

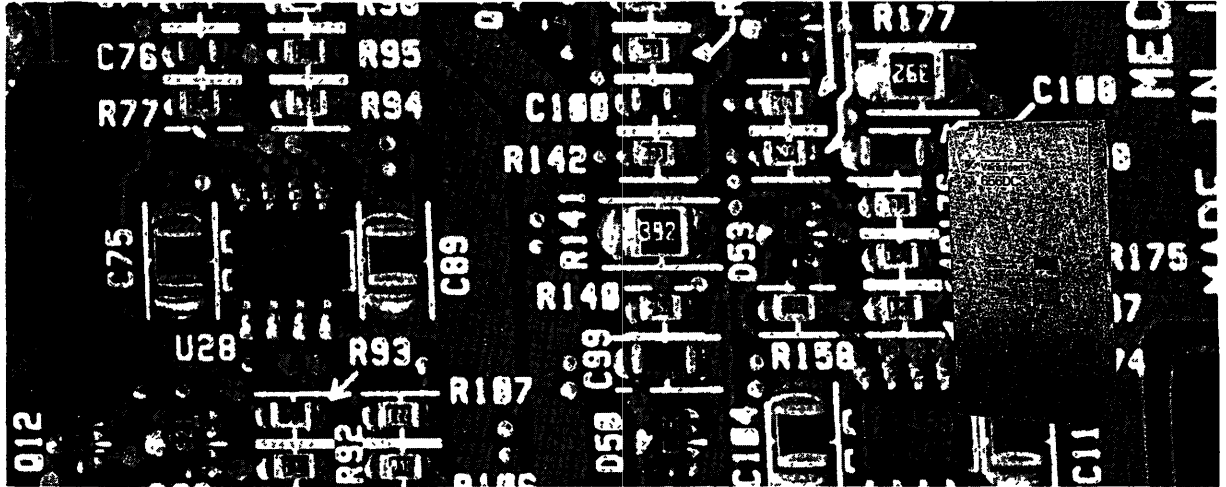
Varispeed-656DC3

PWM TRANSISTOR CONVERTER

200 TO 230V, 27 TO 120HP (20 TO 90kW)

380 TO 460V, 27 TO 496HP (20 TO 370kW)

MODEL CIMR-DCA

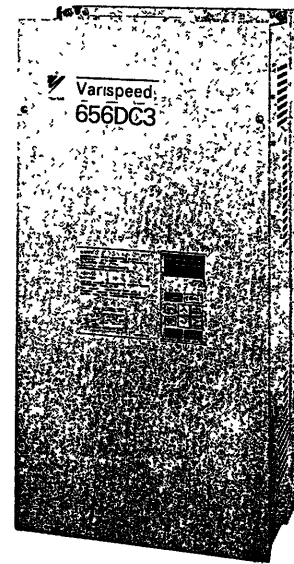


Before initial operation read these instructions thoroughly, and retain for future reference.



YASKAWA

When properly installed, operated and maintained, this equipment will provide a lifetime of service. It is mandatory that the person who operates, inspects, or maintains this equipment thoroughly read and understand this manual, before proceeding.



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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-656DC3 using the ground terminal G (E).

CAUTION

- (1) All the potentiometers of VS-656DC3 have been adjusted at the factory. Do not change their settings unnecessarily. However, input voltage must be set according to the power supply voltage (refer to page 13).
- (2) Do not make withstand voltage test on any part of the VS-656DC3 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.

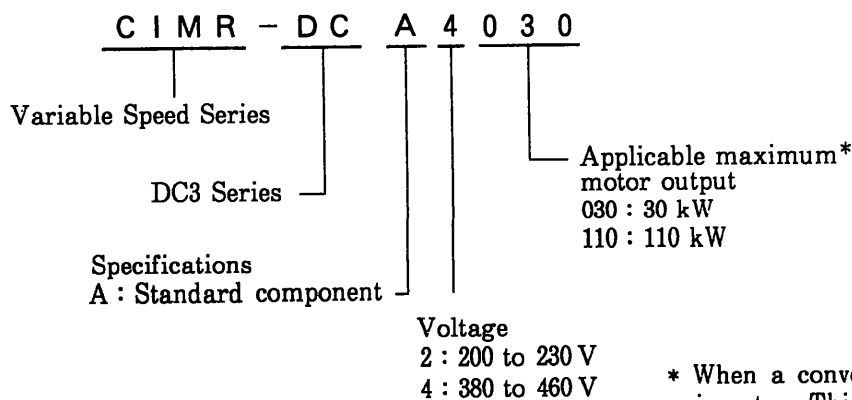
RECEIVING

This VS-656DC3 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-656DC3 is damaged or lost, immediately notify the shipper.

NAMEPLATE DATA

CONVERTER MODEL	MODEL	CIMR-DCA4030 400V CLASS TRANSISTOR CONVERTER
INPUT SPEC.	INPUT	AC 3PH 380~460V 50Hz/60Hz 64A
OUTPUT SPEC.	OUTPUT	DC 660V 60A
ENCLOSURES & MOUNTINGS/ MANUFACTURING NUMBER	SPEC.	4 0 3 0
MODEL DESIGNATION	YASKAWA ELECTRIC CORPORATION MADE IN JAPAN	



* When a converter is used for one inverter. This is not applied to when a converter is used as common.

INSTALLATION

CAUTION

Never move, lift or handle the VS-656DC3 cabinet by front cover or terminal stands. Lift the cabinet from bottom.

LOCATION

Location of the equipment is important to achieve proper performance and normal operating life. The VS-656DC3 units should be installed in areas where the following conditions exist.

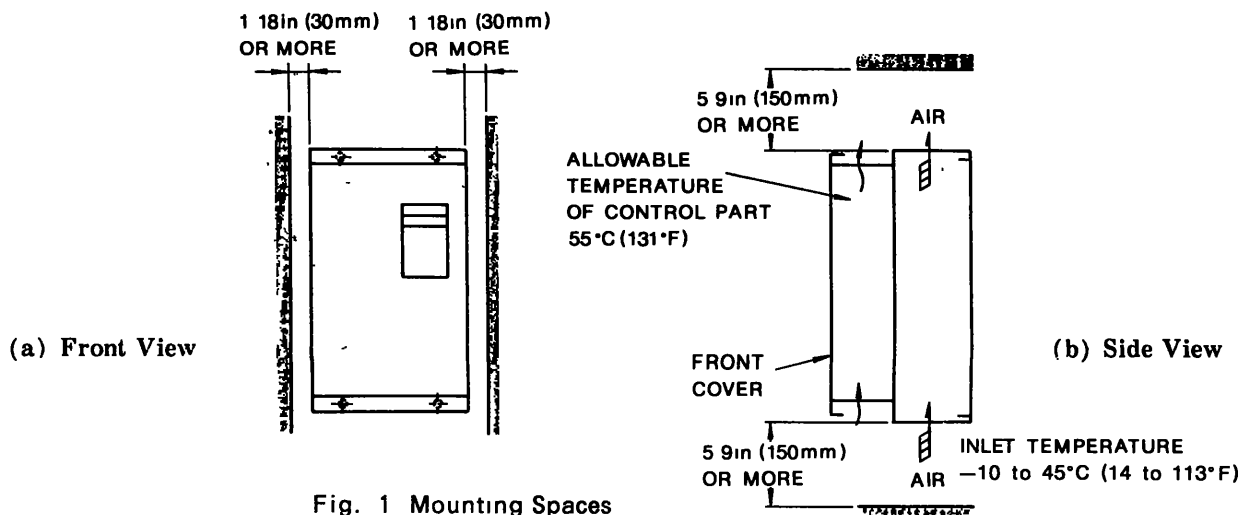
- Ambient temperature: -10 to $+45^{\circ}\text{C}$, $+14$ to 113°F
- Protected from rain or moisture.
- Protected from direct sunlight.
- Protected from corrosive gases or liquids.
- Free from airborne dust or metallic particles.
- Free from vibration.
- Free from magnetic noise.

CAUTION

To house multiple VS-656DC3 in a switchgear, install a cooling fan or some other means to cool the air entering the inverter below 45°C (113°F).

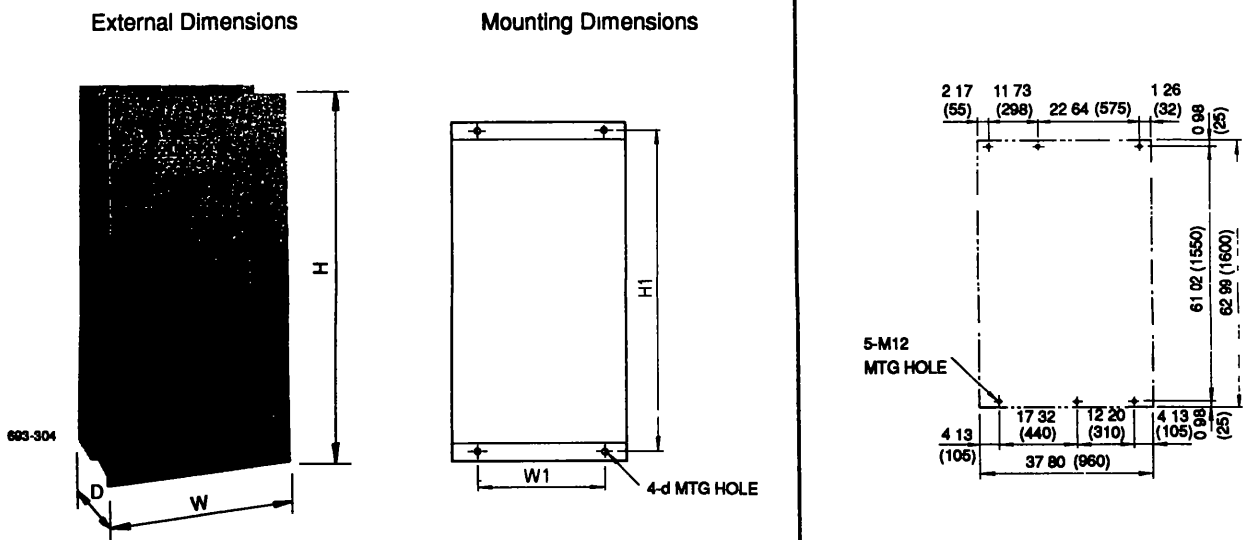
MOUNTING SPACE

Install VS-656DC3 vertically and allow sufficient space for effective cooling as shown in Fig. 1.



DIMENSIONS in inch (mm)

Voltage	Model CIMR-DCA[]	Output HP (kW)	External Dimensions			Mounting Dimensions			Mass lb (kg)
			W	H	D	W1	H1	d	
200 to 230	2015 *	27 (20)	12.80 (325)	21.65 (550)	9.65 (245)	10.83 (275)	21.06 (535)	M6	55 (25)
	2022	40 (30)	12.80 (325)	26.57 (675)	10.04 (255)	10.83 (275)	25.98 (660)	M6	66 (30)
	2037	67 (50)	18.70 (475)	31.50 (800)	11.02 (280)	14.76 (375)	30.71 (780)	M10	121 (55)
	2075 *	120 (90)	23.62 (600)	57.09 (1450)	17.72 (450)	19.69 (500)	55.71 (1415)	M12	330 (150)
380 to 460	4015	27 (20)	12.01 (305)	23.62 (600)	10.04 (255)	94.49 (240)	23.03 (585)	M6	55 (25)
	4030	54 (40)	13.78 (350)	31.50 (800)	11.02 (280)	9.84 (250)	30.71 (780)	M8	99 (45)
	4045	80 (60)							110 (50)
	4075	134 (100)	22.64 (575)	36.42 (925)	11.02 (280)	18.70 (475)	35.43 (900)	M12	187 (85)
	4160	248 (185)	23.62 (600)	53.54 (1360)	17.83 (453)	21.65 (550)	52.17 (1325)	M12	375 (170)
	4300	496 (370)	37.80 (960)	62.99 (1600)	17.91 (455)	See figure below.			860 (390)



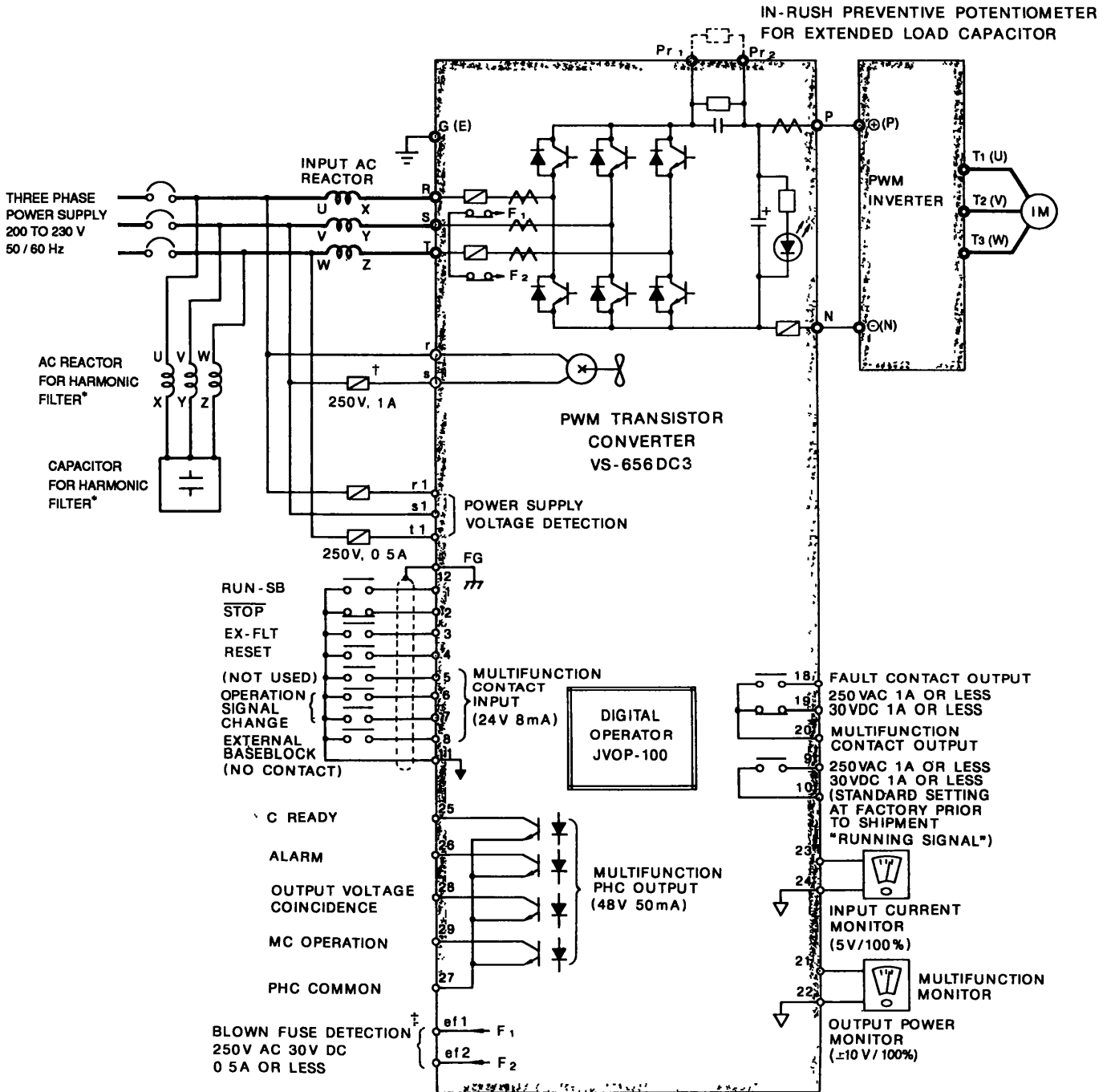
* Due to ongoing product design, data subject to change without notice

WIRING

INTERCONNECTION

The following shows an interconnection diagram. With digital operator, the operation can be performed by wiring the main circuit only.

(Terminal ⊙ shows main circuit and ○ control circuit.)



* Be sure to install AC reactor for harmonic input and capacitor for harmonic filter

† Fuse only for models CIMR-DCA 2015 and 2022

‡ Only for models CIMR-DCA 2022 or below (200 V class) and CIMR-DCA 4045 or below (400 V class)

Fig 2 Interconnections

MOLDED-CASE CIRCUIT BREAKER (MCCB)

Be sure to connect MCCBs between the AC main circuit power supply and input AC reactor. Connect magnetic contactors if necessary. Recommended MCCBs and magnetic contactors are listed in Table 1.

Table 1 Molded-case Circuit Breakers and Magnetic Contactors

200 V Class

Recommended MCCBs and Magnetic Contactors	Voltage Class	200 V Class			
	Model CIMR-DC []	A2015	A2022	A2037	A2075
	Output Current (ADC)	60	90	150	280
	Output Capacity HP (kW)	27 (20)	40 (30)	67 (50)	120 (90)
	Input Current (AAC)	64	96	160	300
MCCB (Mitsubishi Electric)		NF 100 100 A	NF 225 150 A	NF 400 300 A	NF 600 600 A
Magnetic Contactor (Yaskawa Control)		HI-80E	HI-100E	HI-200E	HI-500E

400 V Class

Recommended MCCBs and Magnetic Contactors	Voltage Class	400 V Class					
	Model CIMR-DC []	A4015	A4030	A4045	A4075	A4160	A4300
	Output Current (ADC)	30	60	90	150	280	560
	Output Capacity HP (kW)	27 (20)	54 (40)	80 (60)	134 (100)	248 (185)	496 (370)
	Input Current (AAC)	32	64	96	165	300	600
MCCB (Mitsubishi Electric)		NF 100 60 A	NF 100 100 A	NF 225 150 A	NF 400 300 A	NF 600 600 A	NF 1000 1000 A
Magnetic Contactor (Yaskawa Control)		HI-50E	HI-80E	HI-100E	HI-200E	HI-500E	HU-593

CONTROL POWER FUSE

Table 2 Control Power Fuses

Model CIMR-DCA []	Cooling Fan (Control Power) Fuse	Power Supply Voltage Detection Fuse	Main Circuit Blown Fuse Detection Contacts ef1, ef2
2015	1-Fuse (250 V, 1 A) needed	2-Fuse (250 V, 0.5 A) (r1, t1)	Provided
2022	1-Fuse (250 V, 1 A) needed	2-Fuse (250 V, 0.5 A)	Provided
2037	Built-in fuse (3.5 A)	2-Fuse (250 V, 0.5 A)	Not provided
2075	Built-in fuse (3.5 A)	2-Fuse (250 V, 0.5 A)	Not provided
4015	Built-in fuse (1 A)	2-Fuse (600 V, 0.5 A)	Provided
4030	Built-in fuse (1.5 A)	2-Fuse (600 V, 0.5 A)	Provided
4045	Built-in fuse (1.5 A)	2-Fuse (600 V, 0.5 A)	Provided
4075	Built-in fuse (8 A)	2-Fuse (600 V, 0.5 A)	Not provided
4160	Built-in fuse (12 A)	2-Fuse (600 V, 0.5 A)	Not provided
4300	Built-in fuse : • 12 A for 200 V • 8 A for 400 V	2-Fuse (600 V, 0.5 A)	Not provided

SURGE ABSORBER

For the surge absorbers should be connected to the coils of relays, magnetic contactors, magnetic valves, or magnetic relays. Select type from Table 3.

Table 3 Surge Absorbers

Coils of Magnetic Contactor and Control Relay		Surge Absorber *		
		Model	Specifications	Code No.
200 to 230 V	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 460 V Units		DCR2- 50D100B	1000 VDC 0.5 μ F + 220 Ω	C002630

* Made by MARCON Electronics.

CONTROL CIRCUIT

The external interconnection wiring must be performed with following procedures.

After completing VS-656DC3 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 must be separated from main circuit leads and other power cables to prevent erroneous operation caused by noise interference.

(2) Control circuit leads (contact output) must be separated from leads.

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

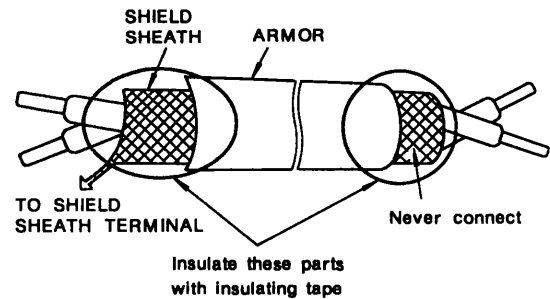


Fig. 3 Shielded Lead Termination

(3) Wiring distance

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

GROUNDING

Ground the casing of the VS-656DC3 using ground terminal G (E).

- (1) Ground resistance should be 100Ω or less.
- (2) Never ground VS-656DC3 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-656DC3 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-656DC3 in parallel, and ground only one of VS-656DC3 to the ground pole is also permissible (Fig. 4). However, do not form a loop with the ground leads.

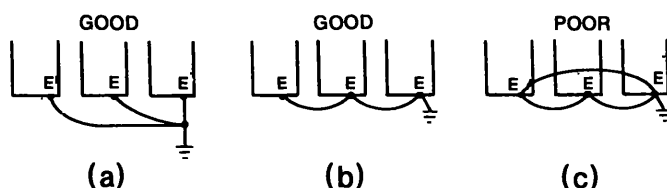


Fig. 4 Grounding of Three VS-656DC3 Units

EXAMPLE OF CORRECT WIRING

When connecting power line to VS-656DC3 r, s terminals and inverter r, s terminals, be sure to use primary power line as shown in Fig. 5 (a).

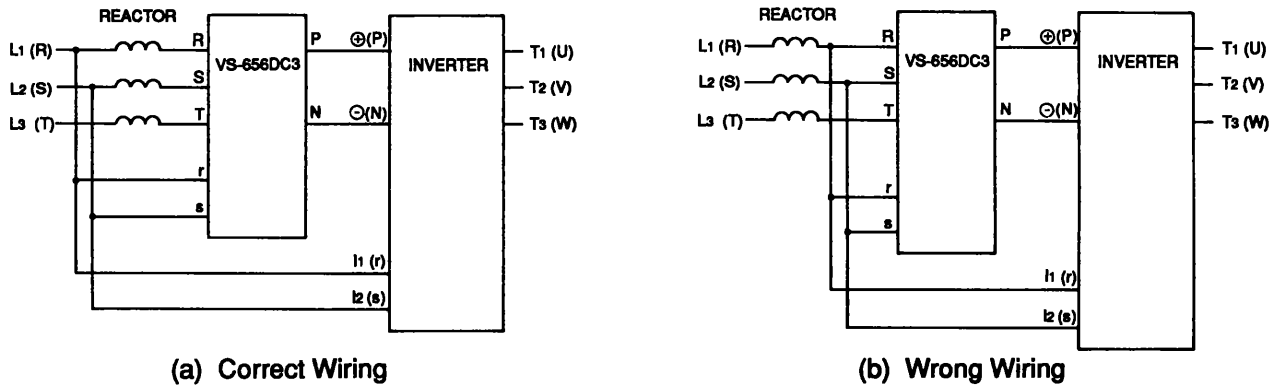


Fig. 5 Example of Wiring

WIRE AND TERMINAL SCREW SIZES

The wire sizes and types are shown in Tables 4 and 5. The sizes of the closed-loop connectors are shown in Table 6.

Table 4 200 V Class Wire Size

Circuit	Model CIMR-DCA □	Output HP (kW)	Terminal Symbol	Terminal Screw	75°C Copper Wire Range		Wire Type
					AWG	mm ²	
Main	2015	27 (20)	R, S, T, N, P	M8	8-4	8-22	Power cable : 600 V vinyl sheathed wire or equivalent
			E		14-10	2-5.5	
			r, ϕ, r1, ϕ1, t1, ef1, ef2	M4	20-14	0.5-2	
	2022	40 (30)	R, S, T, N, P	M8	4-2	22-38	
			E		14-10	2-5.5	
			r, ϕ, r1, ϕ1, t1, ef1, ef2	M4	20-14	0.5-2	
	2037	67 (50)	R, S, T, N, P	M10	2-4/0	38-100	
			E	M8	14-10	2-5.5	
			r, ϕ, r1, ϕ1, t1	M4	20-14	0.5-2	
	2075	120 (90)	R, S, T, N, P	M12	4/0- MCM400	100-200	
			E	M8	14-10	2-5.5	
			r, ϕ, r1, ϕ1, t1	M4	20-14	0.5-2	
Control	Common to All Models	—	1-32	M3.5	20-14	0.5-2	Twisted shielded wire with class 1 wiring or equivalent.

IMPORTANT

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% of normal rated voltage.

Phase-to-phase voltage drop (V) =

$$\sqrt{3} \text{ wire resistance } (\Omega/\text{km}) \times \text{wiring distance (m)} \times \text{current (A)} \times 10^{-3}$$

Table 5 400 V Class Wire Size

Circuit	Model CIMR-DCA	Output HP (kW)	Terminal Symbol	Terminal Screw	75°C Copper Wire Range		Wire Type
					AWG	mm ²	
Main	4015	27 (20)	R, S, T, N, P	M5	10-8	5.5-8	Power cable : 600 V vinyl sheathed wire or equivalent
			E	M8	14-10	2-5.5	
			r, ∅ 200, ∅ 400, r1, ∅ 1, t1, ef1, ef2	M4	20-14	0.5-2	
	4030	54 (40)	R, S, T, N, P	M8	4-2	22-38	
			E		14-10	2-5.5	
			r, ∅ 200, ∅ 400, r1, ∅ 1, t1, ef1, ef2	M4	20-14	0.5-2	
	4045	80 (60)	R, S, T, N, P	M8	4-2	22-38	
			E		14-10	2-5.5	
			r, ∅ 200, ∅ 400, r1, ∅ 1, t1, ef1, ef2	M4	20-14	0.5-2	
	4075	134 (100)	R, S, T, N, P	M10	2-4/0	38-100	
			E	M8	14-10	2-5.5	
			r, ∅ 200, ∅ 400, r1, ∅ 1, t1	M4	20-14	0.5-2	
	4160	248 (185)	R, S, T, N, P	M12	4/0- MCM400	100-200	
			E	M8	14-10	2-5.5	
			r, ∅ 200, ∅ 400, r1, ∅ 1, t1	M4	20-14	0.5-2	
	4300	496 (370)	R, S, T, N, P	M16	MCM650 min	325 min*	
			E	M8	10 min.	5.5 min.	
			r, ∅ 200, ∅ 400, r1, ∅ 1, t1	M4	20-14	0.5-2	
Control	Common to All Models	—	1-22 25-27	M3.5	18-14	0.5-2	Twisted shielded wire with class 1 wiring or equivalent.

* Use 2-copper wire with allowable temperature 75°C or more

Table 6 Closed-loop Connectors

Wire Range		Terminal Screw	Closed-loop Connectors
AWG	mm ²		
20	0.5	M3.5 M4	1.25-3.5
18	0.75		1.25-4
16	1.25		
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	M6	22-8
2	38	M8	38-8
1	38	M10	38-10
2/0	60	M10	60-10
3/0	80	M10	80-10
4/0	100	M10	100-10
4/0	100	M12	100-12
MCM300	150	M12	150-12
MCM400	200	M12	200-12

EXTERNAL TERMINALS

MAIN CIRCUIT

- R, S, T : Main circuit input terminals. Connected to the secondary side of input AC reactor.
- r, s200 : Operation power supply input terminals. Used for excitation of cooling fan and
- r, s400 : in-rush preventive MC.

NOTE

When 200 V class is used for the operating power supply, connect between r and s200. When 400 V class is used, connect between r and s400.

- r₁, s₁, t₁ : Terminals for power supply voltage detection. Connected to the primary side of input AC reactor.

NOTE

Be sure to match with the main circuit phase order.

- P, N : Output terminals. P indicates positive and N indicates negative. Two terminals are provided for each type.

NOTE

Up to three closed-loop connectors can be connected to one terminal. Therefore, up to 6 output cables each for N and P can be accepted in the unit.

- Pr₁, Pr₂ : Terminals for in-rush preventive potentiometer mounting.

NOTE

According to the output side connection capacitor capacity (inverter main circuit capacitor), the in-rush potentiometer must be connected externally.

- E : Enclosure grounding terminal.

CONTROL TERMINALS

Sequence Input

In the input circuit insulated by photocouplers, circuit voltage and current are 24 VDC 8 mA per circuit.

All input signals except RUN SB signal are status signals. (RUN SB signal is internally held.) When RUN SB and RESET are input, the input must be held more than 40 ms.

Table 7 Sequence Input Terminals

Terminal No.		Description
1	RUN SB	PWM converter operation start command CLOSED : Start (RUN SB signal is internally held.)
2	STOP	PWM converter operation stop command OPEN : Stop (stop with priority)
3	EX · FLT	External fault CLOSED : External fault *1
4	RESET	Fault reset CLOSED : Reset
5	Reserved	Not used *2
6	Operation Signal Selection	OPEN : Run according to Sn-04 1st, 2nd setting *2 CLOSED : Run by run/stop signal from operator
7	Option/Converter Ref. Selection	OPEN : Run by run command, voltage ref from option *2 CLOSED : Run by run command, voltage ref from inverter
8	External Baseblock A	Stops converter PWM operation. (NO contact input) *2
11	Sequence Common	Sequence input common terminal

*1 Converter process method can be selected at external fault input. (Sn-12)

*2 Multi-function contact input. Standard setting prior to shipping. (Sn-15 to 18)

Contact Output

Output circuit insulated by relays. Can be used for 250 VAC or 30 VDC 1 A or less.

Table 8 Contact Output Terminals

Terminal No.	Description	
18	CLOSED at fault	Fault contact output NONC contact
19	OPEN at fault	
20	Common	
9	CLOSED at RUN	RUN contact output NO contact *
10	Common	

* Multi-function contact output. Standard setting prior to shipping.

Photocoupler Insulation Output

Status output signals insulated by photocouplers. Can be used for 48 VDC 50 mA or less. Since all photocoupler outputs are multi-function outputs, the output can be selected according to the applications.*1

Table 9 Photocoupler Insulation Output Terminals

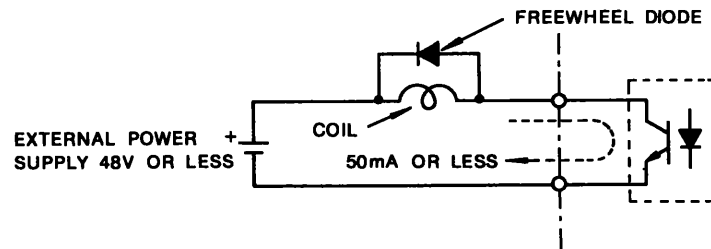
Terminal No.	Description
25	Converter Operation Enable Signal CLOSED : Converter RUN command can be accepted.
26	Minor Fault (Alarm) CLOSED : Minor fault occurrence *2
28	Output Voltage Coincidence CLOSED : Converter output voltage coincides with reference value.
29	MC Actuating CLOSED : MC for the short circuit of in-rush current limit resistance is closed. *3
27	Common Photocoupler output common

*1 Multi-function output function selection list (Sn-20 to 24)

*2 Fault mode selection (Sn-13, 14)

*3 Used for ride-through operation interlock with inverter.

Note : When L loads such as relay coils are driven by photocoupler output, be sure to insert a freewheel diode.



Select circuit voltage/current or above for the freewheel diode ratings.

Analog Monitor Output

Monitor signal which outputs the internal status level in analog. Output is up to ± 11 V 2 mA and resolution is equivalent to full-scale 8 bits.

Table 10 Analog Monitor Output Terminals

Terminal No.	Description
21, 22	Output capacity : ± 11 V 2 mA Resolution : Full scale 8 bits Multi-function monitor* Standard setting prior to shipment : Converter output power monitor (± 10 V/100%) Common : No. 22 terminal
23, 24	Output capacity +10 V 2 mA Input current monitor (+5 V/100%) Common : No. 24 terminal

* Refer to bn-17 for multi-function monitor selection.

Blown Fuse Detection

Output circuit insulated by relays. Can be used for 250 VAC or 30 VDC 0.5 A or less.

Table 11 Blown Fuse Detection Terminals

Terminal No.	Description	
ef1, ef2	OPEN at blown fuse	This contact output is available for models CIMR-DCA 2015, 2022, 4015, 4030, 4045 (Models using main circuit terminals ⊕ and ⊖) for control power supply (RCC).

TEST OPERATION

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

The line voltage selecting connector shown in Fig. 6 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 440 line voltage.

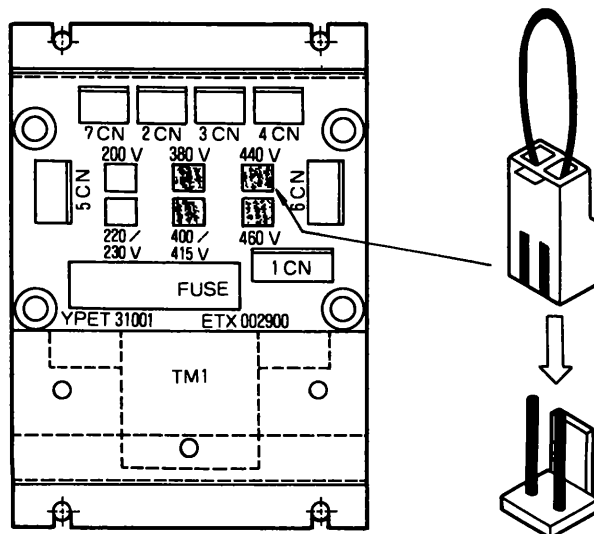

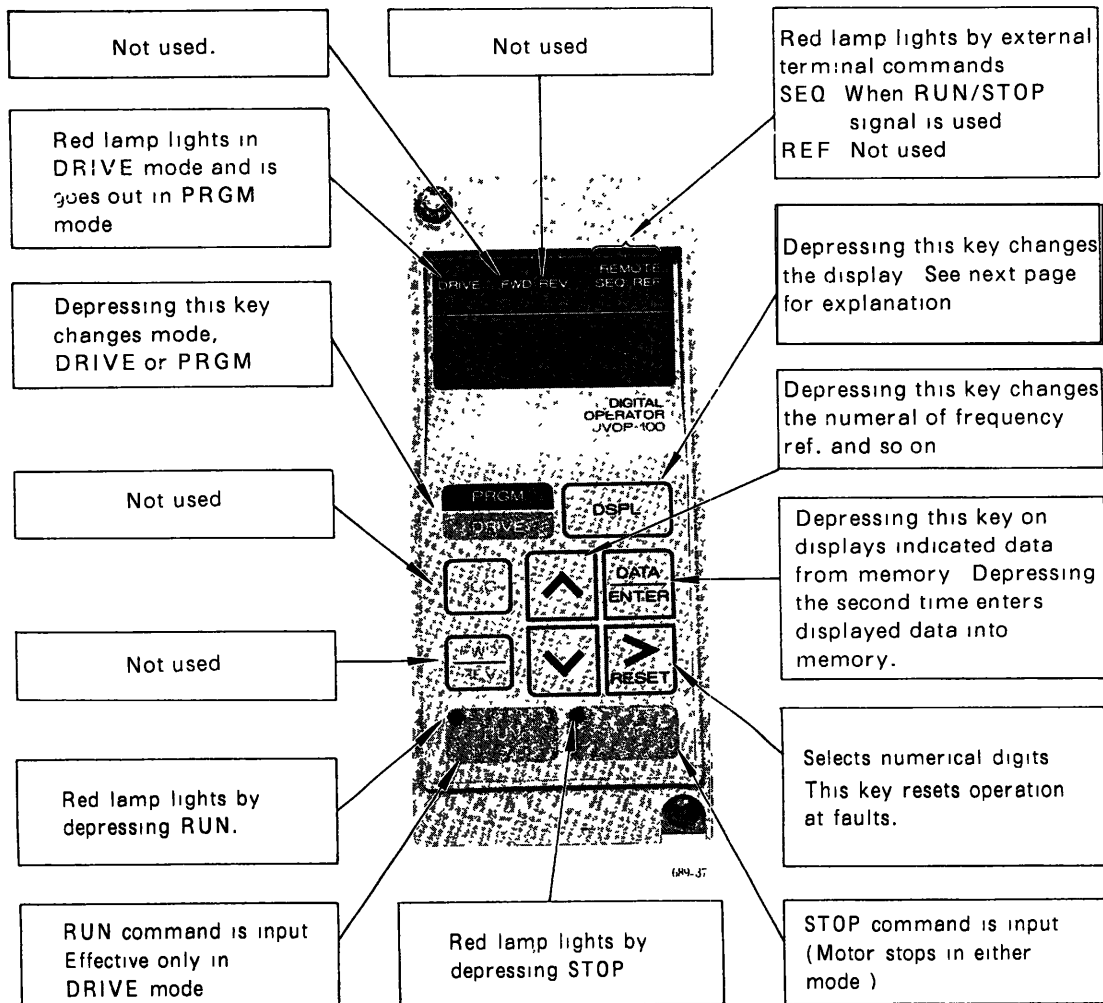


Fig. 6 Selection of Line Voltage

OPERATION

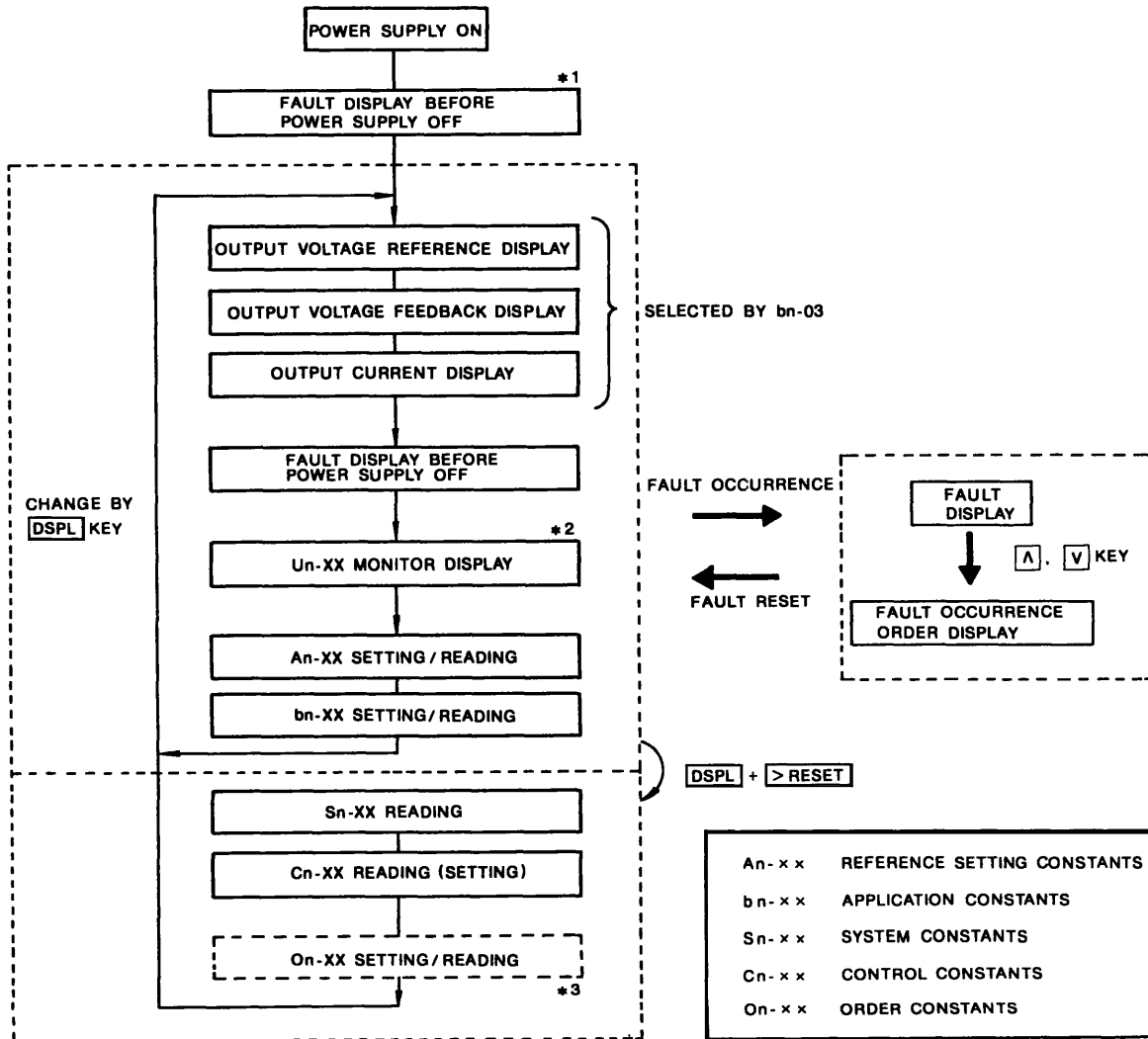
DIGITAL OPERATOR

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.



DRIVE MODE

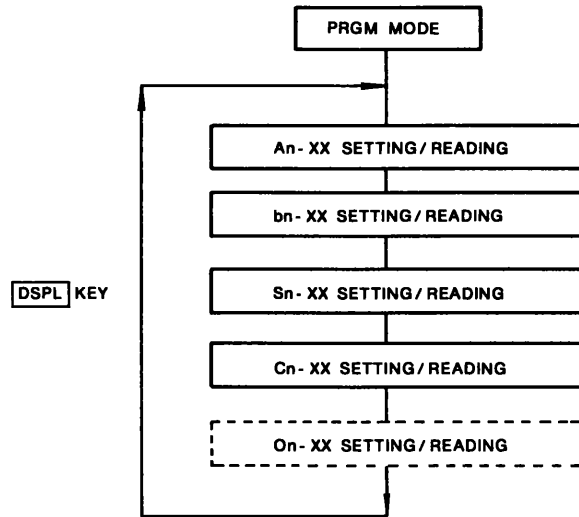
The display item flow chart in the DRIVE mode after the power supply has been turned on is shown below.














- *1 When a fault occurs before the power supply is turned off, the fault contents are displayed and blinks for 5 seconds. After blinking, it is changed automatically to the item selected by bn-13. When any key is depressed during blinking, the mode of "fault 2 before power supply off" is transmitted. When no fault has occurred before the power supply was turned off, the item selected by bn-13 is displayed.
- *2 When no fault has occurred before the power supply was turned off, the faults before the power supply was turned off are not displayed.
- *3 On-XX is displayed when Sn-03 set value is 1010 or 1001.

PROGRAM (PRGM) MODE

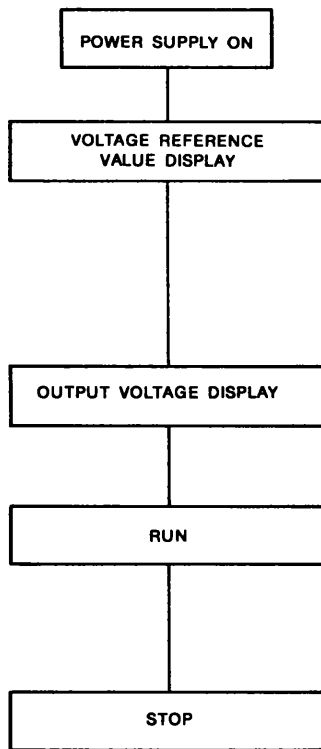
In the program mode, An-XX, bn-XX, Cn-XX or On-XX setting and reading are performed. The display status flow chart of each constant in the program mode is shown below:



(Constant Setting and Reading Procedures)

- ① Depress  key to enter the PRGM mode.
 - ② Depress  key to select the constant type (An-XX, bn-XX, etc.)
 - ③ Depress  or  key to select the constant number to be set or read.
 - ④ Depress  key to display the selected constant data.
 - ⑤ Depress ,  or  key to set the data.
 - ⑥ Depress  key to write-in the data.
 - ⑦ Depress  key to display the constant number again. Repeat steps ② to ⑥ to perform setting or reading.
- When the set value is not within the setting range, it blinks for 2.5 seconds and the set value before the change is displayed.
 - When the set value is within the setting range, End is displayed for 0.5 second after  key is depressed.

OPERATION BY DIGITAL OPERATOR (SET PRIOR TO SHIPMENT)



When the power supply is turned on, the output voltage reference is displayed.

Depress key to change to output voltage display.

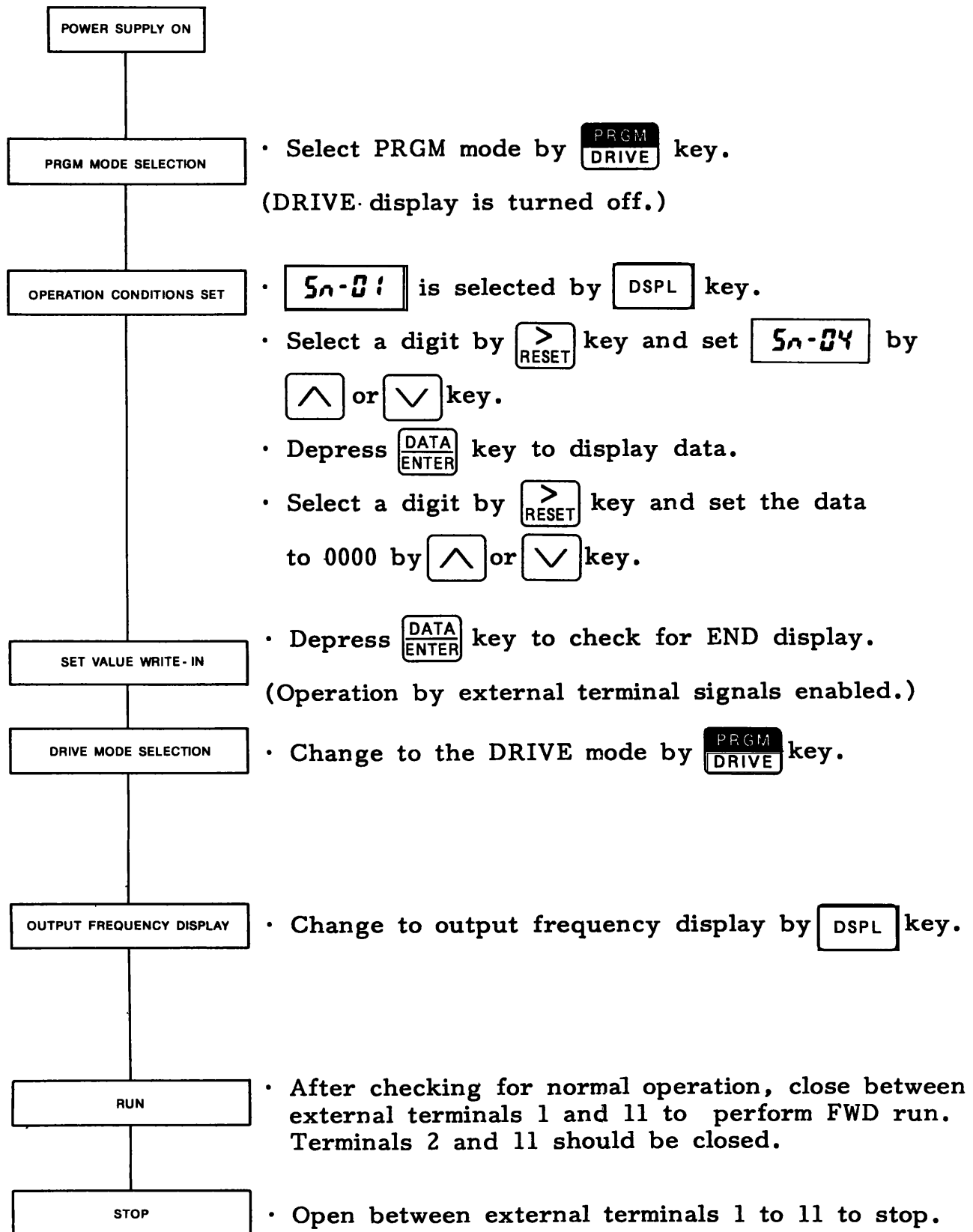
Change to output frequency display by

key.

Start the operation by key.

Stop the operation by key.

OPERATION BY EXTERNAL TERMINAL SIGNALS



MAINTENANCE

PERIODIC INSPECTION

VS-656DC3 requires very few routine checks. However, performing daily checks as shown in Table below will prevent potential accidents and secure highly reliable operation for a long time. Before checking, disconnect the main circuit power, and check that the CHARGE indicator is OFF.

Table 12 Periodical Inspection

Check Item	Check for	Action
External Terminal, Unit Mounting Bolt, Connector, etc.	Loose screw	Tighten
	Loose connector	Mount the connector again
Cooling Fin	Accumulated dust or dirt	Blow by dry compressed air of 39.2×10^1 to 58.8×10^4 Pa pressure
Printed Circuit Board	Accumulated conductive dust or oil mist	Clean the board If dust or oil still remain, replace the board
Cooling Fan	Excessive noise or vibration Cumulative operation time exceeds 20,000 hours	Replace the cooling fan
Power Element	Accumulated dust or dirt	Blow by dry compressed air of 39.2×10^4 to 58.8×10^4 Pa pressure
Smoothing Capacitor	Discoloration, odor, etc	Replace the capacitor or converter unit

SPARE PARTS

Table 13 Common Spare Parts

Spare Parts Specifications	Control Card	Digital Operator	Converter Card
Model	—	JVOP-100	—
Code No.	ETC67029 []-S601 []	CDR000070	73600-A011 []
Quantity	1	1	1

Table 14 Spare Parts

Model CIMR-DCA []	Spare Parts Specifications	Gate Drive Card (Base Drive Card)	Main Circuit Transistor	Main Circuit Fuse	Cooling Fan	
		Model	—	MG200J2YS1	CR2LS-100S	THA1V-HS4556MV
200 to 230 V	2015	Code No.	ETC67003 []	STR000365	FU000884	FAN000180
		Q'ty	1	3	3	1
		Model	—	CM300DY-12	CR2L-150S	THA1V-7556XV
	2022	Code No.	ETC67028 []	STR000405	FU000879	FAN000176
		Q'ty	1	3	3	1
		Model	—	QM500HA-H	CR2L-260S	THA1V-7556XV
	2037	Code No.	ETC67015 []	STR000316	FU000885	FAN000176
		Q'ty	1	6	3	2
		Model	—	CM400HA-2E	CR2L-600S	THA1V-7556XV
	2075	Code No.	ETC67017 []	STR000457	FU000886	FAN000176
		Q'ty	1	12	3	2
		Model	—	MG100Q2YS1	CR6L-50S	THA1V-HS4556MV
380 to 460 V	4015	Code No.	ETC67005 []	STR000354	FU000887	FAN000180
		Q'ty	1	3	3	1
		Model	—	CM300HA-24	CR6L-100S	THA1V-7556XV
	4030	Code No.	ETC67020 []	STR000376	FU000888	FAN000176
		Q'ty	1	6	3	1
		Model	—	CM300HA-24	CR6L-150S	THA1V-7556XV
	4045	Code No.	ETC67020 []	STR000376	FU000889	FAN000176
		Q'ty	1	6	3	1
		Model	—	CM400HA-24	CR6L-300S	THA1V-7556XV
	4075	Code No.	ETC67031 []	STR000385	FU000890	FAN000176
		Q'ty	1	6	3	2
		Model	—	CM400HA-24E	CR6L-600S	THA1V-7556XV
4160	Code No.	ETC67039 []	STR000469	FU000891	FAN000176	
	Q'ty	1	12	3	2	

VS-656 DC3 Model	Spare Parts Specifications	Drive Unit			Main Drive Card	Sub Drive Card	Converter Card	Cooling Fan Unit	Fuse	
		Main Circuit Transistor	Fuse							
CIMR-DCA4300	Model	—	CM600HA-24E	CR6L-200S	—	—	—	—	CS10F-1000P	CS5F-800
	Code No.	ETJ000272 []	STR000459	FU000919	ETC67041 []	ETC67042 []	ETX00302 []	EUX00349 []	FU002001	FU002002
	Q'ty	3	8*	4*	1	3	1	3	1	2

* Quantity per drive unit.

PROTECTIVE FUNCTION (FAULT DISPLAY)

If a transistor converter detects a fault, the fault is displayed on the digital operator and fault contact output operated to stop the transistor converter. (When a minor fault occurs, an alarm is output and operation is continued.)

Provide proper corrective action after troubleshooting.

Table 15 Protective Function (Fault Display)

Fault Display	Contents	Description	Remarks
PUU	Undervoltage (PUV)	Output voltage becomes undervoltage during operation.	<ul style="list-style-type: none"> • $V_{OUT} \leq 210$ VDC power supply fault • Momentary overload
CUU	Undervoltage (CUV)	Control power supply becomes undervoltage during operation.	<ul style="list-style-type: none"> • Power supply in unit fault
MC	Undervoltage (MC-ANS fault)	Main circuit contactor (MC) does not operate correctly.	<ul style="list-style-type: none"> • Unit fault, etc.
AUU	Undervoltage (AUV)	Input voltage becomes undervoltage during operation.	<ul style="list-style-type: none"> • $V_{IN} \leq 150$ VAC • Power supply fault (open phase)
RFU	Fuse blown (ACFU)	Input side fuse is blown.	<ul style="list-style-type: none"> • Output shortcircuit, grounding • Power element fault
DFU	Fuse blown (DCFU)	Output side fuse is blown.	<ul style="list-style-type: none"> • Output shortcircuit, grounding
PFU	Fuse blown (Drive Unit)	Drive unit fuse in model CIMR-DCA4300 is blown.*	<ul style="list-style-type: none"> • Output shortcircuit, grounding • Power element fault
OC	Input overcurrent	Excessive input current and output side grounding	<ul style="list-style-type: none"> • Output shortcircuit • Power supply drop
OU	Output overvoltage	Output voltage becomes overvoltage.	<ul style="list-style-type: none"> • $V_{OUT} \geq 400$ V • Excessive regenerative power
OH	Radiation fin overheat	Radiation fin is overheated.	<ul style="list-style-type: none"> • Fin temperature $\geq 90^{\circ}\text{C}$ (194°F) • Excessive ambient temperature
FdEu	Power supply frequency fault	Power supply frequency exceeds allowable value.	<ul style="list-style-type: none"> • Power supply fault
CPFD0	Transmission-fault converter ↔ operator	Check sum and check pattern fault	<ul style="list-style-type: none"> • Hardware fault
CPFD1	Transmission fault converter ↔ operator	Check sum and watchdog timer fault	<ul style="list-style-type: none"> • Hardware fault
CPFD2	Baseblock fault	Baseblock circuit malfunction	<ul style="list-style-type: none"> • Hardware fault

* CIMR-DCA4300 is provided with three drive units : Four fuses per unit
 When the LED (FU) on the drive unit is lit, it means one or more drive unit fuses are blown.
 Remove the top cover, and you can find LED (FU) on the drive unit.

Table 15 Protective Function (Fault Display) (Cont'd)

Fault Display	Contents	Description	Remarks
CPFD3	NVRAM fault	SRAM fault in NVRAM	• Hardware fault
CPFD4	NVRAM fault	BCC check fault	• Hardware fault
CPFD5	A/D converter fault in CPU	Conversion time exceeded, improper conversion value	• Hardware fault
CPFD6	Optional connection fault		• Hardware fault
CPF10	DSP hardware fault	Transmission error, A/D error, internal RAM error, ROM error	• Hardware fault
CPF20	Optional A/D converter fault		• Hardware fault
CPF24	Converter card error	Hardware fault, improper mounting	Hardware fault
oPE01	kVA selection fault	kVA selection is not normal.	Setting and hardware fault
oPE02	Constant setting range fault	Constant exceeds setting range.	Setting and hardware fault
OL1	Converter input current OL	Converter input overload	Excessive load, alarm possible to select *1
OL2	Converter output current OL	Converter output overload	Excessive load, alarm possible to select *1
FRn	Cooling fan stop	Cooling fan stops. *1	Alarm possible to select *2
EF	External fault	External fault is input.	Alarm possible to select *3
oP	Digital monitor fault	The monitor is mounted when under the program mode or during operation by the operator.	Check the function.
Err	NVRAM writing fault	NVRAM internal write data did not match when initializing the constant.	Hardware fault.

*1 CIMR-DCA4300 is provided with three drive units : One cooling fan per unit.

When the LED (FAN) on the drive unit is lit, it means the drive unit cooling fan has stopped.

Remove the top cover, and you can find the LED (FAN) on the drive unit.

*2 Failure selection (Sn-13, 14)

*3 Failure selection (Sn-12)

PRECAUTIONS

TOTAL LOAD CAPACITY

The total load capacity must be less than the converter rated output capacity.

$$P_{out} \text{ HP (kW)} \geq \frac{1}{\eta_{INV} \times \eta_M} (P_{M1} + \dots + P_{MN}) - \eta_{INV} \times \eta_M (P_{M1'} + \dots + P_{MN'})$$

MOTOR DRIVE
REGENERATION

P _{out} :	Converter Rated Output HP (kW)
P _{M1} to P _{MN'} :	Motor Output HP (kW)
η _M :	Motor Efficiency 0.9*
η _{INV} :	Inverter Efficiency 0.95*

* When a motor less than 10 HP (7.5 kW) is used, set the motor efficiency and inverter efficiency to 0.85 and 0.9, respectively.

INPUT AC REACTOR

Input 3-phase reactors each of which corresponds to each capacity of the VS-656DC3, (considering saturation current and thermal items) are necessary for the PWM converter VS-656DC3. The following shows the AC reactor list. Use the proper reactors for applications.

Table 16 AC Reactor List

VS-656DC3 Capacity		Rated Current (Arms)	Saturation Current (Peak A)	Inductance (mH)	AC Reactor Code No.
200 V Class	A2015	64	240	1.32	X 002666
	A2022	96	360	0.88	X 002667
	A2037	160	600	0.53	X 002668
	A2075	300	1150	0.28	X 002670
400 V Class	A4015	32	120	5.28	X 002671
	A4030	64	240	2.64	X 002672
	A4045	96	360	1.76	X 002673
	A4075	165	620	1.02	X 002674
	A4160	300	1200	0.57	X 002675
	A4300	600	2400	0.28	X 002677

INTERLOCKING WITH CONNECTING INVERTERS

The PWM converter VS-656DC3 can be used as diode converters *1 if the in-rush current control potentiometer shortcircuiting MC is closed even if the input side switching elements are not performing PWM operation. However, when the above MC is opened, power cannot be supplied to the load. Therefore, it is necessary to shut off the converter load (inverter output) according to the MC operation status.

The VS-656DC3 outputs "MC Operating (Closed by MCon)" from the control board terminal 29 (PHC output) as an MC operation signal. By using this signal, interlock the converters with the inverter side.*2

*1 Continuous current conduction at the motor drive side is possible within the rating, but not possible at the power supply regenerative side. Pay attention to rated output current since output voltage generates approx. 20% regulation for the diode rectification value.

*2 Interlocking at hardware is recommended.

Typical Interlock

- (1) When reactivation after momentary power loss is not performed (Coasting to a stop by momentary power loss detection)

Insert the converter "MC Operating" output to the inverter "External Fault" input.

- The inverter "External Fault" input is NC contact input. To prevent external fault operation at power supply ON, select "Eternal fault accepted only during RUN".

VS-676XX3, 616H3, G3 settings:

[External fault NC contact input: Set Sn-12 1st digit to "1".
External fault detected only during RUN: Set Sn-12 2nd digit to "1".

- (2) When reactivation after momentary power loss is performed as system

Insert the converter "MC Operating" output to the inverter "External BB" input.

- Select reactivation after momentary power loss at the inverter side. Then select the coasting lead-in mode or speed search mode.
- Select NC contact input for the inverter "External BB" input.

INTERLOCKING WITH CONNECTING INVERTERS (Cont'd)

VS-676XX3, 616H3, G3 settings:

External BB NC contact input: Set one of Sn-15 to 18 to "09" for VS-676XX3.

Set one of Sn-15 to 18 to "64" for G3 or H3.

Continuous operation after momentary power loss:

Set Sn-11 3rd digit to "1".

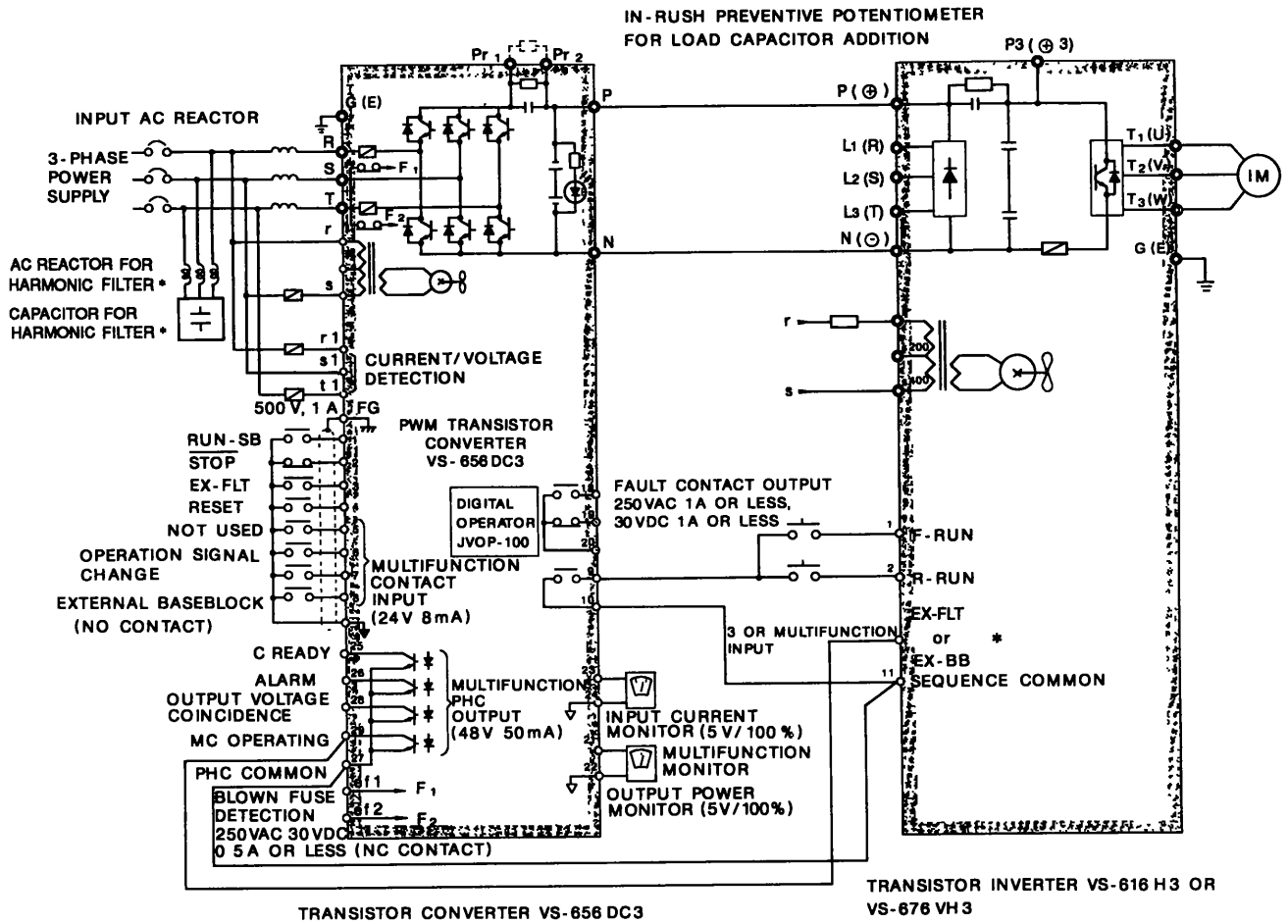
Coasting lead-in mode: Set Sn-07 1st digit to "1".

CONVERTER POWER OFF AND HARMONIC FILTER

- Make a sequence to open the converter power side after the converter operation stops.
- Be sure to install a harmonic filter. See Table 17.

Table 17 Harmonic Filter List

VS-656DC3		Harmonic Filter (LC Filter)			
Voltage V	Model CIMR-[]	Reactor (L)		Capacitor (C)	
		Specifications	Code No.	Specifications	Code No.
200 to 230	2015	30 A, 0.35 mH	X2492	100 μ F	C3477
	2022	50 A, 0.21 mH	X2494	150 μ F	C3186
	2037	80 A, 0.13 mH	X2497	200 μ F	C3187
	2075	160 A, 0.07 mH	X2556	400 μ F	C3190
380 to 460	4015	15 A, 1.42 mH	X2501	25 μ F	C3481
	4030	30 A, 0.7 mH	X2503	50 μ F	C3482
	4045	50 A, 0.42 mH	X2505	75 μ F	C3483
	4075	80 A, 0.26 mH	X2508	100 μ F	C3484
	4160	150 A, 0.15 mH	X2567	200 μ F	C3485
	4300	250 A, 0.09 mH	X2569	400 μ F	C3486



* It is necessary to change the inverter side setting depending on whether continuous operation after momentary power loss occurs or not

Fig. 7 Typical Interlocking Connection with Inverter

PWM CONVERTER CONSTANT LIST

SYSTEM CONSTANT (Sn-XX)

VS-656DC3		System Constants Sn-XX				
Data No.	Data Name	Bit No.	Set Data	Function	Initial Set Data (HEX)	
Sn-01	Capacity Selection	—	—	Converter capacity selection	—	
Sn-02	Not Used	—	—	Not used	—	
Sn-03	Operator Status	1-digit	0000	An-, bn- setting/reading, Sn-, Cn-, Un-reading possible	0000	
		2-digit	0101	An- setting/reading, bn-, Sn-, Cn-, Un-reading possible		
		3-digit	1010	An-, bn- setting/reading, Sn-, Cn-, On-, Un-reading possible		
		4-digit	1001	An-, bn-, Cn-, On- setting/reading, Sn-, Un-reading possible		
Sn-04	Operation Mode Selection 1	1-digit	1	Voltage reference/(An-01)is output voltage reference.	0111	
		2-digit	0	External terminal run command effective		
			1	Operator run command effective		
		3-digit	01	Baseblock to stop		
4-digit						
Sn-05	Operation Mode Selection 2	1-digit	0	Operator STOP key effective during running from external terminals	0000	
			1	Operator STOP key ineffective during running from external terminals		
Sn-08	Operation Mode Selection 5	1-digit	0	Run by option output voltage reference and run command (when option provided)	0000	
			1	Run by converter output voltage reference and run command		
		2-digit	0	Minor fault automatic reset mode (fault reset)		
			1	Minor fault latch mode (hold)		
Sn-09	Not used	—	—	0000		
Sn-11	Protective Characteristics Selection 2 (Protection against Momentary Power Loss)	1-digit	Not used		0101	
		2-digit	0	Fault contact during fault retry : Open		
			1	Fault contact during fault retry : Closed		
		3-digit	0	Stop by momentary power loss		
			1	Continuous operation at recovery from momentary power loss		
		4-digit	0	UV detection level : 80%		
1	UV detection level : Set by Cn-17 (PUV detection level)					

VS-656DC3	System Constants Sn-XX (Cont'd)
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Data No.	Data Name	Bit No	Set Data	Function	Initial Set Data (HEX)
Sn-12	Protective Characteristics Selection 3	1-digit	0	External fault signal : NO contact input	0100
			1	External fault signal : NC contact input	
		2-digit	0	External fault signal : Always detected	
			1	External fault signal : Detected during RUN	
		3-digit	01 : BB stop, fault output		
4-digit	11 : Continuous operation (minor fault)				
Sn-13	Protective Characteristics Selection 4 (Inverter Protection)	* COL	1-digit	01 : BB stop, fault output	0101
			2-digit	11 : Continuous operation (minor fault) * Input current overload	
		* FAN	3-digit	01 : BB stop, fault output	
			4-digit	11 : Continuous operation (minor fault) * Fan fault	
Sn-14	Protective Characteristics Selection 5 (Motor Protection)	1-digit	01 : BB stop, fault output	0001	
		2-digit	11 : Continuous operation (minor fault) * Output current overload		
Sn-15	Multi-function Contact Input (Terminal 5) Function Selection	—	00-FF	Multi-function input terminal 5 function selected	FF
Sn-16	Multi-function Contact Input (Terminal 6) Function Selection	—	00-FF	Multi-function input terminal 6 function selected	01
Sn-17	Multi-function Contact Input (Terminal 7) Function Selection	—	00-FF	Multi-function input terminal 7 function selected	02
Sn-18	Multi-function Contact Input (Terminal 8) Function Selection	—	00-FF	Multi-function input terminal 8 function selected	08
Sn-19	Not used	—	—	—	—
Sn-20	Multi-function Contact Output (Terminals 9, 10) Function Selection	—	00-FF	Multi-function contact output (terminals 9 10) function selected	00
Sn-21	Multi-function PHC Output 2 (Terminal 25) Function Selection	—	00-FF	Multi-function PHC output (terminal 25) function selected	06

VS-656DC3	System Constants Sn-XX (Cont'd)
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Data No.	Data Name	Bit No.	Set Data	Function	Initial Set Data (HEX)
Sn-22	Multi-function PHC Output 3 (Terminal 26) Function Selection	—	00-FF	Multi-function PHC output (terminal 26) function selected	10
Sn-23	Multi-function PHC Output 4 (Terminal 28) Function Selection	—	00-FF	Multi-function PHC output (terminal 28) function selected	02
Sn-24	Multi-function PHC Output 5 (Terminal 29) Function Selection	—	00-FF	Multi-function PHC output (terminal 29) function selected	0A
Sn-25	Not used	—	—	—	0000
Sn-26 to Sn-28	Not used	—	—	—	—
Sn-29	Not used	—	—	—	01
Sn-30	Not used	—	—	—	0000
Sn-31	Not used	—	—	—	0100
Sn-32	Not used	—	—	—	0001

(1) Sn-01: Output Selection

VS-656DC3	System Constant Sn-01 : Output Selection
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200 V Class

Output Selection No.	00	01	02	04
Max. Applicable Motor Output HP (kW)	20 (15)	30 (22)	50 (37)	100 (75)
Converter Output HP (kW)	27 (20)	40 (30)	67 (50)	120 (90)

400 V Class

Output Selection No.	20	21	22	23	24	26
Max. Applicable Motor Output HP (kW)	20 (15)	40 (30)	60 (45)	100 (75)	210 (160)	400 (300)
Converter Output HP (kW)	27 (20)	54 (40)	80 (60)	134 (100)	248 (185)	496 (370)

200 V Class : 00 to 04

400 V Class : 20 to 26

(2) Sn-03: Operator Status

VS-656DC3	System Constant Sn-03 : Operator Status
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Note : Cannot change to the PRGM mode during RUN.
Fault detection is not performed at the PRGM mode.

Sn-03	DRIVE Mode (During RUN, STOP)			PRGM Mode (Only During STOP)		
	Setting/reading Possible	Only Reading Possible	Setting/reading not Possible	Setting/reading Possible	Only Reading Possible	Setting/reading not Possible
0000 (OEM)	An-XX bn-XX	Cn-XX Sn-XX Un-XX	On-XX	An-XX bn-XX Cn-XX Sn-XX		On-XX
0101 (END USER)	An-XX	bn-XX Cn-XX Sn-XX Un-XX	On-XX	An-XX Sn-03	bn-XX Cn-XX Sn-XX	On-XX
1010	An-XX bn-XX	Cn-XX Sn-XX On-XX Un-XX		An-XX bn-XX Cn-XX Sn-XX On-XX		
1001 (For VS-656DC3 Adjustment)	An-XX bn-XX Cn-XX On-XX	Sn-XX Un-XX		An-XX bn-XX Cn-XX Sn-XX On-XX		
1110						Initialization

(3) Sn-15 to 18: Multi-function Input Function Selection

VS-656DC3	System Constant Description Sn-15 to 18 : Multi-function Input Function Selection List
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(Must be held for 40 msec or more.)

Set Value	Function	Contents
01	Operation signal selection	Open : Run according to Sn-04 1st, 2nd digit setting Closed : Run by RUN/STOP signal from operator
02	Option/inverter command selection	Open : Run according to Sn-08 1st, 2nd digit setting Closed : Run by RUN command or frequency ref. from inverter
08	External baseblock A (NO contact input)	Closed : Converter PWM operation is shut.
09	External baseblock B (NC contact input)	Open : Converter PWM operation is shut.
20-2F	External fault signal selection 1	See external fault signal selection list below.
30-3F	External fault signal selection 2	See external fault signal selection list below.
40-4F	External fault signal selection 3	See external fault signal selection list below.
50-5F	External fault signal selection 4	See external fault signal selection list below.
FF	Not used	—

Note : Set values must be set for Sn-15 to Sn-18 in ascending order (i. e. 01 for Sn-15, 02 for Sn-16 ...). Do not use the same set value more than once except for FF.

† Terminal Nos. displayed on the operator (EF□)

Set Value (HEX Input) (same data cannot be set.)		Selection Mode					
		Contact Mode		Detection Mode		Stop Mode	
Bit 7 to 4 Setting priority No.	Bit 3 to 0 Selection mode No.	NO contact input	NC contact input	Always detected	Detected during RUN	Coasting to stop (major fault)	Continuous Operation (minor fault)
2-5	4	○		○		○	
2-5	5		○	○		○	
2-5	6	○			○	○	
2-5	7		○		○	○	
2-5	C	○		○			○
2-5	D		○	○			○
2-5	E	○			○		○
2-5	F		○		○		○

Set Data Bit No.	0	1
0	External fault signal : NO contact input	External fault signal : NC contact input
1	Always detected	Detected during run
3, 2	Process selection at external fault signal detection	00 Not used 01 Coasting to stop (major fault) 10 Not used 11 Continuous operation (minor fault)

(4) Sn-20 to 24: Multi-function Output Function Selection

(Output must be held for 100 msec after function operation.)

Set Value	Function	Contents
00	Running	Closed : Running
01	Zero speed	Closed : Converter output voltage is established
02	Operation voltage coincidence	Output voltage = output voltage reference
06	Operation ready	Closed : Converter operation ready status (Initial data receiving completed selected)
07	During UV (UV1)	Closed : Momentary power loss detection
08	Baseblock	Closed : Baseblock
09	Baseblock release	Closed : Baseblock release
0A	In-rush MC operating	Closed : In-rush MC operating
10	Minor fault	Closed : Minor fault occurrence
11	Reset command input	Closed : Reset command input

CONTROL CONSTANT (Cn-XX)

VS-656DC3	Control Constants Cn-XX
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Data No.	Data Name	Setting Unit	Setting Range	Initial Value
Cn-02	Voltage Coincidence Detection Level	0.01%	0.00-100.00	100.00*
Cn-03	Voltage Coincidence Detection Width	0.01%	0.00-100.00	2.00
Cn-07	Torque Reference Filter 1	1 msec	0-500	0
Cn-08	Input Current OL Detection Starting Current	1%	30-150	112
Cn-09	Input Current OL Operation Time	1 sec	1-120	60
Cn-12	Not used	—	—	00000
Cn-14	Output Current OL Detection Starting Current	1%	50-200	110
Cn-15	Output Current OL Operation Time	1 sec	1-120	48
Cn-17	PUV Detection Level	1 V	131-210 (200 V) 262-420 (400 V)	131 (200 V) 262 (400 V)
Cn-19	Assured Time for Momentary Power Loss	0.01 sec	0.00-2.00	1.00
Cn-20	No. of Fault Retry Operations	1	0-10	0
Cn-30	Not used	—	—	100.0
Cn-31	Not used	—	—	100.0
Cn-32	Not used	—	—	100.0

* Corresponds to 340 V (200 V class) and 680 V (400 V class).

APPLICATION CONSTANT (bn-XX)

VS-656DC3	Application Constants bn-XX
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Data No.	Data Name	Setting Unit	Setting Range	Initial Value
bn-01	Pressure Rise Time 1	0.1 sec	0.0-3000.0	10.0
bn-02	Pressure Drop Time 1	0.1 sec	0.0-3000.0	10.0
bn-05	AVR Proportional Gain	1	0-300	10
bn-06	AVR Integral Time	1 msec	0-30000	500
bn-07	Plus Side Torque Limit	0.01%	0.00-300.00	150.00
bn-09	Regenerative Side Torque Limit	0.01%	0.00-300.00	150.00
bn-11	Trace Sampling Time*	0.020 sec	0.020-10.000	0.060
bn-13	Monitor No. after Power ON	1	1-3 [†]	1
bn-17	Multi-function-Monitor Output Selection	1	1-5, 9-15 [‡]	14
bn-18	Multi-function Monitor Output Gain	0.001	0.001-10.000	1.000
bn-22	A0 Option CH1 Output Selection	1	1-5, 9-15 [‡]	01
bn-23	A0 Option CH1 Output Gain	0.001	0.001-10.000	1.000
bn-24	A0 Option CH2 Output Selection	1	1-5, 9-15 [‡]	02
bn-25	A0 Option CH2 Output Gain	0.001	0.001-10.000	1.000

* Data are traced in the setting unit of 0.020 sec period to renew the Dual Port RAM contents.

† 1 : Output voltage reference, 2 : Output voltage feedback, 3 : Output current

‡ Corresponds to monitor constant (Un-XX).

REFERENCE SETTING CONSTANT (An-XX)

VS-656DC3		Reference Setting Constants An-XX			
Data No.	Data Name	Setting Unit	Setting Range	Initial Value	
An-01	Output Voltage Reference *1	10 ⁻¹ V	300.0-340.0 *2	330.0 *2	

*1 Effective when set values are displayed on the digital operator (JVOP-100).

Ineffective when transmission mode (transmission option) is selected.

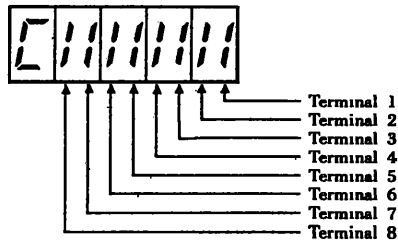
*2 Doubled for 400 V class.

MONITOR CONSTANT (Un-XX)

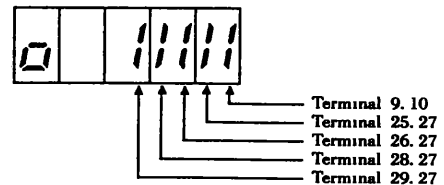
VS-656DC3		Monitor Constants Un-XX			
Data No.	Data Name	Setting Unit	Setting Range	Initial Value	Remarks
Un-01	Output Voltage Reference	VREF	10 ⁻¹ V	300-340	
Un-02	Output Voltage Feedback	VFB	10 ⁻¹ V	0.0-1000.0	
Un-03	Input Voltage	VS	10 ⁻¹ V	0.0-550.0	
Un-04	Output Current	IOUT	10 ⁻¹ A	—	
Un-05	Input Current	IS	10 ⁻¹ A		
Un-06	Input Terminal Status	INRLY			*
Un-07	Output Terminal Status	OUTRLY			*
Un-08	Fault before Power OFF				
Un-09	Effective Current Reference	IRREF	10 ⁻¹ %	-150 0-150.0	
Un-10	Ineffective Current Reference	IREF	10 ⁻¹ %	0.0-50.0	
Un-11	Primary Current Reference	IREF	10 ⁻¹ %	0.0-150.0	
Un-12	Input Power Factor	IPHA1	10 ⁻¹ %	-100.0-100.0	
Un-13	Input Power	WIN	10 ⁻¹ kW		
Un-14	Output Power	WOUT	10 ⁻¹ kW		
Un-15	Input Frequency	FIN	10 ⁻¹ Hz		

* I/O terminal status display

Notes: 1. Input terminal status display
Sequence input terminal 1 to 8
Light ON at closed, Light OFF at open



2. Output terminal status display
Sequence output terminal
Light ON at closed, Light OFF at open



ORDER CONSTANT (On-XX)

Order constants have been preset at factory. Never change the constant.

VS-656DC3		Order Constants On-XX		
Data No.	Data Name	Setting Unit	Setting Range	Initial Value
On-01	Control Status 1	bit set	0.0.0.0-1 1.1.1	0000
On-03	Control Status 2	bit set	0.0.0.0-1.1.1.1	1000
On-05	Output Voltage Adjustment	0.0001	0.9000-1.0920	1.0000
On-08	Current Amplifier Characteristics	DEC code	0-254	021
On-09	Rated Current Variable Rate	1%	30-100	100
On-10	Not Used	1%	0-50	50
On-16	Not Used	—	—	0000
On-17	DSP AD Converter U-phase Gain	0.0001	0.9000-1.1000	*
On-18	DSP AD Converter U-phase Offset	1	-819-819	*
On-19	DSP AD Converter W-phase Gain	0.0001	0.9000-1.1000	*
On-20	DSP AD Converter W-phase Offset	1	-819-819	*
On-21	ON DELAY Compensation Gain	0 01	0.00-2.00	1.00
On-22	Compensation Gain for Output Voltage Response	0.1	0.0-1 5	0.0
On-23	Time Constant for Output Voltage Response	1 ms	1-100	20
On-24	Output Voltage Compensation Gain	0.1	0.0-1.5	1
On-25	Power Supply Phase Adjustment	1 el	-180-180	-155

* Original constant for control card.

CONVERTER SPECIFICATIONS

Voltage Class		200 V				400 V					
Model CIMR-DCA[]		2015	2022	2037	2075	4015	4030	4045	4075	4160	4300
Input/Output Ratings	Output Capacity HP (kW)	27 (20)	40 (30)	67 (50)	120 (90)	27 (20)	54 (40)	80 (60)	134 (100)	248 (185)	496 (370)
	Output Current A	60	90	150	280	30	60	90	150	280	560
	Input Current A	64	96	160	300	32	64	96	165	300	600
	Inverter Capacity kVA	20	30	50	100	20	40	60	100	200	400
	Output Voltage V	330 VDC				660 VDC					
Input Power Supply	Voltage and Frequency	200 to 220 VAC, 50 Hz 200 to 230 VAC, 60 Hz				380 to 460 VAC, 50/60 Hz					
	Allowable Voltage Fluctuation	±10%									
	Allowable Frequency Fluctuation	±3 Hz (Phase rotation free)									
Control Characteristics	Control Method	Sine wave PWM									
	Input Power Factor	0.95 or more									
	Output Voltage Accuracy	±5%									
	Overload Capacity	Motor coasts to a stop after 1 minute at 150% rated output current.									
Operation Input		By digital operator and/or control circuit terminal									
Status Output	Fault	1 NO NC contact output									
	Running	1 NO contact output									
	Alarm	4 PHC outputs selectable									
	Analog Output	Input current monitor/1 analog output selectable.									
Constant Setting		By digital operator									
Protective Function	Instantaneous Overcurrent	Motor coasts to a stop at approx. 200% converter input current.									
	Blown Fuse	Motor coasts to a stop by blown-fuse.									
	Overload	Motor coasts to a stop after 1 minute at 150% rated output current. (regeneration)									
	Undervoltage (Output)	Stop at approx. 210 VDC or less.					Stop at approx. 420 VDC or less.				
	Undervoltage (Input)	Stop at approx. 150 VAC or less.					Stop at approx. 300 VAC or less.				
	Overvoltage	Stop at approx. 400 VDC or more.					Stop at approx. 800 VDC or less.				
	Fin Overheat	Thermostat									
	Power Supply Open phase	Motor coasts to a stop at power supply open phase detection.									
	Ground Fault Detection	Motor coasts to a stop at approx. 50% converter input current.									
	Power Frequency Error	Motor coasts to a stop by fluctuation more than ±3 Hz rated input frequency.									
	Fan Stop	Fan stop detection									
	Power Charge Indication	Indicated until main output voltage is approx. 50 V or less.									
	Momentary Power Loss	Continuous operation during power loss less than 2 sec is available by setting constant.									
Environmental Conditions	Location	Indoor (protected from corrosive gases and dust)									
	Ambient Temperature	+14 to 104° F (-10°C to + 45°C)									
	Humidity	90% RH or less (non-condensing)									
	Vibration	9.8 m/s ² (1G) less than 20 Hz, up to 1.96 m/s ² (0.2G) at 20 to 50 Hz									

MEMO

Varispeed-656DC3

PWM TRANSISTOR CONVERTER

MODEL CIMR-DCA

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