓ1, ℓ2, x, y			M4	14 - 10	2 - 5.5		
5055	75	L1, L2, L3, B0/⊖, B1/⊕, T1, T2, T3	M8	1 - 2/0	38 - 60		
		G	*	8 - 2	8 - 30		
		ℓ1, ℓ2, x, y	M4	14 - 10	2 - 5.5		
5075	100	L1, L2, L3, B0/⊖, B1/⊕, T1, T2, T3	M8	2/0 - 3/0	60 - 80		
		G	*	6 - 2/0	14 - 60		
		ℓ1, ℓ2, x, y	M4	14 - 10	2 - 5.5		
5090	125	L1, L2, L3, B0/⊖, B1/⊕, T1, T2, T3	M10	3/0 - 300	80 - 150		
		G	*	6 - 2/0	14 - 60		
		ℓ1, ℓ2, x, y	M4	14 - 10	2 - 5.5		
5110	150	L1, L2, L3, B0/⊖, B1/⊕, T1, T2, T3	M12	300 - 400	150 - 200		
		G	*	4 - 2/0	22 - 60		
		ℓ1, ℓ2, x, y	M4	14 - 10	2 - 5.5		
5160	200	L1, L2, L3, B0/⊖, B1/⊕, T1, T2, T3	M12	350 - 400	177 - 200		
		G	*	4 - 2/0	22 - 60		
		ℓ1, ℓ2, x, y	M4	14 - 10	2 - 5.5		
Control	Common to all models	—	1 to 22 25 to 27	M3 5	20 - 14	0.5 - 2	Twisted shielded wire with class 1 wiring or equivalent

- Note 1 Where □ is "A" through "Z"
 2 Use a pressure lug for the terminal screw of which given with an asterisk
 3 Use 1000V vinyl sheathed wire or equivalent for DC circuits

Table 4 Closed-Loop (Ring Lug) Connectors

Wire Range		Terminal Screw	Closed-Loop (Ring Lug) Connector
AWG	mm ²		
14	2	M4	2 - 4
		M5	2 - 5
12	3.5	M4	3.5 - 4
		M5	3.5 - 5
10	5.5	M4	5.5 - 4
		M5	5.5 - 5
8	8	M5	8 - 5
		M6	8 - 6
6	14	M6	14 - 6
4	22	M8	22 - 8
3	27	M8	38 - 8
2	38		
1/0	50	M8	60 - 8
2/0	60	M10	60 - 10
3/0	80	M10	80 - 10
MCM300	150	M10	150 - 10
MCM350	177	M12	200 - 12
MCM400	200		

Note The closed-loop connectors are not needed for the terminal screws of wire range 2 AWG (30mm²), because the terminals are connected to the pressure lug

IMPORTANT

1. Use 60 or 75°C copper wires only.
2. Wire size should be determined considering voltage drop. Voltage drop is obtained by the following equation: select the size so that voltage drop will be less than 2% the normal rated voltage.

$$\text{Phase-to-phase voltage drop (V)} = \sqrt{3} \text{ wire resistance } (\Omega/\text{km}) \times \text{wiring distance (m)} \times \text{current (A)} \times 10^{-3}$$

CAUTION

The external interconnection wiring must be performed with following procedures.

After completing VS-616G3 interconnections, be sure to check that connections are correct. Never use control circuit buzzer check.

MAIN CIRCUIT INPUT/OUTPUT

- (1) Phase rotation of input terminals L1, L2, L3 is available in either direction, clockwise and counterclockwise.
- (2) When inverter output terminals T1, T2, and T3 are connected to motor terminals T1, T2, and T3, 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 T1, T2, and T3. Otherwise the inverter may be damaged.
- (4) Care should be taken to prevent contact of wiring leads with VS-616G3 cabinet, for short-circuit may result.
- (5) Never connect power factor correction capacitor or noise filter to VS-616G3 output.
- (6) Never open or close contactors in the output circuit unless inverter is properly sized.

GROUNDING

Ground the casing of the VS-616G3 using ground terminal G.

- (1) Ground resistance should be 100Ω or less.
- (2) Never ground VS-616G3 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-616G3 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-616G3 in parallel, and ground only one of VS-616G3 to the ground pole is also permissible (Fig. 3). However, do not form a loop with the ground leads.

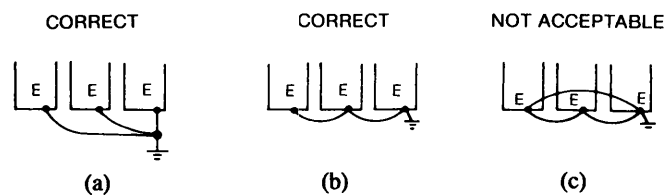


Fig. 3 Grounding of Three VS-616G3 Units

CONTROL CIRCUIT

CONTROL CIRCUIT TERMINALS

Classification	Terminal	Signal Function	Description		Signal Level	
Sequence Input Signal	1	Forward operation-stop signal	Forward run at closed, stop at open		Photo-coupler insulation Input +24VDC 8mA	
	2	Reverse operation-stop signal	Reverse run at closed, stop at open			
	3	External fault input	Fault at closed, normal state at open			
	4	Fault reset input	Reset at closed			
	5	Master/Aux change (Multi-step speed ref 1)	Aux freq ref at "closed"	Multi-function contact input the following signals available to select Forward/reverse, run mode, multi-speed, jog command, accel/ decel time, external fault, external base block stop, hold command, inverter overheat prediction, DB command, aux input effective, speed search, energy-saving operation		
	6	Multi-step speed ref 2	Effective at "closed"			
	7	Jog command	Jog run at "closed"			
	8	External coasting stop	Inv output stop at "closed"			
	11	Sequence control input common terminal	—			
Analog Input Signal	15	Power supply terminal for speed ref	Speed ref power supply		+15V (Allowable current 20mA max)	
	13	Master speed frequency ref	0 to +10V/100% freq		0 to +10V (20kΩ)	
	14		4 to 20mA/100% freq		4 to 20mA (250Ω)	
	16	Aux frequency ref	10V/100%	Multi-function contact input one of the following signals available to select, speed command, command gain, command bias, overtorque, overvoltage bias, rate of accel / decel DB current	0 to +10V (10kΩ)	
	17	Common terminal for control circuit	0V		—	
	12	Connection to shield sheath of signal lead	—		—	
Sequence Output Signal	9	During running (NO)	Run at "closed"	Multi-function contact output one of the following signals available to output Output during running, zero speed, agreed speed, arbitrary agreed speed, speed detection, overtorque, undervoltage, run mode, coasting stop, braking resistor overheat	Dry contact Contact capacity 250VAC 1A or less 30VDC 1A or less	
	10					
	25	Zero speed detection	Makes at min, freq (Cn-07) or less	Open collector output +48V 50mA or less		
	26	Speed agreed detection	Makes when the freq reaches to ±1% of set freq.			
	27	Open collector output common				—
	18	Fault contact output (NO, NC)	Fault at closed between terminals 18 and 20		Dry contact Contact capacity 250VAC 1A or less 30VDC 1A or less	
19	Fault at open between terminals 19 and 20					
20						
Analog Output Signal	21	Frequency meter output	0 to 10V/100% freq	Ammeter output selection available	0 to 11V max 2mA or less	
	22	Common				

■ TYPICAL CONTROL CIRCUIT TERMINAL ARRANGEMENT

11	12	13	14	15	16	17	25	26	27	9	10	18	19	20
1	2	3	4	5	6	7	8	21	22					

CAUTION

The external interconnection wiring must be performed with following procedures.

After completing VS-616G3 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 L1, L2, L3, B1/⊕, B2, T1, T2, T3, ⊖ 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 17, 21, 22 and 25 to 27.

(3) Use the twisted shielded or twisted-pair shielded wire for the control circuit line and connect the shield sheath to the inverter terminal 12 to prevent malfunction caused by noise. See Fig. 4.

4. A wiring distance should be less than 164 ft (50 m).

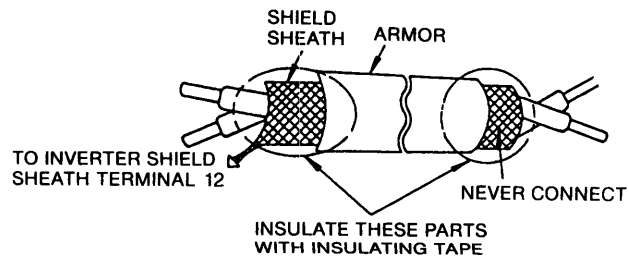


Fig 4 Shielded Wire Termination

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 TEST OPERATION



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 15HP (11kW) AND ABOVE

The line voltage selecting connector shown in Fig. 5 must be set according to the type of main circuit power supply. Insert the connector at the position showing the appropriate line voltage.

The unit is preset at the factory for 575/600V line voltage.

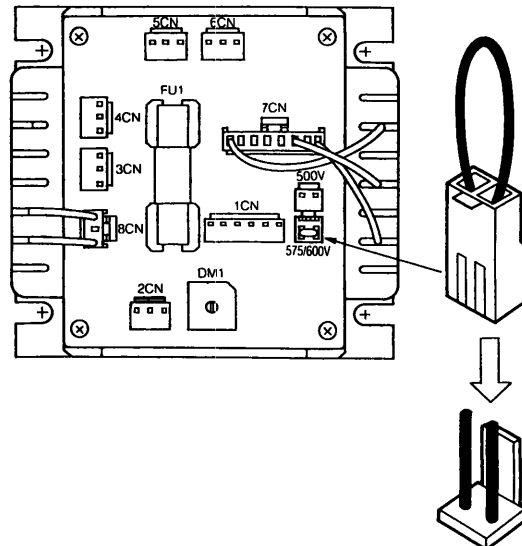

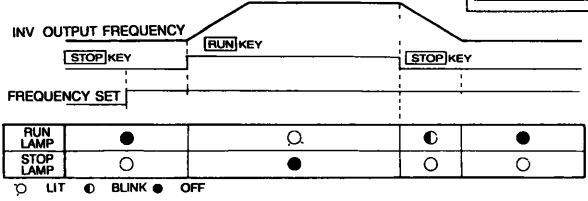
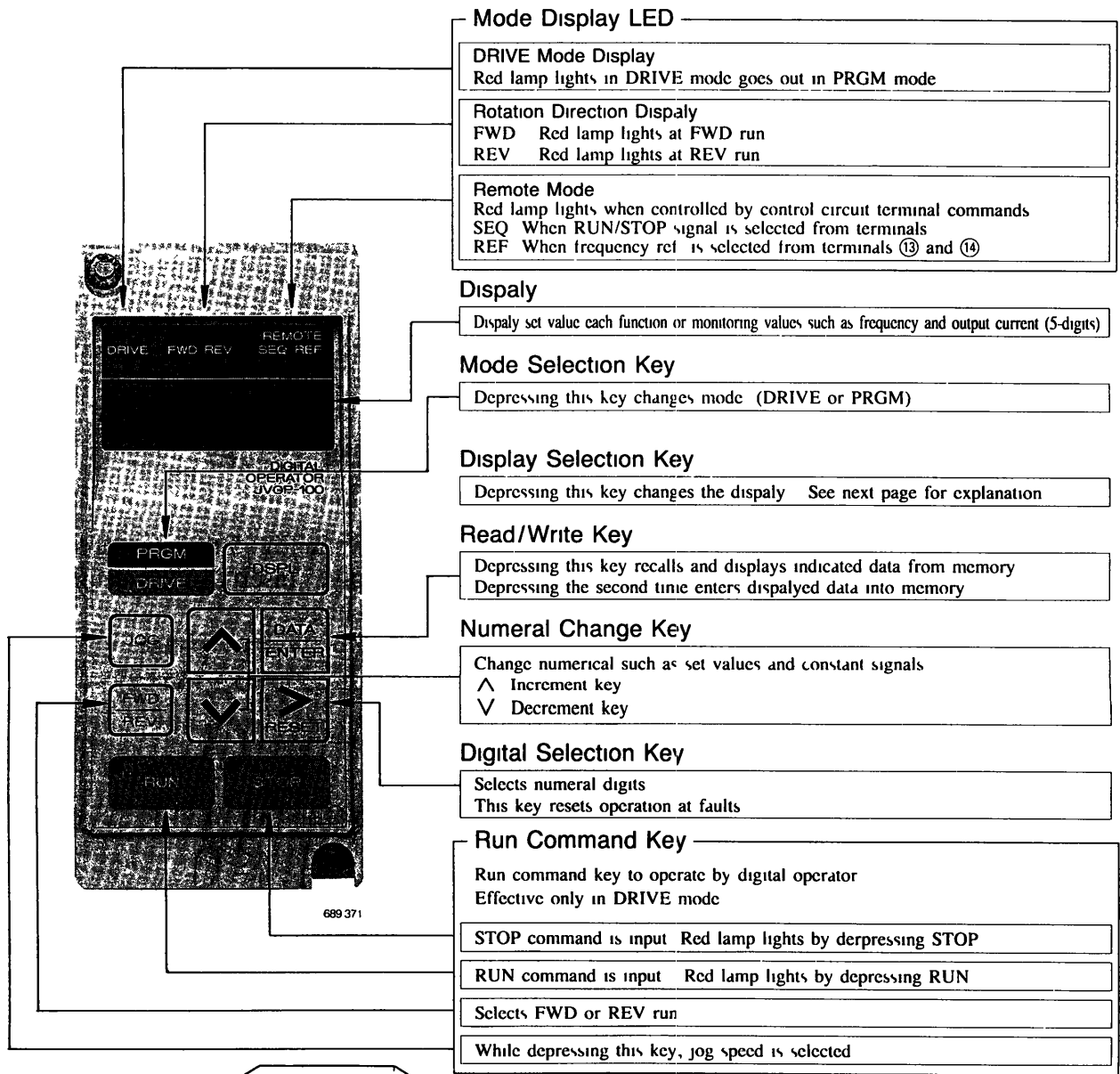


Fig. 5 Selection of Line Voltage

OPERATION

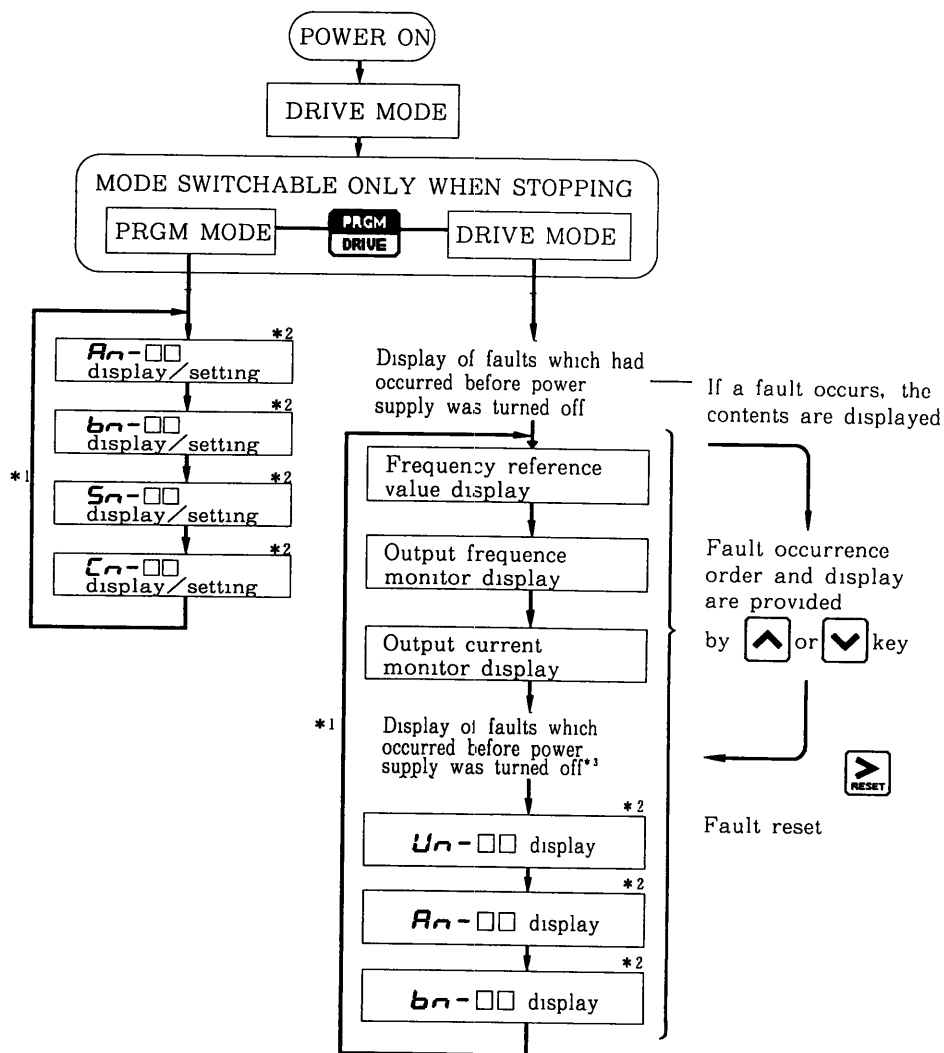
DIGITAL OPERATOR

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  key only when stopped.



RUN or STOP lamp changes in accordance with the following operations

DRIVE MODE AND PRGM MODE



- *1. The constant group to be displayed is changed each time display selection key **DSPL** is depressed.
- *2. For details of constants (An-□□, bn-□□, Cn-□□, Sn-□□, Un-□□), refer to "BASIC CONSTANTS" on page 22
- *3. Faults that occurred in the previous operation are displayed. Even if the power supply is turned OFF at fault occurrence, the constants are stored so that they are displayed after the power supply is turned ON again. (When no fault occurred, fault display of the previous operation is skipped.)

■ DRIVE MODE

Monitor item is changed each time display selection key **DSPL** is depressed. At fault occurrence, the digital operator displays the fault.

Depressing **RESET** key changes to the previous display.

Description	Key Operation	Digital Operator Display	Remarks
Drive mode selected	PRGM DRIVE	LED DRIVE Lights	No display when no fault occurred before power supply was turned OFF
Display of faults which occurred before power supply was turned OFF			
Frequency reference value display/setting	DSPL	F00 00	
Output frequency monitor display	DSPL	0 00	
Output current monitor display	DSPL	0 0A	
Display of faults which occurred before power supply was turned OFF	DSPL	U 1U 1	Example Main circuit undervoltage trip
Un - *	DSPL	Un-0 1	Monitor value is displayed by DATA ENTER Key
An - *	DSPL	An-0 1	
bn - *	DSPL	bn-0 1	

* Check the display data referring to "BASIC CONSTANTS" on page 22

■ PRGM MODE

Monitor item is changed each time **DSPL** key is depressed.

Description	Key Operation	Digital Operator Display	Remarks
PRGM mode selected	PRGM DRIVE	<i>An-01</i>	LED DRIVE OFF
<i>An-</i> *	DSPL	<i>An-01</i>	Date are displayed by DATA ENTER
<i>bn-</i> *	DSPL	<i>bn-01</i>	
<i>sn-</i> *	DSPL	<i>sn-01</i>	
<i>cn-</i> *	DSPL	<i>cn-01</i>	

* Check the display data referring to "BASIC CONSTANTS" on page 22

[Typical Accel Time Setting]

Accel time can be set either in the DRIVE or PRGM mode.

Accel Time Setting	Key Operation	Digital Operator Display	Remarks
• Accel time constant selected	DSPL	<i>bn-01</i>	10 sec preset at factory
• Accel time data display	DATA ENTER	<i>10 0</i>	
• Set 12.5 seconds to accel time	RESET ↑ ↓	<i>12 5</i>	
• Write-in data	DATA ENTER	<i>End</i>	

BASIC CONSTANTS

The constants described here are those required for basic operation.

■ *U_n*- (Monitor Type)

No.	Item	Display	Unit
<i>U_n-01</i>	Frequency reference	120 00	Hz
<i>U_n-02</i>	Output frequency	120 00	Hz
<i>U_n-03</i>	Output current	4 8A	A
<i>U_n-04</i>	Voltage reference	575U	V
<i>U_n-05</i>	DC voltage (V P-N)	P _n 775	V
<i>U_n-06</i>	Output power/("-" displayed at regeneration)	0 75	kW

■ *A_n*- (Frequency Reference)

No	Item	Display	Unit
<i>A_n-01</i>	Master frequency	120 00	Hz
<i>A_n-09</i>	Inching frequency	6 00	Hz

■ *b_n*- (Constant to be Changed during Operation)

No.	Item	Display	Unit
<i>b_n-01</i>	Acceleration time	10 0	sec
<i>b_n-02</i>	Deceleration time	10 0	sec
<i>b_n-11</i>	Frequency meter output gain	1 000	—

■ *S_n*- (System Constant to be Changed at Stopping)

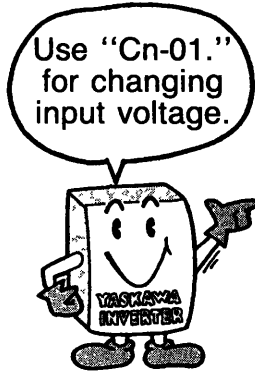
No	Operation Conditions	Data (digits)				Setting prior to Shipment	
		1	2	3	4		
<i>S_n-04</i>	RUN MODE	Master frequency reference. Control terminal 13 or 14 input	—	—	—	0	0011
		Master frequency reference Digital operator (<i>A_n-01</i>)	—	—	—	1	
		Operated by control terminal run command.	—	—	0	—	
		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 <i>b_n-02</i>)	1	1	—	—	

■ *C_n*- (Control Constnat to be Changed at Stopping)

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

INPUT VOLTAGE SET

Set the power supply voltage to be used, by using the digital operator.
The factory set is 575V.

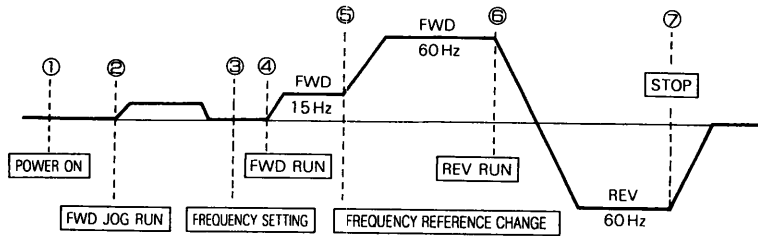


Input Voltage Setting Method	Key Operation	Digital Operator Display	Remarks
POWER ON			
Frequency reference value displayed		F00 00	
Change mode to PRGM	PRGM DRIVE	Pr-01	LED DRIVE OFF
Select Cn-01	DSPL Depress three times	Cn-01	
Data displayed Set to 500V	DATA ENTER	575.0	
Change set value	RESET, ↑, ↓	500 0	
Write-in new set value	DATA ENTER	End	Displayed for 0.5 second
Switch to DRIVE mode	PRGM DRIVE	F00 00	LED DRIVE lights

DIGITAL OPERATOR OPERATION

The following diagram describes typical digital operator operation in the pattern shown below.

■ OPERATION PATTERN



■ TYPICAL OPERATION

Description	Key operation	Digital Operator Display	Remarks
<p>① POWER ON</p> <ul style="list-style-type: none"> Frequency reference value is displayed 		F00 00	
<p>② FWD JOG RUN</p> <p>6 Hz</p> <ul style="list-style-type: none"> Select output frequency monitor display Check rotation direction (FWD at power ON) 	DSPL	0 00	LED FWD lights
<p>② FWD JOG RUN</p> <p>6 Hz</p> <ul style="list-style-type: none"> Jog run operation (Moving while key depressed) 	JOG	6 00	
Cont'd			

Description	Key Operation	Digital Operator Display	Remarks
Cont'd			
<p>③ Frequency setting</p> <p>15 Hz</p> <ul style="list-style-type: none"> Select frequency reference value display Change reference setting Write-in set value Stop blinking for 2 seconds Select output frequency monitor display 	<p>DSPL</p> <p>Depress three times</p> <p>> (RESET) ▲ ▼</p> <p>DATA ENTER</p> <p>DSPL</p>	<p>F00 00</p> <p>F 15 00</p> <p>F 15 00</p> <p>0 00</p>	<p>Stop blinking for 2 second</p>
<p>④ FWD run</p> <p>15 Hz</p> <ul style="list-style-type: none"> FWD run operation 	<p>● RUN</p>	<p>15 00</p>	<p>LED ● RUN lights</p>
<p>⑤ Frequency set value change</p> <p>60 Hz</p> <ul style="list-style-type: none"> Select frequency reference Change set value Write-in set value Stop blinking for 2 seconds Select output frequency monitor display 	<p>DSPL</p> <p>Depress six times</p> <p>> (RESET) ▲ ▼</p> <p>DATA ENTER</p> <p>DSPL</p>	<p>F 15 00</p> <p>F60 00</p> <p>F60 00</p> <p>60 00</p>	<p>FWD run (60Hz)</p> <p>Stop blinking for 2 second</p>
<p>⑥ REV run</p> <p>60 Hz</p> <ul style="list-style-type: none"> Switch to REV run 	<p>FWD REV</p>	<p>-60 00</p>	<p>REV run (60Hz)</p> <p>LED REV lights</p>
<p>⑦ Stop</p> <ul style="list-style-type: none"> Deceleration to a stop 	<p>● STOP</p>	<p>0 00</p>	<p>LED ● STOP lights</p> <p>(LED ● RUN blinks during deceleration)</p>

CONTROL TERMINAL SIGNAL OPERATION

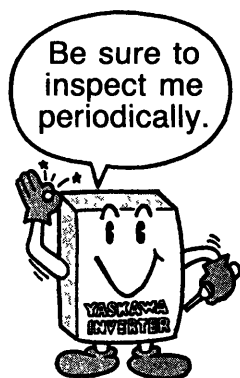
Let's operate your machine using Control Terminal signal.



Description	Key Operation	Digital Operator Display	Remarks
<p>POWER ON</p> <ul style="list-style-type: none"> Frequency reference value displayed Select PRGM mode 	<p>PRGM DRIVE</p>	<p>F00 00</p> <p>Rn-01</p>	<p>LED DRIVE OFF</p>
<p>OPERATION CONDITIONS SET</p> <ul style="list-style-type: none"> Sr-01 displayed Set Sr-04 Data display Set data to 0000 	<p>DSPL</p> <p>Depress twice</p> <p>> ^ v</p> <p>DATA ENTER</p> <p>> ^ v</p>	<p>Sr-01</p> <p>0r-04</p> <p>00 11</p> <p>0000</p>	
<p>SET VALUE WRITE-IN</p> <ul style="list-style-type: none"> Check for "End" display (Operation by control terminal signal enables) 	<p>DATA ENTER</p>	<p>End</p>	<p>Displayed for 0.5 second</p>
<p>DRIVE MODE SELECTION</p> <ul style="list-style-type: none"> Change to DRIVE mode 	<p>PRGM DRIVE</p>	<p>F00 00</p>	<p>LED DRIVE ON</p>
<p>FREQUENCY SET</p> <ul style="list-style-type: none"> Input and check for frequency value of control terminal 13 or 14 		<p>F60 00</p>	
<p>OUTPUT FREQUENCY DISPLAY</p> <ul style="list-style-type: none"> Change to output frequency display 	<p>DSPL</p>	<p>0 00</p>	
<p>OPERATION CHECK</p> <ul style="list-style-type: none"> Closed/open among terminals 1 to 11 with terminals 7 to 11 closed to perform jog operation 		<p>6 00</p>	<p>LED run lights</p>
<p>RUN</p> <ul style="list-style-type: none"> After checking for normal operation, close among control terminals 1 and 11 to perform FWD run 		<p>60 00</p>	<p>Increased to 60 Hz</p> <p>LED run lights</p>
<p>STOP</p> <ul style="list-style-type: none"> Open among control terminals 1 to 11 to stop 		<p>0 00</p>	<p>Decreased to 0 Hz</p> <p>LED stop lights</p> <p>(LED run blinks during deceleration)</p>

MAINTENANCE

PERIODIC INSPECTION



VS-616G3 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 5 as your inspection guide. Before servicing, turn off AC main circuit power and be sure that CHARGE lamp is OFF.

Table 5 Periodical Inspection

Component	Check	Corrective Action
External terminals, unit mounting bolts, connectors, etc.	Loose screws	Tighten
	Loose connectors	Tighten
Cooling fins	Build-up of dust and dirt	Blow with dry compressed air of 39.2×10^5 to 58.8×10^5 Pa (57 to 85 psi.) pressure
Printed circuit board	Accumulation of conductive dust or oil	Blow with dry compressed air of 39.2×10^5 to 58.8×10^5 Pa (57 to 85 psi) pressure. 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 dry compressed air of 39.2×10^5 to 58.8×10^5 Pa (57 to 85 psi) pressure
Smoothing capacitor	Discoloration or odor	Replace the capacitor or inverter unit

Note: Operating conditions as follows.

- Ambient temperature : 30°C (86°F)/yearly average
- 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 your Yaskawa representative: Parts Name, Parts Code No. and Quantity.

Table 6 Spare Parts for 575V Class

VS-616G3 Model CIMR	Parts Name Specifications	Control PC	Gate	Main	Main	Fuse	Cooling	Digital
		Board	Driver	Circuit Transistor	Circuit Diode		Fan	Operator
G3□51P5	Model	—	—	CM15TF-24H	30U6P42	100USH20	4710NL-05W-B40	JVOP-100
	Code	ETC61318□-S□□□□	ETP6U350□	STR001026	SID000503	FU002009	FAN000137	CDR000070
	Q'ty	1	1	1	1	1	1	1
G3□52P2	Model	—	—	CM15TF-24H	30U6P42	100USH20	4710NL-05W-B40	JVOP-100
	Code	ETC61318□-S□□□□	ETP6U350□	STR001026	SID000503	FU002009	FAN000137	CDR000070
	Q'ty	1	1	1	1	1	1	1
G3□53P7	Model	—	—	CM10DY-28H	30U6P42	100USH30	4710NL-05W-B40	JVOP-100
	Code	ETC61318□-S□□□□	ETP6U351□	STR001027	SID000503	FU002010	FAN000137	CDR000070
	Q'ty	1	1	3	1	1	1	1
G3□55P5	Model	—	—	CM10DY-28H	30U6P42	100USH30	4710NL-05W-B40	JVOP-100
	Code	ETC61318□-S□□□□	ETP6U351□	STR001027	SID000503	FU002010	FAN000137	CDR000070
	Q'ty	1	1	3	1	1	1	1
G3□57P5	Model	—	—	CM10DY-28H	30U6P42	100USH30	4710NL-05W-B40	JVOP-100
	Code	ETC61318□-S□□□□	ETP6U352□	STR001027	SID000503	FU002010	FAN000137	CDR000070
	Q'ty	1	1	3	1	1	1	1
G3□5011	Model	—	—	CM50DY-28	30U6P42	A100P35	4715PS-22T-B30	JVOP-100
	Code	ETC61318□-S□□□□	ETC61321□	STR000388	SID000503	FU000873	FAN000130	CDR000070
	Q'ty	1	1	3	1	1	1	1
G3□5015	Model	—	—	CM100DY-28	75U6P43	A100P50	5915PC-22T-B30	JVOP-100
	Code	ETC61318□-S□□□□	ETC61322□	STR000389	SID000504	FU000874	FAN000131	CDR000070
	Q'ty	1	1	3	1	1	1	1
G3□5018	Model	—	—	CM100DY-28	75U6P43	A100P50	5915PC-22T-B30	JVOP-100
	Code	ETC61318□-S□□□□	ETC61322□	STR000389	SID000504	FU000874	FAN000131	CDR000070
	Q'ty	1	1	3	1	1	1	1
G3□5022	Model	—	—	CM100DY-28	75U6P43	A100P50	5915PC-22T-B30	JVOP-100
	Q'ty	ETC61318□-S□□□□	ETC61322□	STR000389	SID000504	FU000874	FAN000131	CDR000070
	Code	1	1	3	1	1	1	1
G3□5030	Model	—	—	CM200HA-28	110U2G43	A100P100	THA1V-U7556MX-TP	JVOP-100
	Q'ty	ETC61320□-S□□□□	ETC61323□	STR000390	SID000505	FU000875	FAN000191	CDR000070
	Code	1	1	6	3	1	2	1
G3□5037	Model	—	—	CM200HA-28	110U2G43	A100P100	THA1V-U7556MX-TP	JVOP-100
	Q'ty	ETC61320□-S□□□□	ETC61323□	STR000390	SID000505	FU000875	FAN000191	CDR000070
	Code	1	1	6	3	1	2	1
G3□5045	Model	—	—	CM200HA-28	110U2G43	A100P100	THA1V-U7556MX-TP	JVOP-100
	Q'ty	ETC61320□-S□□□□	ETC61323□	STR000390	SID000505	FU000875	FAN000191	CDR000070
	Code	1	1	6	3	1	2	1
G3□5055	Model	—	—	CM300HA-28	110U2G43	A100P150	THA1V-U7556MX-TP	JVOP-100
	Q'ty	ETC61320□-S□□□□	ETC61323□	STR000391	SID000505	FU000876	FAN000191	CDR000070
	Code	1	1	6	3	1	2	1
G3□5075	Model	—	—	CM300HA-28	110U2G43	A100P150	THA1V-U7556MX-TP	JVOP-100
	Q'ty	ETC61320□-S□□□□	ETC61323□	STR000391	SID000505	FU000876	FAN000191	CDR000070
	Code	1	1	6	3	1	2	1

Table 6 Spare Parts for 575V Class (Cont'd)

VS-616G3 Model CIMR	Parts Name Specifications	Control PC	Gate	Gate	Main	Main	Fuse	Cooling	Digital
		Board	Driver	Driver Sub Board	Circuit Transistor	Circuit Diode		Fan	Operator
G3□5090	Model	—	—	—	CM200HA-28 (2P)	160U2G43	A100P200	THA1V-U7556MX	JVOP-100
	Code	ETC61320□S□□□□	ETC61324□	ETC61608□	STR000460	SID000508	FU000877	FAN000191	CDR000070
	Q'ty	1	1	1	12	6	1	2	1
G3□5110	Model	—	—	—	CM300HA-28 (2P)	160U2G43	A100P300	THA1V-U7556MX	JVOP-100
	Code	ETC61320□S□□□□	ETC61324□	ETC61609□	STR000461	SID000508	FU000878	FAN000191	CDR000070
	Q'ty	1	1	1	12	9	1	2	1
G3□5160	Model	—	—	—	CM400HA-28 (2P)	160U2G43	A100P350	THA1V-U7556MX	JVOP-100
	Code	ETC61320□S□□□□	ETC61324□	ETC61609□	STR000461	SID000508	FU002003	FAN000191	CDR000070
	Q'ty	1	1	1	12	9	1	2	1

Notes

- 1 It is recommended the whole proper unit be replaced for the part's faults in □□□□ area
- 2 The above spare parts for models with revision mark "F" and beyond in SPEC column of nameplate data

Standard Parts Replacement

Item Name	Replacement Cycle	Remarks
Cooling Fan	2 or 3 years	Replace with a new product
Smoothing Capacitor	5 years	Replace with a new product (Determine after examination)
Circuit Breakers and Relays	—	Determine after examination
Fuse	10 years	Replace with a new product
Aluminum Capacitor on PC Board	5 years	Replace with a new product (Determine after examination)

Note Operating as follows

- Ambient temperature Yearly average 30°C, 86°F
- Load factor 80% or less
- Operating time 20 hours or less per day

FAULT DISPLAY

As Table 7 shows, the faults that the VS-616G3 detects are classified into troubles and alarms. If a problem occurs, the fault contact is output and the motor coasts to a stop. When an alarm is issued, the digital operator indicates the alarm for warning.

Table 7 Fault Display and Details

Indication	Fault Display	Description	Corrective Action
<i>UU1</i>	Undervoltage (PUV)	DC main circuit becomes low voltage during operation Detection level Approx 546VDC and below	<ul style="list-style-type: none"> • Check wiring of line units (at power supply side) • Correct power supply voltage
<i>UU2</i>	Undervoltage (CUV)	Control circuit becomes low voltage during operation	
<i>UU3</i>	Undervoltage (MC-ANS fault)	Main circuit magnetic contactor does not operate correctly	
<i>GF</i>	Grounding	Grounding current > approx 50% of inverter rated current	<ul style="list-style-type: none"> • Check that motor insulation not deteriorated • Check that there is no damage to wiring at load side
<i>oC</i>	Overcurrent	Inv output current > 200% of Inv rated current	<ul style="list-style-type: none"> • Check the motor winding resistance and ground • Increase accel time
<i>ou</i>	Overvoltage	Detection level Approx 1040V [(Cn-01) > 500V] Approx 910V [(Cn-01) ≤ 500V]	Increase decel time and/or add braking resistor
<i>FU</i>	Fuse blown	—	Check short-circuit at load, ground fault etc
<i>oH</i>	Radiation fin overheated	Fin temperature 90°C (194°F)	Check fan or ambient temperature (less than 45°C, 113°F)
<i>oL1</i>	Overload	Protect the motor	Measure motor temperature-rise and reduce load, then reset V/f
<i>oL2</i>	Overload	Protect the inverter	Reduce load, and increase accel time, then reset V/f
<i>oL3</i>	Overtorque	When selecting inv output OFF at “inv output current > over-torque detection level” and over-torque detection	—
<i>rr</i>	Regenerative transistor fault	—	Replace transistor
<i>rH</i>	Braking resistor overheated	Protect braking resistor incorporated in inverter unit	Reduce regenerative load, or use other resistor unit separately installed
<i>FRn</i>	Cooling fan fault	Cooling fan stops during operation	Replace cooling fan
<i>EF3</i>	Control circuit terminal ③ fault	Stop mode selection possible	Check state of input terminal with data <i>Un-07</i> (Replace inverter if “;” is indicated as the state of open terminal)
<i>EF5</i>	Control circuit terminal ⑤ fault		
<i>EF6</i>	Control circuit terminal ⑥ fault		
<i>EF7</i>	Control circuit terminal ⑦ fault		
<i>EF8</i>	Control circuit terminal ⑧ fault		

Table 7 Fault Display and Details (Cont'd)

Indication	Fault Display	Description	Corrective Action
<i>bUS</i>	Communication inverter card (option) communication error	Stop mode selection possible	Check communication cable between communication interface card (SI-B) and master controller
<i>CPF00</i>	Operator communication error	Communication between G3 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 • Check wiring of control board
<i>CPF01</i>	Operator communication error	Communication error occurs for 2 seconds after communication between G3 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
<i>CPF02</i>	Control circuit fault	Inverter fault	• Replace control PC board
<i>CPF03</i>	NV-RAM (S-RAM) fault		
<i>CPF04</i>	NV-RAM (BCC, Access Code) fault		
<i>CPF05</i>	A/D converter fault in CPU		
<i>CPF06</i>	Optional connection fault	—	• Check and secure the option card connector
<i>CPF20</i>	Fault of A/D converter built in analog speed reference card (option)	Option card fault	Replace option card
<i>CPF21</i>	Self-analysis fault of CP-213 communication interface card (option)		
<i>CPF22</i>	Model code fault of CP-213 communication interface card (option)		
<i>CPF23</i>	Mutual analysis fault of CP-213 communication interface card (option)		

CAUTION

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

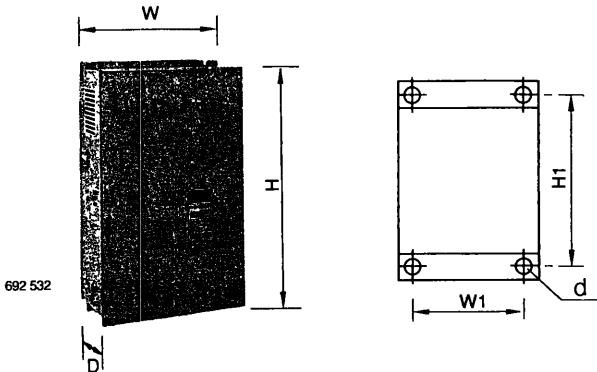
APPENDIX A

SPECIFICATIONS

Inverter Model CIMR-G3□□		500 to 600V																
		51P5	52P2	53P7	55P5	57P5	5011	5015	5018	5022	5030	5037	5045	5055	5075	5090	5110	5160
Max Applicable Motor Output HP (kW)*1	Constant Torque Ratings	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)	75 (55)	100 (75)	125 (90)	150 (110)	200 (160)
	Variable Torque Ratings	3 (2.2)	3 (2.2)	5 (3.7)	10 (7.5)	10 (7.5)	15 (11)	20 (15)	25 (18.5)	30 (22)	40 (30)	50 (37)	60 (45)	75 (55)	100 (75)	150 (110)	200 (160)	200 (160)
Output Characteristics	Inverter Capacity kVA	2	3	5	7.5	10	15	20	25	30	40	50	60	75	100	125	150	200
	Rated Output Current (Constant Torque Ratings) A	3.5	4.1	6.3	9.8	12.5	17	22	27	32	41	52	62	77	99	130	172	200
	Max Continuous Output Current*2 (Variable Torque Ratings) A	3.9	4.6	7.0	11.0	14.0	19	25	30	36	46	58	69	86	111	145	192	224
	Max Output Voltage	3-Phase, 500/575V (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, 500/575/600V, 50/60Hz																
	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 0.01Hz for 100Hz or below / 0.1Hz for 100Hz and above Analog reference 0.06Hz/60 Hz																
	Output Frequency Resolution	0.01 Hz (1/30000)																
	Overload Capacity	150% constant torque rating current for 1 minute / 110% variable torque rating current for 1 minute																
	Frequency Setting Signal	0 to 10 VDC (20 kΩ), 4-20 mA (250 Ω)																
	Accel/Decel Time	0.1 to 6000 sec (Accel/Decel time setting independently)																
	Braking Torque	Approx 20%																
	No. of V/f Patterns	15 types of V/f pattern selection and arbitrary program V/f pattern setting enabled <div style="display: flex; justify-content: space-around; border-left: 1px solid black; border-right: 1px solid black; padding: 0 5px;"> 4 For general purpose 4 For high starting torque 4 For fans and pumps 3 For machine tools </div>																
Protective Functions	Motor Overload Protection	Electric thermal overload relay																
	Instantaneous Overcurrent	Motor coasts to a stop at approx 200% of inverter rated current																
	Blown Fuse Protection	Motor coasts to a stop by blown-fuse																
	Overload	Motor coasts to a stop after 1 minute at 150% / Motor coasts to a stop after 1 minute at 110% variable torque rating current.																
	Overvoltage	Motor coasts to a stop if converter output voltage exceeds 1040V. (approx 910V) *3																
	Undervoltage	Motor coasts to a stop if converter output voltage drops to 546V 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.) *6 Setting made before shipment																
	Fin Overheat	Thermostat																
	Cooling Fan Fault	Fan sensor																
	Stall Prevention	Stall prevention at accel/dec 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		+14 to +104°F (-10 to +40°C) (Enclosed type, totally-enclosed type) +14 to +122°F (-10 to +50°C) *4 (Open chassis type) (not frozen)																
Storage Temperature*5		-4 to 140°F (-20 to +60°C)																
Humidity		90% RH (non - condensing)																
Vibration		9.81m/s² (1G) less than 20Hz, up to 1.96m/s² (0.2G) at 20 to 50Hz																

*1 YASKAWA standard 4-pole motor is used to determine max applicable motor output
 *2 Allowable values for the applications not required overload
 *3 Approx 910V when input voltage set value (Cn-01) is less than 500 0V, Approx 1040V when it exceeds 500 0V
 *4 Up to 122°F (50°C) allowed when front cover is removed (open chassis type)
 *5 Temperature during shipping (for short period)
 Note: The above specifications for models with revision mark "F" and beyond in SPEC column of nameplate data

APPENDIX B
DIMENSIONS in inch (mm)



Voltage V	Motor Capacity HP (kW)	VS-616G3						Mass lb (kg)
		Enclosed Type						
		W	H	D	W1	H1	Mtg Hole d	
500 to 600	2 (1.5)	8.05 (204.5)	13.94 (354)	6.50 (165)	7.09 (180)	13.19 (335)	M6	15 (7)
	3 (2.2)							
	5 (3.7)							
	7.5 (5.5)	8.05 (204.5)	13.94 (354)	7.87 (200)	7.09 (180)	13.19 (335)	M6	22 (10)
	10 (7.5)							
	15 (11)	12.80 (325)	23.62 (600)	10.83 (275)	9.84 (250)	23.03 (585)	M6	77 (35)
	20 (15)							
	25 (18.5)	15.75 (400)	29.53 (750)	11.22 (285)	11.81 (300)	28.74 (730)	M8	99 (45)
	30 (22)							
	40 (30)							
	50 (37)	22.64 (575)	33.46 (850)	11.81 (300)	18.70 (475)	32.48 (825)	M10	159 (72)
	60 (45)							
	75 (55)	22.64 (575)	41.34 (1050)	12.80 (325)	18.70 (475)	40.35 (1025)	M10	205 (93)
	100 (75)		41.97 (1066)					
	125* (90)	22.64 (575)	49.21 (1250)	12.99 (330)	18.70 (475)	48.23 (1225)	M10	265 (120)
150* (110)	22.64 (575)	62.99 (1600)	13.98 (355)	18.70 (475)	61.81 (1570)	M12	331 (150)	
200* (160)								

*Only for open chassis type
 Note For detailed dimensions, contact your YASKAWA representative
 The above dimensions for models with revision mark "F" and beyond in SPEC column of nameplate data

APPENDIX C

V/f PATTERN (Sn-02)

The following V/f patterns can be selected by Sn-02. Set inverter input voltage to Cn-01 before V/f pattern selection.

- Sn-02 data ① to ⑤ : Impossible to change
- Sn-02 data ⑥ : Possible to set freely (The following shows the data after initialization.)

■ 2HP (1.5kW) to 60HP (45kW) V/f PATTERN SELECTION (575V Class)

Application	Specification	Sn-02	V/f Pattern ^(Note 1)	Application	Specification	Sn-02	V/f Pattern ^(Note 1)		
General Purpose	50Hz	①		High Starting Torque ^(Note 2)	50Hz	⑧			
								60Hz	60Hz Saturation
	50Hz Saturation	②	60Hz		High Starting Torque	⑩			
	72Hz	③				90Hz		④	
			Variable Torque Operation (Fans and Pumps)				50Hz		
	Variable Torque 2	⑤			180Hz	⑥			
60Hz	Variable Torque 1	⑥		120Hz			⑥		
	Variable Torque 2	⑦			180Hz	⑦			

- Notes
- 1 Consider the following points as V/f pattern selecting conditions
 - (1) Select a pattern in accordance with the motor voltage-frequency characteristics
 - (2) Select a pattern in accordance with the motor maximum r/min
 - 2 High starting torque must be selected only in the following cases
 - (1) Wiring distance is long (approx 492ft 150m or more)
 - (2) Voltage drop at starting is large
 - (3) AC reactor is inserted in inverter input or output
 - (4) Motor smaller than the maximum applicable motor is operated

■ 75HP (55kW) to 200HP (160kW) V/f PATTERN SELECTION (575V Class)

Application	Specification	Sn-02	V/f Pattern ^(Note 1)	Application	Specification	Sn-02	V/f Pattern ^(Note 1)		
General Purpose	50Hz	①		High Starting Torque ^(Note 2)	50Hz	Low Starting Torque ⑧			
								60Hz	60Hz Saturation ① ②
	60Hz	50Hz Saturation ②	①			60Hz	High Starting Torque ⑩		
								72Hz	③
	Variable Torque Operation (Fans and Pumps)	50Hz	④			Constant HP Operation (Machine Tools)	120Hz		
								60Hz	Variable Torque 1 ⑥
60Hz		Variable Torque 2 ⑦	⑥		180Hz		⑥		
								60Hz	Variable Torque 1 ⑦

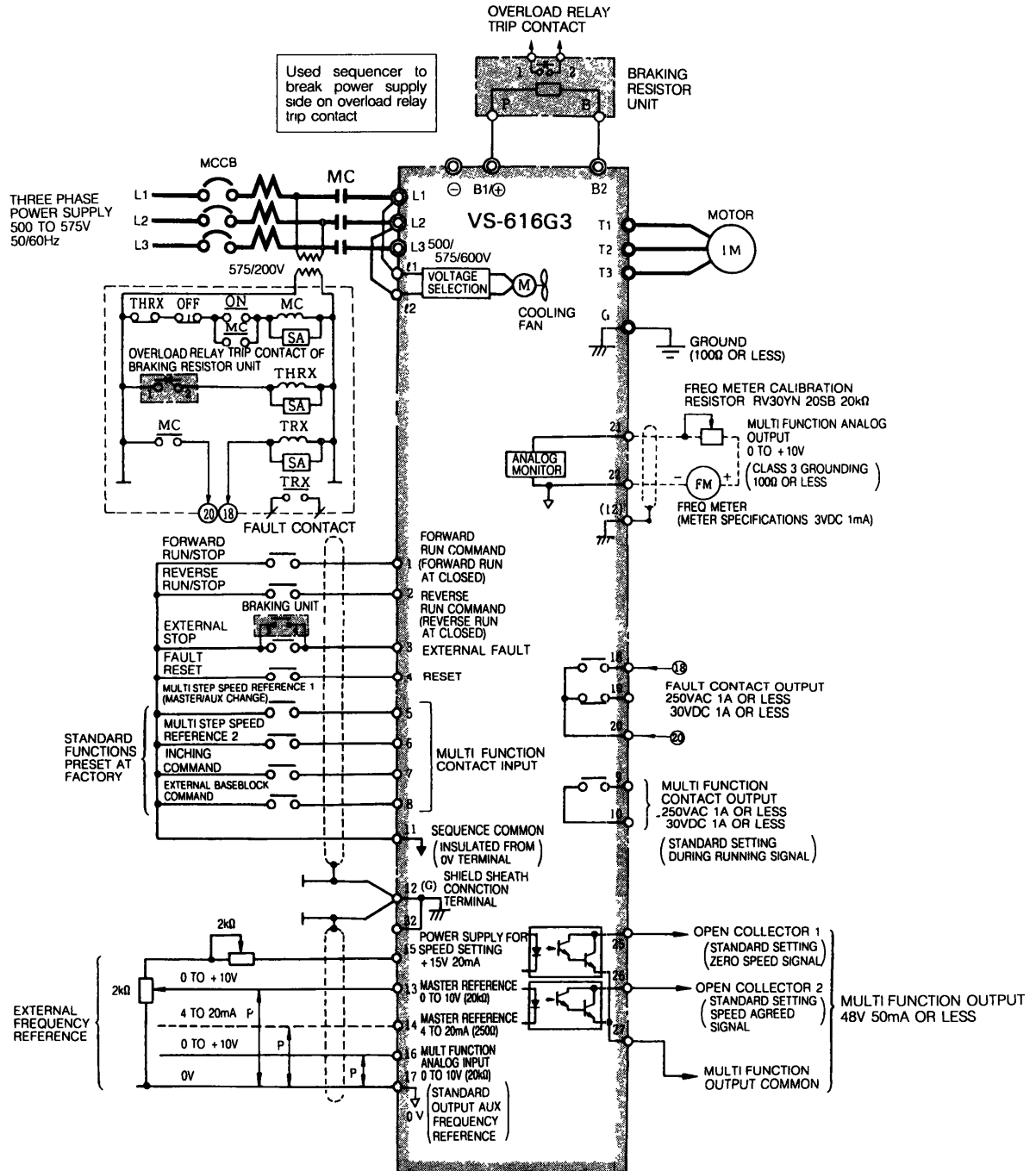
- Notes
- 1 Consider the following points as V/f pattern selecting conditions
 - (1) Select a pattern in accordance with the motor voltage-frequency characteristics
 - (2) Select a pattern in accordance with the motor maximum r/min
 - 2 High starting torque must be selected only in the following cases
 - (1) Wiring distance is long (approx 492ft 150m or more)
 - (2) Voltage drop at starting is large
 - (3) AC reactor is inserted in inverter input or output
 - (4) Motor smaller than the maximum applicable motor is operated

APPENDIX D

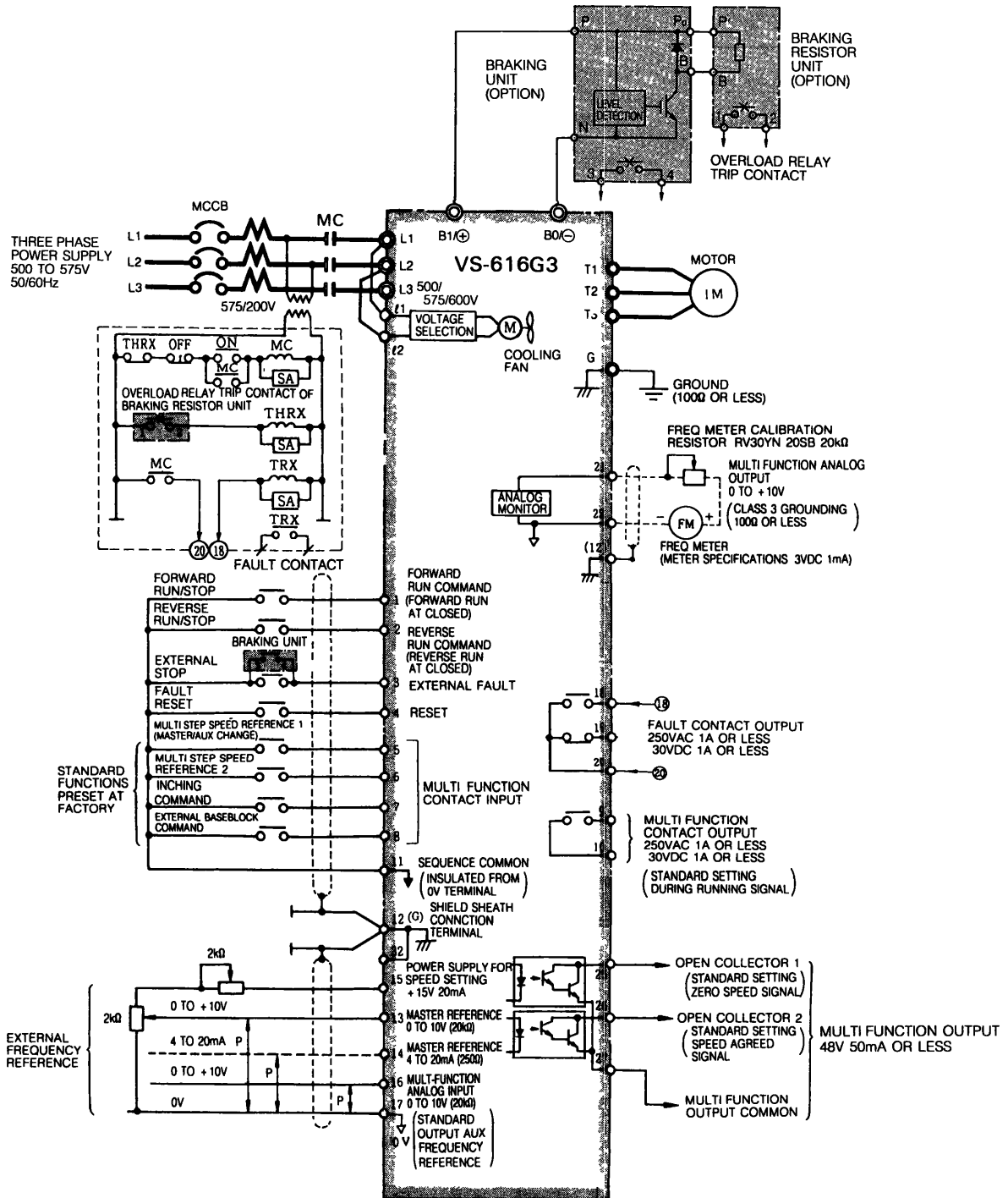
TYPICAL CONNECTION DIAGRAM

(1) Braking Unit

For Models CIMR-G3[]5011 to -G3[]5022
(575V Class, 15 to 30HP, 11 to 22kW)



(2) Braking Unit and Braking Resistor Unit
 For Models CIMR-G3[]5030 to -G3[]5160
 (575V Class, 40 to 200HP, 30 to 160kW)



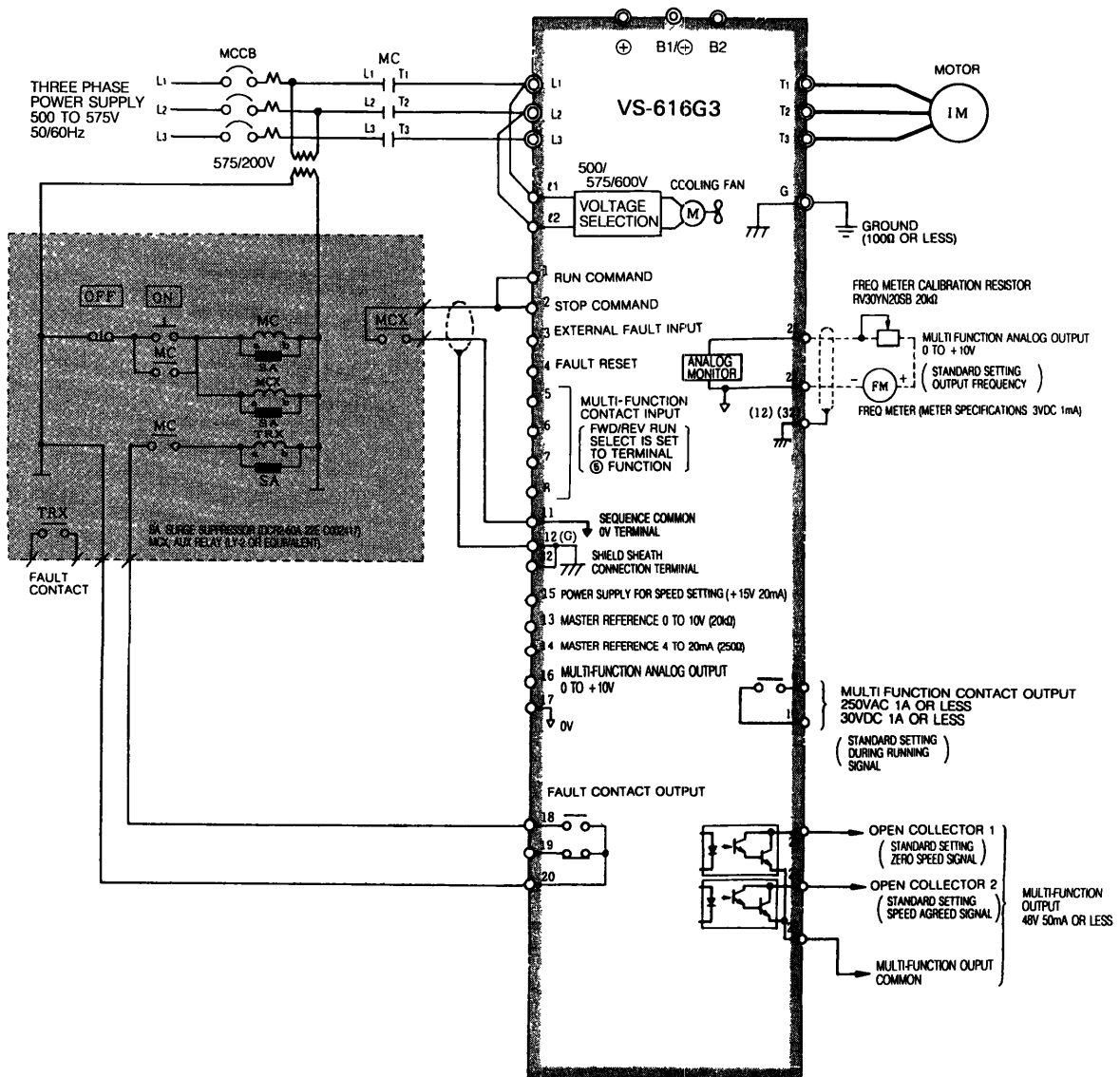
(3) Run/Stop by Main Circuit Magnetic Contactor

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	-	1	0	0

* Frequency reference setting
 0 Set by frequency setting resistor
 1 Digital operator set value (An-01)



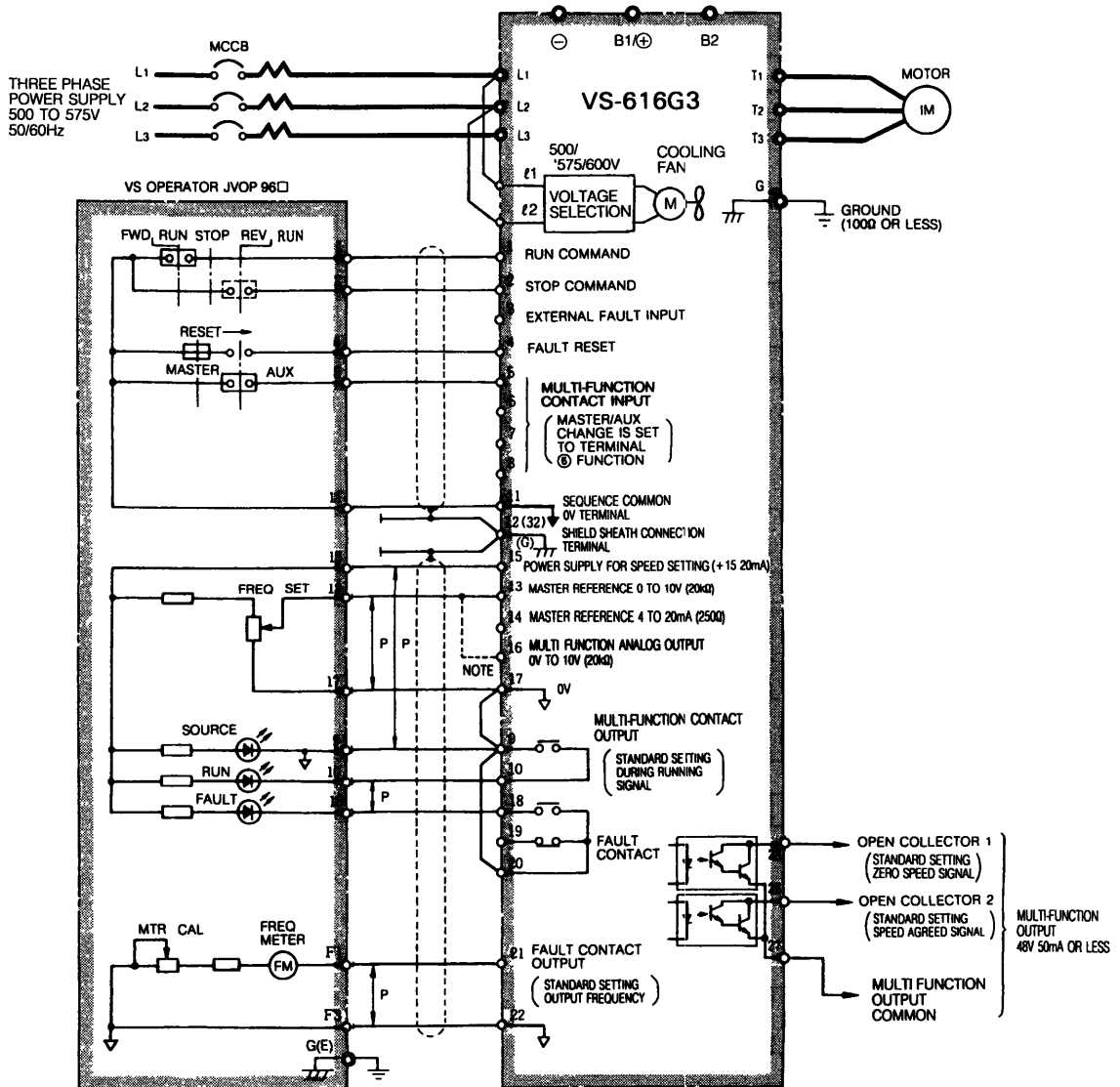
- Notes.
- 1 Braking is not activated at deceleration stop. It coasts to a stop.
 - 2 Use MC or MCX of delay release type for restart operation after momentary power loss.
 - 3 Frequency setting resistor is not required for the use of digital operator's set value as frequency reference.

(4) With VS Operator Models JVOP - 95

System Constant Setting

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

* Connect to control circuit terminal 13 or 16 according to the application. For terminal 16, set Sn-19 = x x 00



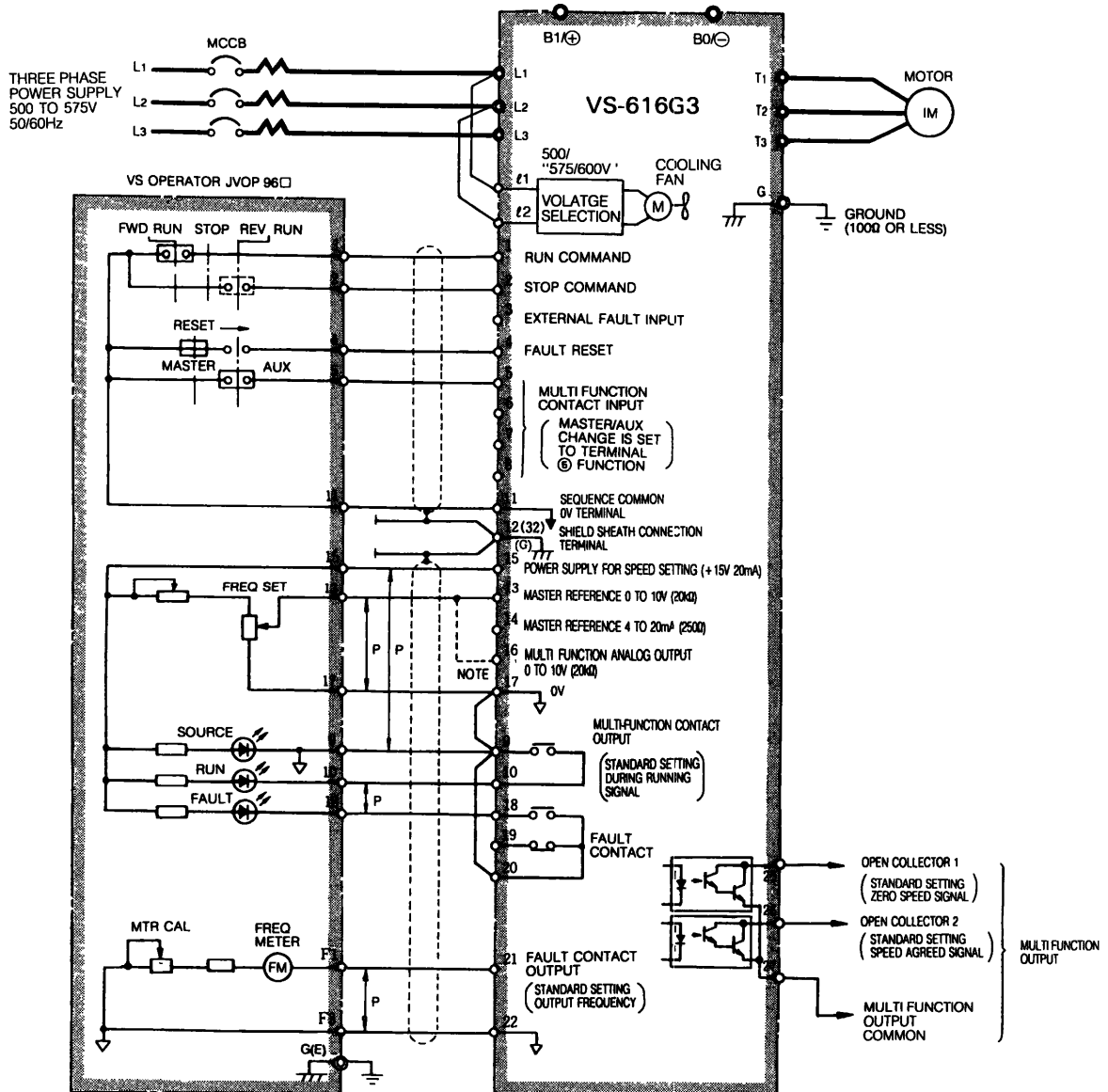
TYPICAL CONNECTION DIAGRAM

(5) With VS Operator Models JVOP - 96 • □

System Constant Setting

System Constant No	Data			
	4th digit	3rd digit	2nd digit	1st digit
<i>S_n-04</i>	—	—	0	0
<i>S_n-05</i>	0	—	0	—
<i>S_n-15</i>	—	—	0	3
<i>S_n-19</i>	—	—	0	0*
<i>S_n-20</i>	—	—	0	0

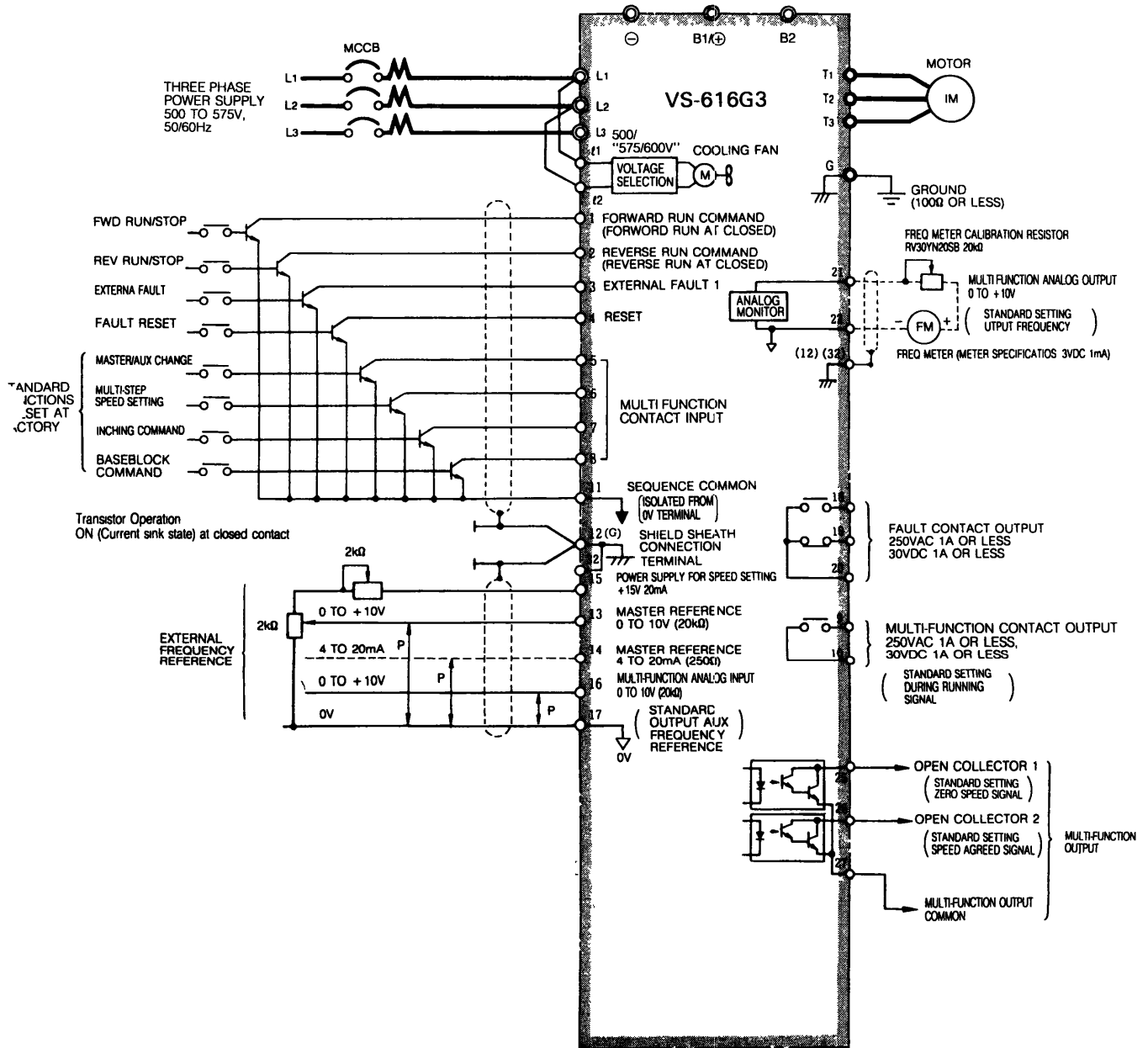
* Connect to control circuit terminal 13 or 16 according to the application For terminal 16, set Sn-19 = × × 00



(6) With Transistor Open Collector for Operation Signal

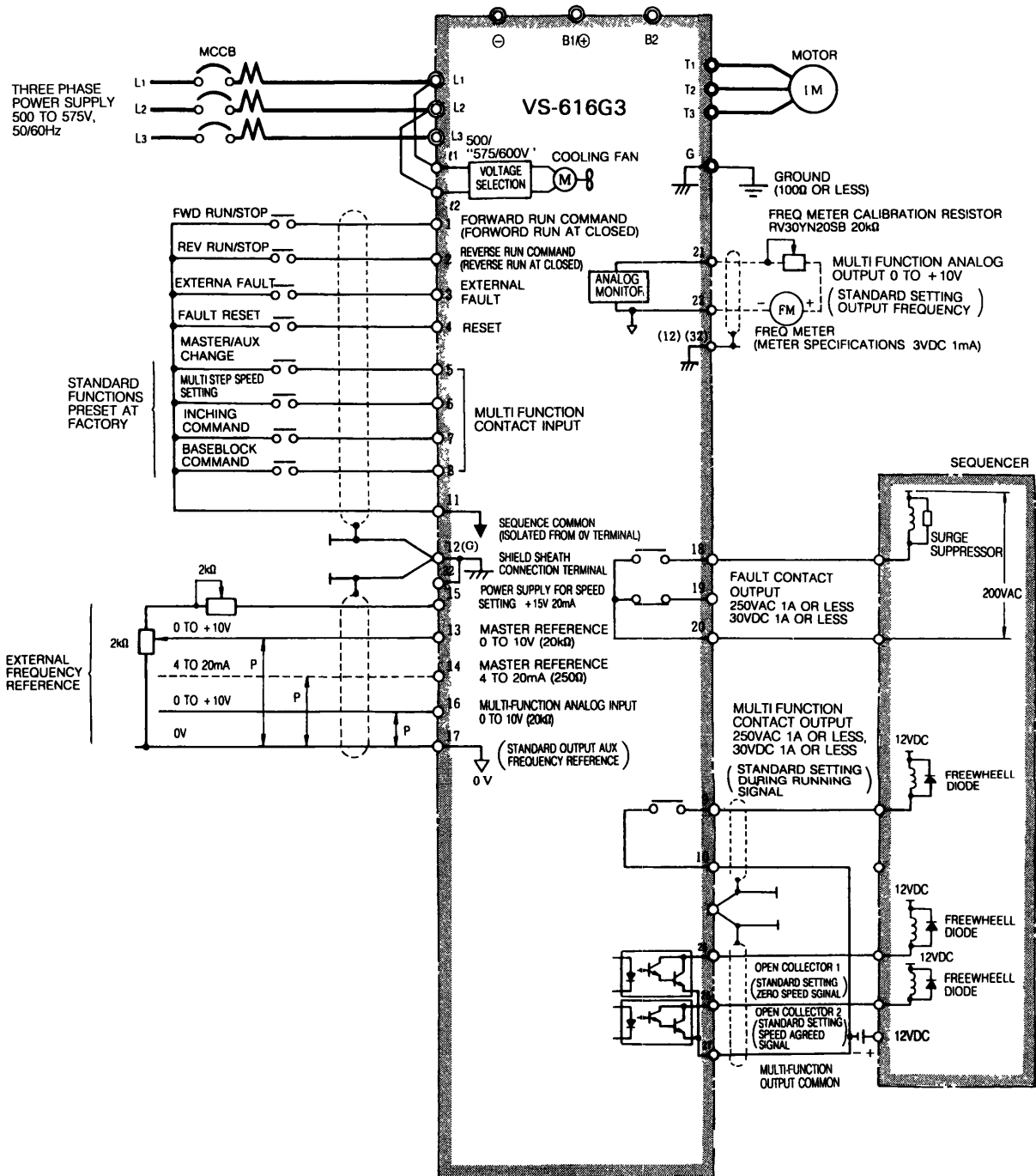
System Constant Setting

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



TYPICAL CONNECTION DIAGRAM

(7) With Contact Output, Photo-coupler Output



APPENDIX E

OPTION

(1) OPTION CARDS

(Except digital output card DO-08, there terminals are to be connected only class 2 circuits)

	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)	TOE-C736-30.13
	Analog Speed Reference Card AI-14B	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)	TOE-C736-30.14
	Digital Speed Reference Card DI-08	73600-C003X	Permits setting an 8-bit digital speed reference <ul style="list-style-type: none"> • Input signal Binary 16 bits/BCD 2 digits + Sign • Input voltage +24V (isolated) • Input current. 8mA 	Attach the card at 2CN on the control circuit board (See Note 1)	TOE-C736-30 15
	Digital Speed Reference Card DI-16G	73600-C011X	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 (isolated) • Input current 8mA/point } Supplied by external device	Attach the card at 2CN on the control circuit board (See Note 1)	—
Communication Interface Card SI-B		73600-C006X	Permits operation or constant setting by command from master controller. <ul style="list-style-type: none"> • Communication method Synchronous • Communication speed 19 2kBPS (up to 136 5kBPS possible) • Interface RS-232, RS-422, RS-485 	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 isolated) • Output channel 2 channels 	Attach the card at 3CN on the control circuit board (See Note 2)	TOE-C736-30.21
	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 isolated) • Outut channel: 2 channels 	Attach the card at 3CN on the control circuit board. (See Note 2)	TOE-C736-30.22
	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% (isolated) • Output current 20mA max 	Attach the card at 3CN on the control circuit board (See Note 2)	TOE-C736-30.23
	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)	TOE-C736-30 24

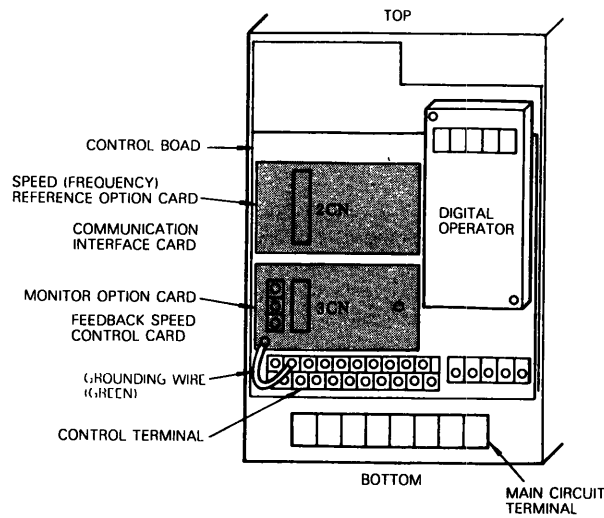
- Notes 1 Only one of the speed (frequency) reference option cards or communication interface cards can be attached at 2CN
 2 Only one of the monitor option cards or feedback speed control cards can be attached at 3CN
 3 When a communication interface card is attached at 2CN, no option card can be attached at 3CN

(1) OPTION CARDS (Cont'd)

(Except digital output card DO-08, there terminals are to be connected only class 2 circuits)

Name	Code No	Function	Installing Position	Document No
Feedback Speed Control Card PG Speed Control Card PG-C	73600-D005X	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 • Input voltage +12V • Input current 300mA } Supplied by external source	Attach the card at 3CN on the control circuit board (See Note 2)	—

- Notes
- 1 Only one of the speed (frequency) reference option cards or communication interface cards can be attached at 2CN
 - 2 Only one of the monitor option cards or feedback speed control cards can be attached at 3CN
 - 3 When a communication interface card is attached at 2CN, no option card can be attached at 3CN



Option Card Installing Position

(2) OPTIONAL UNIT

Name	Model (Code No)	Function	Installing Position	Document No
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	TOE-C730-50 4
Remote Operator	JVOP - 102 (73041 - 0912X)	Digital operator (JVOP-100) and digital monitor (JVOP-101) are built-in Can perform operation or monitoring by serial communication at a distance of 328ft (100m) maximum from the inverter 200mA current loop Power supply 85 to 264VAC, 50 to 60Hz (D-SUB connector, cover, power supply connector provided)	Separately-mounted For open chassis or enclosed type	—
Remote Monitor	JVOP -103 (73041 - 0913X)			
Remote Interface	JVOP - 104 (73041 - 0914X)	Mounted on the inverter at remote operation or monitoring [up to 328ft (100m)] by remote operator (JVOP-102) or remote monitor (JVOP-103) 20mA current loop/RS-232C (D-SUB connector, cover provided)	On inverter	—
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	TOE-C736-50 11
Adapter Panel Exclusive Use Extension Cable	3 3ft (1m) cable (72616-W3001-01) 9 9ft (3m) cable (72616-W3003-01)	Used for remote operation of digital operator/monitor using adapter panel (JVOP-109)	—	
VS Operator (Small Plastic Version)	JVOP - 95□ *2 (73041 - 0905X - □)	An exclusive control panel for remotely setting frequency and for starting and stopping a inverter using analog commands [distance up to 164ft (50m)] Scale on the frequency indicator 60/120Hz, 90/180Hz	Separately installed	—
VS Operator (Standard Version)	JVOP - 96□ *2 (73041 - 0906X□)	An exclusive control panel for remotely setting frequency and for starting and stopping a inverter using analog commands [distance up to 164ft (50m)] Scale on the frequency indicator, 75Hz, 150Hz, 220Hz	Separately installed	—
Exclusive Extension *3 Cable for Digital Opertor or Monitor	3 3ft (1m) cable (72616 - W3001) 9 9ft (3m) 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 3.3ft (1m) and 9 9ft (3m) lengths The package of the extension cable includes a simple indicating cover Depending on the application, the use of the operator/monitor adapter JVOP-109 is recommended	*1 On the inverter front cover (indicating cover)	TOE-C730-50 10

(2) OPTIONAL UNIT (Cont'd)

Name	Model (Code No)	Function	Installing Position	Document No
Braking Unit	CDBR - □ (73600 - R□□□0)	Used in combination with the braking resistor unit to reduce motor deceleration time	Separately installed	TOE- C736-50 5
Braking Resistor Unit	LKEB - □ (73600 - K□□□0)	Shortens the motor deceleration time by causing the regenerative energy to be consumed through the resistor	Separately installed	TOE- C736-50 5
Back up Capacitor Unit for Momentary Power Loss	P00□0 (73600 - P00□0)	Designed for momentary power loss of control power (Backup time 2sec)	Separately installed	TOE- C736-50 6
Control Power Unit for DI-16G	AVR387 (72600-AVR387)	Used to supply power to digital reference card (DI-16G) • Input 200 to 240VAC ± 10% 50/60Hz • Output +24VDC 0.2A	Separately installed	—
	AVR388 (72600-AVR388)	Use AVR388 for momentary power loss (Backup time 2sec)		
Control Power Unit for PG-C	AVR385 (72600-AVR385)	Used to supply power to PG speed control card (PG-C) • Input 200 to 240VAC ± 10% 50/60Hz • Output +12VDC 0.3A	Separately installed	—
	AVR386 (72600-AVR386)	Use AVR386 for momentary power loss (Backup time 2sec)		

- *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 (3.3ft 1m, 9.9ft 3m), use exclusive use extension cable (with indicating cover) or adapter panel and adapter panel exclusive use extension cable

NOTES

Varispeed-616G3

GENERAL-PURPOSE INVERTER**500 to 600V, 2 to 200HP (1.5 to 160kW) 2 to 200kVA**

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